



Balgray Wind Farm

Chapter 16: Synergistic Effects, Schedule of
Environmental Commitments and Residual Effects

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List of Abbreviations

Abbreviation	Description
AIL	Abnormal Invisible Loads
BBPP	Breeding Bird Protection Plan
BHMP	Biodiversity and Habitat Management Plan
BSI	British Standards Institution
CAA	Civil Aviation Authority
CAR	Controlled Activities Regulations
CEMP	Construction Environment Management Plan
CMS	Construction Method Statement
CTMP	Construction Traffic Management Plan
ECow	Environmental Clerk of Works
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
HES	Historic Environment Scotland
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
MoD	Ministry of Defence
OEMP	Operational Environmental Management Plan
PMP	Peat Management Plan
SEPA	Scottish Environment Protection Agency
SPP	Species Protection Plan
SPMP	Outline Soil and Peat Management Plan
TMP	Traffic Management Plan
WSI	Written Scheme of Investigation

16. Synergistic Effects, Schedule of Environmental Commitments and Residual Effects

16.1. Schedule of Environmental Commitments

- 16.1.1. This chapter outlines a Schedule of Environmental Commitments and the Synergistic Effects for the Proposed Development. A key aspect of best practice in Environmental Impact Assessment (EIA) is the inclusion of a Schedule of Environmental Commitments, which serves as a central reference for all agreed mitigation and enhancement measures. This schedule outlines the commitments made by the Applicant to address potential environmental impacts. It provides a useful reference point for decision makers when seeking to secure these commitments by way of planning conditions. Thereafter it will play a crucial role in guiding the design team throughout the project's detailed design phase, ensuring that environmental considerations are integrated at every stage. Additionally, contractors appointed for the construction phase will have easy access to these commitments to ensure they are implemented in line with any stated planning conditions.
- 16.1.2. **Table 16.1** presents a Schedule of Environmental Commitments for the Proposed Development, listed according to the relevant environmental topic area.

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Table 16.1: Schedule of Environmental Commitments

Topic	Consultees	EIAR Reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
Landscape and Visual (LVIA)	NatureScot Dumfries and Galloway Council North Milk Community Council	Chapter 6	The LVIA assessed the long-term effects of the Proposed Development during its operational lifetime, the short-term temporary effects of its construction, and where appropriate, any residual effects following decommissioning and removal of the turbines. It considered the potential effects on the landscape and effects on specific views and visual amenity. On the existing moorland landscape, it is expected that the magnitude of change on the landscape during construction would be a result from the construction of new access tracks, laydown areas, crane pads and turbine foundations and therefore the effects are considered to be moderate/minor, as these changes would be localised and short-term and therefore not considered significant. There would however be localised areas of high magnitude change to landscape character upon LCT 175. Construction in these areas will	The approach to mitigating these significant effects has focussed on the careful design of the Proposed Development layout, aiming to minimise landscape and visual impacts as detailed in Chapter 2 of the EIAR. Initially proposed with 7 turbines at 230m, the design evolved through multiple stages, considering factors such as landscape character, visual amenity and the proximity to other wind developments in the area. The final layout consists of 6 turbines at 200m, ensuring a well-balanced and compact arrangement that reduces visual impact from the selected viewpoints.	The Proposed Development is expected to cause localised but significant changes to the landscape withing approximately 6km. LCT 175,172 and 161 will experience significant impacts as these are in immediate area, while the broader landscape is considered capable of accommodating them. In terms of visibility, the Proposed Development will be noticeable from nearby properties, settlements and public routes and roads. Of the 17 viewpoints, 6 are

Topic	Consultees	EIAR Reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
			cause a significant but temporary disruption. Following construction, landscape character of the site would experience a substantial transformation due to the considerable change of the affected area and the introduction of six wind turbines. These additions would have a long-term presence but remain reversible. The operational phase of the Proposed Development is expected to result in a high significant effects on LCT 175, LCT 172, LCT161 and moderate and less significant effects on LCT 163 and LCT 162. 21 out of 51 of the residential properties assessed within the 2km RVAA study area would experience a higher degree of change to their views and these were taken forward to a detailed assessment. Of the 21 properties brought forward, 6 were identified not to experience any significant effects., The remaining 15	Supporting infrastructure, including substation, construction compound, battery storage and borrow pits have been strategically positioned to minimise their impact on the surround landscape. To mitigate the impact of aviation lighting, visibility sensors will be installed to adjust light intensity based on atmospheric conditions. Additionally, the directional intensity of the lights will be controlled to limit downward light spill, reducing their visibility from ground-level viewpoints.	expected to experience significant visual effects. The only settlement where significant effects were identified is Corrie Common. The assessment also found that parts of the Core Path NORT/309 and certain sections of the B723 road will experience notable visual impacts.

