19 SUMMARY OF MITIGATION

This Chapter of the Environmental Impact Assessment Report (EIA Report) provides a summary of mitigation measures that have been proposed within the EIA Report to prevent, reduce or offset the effects associated with the Heathland Wind Farm (the Development).

Embedded mitigation measures have been integral to the design evolution of the Development as outlined in **Chapter 3 - The Development**. The overall aim of the design strategy was to create a wind farm with a cohesive design that relates to the surrounding landscape whilst taking account of the environmental characteristics of the area in which the Development is located (the Site), for example priority habitats, peat and hydrological resources.

Table 19.1 presents a schedule of mitigation measures for the Development listed according to the relevant environmental topic, which would be applied during the construction and operation of the Development.

Table 19.1 Summary of Mitigation

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 3: The Development	**Micro-siting** A micro-siting allowance of 100 metres (m) in all directions has been included for all proposed turbine infrastructure. This is to allow for a degree of flexibility should unsuitable ground conditions be encountered or in the event of environmental constraints identified during pre-construction surveys, particularly as there are known previous mine workings in the area. Turbines would not be micro-sited into deeper peat or closer to watercourses except with prior agreement from SEPA, and any changes will be subject to approval of the Ecological Clerk of Works (ECoW) with other specialist environmental advice (e.g. hydrology, archaeology, etc.) as required.	Pre-construction

Environmental Subject Area	Mitigation Proposed	Timing
	Construction Method Statements (CMSs) All aspects of construction will be controlled via a series of detailed CMSs which will be prepared by an Infrastructure Contractor appointed by the Applicant, who will have an overall responsibility for environmental management on the construction site. **Construction Environmental Management Plan (CEMP)** A Construction Environmental Management Plan (CEMP) will be the overarching document which combines the principles of all other management plans and environmental plans outlined within this EIA Report and would support the CMSs. The CEMP will typically be supported by the following documents which apply to the construction process: • Water Construction Environment Management Plan (WCEMP); • Pollution Prevention Plan (as required under SEPA Construction Licence); • Site Waste Management Plan; • Peat Management Plan; • Ecological Protection Plan, including Breeding Bird Protection Plan and any habitat protection measures required during construction; • Traffic Management Plan; and • Restoration Plan.	Pre-construction and during construction

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 6: Landscape and Visual Amenity	**Embedded Design Principles** Measures to reduce effects upon the landscape resource and visual amenity were predominantly achieved through the design of the wind farm. Landscape architects have worked closely with the project team to achieve a scale and a design that minimises the potential landscape and visual effects while maintaining economic viability. A particular design strategy was to minimise 'overbearing' views from nearby residential properties and settlements, such as Forth and Breich, from which there is visibility of the Development within the context of cumulative developments (particularly Tormywheel and Longhill Burn). Whilst visibility from these receptors has not been eliminated, the design has sought to create a scheme which reduces the prominence of turbines whilst establishing a coherent and balanced layout within the context of the residential properties and settlements. The key landscape and visual design objectives for the Development have been to: • Design a scheme which responds to the adjacent cumulative context including the operational Tormywheel (15 turbines at 111 m to tip) and the application stage Longhill Burn (5 turbines at 200 m to tip height but noting the consent for 180 m to tip turbines). The proposed turbines are contained on the upland plateau between Tormywheel and Longhill Burn; • Minimise effects on residential visual amenity for properties in close proximity largely to the south and west of the site through careful consideration of turbine size, distance and nature of views from properties; • Create a coherent and balanced layout in views from settlements including the closest proximity settlements of Breich, Fauldhouse and Longridge to the north; Woolfords to the east; and Forth to the south-west; and • Create a coherent and balanced layout which respond to the cumulative context in views from the Pentlands.	Pre-submission
Chapter 7: Archaeology and Heritage	Known archaeological features have been avoided and no mitigation is recommended. **Micro-siting** Mitigation will be embedded into the design ensuring T2 is not micro-sited within close proximity of HER 40976 as T2 could not physically be built within close proximity of a shaft.	N/A Pre-construction

