

# Chapter 15

## Synergistic Effects, Summary of Mitigation and Residual Effects

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## List of Abbreviations

Abbreviation	Description
ACoW	Archaeological Clerk of Works
BHS	British Horse Society
CAA	Civil Aviation Authority
CEMP	Construction Environment Management Plan
DGC	Dumfries & Galloway Council
DGCAS	Dumfries and Galloway Council Archaeological Service
FLS	Forestry and Land Scotland
FMS	Fisheries Management Scotland
GA	Glasgow Airport
GPA	Glasgow Prestwick Airport
HES	Historic Environment Scotland
HMP	Habitat Management Plan
IEF	Important Ecological Feature
IOF	Important Ornithological Feature
JRC	Joint Radio Company
LCT	Landscape Capacity Type
LDSFB	Local District Salmon Fisheries Board
MCoS	Mountaineering Council of Scotland
MOD	Ministry of Defence

Abbreviation	Description
MSS	Marine Scotland Science
NATS	National Air Traffic Services Ltd.
NERL	NATS En Route Ltd
PPIP	Pollution Prevention Incident Plan
RSA	Regional Scenic Area
RSPB	Royal Society for Protection of Birds
SEPA	Scottish Environment Protection Agency
SF	Scottish Forestry
SLA	Scenic Landscape Area
SLC	South Lanarkshire Council
SPP	Species Protection Plan
SUW	Southern Upland Way
SW	Scottish Water
TS	Transport Scotland
UXO	Unexploded Ordnance
VS	VisitScotland
WoSAS	West of Scotland Archaeology Service
WSI	Written Scheme of Investigation

## 15.1 INTRODUCTION

15.1.1 This chapter of the EIAR presents a summary of the topics scoped for the EIA, the consultees which were consulted/responded during the EIA, where in the EIAR these responses have been addressed if applicable, the EIA results where these are potentially significant, the mitigation proposed and the residual effects. Synergistic effects are potential effects which may be caused through a combination of effects from different topics and these are assessed in section 15.2 below.

