3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Introduction

3.1.1 This chapter provides a description of Torrance Wind Farm Extension II (the Proposed Development). The application seeks consent pursuant to the Town and Country Planning (Scotland) Act 1997[1] (as amended by the Planning etc. Scotland Act 2006) for a wind energy development comprising of the construction, 40 year operation and subsequent decommissioning of four turbines; together with on-site access tracks, wind turbine hardstanding and crane pad areas, a network of underground cables and onsite construction compound and substation. During construction, a temporary construction compound will be required which will house a site office and welfare facilities.

3.1.2 The purpose of the Proposed Development is to generate electricity from the four proposed wind turbines. Based on current candidate turbine specifications, it is expected that each wind turbine would have an output of 6.6 Megawatts (MW), giving a total installed capacity of 26.4 MW.

3.1.3 This chapter of the Environmental Impact Assessment Report (EIA Report) describes the Proposed Development, which with the inclusion of mitigation measures outlined in each of the technical chapters that follow, serves as the basis for the consent application. Section 3.8 details how these mitigation measures would be secured and implemented.

3.2 Proposed Development Layout

3.2.1 The layout of the Proposed Development is shown in Figure 3.1. Table 3.1 specifies the indicative National Grid References (NGR) and maximum tip height for each of the proposed turbines; the turbines will be subject to a micro-siting allowance as detailed within Section 3.3 to ensure their final position on the ground is optimised.

3.2.2 Figure 3.1 also shows the location of the ancillary infrastructure necessary for the Proposed Development. In summary, the associated elements of the wind farm are to be located at the following approximate locations:

- The temporary construction compound at (eastings) 289953 (northings) 664917; and
- The electricity substation and control/maintenance building at (eastings) 289994 and (northings) 664933.

Table 3.1: Wind Turbine Grid References and Maximum Tip Heights

Turbine No.	*NGR*	*Maximum Tip Height (meters (m))*
1	*NS 90837 65528*	*200*
2	*NS 90293 65185*	*200*
3	*NS 89627 65186*	*200*

[1] UK Government (1997) Town and Country Planning (Scotland) Act 1997 [Online] Available at: Town and Country Planning (Scotland) Act 1997 (legislation.gov.uk) (Accessed 28/06/2022)

4	*NS 89217 64680*	*200*

3.3 Micro-siting

3.3.1 Current knowledge of the ground conditions at the Site is based on desktop studies and preliminary site investigations. These would be verified by more detailed pre-construction ground investigations which may result in minor adjustments to turbine and ancillary infrastructure locations due to environmental or technical constraints.

3.3.2 For this reason, a 50 m micro-siting allowance has been included around the proposed turbine and ancillary infrastructure locations.

3.3.3 The micro-siting area allowances are considered and assessed throughout the technical and environmental chapters completed as part of the EIA for the Proposed Development.

3.4 Description of the Wind Farm Elements

Wind Turbines

3.4.1 A diagram of a typical wind turbine with a tip height of 200 m is shown in Figure 3.2. Figure 3.2 shows a typical horizontal axis wind turbine comprising four main components: a rotor (consisting of a hub and three blades), a nacelle (containing the generator and gearbox), to which the rotor is mounted, a tower, and a foundation. As detailed in Chapter 1, the specific turbine is dependent on the final choice of turbine models available at the time of procurement and will be chosen with the aim of optimising renewable energy generation at the Site. However, the chosen turbines will have a maximum blade tip height of no more than 200 m as this is the upper limit for environmental and planning parameters considered in the EIA.

3.4.2 Wind turbines convert the kinetic energy of the wind into electrical energy, the air passing over the blades causing them to rotate. This low-speed rotational motion of the blades is converted into electrical energy using a generator located inside the nacelle.

3.4.3 A transformer then steps up the voltage to 33 kilovolts (kV), which is then fed into the substation on-site via underground electrical cabling linking all of the turbine unit transformers. The turbine transformers are expected to be located within the nacelle or tower of the turbine; however, if required due to the turbine model selected for installation on-site, they may be located immediately adjacent to it in a small kiosk, typically 3 m x 2 m x 3 m, such that they are generally indistinct from the tower base unless viewed close up or in silhouette against the skyline at greater distance.

3.4.4 The electricity generated by the wind farm would be metered in the substation and fed into the electricity network to which it is connected.

3.4.5 The turbine dimensions would vary depending on the turbine selected but for the purposes of the EIA, the Siemens Gamesa SG170 has been used as the reference wind turbine.

3.4.6 Turbines have a proven track record for safety, although a very small number have been known to fail through accidental damage due to lightning or mechanical problems. However, turbine control and monitoring systems operate with several levels of redundancy to protect the turbines from damage.

3.4.7 All turbines are controlled by a sophisticated Supervisory Control and Data Acquisition (SCADA) system, which would gather data from all the turbines in order to control them from a central remote location. Communications cables connecting to each turbine would be buried in the electrical cable trenches to facilitate this.

3.4.8 In the case of any fault, such as over-speed of the blades, overpower production, or loss of grid connection, the turbines shut down automatically through braking mechanisms. They are also fitted with vibration sensors so that, in the unlikely event a blade is damaged, the turbines would automatically shut down.

3.4.9 Turbines, as with any tall structure, can be susceptible to lightning strike and appropriate measures are included in the turbine design to conduct lightning strike down to earth and minimise the risk of damage to it. In the case of a lightning strike on a turbine or blade the turbine would automatically shut down.

3.4.10 In cold weather, ice can build up on blade surfaces when operating. The turbines can continue to operate with a thin accumulation of snow or ice but would shut down automatically when there is a sufficient build up to cause aerodynamic or physical imbalance of the rotor assembly.

3.4.11 During the construction phase, heavy lifting cranes will be used to install the wind turbines. The crane type would be confirmed when the specific turbine type has been selected. However, it is anticipated that two teams would carry out turbine erection, each using two road-going cranes. The construction contractors would determine the actual cranes used, together with the exact programme and number of teams on-site.