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 8: Ecology	**Embedded Design Principles** A critical design consideration has been the avoidance of habitats with high conservation value or sensitivity, which has been largely achieved by siting the majority of the Development infrastructure in coniferous plantation and making use of existing forestry tracks. The sensitive designs of watercourse crossing and culverts have been developed to safeguard the water environment, which will also help effectively mitigate construction-related direct and indirect impacts to fish and other aquatic features. Good practice design mitigation measures have been adopted to minimise the risk of bats colliding with operational turbines, in accordance with NatureScot published guidance. Turbines will have a 50 m separation distance between blade tips and high-value bat habitats, such as woodland, riparian habitats, and forest edges.	Pre-submission
	A Habitat Management Plan (HMP) will be produced to inform and guide the commencement of practical habitat creation and restoration techniques during the construction and operation phases of the Development. The HMP will have the aim of safeguarding of protected species during Development construction and operation and to restore and enhance peatland habitats. A suitably qualified and experienced Ecological Clerk of Works (ECoW) will be appointed to provide appropriate ecological and environmental advice during construction, including the monitoring of compliance with conservation legislation, the recommendations of this EIA Report and any subsequent planning conditions. Before construction begins, the ECoW and the project hydrologist will undertake a review of design and drainage plans to inform the requirement for micro-siting, to minimise the potential for effects to sensitive habitats, and to assist in the identification of appropriate locations for commencement of reinstatement works. Where possible, the ECoW will advise on the drainage design to minimise hydrological disruption and reduce the risk of scour and erosion. The ECoW will also monitor and advise on the implementation of pollution prevention and good working practices throughout construction, to protect both terrestrial and aquatic ecosystems from accidental pollution. Pre-construction Surveys for protected species, such as otter and badger, will be undertaken to provide up-to-date information about the distribution and abundance of the protected species identified in the baseline. The results of the surveys will inform the need for Species Protection Plans and associated mitigation and licencing requirements.	Pre-construction and during construction
	Mitigation by Practice during the operational phase will ensure no tree generation within 50 m of turbine locations in order to minimise the risk of bats colliding with operational turbines.	Operation

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 9: Ornithology	The key embedded mitigation with relevance to ornithological features is the implementation of a Breeding Bird Protection Plan (BBPP) to ensure that disruption to nesting birds, and any disturbance to Schedule 1 breeding birds during the construction and decommissioning phases are avoided, as well as during any major works required during the operational phase. This is summarised as: • Where possible, construction works will take place outside the main breeding bird season (March to August inclusive). Where construction works are required during the breeding bird season, the area within 500 m of works will be surveyed ahead of any operations, by a suitably experienced and qualified ECoW, to check for active nests of all bird species; • A pre-construction survey of areas of suitable habitat for nesting goshawk and crossbill within 500 m and 150 m (respectively) of works will be completed ahead of any operations, regardless of the time of year, by a suitably experienced and licensed Ecological Clerk of Works (ECoW), to check for active nests (or other evidence of breeding). If breeding crossbill are recorded within 150 m of works, the ECoW will ensure that any active nests are not destroyed, and that there is no disturbance to nesting crossbill. This may include temporary cessation of works within a determined exclusion zone until all dependent young have fledged. NS will be consulted with to refine mitigation measures; • If any nests or breeding territories of Schedule 1 species are identified during pre-construction surveys, an exclusion zone around the nest/breeding territory will be established (with the distance appropriate to the species and agreed through consultation with NS[1]). No works will be permitted within the exclusion zone and no personnel or vehicles will be allowed to enter or pass through until the ECoW has confirmed that the chicks have fledged or the breeding attempt has failed. Where this is not feasible, NS will be contacted and further mitigation measures agreed to ensure that nesting birds are not disturbed; and • The ECoW will ensure all contractors working on the Development are aware of ornithological sensitivities and relevant legislation.	Pre-construction and during Construction Operation Decommissioning
Chapter 10: Hydrology and Hydrogeology	**Embedded Design Principles** The following mitigation measures relating to the hydrological environment are embedded into the design and construction of the Development: • The requirement for access tracks crossing watercourses has been minimised as much as possible through the design of the Development; • 50 m watercourse buffers for construction works with the exception of watercourse crossings, and infrastructure associated with T3 and T4 where the crane hardstandings associated with these turbines encroach on the watercourse buffers by 13 m and 18 m respectively.	Pre-submission

[1] For Schedule 1 species, the exclusion zone will be agreed with NS.