Table 15.1: Summary of Effects, Mitigation and Residual Effects

Topic	Consultees	EIAR reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
Carbon Balance	SEPA	Chapter 4	Peatland is an important carbon store and the Proposed Development will have an impact. A carbon balance assessment report has been produced and SEPA’s Carbon Calculator completed, to determine the carbon payback time for the Proposed Development (see EIAR Technical Appendix 4 for full details). The results from the carbon calculator reveal that the Proposed Development would have effectively paid back its expected carbon debt from manufacture, construction, impact on habitat and decommissioning within 1.7 years, if it replaced the fossil fuel electricity generation method. Following the expected ~33 years generation of carbon-free renewable electricity, it is calculated that the Proposed Development will result in over 3,743,124 tonnes of CO <sub>2</sub> emission savings when replacing fossil fuel electricity generation.	n/a – As the negative payback period represents approximately 6% of the operational period and the positive contribution is 94%, it is possible to conclude that the positive contribution is statistically significant. The Proposed Development therefore illustrates a <b>significantly positive net</b> impact in terms of its contribution towards the reduction of greenhouse gas emissions from energy production.	Positive significant effect.
Landscape & Visual	SLC DGC NatureScot ScotWays	Chapter 5	<p>The Proposed Development is located within 2 LCT (177 and 217). These LCT within the Proposed Development Area will experience significant effects upon landscape due to the nature of change in accommodating onshore wind turbines.</p> <p>Of the 8 LCT within and surrounding the Proposed Development Area, 3 are assessed to experience some localised significant landscape and cumulative effects; LCT 177, 209 and 217. However, overall these would <b>not be significantly affected</b>.</p> <p>Of the 4 landscape designations assessed, 2 are predicted to receive significant effects; the Leadhills, &amp; the Lowther Hills SLA and Thornhill Uplands RSA. The Proposed Development would be located within both designations and it is predicted that the special qualities would be affected within the Proposed Development Area and within the surrounding area extending to 8 km. Overall, there would <b>not be a significant effect</b> upon these designations given the limited extent.</p> <p>Of 18 viewpoints used for LVIA, 12 are predicted to receive significant effects. These include locations extending up to 9.5 km from the Proposed Development that obtain open views towards the proposed turbines. This would include nearby hill tops and views from within the valley containing the Daer Water to the north west of the Proposed Development. From these locations, the proposed turbines would be viewed in conjunction with Clyde or Harestanes/Minnygap developments and extend turbines into the area between the operational sites.</p> <p>Settlements assessed in the LVIA have been concluded to receive <b>no significant effects</b>.</p> <p>One route receptor has been assessed as receiving significant effects; the SUW which passes through the northern section of the Proposed Development Area. This route would receive close open views towards the Proposed Development which would occupy a considerable part of the view but for a relatively short section of the overall length of the walk.</p> <p>All five of the residential receptors (4 of which are financially involved with the Proposed Development) assessed are predicted to receive <b>a significant visual effect</b> of the proposed turbines. This would be due to the openness of the view obtained from each property within 2 km of the proposed turbines and supporting infrastructure would be visible. Potential visual effects from visible aviation warning lighting have been assessed to be <b>not significant</b>.</p>	<p>The Proposed Development has been through an iterative design process to establish a layout which aims to balance impacts upon various factors including the landscape and visual receptors, with a project capable of generating enough renewable electricity to be financially viable, meet renewable energy and net zero targets and offer electricity at competitive rates to the consumer. During the design process, residential receptors and the SUW were a key consideration and turbines were positioned to create a buffer and reduce the vertical extent to avoid being overbearing within the view. Establishing a sufficient gap from other wind farms was a factor to prevent amalgamation with other nearby cumulative sites.</p> <p>Many elements of infrastructure including the temporary construction compound, substation, control building, energy storage, have been located on the east away from the residential receptors and access tracks designed to avoid ridgelines, steep slopes and large areas of cut and fill as much as possible.</p> <p>SLC Wind Capacity Study identified several sensitive VP including Queensbury Hill which was a key summit view and a sufficient distance was maintained and the layout designed to reduce vertical extent and stacking of turbines from this view.</p> <p>Higher ground surrounding the site restricts the extent of theoretical visibility.</p>	The LVIA has concluded that there would be several significant effects to both landscape and visual receptors but these would affect a relatively small number of landscape and visual receptors overall. These are limited to isolated parts of the SUW, limited number of residential properties, surrounding hilltops and landscape and visual receptors in the upland glen within the vicinity of Watermeetings.