3.4.12 The methodology for turbine erection would depend on the crane supplier. Two common methods of blade installation exist: single blade lifts or full rotor assembly on the ground prior to lifting. Turbine manufacturers prefer the latter as it is quicker and does not require re-alignment of turbine components. As described below, lay down areas would accommodate components ready for assembly, and crane hard-standings would provide a firm base for cranes used to erect the turbines. If a full rotor assembly is required to be carried out prior to lifting, then additional temporary supports would be required to be positioned under the hub and blades. Due to the uncertainty of support requirements (it varies by turbine manufacturer) exact details cannot be defined but may include the creation of small additional support areas built off the sides of the crane hardstanding area.

Wind Turbine Foundations

3.4.13 The wind turbines would be installed on foundations of stone and concrete. A diagram of a typical wind turbine foundation is shown in Figure 3.3.

3.4.14 The load bearing strata or bedrock would be levelled off and blinded prior to the in-situ casting of the steel-reinforced concrete slab that would be approximately 30m in diameter. The depth of the excavation would be approximately 5 m, and depending on the depth of the load bearing strata or bedrock, the sides would be battered back to ensure that they remain stable during construction. Each foundation is expected to be made up from approximately 1200 m^3 of concrete.

3.4.15 On top of the slab, a concrete up-stand would then be cast, to which the turbine tower would later be bolted. The excavated area would be backfilled with compacted layers of graded material from the original excavation and capped with topsoil. The exact details of each foundation would vary across the Site in response to the actual ground conditions encountered. A detailed ground investigation would be undertaken prior to construction to establish the requirement at each foundation.

3.4.16 Whilst the foundation excavation is open (typically for 1 to 2 months) it would need to be kept free of water to allow construction of the reinforced concrete base. Water ingress would potentially be from ground (from exposed faces), surface, and rainwater. The foundation excavation would be designed to be gravity draining where local topographical conditions allow. If this is not possible, the excavation would be dewatered by pumping. The discharges from dewatering operations would be subject to a method statement agreed with the on-site ecologist and the Scottish Environment Protection Agency (SEPA). Where necessary, settling ponds, filter treatment facilities, and buffer strips would be installed to remove sediment from pumped water. No water from foundation dewatering operations would be discharged directly into a watercourse.

Crane Hardstandings

3.4.17 Each wind turbine requires an area of hardstanding to be built adjacent to the turbine foundation. A soft, levelled area is also required adjacent to the hardstanding for the assembly of turbine components. This provides a stable base on which to lay down turbine components for assembly, erection, and to lift the tower sections, nacelle, and rotor into place.

3.4.18 Topsoil would be removed from the area of the crane pad and either laid at the margin but within the disturbed area or preferably, transferred directly to the areas to be restored. The area would then be covered by geo-grid overlain with compacted stone to approximately 450 millimetre (mm) depth, dependent on ground conditions and load capacity.

3.4.19 The crane hardstanding would be left in place following construction in order to allow for the use of similar plant should major components need replacing during the operation of the wind farm. These could also be utilised during decommissioning at the end of the Proposed Development's design life.

3.4.20 The total area of hardstanding at each turbine location, including the turbine foundations, would be approximately 6000 m^2. Based on a fill depth of 450 mm, an approximate total of 2700 m^3 of stone would be required per hardstanding. A typical crane hardstanding is shown in Figure 3.4.

On-Site Access Tracks

3.4.21 A total of approximately 2.9 km of on-site access tracks would be required for the Proposed Development. It is anticipated that the entirety of the 2.9 km of access track, including turning heads, would be new.

3.4.22 The proposed alignment of access tracks, developed through an iterative process based on the digital terrain model and site surveys, has sought to:

- Minimise the overall track length;
- Minimise the variation of the vertical alignment of the tracks;
- Minimise the number of dead ends within the layout; and

- Avoid or minimise incursion into identified constraints, such as watercourses, areas of deeper and potentially unstable peat, priority habitats, and steep slopes.

3.4.23 The location of the on-site access tracks is shown in Figure 3.1.

3.4.24 Owing to the size of some of the turbine components, all on-site access tracks would be a minimum of 5 m wide with some additional localised bend widening to a maximum of approximately 30 m. Temporary passing places (approx. 3 m x 20 m) would also be provided as required along with turning heads (approx. 54 m length, 25 m radius) to facilitate traffic movements. The new and upgraded tracks will be unpaved and formed of crushed rock sourced onsite, where possible.

Track Drainage

3.4.25 The need for drainage on the access track network would be considered for all parts of the track network separately since slope and wetness vary considerably across the Site. In flat areas, drainage of floating tracks is not required, as it can be assumed that rainfall on to the road would infiltrate to the ground beneath the tracks or along the verges. Track-side drainage would be avoided, where possible, in order to prevent any local reductions in the water table or influences on the tracks structure and compression (the latter can occur where a lower water table reduces the ability of peat to bear weight, increasing compression).

3.4.26 Where tracks are to be placed on slopes, lateral drainage would be installed on the upslope side of the track. The length of drains would be minimised, to prevent either pooling on the upslope side or, at the other extreme, creating long flow paths along which rapid and concentrated runoff could occur. Regular cross-drains would be required to allow flow to pass across the track with a preference for subsequent re-infiltration on the downslope side, rather than direct discharge to the drainage network.

Drainage Ditches along Excavated Tracks

3.4.27 Excavated tracks cut off the natural drainage across it; therefore, drainage ditches would be required. It is anticipated that at times the water in the ditches may contain high concentrations of sediment from excavations and track construction, as well as possible accidental pollutants from construction activities; therefore, no water from a drainage ditch would be discharged directly to a watercourse. Instead, it would pass through a sand filter, filter strip, silt trap or other best practice pollution control feature. Drains would not be ended directly into natural channels, ephemeral streams, or old ditches.

3.4.28 The ditch design would be considered in line with the recommendations of the Forestry Civil Engineering (FCE) and NatureScot guidance[2], including the use of flat-bottomed ditches to reduce the depth of disturbance.

[2] NatureScot (2019). Guidance – Good Practice During Wind Farm Construction. [Online] Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction (Accessed 16/02/2023)

3.4.29 In instances of drainage close to surface watercourses, discharge from the drainage may be to surface water rather than re-infiltration. In these situations, best practice control measures including sediment settlement would be undertaken before the water is discharged into surface water systems. The discharges would be small and collected from only a limited area, rather than draining a large area to the same location.