Environmental Subject Area	Mitigation Proposed	Timing
	Construction good practice methods and works for protection of hydrological receptors as outlined in the Appendix A10.1: Outline WCEMP. The Outline WCEMP describes water management measures to control surface water run-off and drain hardstanding's and other structures during the construction and operation of the Development.	Pre-construction, construction and operation
Chapter 11: Geology, Soils and Peat	**Embedded Design Principles** Through embedded design, the site layout avoids deep peat and limits the impacts on deep peat where possible, as well as taking cognisance of hydrological and ecological features and associated buffers. Probing data available illustrates that the turbines have primarily been placed in areas where peat depths are less than 1 m with the exception of T3 which could not be micro-sited within 50 m of the original location to avoid deep peat.	Pre-submission
	Micrositing allowance of 100 m for turbine, where feasible in regards to other constraints, to reduce the impact on deep peat and peaty soils. There are exceptions to this on specific turbines to ensure they are not micro-sited into deeper peat than that which it has been placed. In order to reduce the impact on peat, best practice drainage and peat management measures would be implemented across the site and in particular in areas where peat depths are greater than 1.0 m. Best practice measures for managing excavated peat and peaty soils are detailed in the Outline Peat Management Plan, Appendix A11.2. Implementation of construction best practice, good drainage and regular slide risk monitoring to be incorporated into the CEMP and wCEMP.	Pre-construction and during construction
	Mining and ground investigation Additional Site investigation will be undertaken following forest clearance at turbine locations located across the site infrastructure to determine more details on peat, geology, contamination and in particular, mining conditions. A 100 m micrositing allowance is being sought as part of the application to allow flexibility following pre-construction ground investigation surveys with regards to mining risk. Should the 100 m micrositing not achieve a re-location of turbines into less risk in relation to the underlying mining conditions, then a series of further mitigation measures will require consideration and theses will be informed by the ground investigations scheme. This could include one or more of the following circumstances and related mitigation but not be limited to this: • Turbine is located in an extensive areas of development risk from shallow underground mining – Mine Working Consolidation would be required directly beneath the area of the turbine and associated infrastructure by injection of a cement-based grout; • Turbine is located in an extensive area of former opencast mining – Turbine foundation would require to be an abnormal-solution, possibly piling (to be informed by results of intrusive ground investigations).	Pre-construction and during construction

Environmental Subject Area	Mitigation Proposed	Timing
	Contaminated Land It is recommended that ground investigation be undertaken pre-construction to allow for chemical testing to determine the potential for contaminants to exist within the soils, particularly the risk of asbestos and leachates in the soil. Addition mitigation measures include: • Appropriate PPE to be worn by all site personnel and the provision of adequate welfare facilities and dust control measures; • Allowance for the installation of gas monitoring wells to enable a period of ground gas monitoring in accordance with CIRIA 665 to classify the ground gas risk at the Site; and • A series of groundwater monitoring wells should be advanced to allow for groundwater sampling.	Pre-construction and during construction
Chapter 12: Traffic and Transport	A number of mitigation measures are recommended for adoption in a Traffic Management Plan which would be implemented during the construction of the Development. The recommended mitigation measures are as follows: • As far as reasonably possible, deliveries should be scheduled outside of school opening and closing times; and • Drivers of all delivery vehicles to be made aware during induction of the presence of schools, medical centre and other amenities along the delivery route.	Construction

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 13: Noise	The good practice measures will be implemented to include: • Operations shall be limited to times agreed with the Councils; • Deliveries of turbine components, plant and materials by HGV to site shall only take place by designated routes and within times agreed with the Councils; • The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery and construction activities, as advocated in BS 5228; • Where practicable, the work programme will be phased, to reduce the combined effects arising from several noisy operations; • Where necessary and practicable, noise from fixed plant and equipment will be contained within suitable acoustic enclosures or behind acoustic screens; • All sub-contractors appointed by the main contractor will be formally and legally obliged, and required through contract, to comply with all environmental noise conditions; • Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night-time construction activities likely to generate significant noise levels, e.g., turbine erection; and • Any plant and equipment normally required for operation at night (23:00 - 07:00), e.g. generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45 dB, $L_{Aeq,night}$ shall not be exceeded at the nearest noise-sensitive receptors. In the event that stone is required to be extracted from borrow pits by blasting, the following process would be employed to ensure that the effects of blasting noise and vibration on nearby properties are adequately controlled: • Compliance with deemed planning permission conditions specifying limits to vibration resulting from blasting, restrictions on times of blasting, and a requirement for vibration monitoring; • Trial blasting, using progressively larger charge loads, to establish maximum acceptable charge; and • Provision of information on blasting to neighbouring residents.	Construction
	Using the reduced-noise modes available for the candidate turbine models, an example mitigation strategy (detailed in **Chapter 13 – Noise**) has been developed which will result in noise levels no greater than the apportioned noise limits for the Development.	Operation