Topic	Consultees	EIAR reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
Ecology	NatureScot SLC MS RSPB FMS LDSFB	Chapter 6	<p>It is predicted that unmitigated the Proposed Development would have no significant effects on any IEFs but will have a moderate negative (not significant) effect on common and soprano pipistrelle bats and a low negative (not significant) effect on other bat species and on blanket and modified bog.</p> <p>The cumulative effect upon bats is assessed to be not significant.</p> <p>With the restoration of bog habitats as part of HMPs for the Proposed Development and Clyde Wind Farm Extension there will be an overall positive regional impact on blanket bog. An additional 153 ha of bog will be restored above the extent of bog habitat loss. This is aligned with the principle of Biodiversity Net Gain.</p>	<p>A reduced lighting scheme limiting the number of turbines lit with visible lights and the type of light to be used has been agreed with CAA.</p> <p><b>No significant effects to mitigate.</b></p> <p>Additional controls through appointment of an ECoW during construction and adherence to CEMP and an SPP.</p> <p><b>Enhancement</b> through HMP to restore modified and damaged bog habitats.</p>	Not significant.
Ornithology	NatureScot RSPB	Chapter 7	<p>The Proposed Development is assessed to have no significant effects on all of the IOFs recorded.</p> <p>No significant cumulative disturbance/displacement or collision effects have been concluded for any IOFs.</p>	<p><b>No significant effects to mitigate.</b></p> <p>Additional controls through appointment of an ECoW during construction and adherence to a CEMP and an SPP.</p> <p><b>Enhancement</b> through HMP to restore modified and damaged bog habitats thus positively impacting breeding upland birds.</p>	Not significant.
Hydrology, Geology & Hydrogeology	DGC SLC MSS RSPB SW SEPA	Chapter 8	<p>The potential effects on the hydrological, geological and hydrogeological environment have considered, pollution incidents, erosion and sedimentation, changes in water quality, changes to water resources i.e. Daer Reservoir and private water supplies, modification of surface water and groundwater flows, modification of natural drainage patterns, impediments to flow and flood risk, peat instability and compaction of soils.</p> <p>Following the identification and assessment of the key receptors, taking into account the potential effects listed above, mitigation and good practice measures has been incorporated into the design, including extensive buffer areas. In addition, a PPIP and a site-specific CEMP as well as detailed design of infrastructure and associated mitigation will be implemented to protect the groundwater and surface water resources from pollution and minimise changes to the hydrological environment.</p> <p>The impact assessment has taken into account the hydrological regime, highlighting that the principal effects will occur during the construction phase. Following the successful design and implementation of mitigation measures the significance of construction effects on all identified receptors are not defined as significant. The assessment of predicted operational effects has determined that the significance of effects on all receptors to be of no significance.</p>	<p>Embedded mitigation through site design, appointment of an ECoW during construction and adherence to CEMP and PPIP.</p> <p><b>Enhancement</b> through HMP to improve natural flood management.</p>	Not significant.
Cultural Heritage	HES SLC DGC DGCAS WoSAS	Chapter 9	<p>Potential direct effects, in the absence of mitigation, have been predicted on five heritage assets arising from construction of the Proposed Development. Four of these, on assets of local heritage value and low sensitivity, are assessed, in the absence of mitigation, as being minor and not significant but avoidable. One other impact, on an asset of no intrinsic archaeological or heritage value and negligible sensitivity is assessed as being not significant and requiring no mitigation.</p> <p>The assessment concludes that in no case would the settings of any of identified assets be significantly adversely affected by the construction and operation of the Proposed Development.</p> <p>The cumulative effect of the Proposed Development in combination with other existing and proposed wind energy developments in the vicinity is considered to be of no more than minor adverse and not significant in terms of the EIA regulations.</p>	<p><b>No significant effects to mitigate.</b> Additional controls through producing WSI and appointing an ACoW to ensure avoidance, reduction and offsetting of potential effects on heritage assets.</p>	Not significant.
Noise	SLC DGC	Chapter 10	<p>An operational noise assessment has been undertaken by comparing predicted noise levels for a candidate turbine for the Proposed Development with the noise limits derived from baseline noise measurements</p>	<p><b>No significant effects to mitigate.</b></p>	Not significant.

Topic	Consultees	EIAR reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
			<p>carried out at a number of properties in the vicinity of the Proposed Development. Predicted noise levels are below these noise limits under all wind speed and wind direction conditions, and therefore the operational noise impacts are not significant.</p> <p>Noise from traffic during the construction and decommissioning phases were assessed against the noise limits set out in BS 5228. Noise from construction activities will be below this noise limit and therefore the noise from such activities is not significant.</p> <p>The increase in noise levels due to construction traffic accessing the site was assessed by comparing the noise levels generated including the construction traffic with the predicted road traffic noise levels in the absence of construction activities. The predicted increase is less than 1 dB and therefore there will be no perceptible impact.</p> <p>The cumulative operational noise assessment shows that there are no significant cumulative noise impacts predicted, and no significant cumulative construction noise impacts are expected.</p>		
Traffic and Transport	DGC SLC TS	Chapter 11	<p>The Proposed Development would lead to a temporary increase in traffic volumes on the study road network during the construction phase and no significant capacity issues are expected.</p> <p>A review of the road network has been undertaken to assess the feasibility of transporting the candidate turbines to the site and no significant issues have been noted.</p>	<b>No significant effects to mitigate.</b> Additional controls through TMP.	Not significant.
Forestry	FLS SF	Chapter 12	Whilst there is no forestry on the ground where wind turbines are proposed, there is commercial forestry along the proposed access from the public road. There would be a net loss of woodland area of 5.13 ha to accommodate the Proposed Development (0.089% of the total study area).	Additional controls through compliance with Scottish Government's Control of Woodland Removal Policy. Compensation planting would be required to mitigate for the loss of woodland area (5.13 ha)	Not significant.
Footpaths	SLC DGC ScotWays	Chapter 13	The SUW passes through the northern part of the Proposed Development Area and crosses the proposed access from the public road. This section is an existing track and therefore no new effects other than temporary management during construction. The Proposed Development has been designed to avoid new direct effects on the SUW and a topple distance buffer of 180 m applied to turbine locations from the SUW.	<b>No significant effects to mitigate.</b> Additional controls through management of access on SUW during construction. <b>Enhancement</b> of the SUW has been proposed by the Applicant through upgrades to be agreed with stakeholders.	Not significant.
Telecommunications	Openreach JRC	Chapter 13	There remains one micropath link known to the Applicant which bisects the Proposed Development Area. All proposed turbines are greater than 200 m away other than one which is more than 100 m from the micropath. The stakeholder was consulted but a response was not received to confirm the potential effect. It is considered that the Proposed Development would not affect the micropath's operation.	<b>No significant effects to mitigate.</b> Additional controls through pre-construction checks of microwave fixed links.	Not significant.
Public Water Supply	SW	Chapter 13	The Proposed Development is within the catchment for the Dear Reservoir. The stakeholder has been consulted throughout the process and is also a landowner which has experience of such projects in similar settings elsewhere. Embedded mitigation through following best practice, SW's guidance and a PPIP will ensure there are no significant adverse effects on public water supply.	<b>No significant effects to mitigate.</b> Additional controls through PPIP, CEMP.	Not significant.
Underground Assets		Chapter 13	A high-pressure gas pipeline runs underground in the northern tip of the Proposed Development Area. Direct effects have been avoided and proposed turbines located at least 180 m away.	<b>No significant effects to mitigate.</b> Additional controls through pre-construction checks of underground assets.	Not significant.
Unexploded Ordnance		Chapter 13	A desk-based survey indicated potential risk of UXO in the Proposed Development Area. Surveys for UXO undertaken during other survey work resulted in no UXO being found.	<b>No significant effects to mitigate.</b> Additional controls through pre-construction checks for UXO.	Not significant.
Shadow Flicker		Chapter 13	There are 5 properties identified which, albeit at the periphery of, are within a zone whereby shadow flicker may be experienced under certain meteorological conditions. Four of these properties financially involved	<b>No significant effects to mitigate.</b>	Not significant.

