

# **Hare Hill Windfarm Repowering and Extension**

**Environmental Impact Assessment  
Report**

**Volume 1**

**Chapter 15: Summary of Residual  
Effects**

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## Abbreviations

Abbreviation	Description
<b>CAA</b>	Civil Aviation Authority
<b>CMS</b>	Construction Method Statement
<b>DCEMP</b>	Decommission, Construction Environment Management Plan
<b>ECoW</b>	Environmental Clerk of Works
<b>EIA</b>	Environmental Impact Assessment
<b>EIA Report</b>	Environmental Impact Assessment Report
<b>EMP</b>	Environmental Management Plan
<b>HMP</b>	Habitat Management Plan
<b>NPF4</b>	National Planning Framework 4
<b>SEPA</b>	Scottish Environmental Protection Agency
<b>SPP</b>	Species Protection Plan
<b>LPA</b>	Local Planning Authority

# 15. Summary of Residual Effects

## 15.1. Introduction

1. This chapter presents a summary of mitigation, good practise and commitments that have been put forward as a Schedule of Commitments, through the Environmental Impact Assessment (EIA) for the Hare Hill Windfarm Repowering and Extension (the 'proposed Development'). This Schedule of Commitments describes how the proposed Development will mitigate potential effects of the proposed Development on the environment through prevention, reduction or offsetting.

## 15.2. Schedule of Commitments

2. The mitigation and best practise measures presented in **Table 15.1** can be applied prior to construction, during construction, during operation of the proposed Development. Many of these measures are detailed throughout the EIA Report chapters as embedded mitigation which can be undertaken through good practise and/or relevant legislation during all stages of the proposed Development.

## 15.3. Overall Statement of Significance

3. If the proposed mitigation measures below are implemented successfully through the proposed Development, the adverse residual effects related to the majority of environmental disciplines would not be considered significant within the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
4. Within **Chapter 6 – Landscape and Visual Impact Assessment** there are potential significant effects which are detailed in full within the chapter. It is however acknowledged within National Planning Framework 4 (NPF4), Policy 11 part E) ii), all renewable energy developments that incorporate wind turbines are likely to give a rise to some significant Landscape and Visual effects.

*Table 15.1 Summary of residual effects, mitigation and enhancement for Hare Hill Windfarm*

EIA Report Chapter	Phase	Consideration for Mitigation / Enhancement	Commitment securing mechanism for Mitigation / Enhancement
Landscape and Visual	Design Evolution	Visual Impacts	The proposed Development is to remain within the agreed micrositing limit, detailed in the EIA Report and applied for in the application.
		Aviation Lighting Impact	A proposed reduced lighting scheme has been submitted for approval to the Civil Aviation Authority (CAA) alongside this application to reduce the overall turbine lighting of the proposed Development.
Ecology and Biodiversity	Pre-Construction / Construction / Operation	Protected Species	<p>A Decommissioning and Construction Environment Management Plan (DCEMP) will be produced prior to construction works commencing in consultation with the Local Planning Authority (LPA); see <b>Chapter 5: Development Description</b>. The document will be a live document and will be updated throughout the pre-construction and construction and will:</p> <ul style="list-style-type: none"> <li>Include measures to safeguard habitats and species to be implemented prior to construction and during construction; and</li> <li>Provide details of all pre-construction surveys required including methods and timings.</li> </ul> <p>An Environmental Clerk of Works (ECoW) will be present during enabling works and throughout the construction period of the proposed Development. They will be a suitably experienced individual, whose role would be to provide advice so that that works are carried out in accordance with environmental measures detailed in the DCEMP, and to monitor compliance with relevant legislation and good practice (see <b>Section 7.3. Legislation of Chapter 7 Ecology and Biodiversity</b>). The ECoW would contribute to all relevant DCEMP documents. Once work has commenced, their role will be to provide ecological and pollution control advice and monitor compliance of all relevant mitigation measures and legislation (see also <b>Chapter 9:</b></p>