Topic	Consultees	EIAR Reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
			properties all would experience some significant visual effects from either the property, its curtilage or its private access. However none of the residents would experience such an overbearing or overwhelming effect on their visual amenity that their properties would become unattractive places to live. In relation to settlements, the assessment found that the only settlement in the study area that would experience significant visual effects was Corrie Common. The assessment of Core Paths and Recreational Routes found that users of Core Path NORT/309 and sections of B723 would experience significant effects from the Proposed development. Of the 17 selected viewpoints assessed, six were identified as experiencing significant effects due to their close proximity to the Proposed Development. These viewpoints—specifically Viewpoints		

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			1, 2, 3, 6, 7, and 16—are expected to undergo notable visual changes as a result of the development, with the magnitude of impact varying based on factors such as distance, elevation, and existing landscape character. The route receptors assessed, including roads, railways, and core paths, revealed that six of the eleven core paths—specifically 312, 309, 285, 311, 313, and 259—along with the Annandale Way recreational route, major roads (A74, A709, B723, B7076, B7068, B7020), and the West Coast Mainline railway, are in close proximity to the proposed development. As a result, these routes have the potential to experience significant effects due to their location relative to the Proposed Development. Additional potential visual effects include aviation lighting. As the turbines exceed 150m in height, aviation lighting is required. It is assumed that all turbines will have		

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			red aviation lights operating at 2000cd when visibility is less than 5km and dimmed to 200cd when visibility is greater than 5km. In a worst-case scenario, the assessment assumes the lighting will always be visible although in reality factors such as weather conditions, terrain and ambient light sources would often reduce their perceived impact.		
Ornithology	NatureScot Royal Society for the Protection of Birds Dumfries and Galloway Raptor Study Group	Chapter 7	The assessment considered the various potential impacts from the construction, operation and decommissioning of the Proposed Development, and evaluated the significance of these impacts on the identified key species of interest in the context of their conservation value, sensitivity to wind farm development and the scale of the potential effects. Direct loss of bird habitat through construction of the new access track Disturbance of birds during construction and operation	Avoidance of more sensitive habitats in design process Development and implementation of BBPP, to include pre-construction survey checks; if present avoid disturbing activity in proximity with species-specific buffer zone implemented. Pre-construction survey and active nests avoided.	Non-significant loss of a small amount of upland moorland habitat to the proposed development, and a non-significant risk of disturbance and collision. Using evidence from existing wind farms, it is considered unlikely that there will be any long-term impact on the integrity of the study area's ornithological features, or the

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			Collision risk to birds during operation.		conservation status of the species found here.
Ecology	North Milk Community Council Scottish Forestry The Galloway Fisheries Trust Fisheries Management Scotland NatureScot SEPA	Chapter 8	Marsh Fritillary Butterfly - Loss of suitable marsh fritillary habitat & potential loss of larval webs / food plant. - Disturbance during construction phase Fen – Basin Mire - Indirect hydrological effects Noctule Bats - Loss or disturbance to commuting route during the operational phase of the proposed wind farm.	Appointment of ECoW to monitor objectives of the SPP, CMS and BHMP. Avoidance of basin mire and core Marsh Fritillary butterfly habitat during construction / micro-siting where possible. Timing of site preparatory works and demarcation of working zones within suitable marsh fritillary habitat. Restoration and enhancement of suitable marsh fritillary habitat. Increase marsh fritillary habitat & food plant density. Connect fragmented areas of suitable habitat across Proposed Development area.	Positive effect. (Moderate/Significant) Increased habitat within the Site range and quality within the Site could increase the resilience of the species. No negative significant effects.

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				Adoption of pollution prevention measures (see Chapter 9 Hydrology, Geology and Hydrogeological Assessment)	
				Design of infrastructure (access road to west) to maintain hydrological connectivity between M10 and surrounding habitat, through the use of cross drains and/or waterbars	
				Best practice during design of watercourse crossings	
				50 m buffer maintained between proposed infrastructure and watercourses where possible.	
				Mitigation by design, including Use of existing access tracks where possible to minimise land take and impacts on habitats.	
				Best practice measures during construction.	