Topic	Consultees	EIAR reference	Potential Significant Effects	Proposed Mitigation	Residual Effects
			with the Proposed Development. None of the identified properties have been assessed to experience shadow flicker beyond an acceptable threshold.		
Aviation - Radar	GA GPA MOD NERL	Chapter 13	The Proposed Development will affect the NERL radar at Lowther Hill.	NERL anticipate that new radar which will be in service by the end of 2021 would provide suitable mitigation for the Proposed Development. NERL has also confirmed that a planning condition is appropriate for the Proposed Development to ensure a Radar Mitigation Scheme is established.	Not significant
Aviation – Lighting	CAA MOD	Chapter 13	Owing to the proposed turbines being greater than 150 m in height, they require to be lit with visible aviation warning lighting according to current CAA guidance.  In addition, the MOD has requested infra-red lighting on proposed turbines for safety related to its low flying activities.	A reduced lighting scheme has been proposed which has been agreed with the CAA and addresses the MOD requirement.	Not significant.
Eskdalemuir Seismic Array	MOD	Chapter 13	The Proposed Development is approximately 29 km from this asset. Under methodology used by the MOD at present, the Proposed Development would exceed the allocated noise budget for the asset. However, a court ruling on 23 December 2020 quashed the MOD's current policy on allocating Eskdalemuir noise budget <sup>1</sup> and it is understood that the MOD will consult on a new approach.	A national working group is established which is investigating the methodology for assigning budget. It is expected that a solution can be attained before the Proposed Development is operational and therefore a suitably worded suspensive planning condition should be formed to ensure a scheme is agreed with MOD.	Not significant.
Socioeconomics	BHS DGC MCoS ScotWays SLC VS	Chapter 14	The Proposed Development has the potential to offer positive socioeconomic benefits nationally, regionally and locally.  The Proposed Development has the potential to create job opportunities throughout the construction and operational phases and contribute to meeting the goals of both SLC and DGC Regional Economic Strategies. As noted in Chapter 4: Climate Change, Legislative and Policy Context, it was estimated in 2015 that 58,500 jobs were supported by Scotland's low carbon and renewable energy sector and supply chain. Employment opportunities will be created during the lifecycle of the project in a relatively rural area and foster their diversification into new industries.  The Proposed Development will also help support community initiatives in the surrounding areas.  In the absence of the Proposed Development this opportunity would not be present to contribute to meeting carbon reduction and renewable energy generation targets set out in regional and national policy.  Furthermore, this opportunity would not be present to help meet the goals set out in community action plans or the opportunity to upgrade sections of the SUW.	<b>No significant effects to mitigate.</b> <b>Enhancement</b> of the SUW has been proposed by the Applicant through upgrades to be agreed with stakeholders.  Meet the Buyer Events will be held by the Applicant to promote opportunities for local businesses to be involved.	Not significant.