EIA Report Chapter	Phase	Consideration for Mitigation / Enhancement	Commitment securing mechanism for Mitigation / Enhancement
			<p>Hydrology, Geology and Hydrogeology). The ECoW will also give regular toolbox talks to make site personnel aware of the ecological sensitivities on-site. The ECoW would have the authority to stop any construction activity that is having or likely to have a significant environmental impact or be in breach of legislation.</p> <p>Protected species information was collected through surveys and further reinforced by desktop Studies identified that the proposed Development would not have a significant effect on terrestrial mammal species.</p> <p>During pre-construction, checks for protected species should be undertaken within set buffers of the proposed Development and a Species Protection Plan (SPP) should be used throughout all development periods.</p> <p>Any open excavations should be covered when not active and should provide means to escape for terrestrial mammal species.</p> <p>A Suitable vehicle speed limit is to be enforced within the proposed Development.</p> <p>Warning signs installed, where appropriate, to reduce risk of collision with protected species.</p> <p>If resting places of protected species are found within buffers during construction works, all work within the buffer should cease immediately until it can be established whether it is active.</p>

EIA Report Chapter	Phase	Consideration for Mitigation / Enhancement	Commitment securing mechanism for Mitigation / Enhancement
			<p>Lighting around the proposed Development should ensure that it is not lighting areas of woodland or watercourses during the night. Security lighting and lighting associated with compounds should be low lux and directed away from woodland and watercourses to reduce disturbance.</p> <p>During the operational phases where no construction is taking place, the activity on-site should be significantly reduced and therefore levels of disturbance will be reduced relative to the construction period.</p> <p>Where potential effects exist, control measures will be incorporated into an operational Environmental Management Plan (EMP). In particular, the potential for pollution incidents during routine maintenance activities will be minimised by adoption of Scottish Environmental Protection Agency (SEPA) good practice guidance (SEPA, 2010).</p> <p>Any routine maintenance works will take place during the day where practicable to minimise the potential for disturbance to protected species within the proposed Development (since these are mostly nocturnal/crepuscular) and a speed limit of 15 mph will be enforced for any vehicles going onto the proposed Development, in order to reduce the risk of collision with protected species.</p> <p>The EMP will detail mitigation measures required during the operational phase relating to protected species to ensure ongoing compliance with relevant environmental legislation.</p>
	Construction	Habitats	Detailed mitigation will be provided in the DCEMP for the protection of sensitive habitats detailed mitigation measures will be provided in the

EIA Report Chapter	Phase	Consideration for Mitigation / Enhancement	Commitment securing mechanism for Mitigation / Enhancement
			<p>DCEMP for the protection of sensitive habitats during the pre-construction, construction and post-construction phases and will consist of:</p> <ul style="list-style-type: none"> <li>• Toolbox talks to inform contractors of the sensitive habitats at the proposed Development;</li> <li>• Marking of sensitive areas of habitat close to construction areas, to prevent accidental encroachment;</li> <li>• No storage of materials or machinery permitted within exclusion zones;</li> <li>• Supervised vegetation clearance by the ECoW in sensitive areas prior to construction; and</li> <li>• Where possible (and where other constraints allow) an allowance of 50 m micrositing of infrastructure will be undertaken to ensure construction does not impact on the most sensitive habitats and any other identified ecological constraints and will be completed in consultation with the ECoW. This is particularly important when working in close proximity to waterbodies and sensitive habitats. Where micrositing cannot avoid areas of sensitive habitats or features, the ECoW would discuss and agree additional required mitigation to ensure impacts are minimised.</li> </ul> <p>Any land degraded by construction and not required for the operation of the proposed Development, such as the construction compounds and around areas of tracks, would be restored as soon as possible after construction is completed. Turves would be carefully removed during construction as far as practicable and stored following good practice for re-use in the restoration of areas not required for the operation of the proposed Development. As such, any vegetation removed for the construction phase would be reinstated within the</p>

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			<p>area of the proposed Development, facilitating natural re-colonisation of vegetation communities. Permanent habitat loss would be limited to that required for the footprint of infrastructure and good site management practices would be implemented to minimise the risk of encroachment of the construction corridor into adjacent habitats. As far as is reasonably practicable, any notable floral species encountered will be marked with an exclusion zone or translocated to other suitable areas of habitat or stored for reuse in reinstatement of temporary infrastructure. The implementation of these measures will reduce the potential for impacts on sensitive habitats.</p> <p>Site activities have the potential to cause pollution through dust, siltation, leaks and spillages associated with plant and materials during the construction and operational phases. If such incidents were to occur, then these pollutants may reach waterbodies and surrounding vegetation. Therefore, these activities may directly or indirectly affect habitats and species, especially where they are hydrologically connected.</p> <p>Pollution incidents may occur during construction as well as within the operational phase during maintenance works. Pollution prevention measures will be detailed in the DCEMP and overseen by the ECoW. Pollution with regards to waterbodies is further discussed in <b>Chapter 9: Hydrology, Geology and Hydrogeology</b>. Measures to control the impact of dust on sensitive habitats would be implemented during the preparation and construction phase. These measures will be adopted, when necessary, in dry weather, in areas of active development, and will most likely involve the controlled dampening of tracks when utilised by construction vehicles. Material for construction will be taken imported from local quarry borrow pit sources where possible,</p>