Topic	Consultees	EIAR Reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
				Turbine layout and adoption of calculated bat buffers for all turbine locations for both woodland and watercourse features. Vegetation management throughout operation period to retain open ground habitat. Targeted mitigation including: Adoption of a curtailment scheme for Turbine 6 in the Autumn period (September – November)	
Hydrology, Hydrogeology & Geology	Energy Consents Unit (ECU) SEPA Galloway Fisheries Trust Scottish Water	Chapter 9	The assessment considered the various potential impacts from the construction, operation and decommissioning of the Proposed Development, and evaluated the significance of these impacts on the identified receptors in the context of their sensitivity to the Proposed Development and the scale of the potential effects.	Embedded mitigation and best practice measures are incorporated into the design. These include water quality monitoring, buffers to watercourses and a site-specific CEMP to ensure effective monitoring and compliance. An outline Soil and Peat Management	No significant effects

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			A number of flush habitats may be partially supported by groundwater, and without appropriate safeguards, could be affected by the Proposed Development.	Plan (SPMP) has been prepared to accompany the EIAR (Technical Appendix 9.5)	
Noise & Vibration	Dumfries & Galloway Council North Milk Community Council Defence Infrastructure Organisation Energy Consents Unit (ECU)	Chapter 10	The operational noise assessment for the wind turbines has been undertaken according to ETSU-R-97 and the Institute of Acoustics Good Practice Guide. Predicted operational wind farm noise levels are very low and meet the applicable limits. Noise from the operation of the proposed BESS will also be insignificant. A fixed noise limit has been proposed in line with the guidance in BS4142:2014. Noise during construction (and decommissioning) will be insignificant for activity on the main wind farm site. Some audible noise will occur from the transportation of construction material and wind farm components. A CEMP will be prepared. This will include details of	Wind farm noise: The manufacturer of the wind turbines procured for the site will be required to provide a warranty to ensure sound power levels will not exceed a certain value and that tones are also limited. There is no requirement for further mitigation. BESS: No mitigation is proposed at present although the units to be provided must meet the proposed 35 dB LAeq noise limit.	It is possible that turbine noise will be just audible under certain downwind conditions but there will be no residual significant effects .

Topic	Consultees	EIAR Reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
			measures to control noise and vibration from construction.		
Cultural Heritage	Historic Environment Scotland Dumfries & Galloway Council	Chapter 11	The Site is considered to have high potential for unknown subsurface archaeological remains of all periods, and there could be direct physical construction impacts on unknown heritage assets within the Site. The assessment of archaeological potential has identified that any remains may be of up to high importance, and if discovered during construction phase groundworks, this may result in a construction-phase physical impact of up to high magnitude. Without mitigation, any adverse effect resulting from a physical impact upon unexpected archaeological remains discovered during construction-phase may be of up to Major Significance. No operational phase impacts on the cultural significance of any other	A programme of archaeological monitoring and reporting will be required. The full scope and nature of these works will be outlined in a Written Scheme of Investigation (WSI) and agreed with Dumfries and Galloway Council in advance of construction.	No Significant effects

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			heritage asset as a result of change through their settings are predicted.		
Traffic & Transport	Network Rail Traffic Scotland	Chapter 12	The Traffic and Transport chapter assessed the existing transport network and evaluated the extent of change that would occur on the public roads and routes designated for transporting the turbine components. The study area was determined based on the location of the proposed development's access point and the public road routes required to reach it. It is predicted that there would be an increase of vehicle congestion but overall, after mitigation the effects would remain moderate. However, The C81A has no pedestrian footways, but a nearby church and recreational users may generate some pedestrian activity. Due to the major increase in traffic and the moderate sensitivity of the route, the impact on pedestrian delay and amenity is considered	The assessment concludes that, with an embedded Construction Traffic Management Plan (CTMP), there will be no significant traffic effects associated with the Proposed Development. A Planning Condition will likely be applied to any approval for the Proposed Development, requiring the CTMP to be prepared and approved by Dumfries and Galloway Council prior to commencement of construction works.	No significant effects

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			significant on this road and requires mitigation.		
Socioeconomics, Tourism & Recreation	DGC North Milk Community Council	Chapter 13	The spatial scope of the socio-economic effects is defined by the study areas of Dumfries and Galloway Council Area and Scotland, while the temporal scope encompasses the development, construction, operational, and maintenance phases. The assessment of tourism and recreation effects is specifically focused on the operational phase of the Proposed Development. Minor beneficial effects on the local economy are predicted and no significant effects on tourism or recreation are expected.	The Applicant will host “Meet the Buyer” events that allow local firms to bid for different aspects of construction, such as foundation laying and electrical works. As the planning of the Proposed Development is underway, there have been positive financial and economic effects to local and national business that includes a range of planning, engineering and environmental services.	No significant effects.
Aviation & Radar	NATS Safeguarding Defence Infrastructure Organisation	Chapter 14	Up to four turbines are identified as likely to be detectable by the NATS En Route Lowther Hill radar, with potential to generate false plots and reduce the probability of detection of real aircraft targets in the airspace above the Proposed Development.	The Applicant will enter a commercial agreement with NATS En Route to implement technical mitigation measures on the Lowther Hill radar.	Residual effects on the Lowther Hill radar is assessed as having minor significance.