3.4.30 Although drainage would be provided in areas of disturbance as required, areas of hardstanding would be minimised so that this need is reduced. This includes careful design of construction compounds and minimising the size of crane pads at each turbine location.

Cross Drainage

3.4.31 Where tracks are to be placed on slopes, lateral drainage would be required on the upslope side of the road. The length of drains would be minimised to prevent either pooling on the upslope side or at the other extreme, creating long flow paths along which rapid runoff could occur. Regular cross-drains would be required to allow flow to pass across the road (as recommended in SEPA's guidance)[3] with a preference for subsequent re-infiltration on the downslope side rather than direct discharge to the drainage network.

3.4.32 Cross-drainage may be achieved using culverts or pipes beneath the track, in line with the FCE and NatureScot guidance. Drainage would be installed before or during track construction, rather than afterwards, to ensure that the track design is not compromised. The cross drainage would flow out into shallow drainage, which would allow diffuse re-infiltration to the downslope side. The cross drains would flow out at ground level and not be hanging culverts. The avoidance of steep gradients for the tracks would also reduce the risk of erosion occurring at cross-drain outflows.

Check Dams

3.4.33 Check dams (small dams built across channels or ditches) may be required at regular intervals in the drainage ditches alongside an excavated track. They are required for two principal reasons: firstly, they act as a silt/pollution trap slowing the flow of water and allowing sediment to settle out, and secondly, they help to direct water into the cross drains and allow natural drainage paths to be maintained as much as possible. The spacing of the check dams would depend on the following factors:

- Gradient of the track;
- Spacing of cross-drains; and
- Depth of excavation.

Interface between Different Types of Road Drainage

3.4.34 Where the track construction method changes, the drainage methods would also change. If this results in an end point for a drainage ditch, the ditch would be piped across the road and allowed to discharge to land on the downside of the slope taking into account the precautions against pollution and erosion.

[3] Forestry Commission Scotland, (2010). Floating Roads on Peat [Online] Available at: http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf (Accessed 16/02/2023)

3.4.35 As set out above, the alignment of the on-site tracks has already been subject to initial review and rerouting to respond to readily identifiable constraints. The final decision on alignment and on the appropriate type of access track design to adopt for a particular length of track would be made by a team of engineers, geologists, and the Environmental Clerk of Works (ECoW), in advance of construction and giving enough time to produce method statements and define working areas for discussion with SEPA prior to construction.

3.4.36 Construction during wetter periods of the year poses a significantly greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snowmelt events. Whilst there is no proposal to restrict construction during such periods, the awareness of the increased potential for effects to arise following precipitation would be captured within the Construction Method Statement (CMS).

Watercourse and Service Crossings

3.4.37 Whilst every attempt has been made to avoid watercourse crossings, it has been necessary for the on-site access tracks to cross local watercourses to reach the proposed wind turbine locations. 4 watercourse crossings have been included in the project design; they are shown on Figure 3.9.

3.4.38 Two types of watercourse crossing are proposed for the Proposed Development: box culverts and pipe culverts. However, the use of each of these types of structure would be determined individually to minimise potential effects based on a site-specific assessment, which would account for topographic, hydrological, and ecological attributes at each proposed crossing point. All watercourse crossings would be designed in accordance with the SEPA Good Practice Guide for the Construction of River Crossings[4], and where culverts are required, they would be designed in accordance with the CIRIA Culvert, Screen and Outfall Manual[5]. All river crossings would be designed to convey a 1 in 200-year return period flood event as well as being individually sized and designed to suit the specific requirements and constraints of its location. The following paragraphs discuss the currently identified water crossings and the anticipated crossing type. As noted above, it is probable that additional crossings would be identified on-site during construction, or the proposed crossings may change. All crossing points and methodologies would be agreed prior to construction.

Culverts

3.4.39 Culverts could be used in locations where there are small but distinct channels with no clear topographic variability. The small size and channel capacity limit the hydrological and ecological benefits that a bridge would bring, while the lack of topographic variation would make bridge design unfeasible.

3.4.40 Where culverts are to be used, their design shall meet minimum requirements as set out in CIRIA Culvert, Screen and Outfall Manual (C786F)[6].

[4] SEPA (2010). Engineering in the Water Environment: Good Practice Guide. River Crossings. [Online] Available at: River crossings - good practice guide (sepa.org.uk) (Accessed 30/06/2022)

[5] CIRIA (2019). Culvert, screen and outfall manual (C786F). [Online]. Available at: Item Detail (ciria.org) (Accessed 30/06/2022)

[6] CIRIA (2019). Culvert, Screen and Outfall Manual (C786F). [Online] Available at: Item Detail (ciria.org) Accessed: 15/06/2022

3.4.41 The size of the culvert would be determined by the design flow of the watercourse and its gradient at the point of crossing. Small circular culverts would be used where a small watercourse needs to be crossed or where the river crossing is deemed to have low environmental sensitivity. Where there is a wider channel, a 'bottomless arched culvert' or precast 'box' culvert would be used and typical plans and sections for these are shown in Figure 3.5.

3.4.42 The construction techniques would be site specific, either where the watercourse would be temporarily diverted whilst the culvert is constructed or where the watercourse would be diverted to a new alignment through the structure. When installing culverts in streams, they would be laid at the natural bed level and the same gradient, so as not to cause a barrier to fish movement. The riverbed would be reinstated through the length of the culvert to keep the watercourse flowing as naturally as possible. A mammal tunnel, if judged necessary by ecologists following further pre-construction surveys, would be provided so that no restriction is created to established animal movement routes.

Temporary Construction Compound

3.4.43 One main temporary construction compound would be created for the Proposed Development. The compound would be approx. 16 m x 51.8 m and its location is shown in Figure 3.1 while the typical construction compound layout is shown in Figure 3.6.

3.4.44 Surface vegetation and mineral substrate would be removed from the area of the construction compound and temporarily stored within the disturbed area at its margins. The area would then be overlain by geogrid materials and covered with compacted stone to approximately 300 mm depth depending on ground conditions.