## 15.2 SYNERGISTIC EFFECTS

- 15.2.1 An assessment of synergistic effects ensures that the assessments provided in the EIAR for each topic are not considered in isolation. Chapters 6 and 7 of the EIAR assess the biological environment (Ecology and Ornithology). Chapters 5, 8, 9, 12 assess the physical environment (LVIA, Hydrology, Cultural Heritage, Forestry) and Chapters 10, 11, 13 and 14 assess population and human health (Noise, Traffic, Infrastructure and Aviation and Socioeconomics). It is acknowledged that there are also some potential overlaps between the physical environment and population and human health.
- 15.2.2 This assessment considers the potential synergistic effect of related residual effects during construction, operation, and decommissioning 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.

### Construction and Decommissioning

- 15.2.3 During the construction and decommissioning phases, potential adverse synergistic effects are limited to the Proposed Development Area where there will be heavy plant operations, earth works, forestry operations 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. These effects would be temporary in nature, will be managed through a CEMP, PPIP, TMP and Decommissioning Plan and in isolation have been assessed in the EIAR as not significant. These potential effects will also be monitored by an ECoW and if deemed necessary a Planning Monitoring Officer enforced through planning condition(s). Given the limited number and extent of receptors, the limited effects predicted and their temporary nature, the synergistic effects during construction and decommissioning phases are considered not significant.

### Operation

- 15.2.4 Potential synergistic effects during the operational phase relate primarily to overlaps between physical and human receptors and are limited to areas which are within or close to the Proposed Development Area where there may be a combination of potential visual, noise and shadow flicker effects.
- 15.2.5 The EIAR predicts that there are no significant adverse effects in isolation for noise, visual effects of aviation warning lighting and shadow flicker but there may be potential significant adverse visual effects of turbines upon 5 residential receptors and (users of) the SUW within 2 km of the Proposed Development. It is noted that 4 of the residential receptors are financially involved with the Proposed Development. With the addition of the Proposed Development, the residential receptors still have fields of view free from wind farm development. A combination of all these effects at once is not possible and in sequence would be very limited in occurrence and duration. It is not considered that the synergistic effects would become overbearing such that these places become unpleasant places to stay.
- 15.2.6 Potential visual effects upon the SUW are dependent upon the views of users as they pass the Proposed Development. Potential direct effects will be managed through siting, site management and signage. As neither the potential visual effects or direct effects will prevent use of the SUW in the long term, it is considered that the synergistic effects during construction and operation are not significant. Furthermore, the Applicant also proposes enhancement to the sections of the SUW which will improve public access in this regard. It is considered that the synergistic effects during operation are on balance positive.
- 15.2.7 The inclusion of habitat management proposed by the Applicant, which will restore degraded peat habitat shall also improve natural flood drainage and habitat for some breeding bird species, thus have a positive synergistic effect in this regard.

## 15.3 SUMMARY

- 15.3.1 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 primarily in the form of embedded mitigation in the siting and design of the proposal, 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 15.1 these are effects which are commonly associated with wind farms and in this regard need to be balanced against the benefits.
- 15.3.2 The Applicant has proposed enhancements including habitat management which will restore degraded peat habitat, improve natural flood drainage and improve habitat for some breeding bird species. The Applicant will fund upgrades to the SUW which will improve public access in the vicinity of the Proposed Development. The Proposed Development will provide socioeconomic benefits through continuing employment opportunities it has already provided at the planning stage throughout the lifetime of the project following consent. Local businesses will be encouraged to provide services through "Meet the Buyer Events" and the Proposed Development will progress the energy management programme of Scottish Water; a national utility. The Proposed Development will contribute towards meeting national renewable energy targets and have a significant positive effect in reducing carbon dioxide emissions to help reach the national carbon net zero target.