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 14: Aviation, Telecommunications and Utilities	**Aviation Lighting** A combined ANO visible lighting design and MoD IR lighting scheme that is compliant with regulations and guidance has been proposed for the Development. This has been agreed with MoD and is to be shortly agreed with the CAA to mitigate significant effects in relation to civil aviation infrastructure and NATS radar operations. **Edinburgh Airport** The Applicant is in late stage discussions with Edinburgh Airport to establish suitable mitigation to mitigate the potential significant effect. It is likely this will involve an upgrade to ANS' radar processing system, which remove the aerodrome safeguarding risk at Edinburgh Airport. **National Air Traffic Services** The predicted impact on the NATS radar will require technical mitigation, for which the Applicant and NATS have a contractual agreement in place. NERL are replacing the existing Raytheon long range ATC radar at Lowther Hill with a new Indra Lanza radar that has wind farm mitigation capabilities that will benefit a number of wind farms in the region, and which will mitigation the effects of the Development on NATS radars. This mitigation can appropriately be secured for the Development by way of a suspensive condition.	Pre-submission / Pre-construction
Chapter 15: Forestry	**Compensatory Planting** In order to comply with the Scottish Government's Control of Woodland Removal Policy, offsite compensation planting would be required by the legal agreement attached to any consent. The Applicant is committed to providing appropriate compensation planting, the volume of which would replicated the net crop area felled for infrastructure construction (49.90 ha). The location, design and planting timescale of such planting to be agreed with Scottish Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of construction of the Development.	Pre-construction, construction and operation.
	Management Felling Risk of windblow in crops adjoining construction areas will prompt management felling of circa 29.30 ha, therefore restocking of 29.30 ha will be carried out within the Site.	Pre-construction and construction.
Chapter 16: Socio-Economics, Land Use, Tourism and Recreation	Temporary health and safety signage during construction period of the Development will be erected at appropriate locations for the Core Paths CL3165/1, CL3166/1 and CL/3167/1 with details of any areas with restricted access and where routes have been diverted. Such measures would be agreed in advance of construction with the Councils, as appropriate.	Construction

Environmental Subject Area	Mitigation Proposed	Timing
Chapter 17: Climate Change and Carbon Balance	The design choices made as a consequence of the key constraints are considered to be mitigation which is 'embedded' in the design; the following are most relevant for the CCIA: • Development infrastructure is built to withstand strong windspeeds and to harness energy; • Turbine spacing is sufficient to reduce turbulence effects on turbines downwind; • The turbines are located to maximise energy generation while minimising environmental impacts; • The Development design aims to reduce impacts on peat – e.g. through use of existing track layout and avoiding areas of deep peat where possible; • Implementation of a CEMP, PMP etc. during construction to minimise environmental impacts and peat disturbance; and • Buffers from watercourses incorporated in layout design, protecting water quality and also protecting Development infrastructure from flooding.	Pre-construction
Chapter 18: Other Issues	**Embedded Mitigation** Health and safety is embedded into the design of the development. Turbines are designed to be safe and are built to withstand extreme wind conditions and wind turbine developments have a proven record in terms of safety and reliability. General construction health and safety management measures will be implemented during construction and decommissioning to ensure Health and Safety concerns are eliminate or minimised as far as reasonably practicable, such as: • The Construction Project Manager will be required to prepare a Construction Phase Plan (Health and Safety Plan) and to forward information to the Applicant during the works to enable the Health and Safety File to be completed; • Day-to-day operational and maintenance activities will be co-ordinated with Forestry and Land Scotland (FLS) operational requirements; • Public access to the Site will be restricted throughout the construction working area during construction and decommissioning; and • An Operations and Maintenance Manual for the design life of the Development will be prepared by the Contractor and will cover all operational and decommissioning procedures.	Construction and decommissioning

Environmental Subject Area	Mitigation Proposed	Timing
	Health and Safety – Borrow Pits Activities During borrow pits activities such as blasting and borrowing, the following mitigation measures will be implemented to protect the general public : • Borrow pit areas will be temporarily fenced off during blasting; • Fencing will be regularly checked and maintained as necessary; • Appropriate warning signs will be placed along the fence line warning of quarry / blasting operations to raise public awareness; • Similarly, warning signs will be placed within the blasting areas alerting site operators to the presence of potential general public access nearby; • Health and Safety awareness and training will be delivered to employees working on site regularly; and • All staff and workers will be provided with appropriate PPE. In order to protect Development workers from quarrying and / or blasting activities from existing quarry operations on site, the following mitigation measures will be implemented to ensure health and safety requirements are met: • Site personnel will be made aware of other quarry / blasting activities in the area during inductions / during toolbox talks. Site personnel will be updated on status of activities on days where operations from existing quarries is due to commence; • During the operation of the Development, warning signs will be erected when blasting / quarry activities is due to commence on site at adjacent quarries; • Health and Safety awareness and training will be delivered to employees working on site regularly; and • All staff and workers will be provided with appropriate PPE.	Construction and operation