3.4.45 Temporary cabins, to be used for site offices and welfare facilities (including toilets and drying rooms) with provision for sealed waste and storage are proposed. Welfare facilities would be installed as required by the Construction (Design and Management) Regulations 2015[7]. If possible, the site welfare facilities would utilise services already in existence- for instance, low voltage power, potable water and sewerage. If connection to local power is not possible, a diesel generator (bunded to 110 % diesel capacity) would be used to service the site facilities.

Electricity Substation Compound

3.4.46 The electricity substation compound would comprise a fenced hardstanding with maximum dimensions of approximately 16 m x 35 m. Figure 3.7 shows the substation compound. The proposed location of the substation compound is shown in Figure 3.1.

3.4.47 The area for the substation compound would be prepared by removing the topsoil and subsoil down to competent bearing strata, and concrete foundations would be required to take the weight of the components. An electrical earth network would be buried around the building.

3.4.48 The underground cables from the wind turbines would be brought into the substation compound in ducts. The ducts would guide the cables to the appropriate switchgear inside the building. Communications cables would enter in a similar manner.

Electrical Connections On-Site

3.4.49 Turbines will be connected by 33 kV single phase power cables which will be laid in trenches alongside the access tracks, typically of a depth of 1 m. The excavated trenches will also include Supervisory Control and Data Acquisition (SCADA) cables or fibre optic cables. This will allow interrogation and control of individual turbines as well as remote monitoring. A copper cable will also be located in the trench and will be connected to the substation and each turbine to provide an earthing system to provide protection from lightning strikes and electrical faults. The cables will be laid on a sand bed, then surrounded by further sand and backfilled using suitably graded material. Clay, or equivalent low permeability barriers, will be inserted into the cable trenches at regular intervals to avoid the trenches becoming preferential drainage pathways. Details of typical trenches are shown in Figure 3.8.

Site Access

3.4.50 Currently, the 'Main Site Entrance' is planned to be formed off the B718 Westcraigs Road to the north of Harthill (Grid Ref: NS906651). This entrance will consist of a crossroad junction onto the B718. The west arm of the crossroad will provide access to the main construction compound and three of the four turbines, with the eastern arm providing access to a further one turbine. ALVs will traverse across the crossroad junction under escort.

3.4.51 The existing staggered crossroad junction will be partially realigned with the existing western arm moved south to a position directly across from the existing eastern arm.

3.4.52 The currently planned 'Abnormal Load Site Entrance' will be formed within the existing Harthill service station off the M8 (Grid Ref: NS898647). This entrance will be used only for the delivery of wind turbine components, which will be loaded on HGVs and by the accompanying escort vehicles. This entrance will only be used under escort with deliveries likely to take place at night. Due to the services being used by lorry traffic off the M8, the access off the M8 is suitable for Heavy Goods Vehicles (HGVs) accessing the Site during the Development's construction phase. It therefore requires no widening or enhancement works to make the access suitable for the Development. Access will be taken off the haul road leading to the services into the Site, and a new junction and access tracks will need to be constructed from that road to provide access to the wider Site. The services are owned by Transport Scotland, and leased by BP, and an agreement has been made between BP and GreenGridPower3 Ltd (the Applicant) to use the services for access to the Site.

3.4.53 It should be noted that the Applicant is currently in dialogue with the operators of the Harthill service station to explore whether the 'Abnormal Load Site Entrance' can also be utilised by general construction traffic (HGVs) during the peak months of the construction phase; this is not a confirmed option at the time of writing but is considered as part of the application should an agreement between the service station and Applicant be reached.

3.4.54 Following construction, the access from the services will remain in place and will be utilised by operational traffic.

[7] Health and Safety Executive (2015) The Construction (Design and Management) Regulations 2015 [Online] Available at: Construction - Construction Design and Management Regulations 2015 (hse.gov.uk) Accessed: 15/06/2022

3.5 Construction of the Proposed Development

Timetable of Events and Indicative Programme

3.5.1 The construction period for the Proposed Development would be approximately 12 months in duration and would comprise the following activities:

- Construction of access junction(s);
- Formation of site compound(s) including hardstanding and temporary site office facilities;
- Construction of new access tracks and passing places (as required), inter-linking the turbine locations and substation compound;
- Construction and upgrade of culverts under roads to facilitate drainage and maintain existing hydrology;
- Construction of crane hardstanding areas;
- Construction of turbine foundations;
- Construction of control building and associated substation;
- Excavation of trenches and cable laying adjacent to site roads;
- Connection of on-site distribution and signal cables;
- Remedial works to the public highway to accommodate turbine deliveries;
- Delivery and erection of wind turbines;
- Commissioning of site equipment; and
- Site restoration.

3.5.2 Where possible, construction activities would be carried out concurrently (thus minimising the overall length of the construction programme), although they would occur predominantly in the order listed. In addition, development would be phased such that, at different parts of the Site, the civil engineering works would be continuing whilst wind turbines are being erected. Site restoration would be programmed and carried out concurrently with the construction to allow restoration of disturbed areas as early as possible and in a progressive manner.

3.5.3 The starting date for construction activities will largely be dependent upon the date that consent might be granted and grid availability; subsequently, the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the consent decision. An indicative construction development programme is shown in Technical Appendix 9.3.

3.5.4 The final length of the programme would be dependent on seasonal working and weather conditions. Summer months are favoured for construction due to longer periods of sunlight allowing longer working days. Summer months are generally also drier which aids the construction progress and reduces the impact of site debris reaching the public highway (e.g., mud, etc.), though wheel wash facilities would be installed at the main site entrance / exit points. Wet weather has the potential to complicate construction activities in peat, although these complications can be minimised through the use of mitigation techniques.

3.5.5 The following sections describe the outline construction methodologies proposed and serve as a basis for completion of the technical assessments.

3.5.6 The Proposed Development would be constructed in accordance with documented ISO 14001 (2015) Environmental Management Procedures[8] which ensure compliance with applicable environmental legislation and best practice. Effective communication underpins the whole system of environmental management, ensuring appropriate information passes between the Applicant and the consultants / contractors engaged. This ensures that environmental considerations are fully integrated into the management of the wind farm throughout construction, the operation, and maintenance of the completed project and ultimately to decommissioning.