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			<p>which will have similar chemical properties to stone found within the area of the proposed Development to ensure no alteration in soil chemistry. Further detail on the mitigation of potential dust impacts will be detailed within the DCEMP.</p>
	Construction	Watercourses and Groundwater Dependant Terrestrial Ecosystems	<p>The pre-construction quality of watercourses and waterbodies would be maintained during construction (see <b>Chapter 9: Hydrology, Geology and Hydrogeology</b>). Watercourse protection measures would be adopted within the Construction Method Statement (CMS)/DCEMP and include protection against siltation and sedimentation, and pollution incidents such as the implementation of a pollution response plan and the safe storage of chemicals in bunded containers.</p> <p>Robust mitigation measures will be installed prior to works commencing to ensure the impacts on watercourses are minimised.</p> <p>Mitigation measures throughout construction of the proposed Development will be regularly monitored and maintained/replaced as required.</p> <p>Maintenance and refuelling of machinery and vehicles would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath a plant and machinery during refuelling and maintenance would contain small spillages.</p> <p>Monitoring of water quality would be carried out before and during construction.</p>

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			<p>The implementation of these measures would minimise impacts on protected species, such as otter and fish species.</p>
	Pre-Construction / Construction / Operation	Bog habitats	<p>Further mitigation is to be provided for bog habitats. An outline Habitat Management Plan (HMP) will be provided for the proposed Development and is to be finalised and agreed with the landowner, NatureScot and the local council authorities, should the application be granted approval.</p> <p>The main aim of the outline HMP is to improve and restore the areas of blanket bog and degraded bog within the application boundary. The restoration will focus on drain blocking in order to re-wet areas of peatland as well as peat had reprofiling and surface bunding.</p> <p>A monitoring regime will be included as part of the HMP to assess the effectiveness of management measures implemented.</p>
	Pre-Construction/ Construction / Operation	Bats	<p>Although there is no species specific mitigation required, various embedded measures will be implemented to ensure compliance with legislation and follow good practise guidance.</p> <p>It is proposed that the following measures will be undertaken during the operation of the proposed development:</p> <ul style="list-style-type: none"> <li>• Bat activity monitoring would be completed for two years after the proposed Development becomes operational, in order to inform the need for a wind turbine bat management protocol (see below); and</li> <li>• A bat carcass search programme for two years after the proposed Development becomes operational would be implemented. It</li> </ul>

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			would include trials to determine values for site-specific biases that affect estimates of bat mortality from carcass searches, such as scavenger removal rates and search accuracy.
Ornithology	Pre-Construction/ Construction / Operation	Protected Species	<p>Industry standard mitigation measures will be embedded within the project.</p> <p>An ECoW will be appointed for the duration of the works to ensure compliance with wildlife legislation and adoption of best practice.</p> <p>SPPs will be agreed with NatureScot and include bird protection plans which will include the following measure to reduce effects to sensitive species:</p> <ul style="list-style-type: none"> <li>• Pre-construction surveys and construction monitoring to update the status of the Important Ornithological Features;</li> <li>• Disturbance protection zones around confirmed nest sites; and</li> <li>• Seasonal working restrictions where required.</li> </ul>
Hydrology, Geology and Hydrogeology	Pre-Construction / Construction/ Operation / Decommissioning	Peat Disturbance, Excavation and Storage	<p>Peat areas have and would be avoided for construction, as far as reasonably possible through site design. Avoiding these areas would minimise the volume of peat extraction.</p> <p>Where areas of peat are unavoidable, methods and approaches to minimised disturbance have been incorporated. This would include the use of floating tracks as well as avoiding the deeper pockets of peat, regardless of its condition.</p>