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	Ministry of Defence		The Proposed Development was also found to potentially impact on military low flying within the Low Flying Area (LFA) 20T and Allocated Region (AR) 2B.	Selected turbines will be fitted with steady state visible lights, and all turbines with infra-red lights. Aviation authorities will be notified of the Proposed Development prior to construction.	Residual effects on military low flying are assessed as having minor significance.
Other Issues		Chapter 15	Ice throw, shadow flicker and impacts on Eskdalemuir Seismic Array were identified as potential further issues arising from the Proposed Development. Ice throw can occur under certain conditions and pose a hazard to people or property within or in proximity to the site. Ten properties were identified as being at risk of being affected by shadow flicker effects caused by the Proposed Development. These were assessed further, and no significant	Ice throw: site design ensures that turbines are located as far from people, roads and public spaces as practicable. Good practice site management such as visual warning signs and restricting access to turbines where ice is present on the blades can reduce the risks to visitors to the site. Additionally, sensor and control systems to detect ice or likely ice and shut down turbines accordingly may be implemented.	Ice throw: no significant residual effects. Shadow flicker: no predicted residual effects.

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			shadow flicker effects are expected at any property.	Shadow flicker: no mitigation required, however the Proposed Development will be monitored and any unexpected shadow flicker effects addressed if necessary.	
			The Proposed Development lies within the 50km Eskdalemuir consultation zone, around 20km from the Eskdalemuir Seismic Array. The modelling confirmed that Balgray remains within the MOD's cumulative limit under all Seismic Impact Limit queue scenarios provided that standard monitoring and turbine selection strategies are adopted.	Eskdalemuir Seismic Array; standard monitoring and turbine selection strategies will be adopted to ensure that Balgray remains within limits.	

16.2. Synergistic Effects

16.2.1. An assessment of synergistic effects ensures that the assessments provided in the EIAR for each topic are not considered in isolation. The need to consider synergistic effects has been incorporated into the project from the outset including during the design process where design/layout and embedded decisions were made with the involvement of the entire project team.

16.2.2. Notable overlaps were identified between:

- Ecology, Hydrology
- Landscape and Visual and Cultural Heritage (setting)
- Landscape and Visual, Noise, Shadow Flicker, Traffic and Transport

It is acknowledged that there are also some potential overlaps between these groupings. This assessment considers the potential synergistic effect of related residual effects during construction, decommissioning and operation of the Proposed Development. A synergistic effect during decommissioning is considered to be of similar or less significance than that created during construction and therefore they are discussed together below.

16.3. Construction and Decommissioning

16.3.1. During the construction and decommissioning phases, potential adverse synergistic effects are largely limited to the Site where there will be heavy plant operations, earth works and vehicle movements. These could result in potential synergistic effects upon physical and biological receptors including where there are overlaps between ecology, hydrology and hydrogeology. In addition, there is scope for impacts to be encountered by local residents through, for example, disruption to local roads as a result of construction traffic. These effects would be temporary in nature, will be managed through a CEMP, TMP and/or Decommissioning Plan. All of these have been included as embedded mitigation measures from the outset and in isolation have been assessed in the EIAR as not significant. It is also proposed as part of the embedded mitigation measures in this process that these potential effects can also be monitored by an ECoW and/or Planning Monitoring Officer if required through a planning condition.

16.3.2. The continuation of existing Community Liaison arrangements with local communities and nearby residents will also allow information on the construction process to flow not only from the construction team to the local community but also from the community to the construction team.

- 16.3.3. With the inclusion of these embedded mitigation measures, the synergistic effects during construction and decommissioning phases are considered not significant.

16.4. Operation

- 16.4.1. Potential synergistic effects during the operational phase relate primarily to overlaps between physical and human receptors and are largely limited to areas which are within or close to the Site where there may be a combination of potential visual, noise and shadow flicker effects. The EIAR predicts that there are no significant adverse effects in isolation for noise and shadow flicker but there may be potential significant adverse visual effects within 6km of the Site.
- 16.4.2. One additional synergistic effect arising from the Proposed Development is the potential to deliver ecological and hydrological enhancements through positive habitat management in and around wetland habitats with a view to enhancing habitat for a population of Marsh Fritillary butterfly which has been found on site, in addition to peatland restoration and providing opportunities for breeding otter. This synergistic effect is considered to be positive.

16.5. Conclusion

- 16.5.1. This chapter of the EIAR summarises the potential effects of the Proposed Development as well as potential synergistic effects which consider such effects in combination. Following the implementation of mitigation, potential significant adverse effects are restricted to isolated landscape and visual effects upon limited receptors within close proximity of the Proposed Development as noted in Table 16.1; effects which are commonly associated with wind farms and should be duly considered by the determining authority in a decision that is balanced with the increase in renewable sourced electricity which the Proposed Development provides.



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