3.5.7 Prior to construction, a detailed Construction Environmental Management Plan (CEMP) would be prepared that collates all measures required during construction to avoid and minimise environmental harm including guidance and best practice. The CEMP would include, but not be limited to:

- Site induction and training;
- Working hours;
- Enabling works;
- Surface water and drainage management;
- Waste management;
- Wastewater and water supply monitoring and control;
- Oil and chemical delivery and storage;
- Water quality monitoring;
- Ecological protection measures;
- Construction noise management;
- Cultural heritage protection measures;
- Handling of excavated materials;
- Reinstatement and restoration;
- Traffic management; and
- Environment incident response and reporting.

3.5.8 To ensure that the mitigation and management measures detailed within this EIA Report are carried out, construction personnel and contractors will be required to adhere to the CEMP which will form an overarching document for all construction site management requirements.

3.5.9 Contractors will also be required to adhere to the following to minimise environmental effects of the construction process:

- Conditions required under the consent;
- Requirements of statutory consultees including SEPA and NatureScot;
- Any other relevant mitigation measures identified in this EIA Report; and
- All relevant statutory requirements and published guidelines that reflect 'good practice'.

[8] ISO 2015. ISO 14001 (2015) Environmental Management Procedures [Online] Available at: ISO 14001 2015 GUIDANCE DOCUMENT_tcm37-56526.pdf (dnv.com) (Accessed 15/05/2022)

Construction Working Practices

3.5.10 Weather, in particular wind, has a strong influence on the timing of construction activities. Crane activities are generally limited during strong winds (>9 m/s) and turbine erection during these weather conditions would be avoided for safety reasons; the actual conditions would be reviewed as part of the crane lifting plan. During periods of cold weather (<4 °C), concrete pouring of the turbine bases must consider cold weather effects, potentially prohibiting concrete pours.

General Construction Methodology

3.5.11 Contractors' working areas would be made available, and the location would be clearly delineated on-site to ensure that no unnecessary disturbance is caused to any sensitive areas.

3.5.12 Particular attention would be given to the storage and use of fuels for the plant on-site. Oil would be stored in accordance with the Water Environment (oil storage) (Scotland) Regulation 2006[9]. Drainage within the temporary site compound, where construction vehicles would park and where any diesel fuel would be stored, would be directed to an oil interceptor to prevent pollution if any spillage occurred. Storage of diesel fuel would be within a bunded area or self-bunded tank in accordance with the SEPA Pollution Prevention Guidelines (PPG)[10]. PPGs are considered to constitute 'best practice' within the industry. The PPGs relevant to the Proposed Development are shown in Table 3.2.

Table 3.2: Applicable PPG Guidelines

PPG Number		
PPG1	General guide to the prevention of pollution	All activities
PPG2	Above ground oil storage tanks	Plant related activities
PPG3	The use and design of oil interceptors	Plant related activities
PPG4	Treatment and disposal of sewage	On-site facilities
PPG5	Works and maintenance in or near water	Works adjacent to on-site watercourses
PPG6	Working at construction and demolition sites	All activities
PPG7	Refuelling facilities	Plant related activities
PPG8	Safe storage and disposal of used oils	Plant related activities
PPG13	Vehicle washing and cleaning	Plant related activities
PPG18	Managing fire water and major spillages	All activities
PPG21	Pollution incident response planning	All activities
PPG22	Incident response – dealing with spills	All activities
PPG26	Storage & handling of drums & intermediate bulk containers	Plant related activities

[9] UK Government (2006). The Water Environment (Oil Storage) (Scotland) Regulations 2006. [Online] Available at: The Water Environment (Oil Storage) (Scotland) Regulations 2006 (legislation.gov.uk) (Accessed 30/06/2022)
[10] SEPA (2022) Pollution Control – Guidance [Online] Available at: Pollution control - guidance | Scottish Environment Protection Agency (SEPA) (Accessed 28/06/2022)

3.5.13 Standard construction working practices would be implemented during construction and any maintenance works, in order to ensure adherence to relevant guidance and other current best practice, including but not limited to the following:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)[11];
- The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2021 (CAR)[12];
- Water Environment (Oil Storage) (Scotland) Regulations 2006[13]; and
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) - A Practical Guide (2022[14]).

3.5.14 SEPA Engineering in the Water Environment Good Practice Guides[15]:

- Bank Protection;
- Rivers and Lochs;
- River Crossings;
- Riparian Vegetation Management;
- Temporary Construction Methods;
- Good Practice During Windfarm Construction (Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, Historic Environment Scotland, 2015);
- Forests and Water: UK Forestry Standard Guidelines (Forestry Commission, 2011); and
- Constructed Tracks in the Scottish Uplands (SNH, 2015).

Construction Works and Delivery Times

3.5.15 For the purposes of this EIA Report, construction activities have been assumed to take place between 07:00 to 19:00 hours on weekdays and 07:00 to 13:00 on Saturdays. Quiet on-site working activities such as electrical commissioning are assumed to extend outside the core working times, noted above, where required. No work at the site would be undertaken on Sundays.

3.5.16 Work outside these hours is not usual, though if it were required to meet specific demands (e.g., during foundation pours or to undertake work which is highly weather dependent such as low wind speeds needed for turbine tower erection), permission for short term extensions to these hours would be sought from the planning authority, as required.