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			<p>ScottishPower Renewables (UK) Limited (the Applicant) would commit to restoration and enhancement of an area of peatland that would result in the overall net positive impact on peat as a resource.</p> <p>Surface run-off from stockpiles of any excavated peat has the potential to affect surface water quality due to the transportation of suspended solids in surface water run-off. Therefore, good practice measures, such as those outlined in the guidance, “Good Practice during Wind Farm Construction” (Scottish Renewables, 2019), would be implemented to ensure that peat is appropriately stored. Any peat storage areas would be located at a distance from any watercourses and would be contained to prevent sediment or nutrient run-off from eventually reaching downstream watercourses.</p> <p>Any storage of peat during construction would minimise slumping and maintain stratification, where possible using water derived from dewatering activities to keep the peat adequately saturated to prevent desiccation and degradation. It is anticipated that a large amount of the excavated peat can be re-used on-site.</p>
	Pre-Construction / Construction/ Operation / Decommissioning	Watercourse Buffer Zones	<p>A minimum buffer of 50 m from watercourses will be maintained for all infrastructure apart from watercourse crossing areas.</p> <p>The watercourse crossings adhere to good practise and are designed to convey a 1 in 200 year return period flood event with allowance for climate change. Each crossing would be designed to not alter the natural drainage or hinder the passage of aquatic fauna. During construction these would be designed to prevent sediment laden run-off from construction plant movement, directly entering watercourses.</p>

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	Pre-Construction / Construction/ Operation / Decommissioning	Avoidance of Flood Zones	Development should not be permitted in the 1 in 200 year (medium) flood zone unless demonstrated that it would not affect the ability of the floodplain to store and convey water.
	Pre-construction / Construction	Excavations and Associated Drainage	<p>Where possible, excavations required to facilitate the construction of foundations for the wind turbines, service trenches and each crane base would be designed so that they can freely drain by gravity. Cut-off drains would be installed around the excavation areas to prevent surface run-off entering the excavations.</p> <p>Turbine construction would adopt mitigation measures, as detailed in the DCEMP, to prevent contaminants entering the shallow groundwater system.</p>
	Pre-Construction / Construction/ Operation	Run-off and Sediment Management	<p>The proposed Development drainage system will convey water away from construction activities and built infrastructure. Prior to the commencement of and during construction, plans showing site drainage and hydrologically sensitive areas (e.g. watercourse buffers,) will be regularly checked to review potential for run-off and ponding of water within the proposed Development so that that run-off patterns are well known.</p> <p>The drainage systems installed in the area within the proposed Development application boundary (the Site) would also have sediment management measures incorporated into their design to help reduce or wholly mitigate effects on the hydrological environment. The type of sediment management would depend on the volume of construction activities occurring in particular areas within the Site. For all the suggested control measures, regular inspection</p>

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			<p>and maintenance would be undertaken, particularly after prolonged heavy rainfall.</p> <p>Silt traps would be installed within the proposed Development drainage system and can take a variety of forms, including terram fences or clean stone. The ability of the silt traps to successfully treat run-off would be dependent upon the volume of run-off within the drainage channel, the type of material used (i.e. the permeability of the terram geotextile material and the size and source of the clean stone) and the frequency of monitoring and replacement of the measures.</p> <p>Large machinery would avoid traveling through any identified spawning areas, particularly from September-April to avoid reed damage and juvenile mortality.</p> <p>If required, flocculants could also be used to treat run-off. Flocculants are very effective at removing suspended sediment from water but they can also have effects on water chemistry. The option to use flocculants would be determined by the contractor and the necessary consent applied for, by them, post-consent as part of the application to SEPA for a Construction Run-off Permit.</p>
	Construction	Concrete Works	<p>Care would be taken during the transportation of concrete to the turbine and building foundations and would be carried out following good practice measures. Freshly mixed concrete and/or dry cement powder would not be allowed to enter any watercourse. This would be avoided by the following actions:</p> <ul style="list-style-type: none"> <li>• Turbines, concrete batching or wash out areas would be located at least 50 m from watercourses.</li> </ul>

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			<ul style="list-style-type: none"> <li>Concrete wagons would only be permitted to wash-out into specifically designed wash-out areas at predetermined and agreed locations site wide, as stipulated in the DCEMP.</li> <li>The drivers would be informed at their site induction of the location of the designated wash-out areas and issued with a location map.</li> <li>Loads would be managed and assessed with regards to the size of vehicle and ground conditions whilst keeping at appropriate speed limits to avoid spillage.</li> <li>Tools and equipment would not be cleaned in watercourses. Should it be necessary to clean tools and equipment on-site, this would be done in the designated wash-out areas.</li> <li>The designated concrete wash-out area would be constructed within the Site at a location agreed with the relevant consultees. The design and construction of these wash out areas would be agreed with SEPA.</li> <li>Wash out areas would be continually monitored, and findings recorded to reduce the chances of effluent spilling over into the water environment.</li> </ul>
Archaeology and Cultural Heritage	Construction	Preservation in Site	<p>Micro-siting of the proposed Development will take into account the desirability of preservation in situ where practicable. Preservation in situ of identified heritage assets would be achieved through marking off those assets that lie within the micro-siting allowance prior to commencement of construction of the proposed Development.</p> <p>Assets will be marked out using high visibility marker posts at 5 m from the edge of the identified heritage assets and will remain in place for the duration of the construction phase.</p>