[11] UK Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 [Online] Available at: The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (legislation.gov.uk) (Accessed: 28/06/2022)

[12] UK Government (2021) The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2021 [Online] Available at: The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2021 (legislation.gov.uk) (Accessed: 28/06/2022)

[13] UK Government (2006) The Water Environment (Oil Storage) (Scotland) Regulations 2006 [Online] Available at: The Water Environment (Oil Storage) (Scotland) Regulations 2006 (legislation.gov.uk) (Accessed: 28/06/2022)

[14] SEPA (2022) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (As amended) A Practical Guide, Version 9.1, March 2022 [Online] Available at: car_a_practical_guide.pdf (sepa.org.uk) (Accessed: 15/06/2022)

[15] SEPA (2022) Pollution Control – Guidance [Online] Available at: Pollution control - guidance | Scottish Environment Protection Agency (SEPA) (Accessed: 28/06/2022)

Air Quality and Dust

3.5.17 In the absence of appropriate mitigation there is the potential for an increase in dust during construction. However, dust control measures form a well-established and effective measure of control during the construction of wind farms. Given the adoption of the mitigation measures that are outlined below, it is not expected that the change in air quality in relation to dust would be significant. The main measures for managing dust that would be used where necessary are:

- Adequate dust suppression facilities would be used on-site. This could include the provision of on-site water bowsers with sufficient capacity and range to dampen down all areas that may lead to dust escape.
- Any storage on-site of aggregate or fine materials would be properly enclosed and screened so that dust escape from the Site is avoided. Adequate sheeting would also be provided for the finer materials that are prone to 'wind whipping'.
- HGVs entering and exiting the Site should be fitted with adequate sheeting to totally cover any load carried that has the potential to be 'wind whipped' from the vehicle.
- Vehicles used on-site should be regularly maintained to minimise vehicle emissions and the risk of leaking of diesel or hydraulic fluids.
- Good housekeeping or 'clean up' arrangements would be employed so that the Site is kept as clean as possible. There would be regular inspections of the working areas and immediate surrounding areas to ensure that any dust accumulation, litter, or spillages are removed/ cleaned up as soon as possible.
- Wheel wash facilities for vehicles entering and exiting the site would ensure that excavated materials do not leave the Site. Such facilities would automatically clean the lower parts of HGVs by removing mud, clay, etc. from the wheels and chassis in one drive-through operation. A water supply would be provided at the main site entrance/exit points should wheel-washing be necessary for vehicles exiting the Site.
- A site liaison person would investigate and take appropriate action where complaints or queries about construction issues arise.

Construction Wastes

3.5.18 Any peat and mineral substrate generated by excavation of foundations is expected to be reused on-site. Peat would be reused in restoration of disturbed areas, and other material would be used to backfill excavations where needed. It is not expected that any material (other than peat) would be unsuitable for re-use in these ways, though in the unlikely event that small amounts of such material arise they would be disposed off-site in line with relevant waste disposal regulations

3.5.19 Construction waste is expected to be restricted to normal materials such as offcuts of timber, wire, fibreglass, cleaning cloths, paper, and similar materials. These would be sorted and recycled, if possible, or disposed of to an appropriately licensed landfill by the relevant contractor.

Fuel Storage and Refuelling Activities

3.5.20 Fuel storage and refuelling activities have been identified as having potential effects that can be controlled by the implementation of pollution prevention and control measures and best practice by the site operator.

3.5.21 Fuel and oil may enter the groundwater by migration vertically into the underlying groundwater or runoff into nearby surface waters, if accidently released or spilled during storage and refuelling. In order to minimise potential releases into the water environment, fuel would be stored in either a bunded area or self-bunded Above Ground Storage Tank (AGST) on-site during the course of the construction phase in accordance with PPG2 and other SEPA Pollution prevention guidelines.

3.5.22 Surface water drainage would be directed to a hydrocarbon interceptor prior to discharge, in areas where there is a potential for hydrocarbon residues from runoff / isolated leakages such as in plant storage areas and the location of the fuel storage tanks and refuelling activities in the proposed temporary site compound. The interceptor would filter out hydrocarbon residues from drainage water and retain hydrocarbon product in the event of a spillage to prevent release into surface waters at the discharge point and deterioration of downstream water quality.

Peat Management during Construction

3.5.23 The Site is situated in an area where there are minimal peat deposits. The wind farm layout, design, and construction methodology has been refined to minimise any peat excavation from tracks and turbine infrastructure.

3.5.24 Peat would be excavated during the construction of tracks, and elsewhere, best practice construction measures will be used to avoid and protect the remaining peat onsite.

3.6 Operation of the Proposed Development

General Servicing

3.6.1 Turbine maintenance will be carried out in accordance with the manufacturer's specification. The following routine turbine maintenance will be undertaken:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oil changes;
- Blade, gearbox and generator inspections; and
- Replacement of blades and components as required.

3.6.2 Each turbine manufacturer has specific maintenance requirements, but typically, routine maintenance or servicing of turbines is carried out twice a year, with a main service at twelve monthly intervals and a minor service at 6 months. In the first year, there is also an initial three-month service after commissioning. The turbine being serviced is switched off for the duration of its service.

3.6.3 Teams of two people with a 4x4 vehicle would carry out the servicing. It takes two people (on average) one day to service each turbine.

3.6.4 At regular periods through the project life, oils and components would require changing, which would increase the service time on-site per machine. Gearbox oil changes are required approximately every 18 months.

3.6.5 Blade inspection and repair work is especially weather-dependent. Light winds and warm, dry conditions are required for blade repairs. Hence summer (June, July, and August) is the most appropriate period for this work.

Track Maintenance

3.6.6 The frequency of track maintenance depends largely on the volume and nature of the traffic using the track, with weathering of the track surface also having a significant effect. Since the volume of traffic using the access tracks during operation would be low (although heavy plant is particularly wearing), the need for track maintenance is anticipated to be low and infrequent. Any maintenance that is required would generally be undertaken in the summer months when the tracks are dry. However, maintenance can be carried out when required.

3.6.7 Safe access to the Development is required year-round. There is potential for the Development to experience snowfall and therefore clearance of snowdrifts may be necessary via grading of the track using suitable ploughing plant.

Operational Waste

3.6.8 Operational waste would generally be restricted to small volumes of waste associated with machinery repair and maintenance disposed of by the maintenance contractors in line with normal waste disposal practices.

Land Management

3.6.9 It is anticipated that long term land management practices would continue unaffected by the Proposed Development with normal forestry practices continuing unimpeded. On-site access tracks could be utilised by transport vehicles, and re-planting can commence soon after turbine construction.

3.7 Decommissioning of the Proposed Development

3.7.1 The Proposed Development has been designed with an operational life of 40 years. At the end of the operational period, it would be decommissioned, and the turbines dismantled and removed. Any alternative to this action would require consent from the Council and is not considered in this EIA Report.

3.7.2 During decommissioning, the bases would be broken out to below ground level. All cables would be cut off below ground level, de-energised, and left in the ground. Access tracks would be left for use by the landowner. No stone would be removed from the Site. The decommissioning works are estimated to take six months. This approach is considered to be less environmentally damaging than seeking to remove foundations, cables, and roads entirely.

3.8 Mitigation and Enhancement Measures Summary

3.8.1 The preceding parts of this chapter capture the inherent Proposed Development design that is the subject of this EIA. In completing the EIA, the subsequent technical chapters have identified a number of environmental measures that provide mitigation for predicted effects or are proposed by the Applicant as enhancement measures. As both enhancement measures and mitigation form an integral part of the Proposed Development, they are summarised in Table 3.3 for completeness.

Table 3.3: Summary of Mitigation and Enhancement Measures

Chapter/Topic	Proposed Mitigation/Enhancement measure
Landscape and Visual Impact	There is limited opportunity for landscape design related mitigation alongside the four turbines of the Proposed Development, however, the following considerations have been made to improve core path connectivity, by linking Core Path NL/213/1 from Blackridge to pathways within the Site to provide an off road route from Blackridge in the north to the south of the site and over the bridge to Harthill, and west to Blairmuckill Road and core path NL/212/1.
Noise	Good practice measures will be implemented during construction to manage the effects of noise and vibration during construction operations. These are detailed in Paragraph 7.7.7 in Chapter 7. No mitigation is required for operational noise.
Forestry	Through design, felling requirements have been minimized through using the keyhole design and utilizing open ground within the woodland for access tracks. Compensatory planting will be provided for 6.65 ha on woodland.
Traffic and Transport	A Construction Traffic Management Plan (CTMP) will be produced prior to the commencement of the construction of the Proposed Development. This will be secured through a condition of consent, and will mitigate the identified potentially significant effects on traffic generation and pedestrian amenity.
Ecology	Important Ecological Features and other ecological features have been avoided where possible during the design of the Proposed Development, and sensitive designs of watercourse crossings etc. have been development to safeguard the water environment. Good practice guidance will be adopted to minimize the risk of bats colliding with operational turbines, through a 50 m separation distance being implemented between blade tips and high value bat habitats. A suitably qualified and experienced Ecological Clerk of Works (ECoW) will be appointed to provide ecological and environmental advice during construction. Before construction begins, the ECoW and the project hydrologist will undertake a review of design and drainage plans to minimize potential effects on habitats and assist in the identification of appropriate locations for habitat restoration works. Pre-construction surveys for protected species will be undertaken to provide up-to-date information about the distribution and abundance of protected species. The results

Chapter/Topic	Proposed Mitigation/Enhancement measure
	will inform the scope of Species Protection Plans, and associated mitigation and licensing requirements. Habitat restoration and enhancement is proposed for woodland and wetland environments within the Site, if suitable areas can be identified and managed effectively.
Ornithology	Standard good practice measures will be implemented during construction to ensure compliance with relevant legislation protecting all breeding wild birds. A Bird Protection Plan (BPP) will be produced prior to construction to safeguard birds and ensure legislative compliance during all stages of the Proposed Development. No further mitigation measures are proposed as no significant effects are predicted on Important Ornithological Features (IOFs). Habitat restoration and enhancement is proposed for woodland and wetland environments within the Site, if suitable areas can be identified and managed effectively.
Cultural Heritage	For known archaeological remains, mitigation is as follows: Turbine 1: Erection of fencing around Netherton Old Hall (Canmore ID 124452) to prevent accidental damage during tree felling or turbine construction; and A walkover survey within the footprint of the proposed tree felling, turbine foundation, hard standing pad, to be undertaken prior to the commencement of any felling or construction. A pre-construction survey of any assets within micro-siting distance (50m) should be carried out with further consultation with the archaeological advisor to the LPA required around the exact scope of these surveys Should the survey identify such assets, consultation with archaeological advisor to the LPA should be undertaken to determine an appropriate and proportionate mitigation strategy. Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 1, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 1 or a watching brief during construction. Given the limited potential of Turbine 1 and its position within an area of modern commercial forestry, it is considered likely that a watching brief on infrastructure elements located outwith this forestry would constitute sufficient mitigation against direct effects. Infrastructure outside of the commercial forestry includes the southern section of hardstanding and the access track. Turbine 2: A walkover and photographic survey within the footprint of the proposed tree felling, turbine foundation, hard standing pad, to be undertaken prior to the commencement of any felling or construction. A pre-construction survey of any

Chapter/Topic	Proposed Mitigation/Enhancement measure
	assets within micro-siting distance (50m) should be carried out with further consultation with the archaeological advisor to the LPA required around the exact scope of these surveys Should the survey identify such assets, consultation with archaeological advisor to the LPA should be undertaken to determine an appropriate and proportionate mitigation strategy. Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 2, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 2 or a watching brief during construction. Given the limited potential of Turbine 2 and its position wholly within an area of modern commercial forestry, it is considered likely that archaeological watching brief would be sufficient to mitigate direct effects of construction, with initial monitoring designed to determine the extent of disturbance caused by forestry plantation and the need for any ongoing archaeological monitoring. Turbine 3: Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 3, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 3 or a watching brief during construction. Given that groundworks associated with Turbine 3 are located within open agricultural fields, it is likely that a limited programme of archaeological evaluation trenching will be requested ahead of construction, to assess the survival of subsurface remains associated with the 19th century railway identified in the DBA. The potential for other previously unknown archaeological remains will also be assessed. Turbine 4: Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 4, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 4 or a watching brief during construction. Given that groundworks associated with Turbine 4 are located within open agricultural fields, it is likely that a limited programme of archaeological evaluation trenching will be requested ahead of construction, to assess the survival of subsurface remains associated with the 19th century railway identified in the DBA. The potential for other