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	Construction	Watching Briefs	<p>There is the possibility that ground works may encounter and expose remains associated with heritage assets. It is recommended that watching briefs are carried out along the access track before any ground works take place.</p>
	Construction	Post Excavation and Reporting	<p>If new, archaeologically significant discoveries are made during any archaeological monitoring works which may be required to be carried out, and it is not possible to preserve the discovered site or features in situ, provision would be made for the excavation where necessary, of any archaeological remains encountered. The provision would include the consequent production of written reports, on the findings, with post-excavation analysis and publication of the results of the works, where appropriate.</p>
Access, Traffic and Transport	Pre-Construction / Construction / Decommissioning	Risk Reduction	<p>Wherever possible the risk considered to arise from the proposed Development should be minimised, in this case it would mean the reduction in number of vehicle movements as far as practicable and removing the need for vehicles to travel on the most sensitive routes to the proposed Development.</p> <p>To achieve this, the primary mitigation commitments would be the use of on-site borrow pits to source the majority of aggregates required for construction and the use of an on-site batching plant.</p> <p>For link 7 (A76 between Cumnock and New Cumnock), whilst the lower threshold of significance is not predicted to be breached in the realistic worst case scenario, cognisance has been taken of the two recent fatalities in New Cumnock. The Applicant is prepared to implement potential additional mitigation in this area in the form of a</p>

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			permanent traffic controlled pedestrian crossing, subject to agreement with Transport Scotland.
Noise	Construction	Construction noise	<p>To reduce the potential effects of noise associated with construction, the following mitigation measures are proposed:</p> <ul style="list-style-type: none"> <li>Activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the Site would be limited to the hours 07:00 to 19:00 Monday to Friday and 08:00 to 16:00 on Saturdays unless otherwise approved in advance by East Ayrshire Council (EAC) and Dumfries and Galloway Council (DGC) (except in the case of an emergency).</li> <li>Light vehicle traffic accessing the Site such as those involved with staff mobilisation, may continue outside of the stated hours;</li> <li>all construction activities shall adhere to good practice as set out in BS 5228-1;</li> <li>all equipment would be maintained in good working order and any associated noise attenuation such as engine casing and exhaust silencers shall remain fitted at all times;</li> <li>where flexibility exists to undertake some construction activities within the Site at different locations, the distance from residential properties would be maximised if possible subject to other safety and practical constraints;</li> <li>a Construction Traffic Management Plan (CTMP) will be developed and secured through planning condition to control the movement of vehicles to and from the Site;</li> <li>construction plant capable of generating high noise and vibration levels would be operated in a manner to restrict the duration of the higher magnitude levels; and</li> <li>a detailed plan on community relations, including a Stakeholder Engagement Plan (SEP), the setting up of a noise compliance phone line, a procedure to notify residents of any necessary work</li> </ul>

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			outside of the permitted working hours and an approach to the investigation of complaints.
Aviation and Existing Infrastructure	Operation	Aviation Lighting	<p>A proposed reduced lighting scheme has been submitted for approval to the CAA alongside this application to reduce the overall turbine lighting of the proposed Development. Visible lighting may be supplemented by infra-red lighting as directed by the Ministry of Defence.</p> <p>Dissemination to the CAA of any enroute obstacle exceeding 100m in height 8 weeks prior to construction.</p>
	Operation	Very High Frequency (VHF) repeater stations	VHF repeater stations would be used where necessary to mitigate against any adverse effects on Prestwick Airport's VHF ground to air communications which may be determined during pre-construction flight trials.
	Operation	Primary Surveillance Radars (PSRs)	Technical mitigation measures for impacts on PSRs are available that would optimise the PSRs to mitigate the impact of the proposed Development to mitigate any residual effects on Prestwick Terma PSR, Lowther Hill PSR and Great Dun Fell PSR.
Shadow Flicker	Pre-construction/ Construction	Turbine shutdown	Once the updated shadow flicker analysis has been secured through a planning condition, should there be an issue with shadow flicker, the ability to shutdown the identified turbines would be ensured by installing shadow module and sunshine sensors.