Chapter/Topic	Proposed Mitigation/Enhancement measure
	previously unknown archaeological remains will also be assessed. For unknown, buried archaeological remains, mitigation is as follows: Turbine 3: Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 3, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 3 or a watching brief during construction. Given that groundworks associated with Turbine 3 are located within open agricultural fields, it is likely that a limited programme of archaeological evaluation trenching will be requested ahead of construction, to assess the potential for previously unknown archaeological remains. Turbine 4: Consultation with the archaeological advisor to the LPA over the requirement for and scope of any additional archaeological works on groundworks associated with Turbine 4, namely construction of the turbine foundations, hardstanding, access tracks and cable trenches. Additional archaeological works may take the form of pre-construction trial trenching, to further determine the archaeological potential of Turbine 4 or a watching brief during construction. Given that groundworks associated with Turbine 4 are located within open agricultural fields, it is likely that a limited programme of archaeological evaluation trenching will be requested ahead of construction, to assess the potential for previously unknown archaeological remains.
Geology and Peat	If any peat is encountered across the Site, good practice measures will be implemented as set out in the Outline Water Construction Environmental Management Plan (oWCEMP; Appendix A14.1). All existing drainage network channels would be maintained, and where necessary, channeled below the access track construction drainage ditches on the upslope of the track. Targeted site investigations will be undertaken pre-construction at the location of proposed site infrastructure and at turbine locations following forest clearance, to determine more details on soils, geology, and potential contamination. Should site investigations identify the presence of unrecorded coal mining, contamination or ground instability, a programme of ground treatment works would be undertaken prior to construction, or turbine locations adjusted to avoid those areas (within the 100 m micrositing allowance). Should micrositing not achieve relocation to a lower risk area, further mitigation would be required, informed by the ground investigations scheme.

Chapter/Topic	Proposed Mitigation/Enhancement measure
Hydrology and Hydrogeology	Embedded mitigation measures and construction good practice measures are included in the WCEMP in Appendix A14.1. With the embedded mitigation measures, no potentially significant effects have been identified, and therefore no further mitigation has been suggested.
Socio-economics	Where temporary closures, access restrictions or diversions are required on informal recreational routes for health and safety purposes during construction, notices will be placed in prominent locations around the Site detailing these changes. New recreational paths are proposed within the Site, one of which will link the wind farm site to the existing Core Path NL/2013/1, located approximately 0.7 km to the north and provide recreational opportunities for local residents and tourists.
Climate Change	No mitigation required beyond that embedded in the design of the Proposed Development, including siting turbines and hardstandings away from watercourses and peat soils, and replanting any removed trees on a like-for-like area basis.
Shadow Flicker	Shadow flicker will be controlled at the source using a shutdown system that will stop the turbines when shadow flicker impacts are predicted to exceed the assessment levels of 30 hours per year or 30 minutes per day. This will be controlled through an appropriately worded planning condition.
Telecommunications	Consultation with MBNL and Vodafone has flagged that the Proposed Development will have significant impacts on their services. Discussions are ongoing with MBNL and Vodafone who are both being consulted to find suitable mitigation options. Construction of the Proposed Development will not begin until agreements / appropriate mitigation has been put in place to ensure the Proposed Development will not interfere with telecommunications signals. Following the implementation of agreed mitigation, there will be no significant effects on Telecommunication. No adverse effects on television reception and utilities are anticipated and therefore no specific mitigation measures are proposed.
Aviation	There are several aspects from an aviation perspective that may require mitigation. These are detailed below: **Airports and Airport Radar** Radar Blanking Radar blanking is a solution for unwanted radar returns. A zone is defined around the source of reflections, in this case the wind farm, within which radar returns are suppressed. The advantage of this solution is that the false returns are removed from the radar display. Radar In-Fill Radar in-fill is a solution whereby: • Radar blanking is applied for the impacted radar; • Coverage from a second radar that has coverage over the wind farm site is imported to the affected

Chapter/Topic	Proposed Mitigation/Enhancement measure
	radar's display system – resulting in seamless coverage. It is necessary that the second radar has coverage to suitably low altitude but is not itself affected by the wind farm. This solution can in principle utilise an existing radar installation that meets the necessary requirements, or a custom-built radar installation. For in-fill radar coverage to be an effective solution, it is necessary to consider the existing system capabilities, such as ensuring that the radar display system can incorporate data from multiple feeds. Replacement Wind Farm Tolerant Radar Some specialised radar have increased capability to tolerate (reject) interreference from wind turbines. A radar which is less tolerant to wind farms can therefore be replaced with a specialised radar that is more tolerant to wind farms to eliminate any interference. Changes to existing radar can also be implemented to increase their capability to tolerate (reject) interference. Upgrades can be physical, e.g. a larger radar antenna, or software based, e.g. processor upgrade or programming known reflector locations. **MoD and Aviation lighting** There is a statutory requirement to fit structures having a height of 150 metres or more with medium intensity (2000 Candela) aviation warning lights. It is also likely that the MOD will request the turbines be fitted with MOD accredited aviation lighting.
Health and Safety	Health and safety issues will be properly considered during development to reduce the risk of harm. In accordance with the CDM Regulations, a Principal Designer and Principal Contractor would be appointed. The Proposed Development has been designed to minimise the impact of flooding, however emergency response plans appropriate for the individual phases of the Proposed Development would be in place and implemented to deal with any occurrences, ensuring the health and safety of employees and the protection of critical infrastructure. The risk of construction accidents as they relate to human health and safety would be covered in Construction Method Statements (CMS), a CEMP, and specific risk assessment method statements, prepared in response to conditions attached to the deemed planning permission. Felling buffers have been applied to all infrastructure, reducing the risk of fire spreading into forestry during the operation of the Proposed Development. The candidate turbine is able to be adapted Ice detection and Operation with Ice system technology, which extends the range of wind turbine operation in icy conditions. With the Proposed Development, it is likely that an external sensor

Chapter/Topic	Proposed Mitigation/Enhancement measure
	option would be utilised. The external sensor would communicate with the Supervisory Control and Data Acquisition (SCADA) system of the turbines, and would be able to stop them in icy conditions. The sensor would allow the turbines to be stopped when ice accumulation is detected, therefore mitigating the risk of ice throw. The Scottish Government Online Advice (2014) states "although wind turbines erected in accordance with best engineering practice should be stable structures, it may be advisable to achieve a set-back from roads and railways of at least the height of the turbine proposed, to assure safety". This has been incorporated into the design of the Proposed Development.