



# **Limekiln Wind Farm**

## **Section 36C Variation Application**

**INFINERGY**

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## **Further Environmental Information**

Volume 1 : Written Statement

February 2022



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## CONTENTS

### VOLUME 1: MAIN TEXT

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1-4</b>
	<b>Background .....</b>	<b>1-4</b>
	<b>Purpose of this Further Environmental Information (FEI) Report .....</b>	<b>1-4</b>
	<b>Structure of Report .....</b>	<b>1-5</b>
	<b>Terminology .....</b>	<b>1-5</b>
	<b>Obtaining Further Information .....</b>	<b>1-5</b>
<b>2.</b>	<b>RELEVANT CONSULTEE COMMENTS .....</b>	<b>2-7</b>
<b>3.</b>	<b>DESCRIPTION OF THE REVISED CONSENTED DEVELOPMENT .....</b>	<b>3-9</b>
<b>4.</b>	<b>PLANNING CONSIDERATIONS .....</b>	<b>4-12</b>
<b>5.</b>	<b>NOISE .....</b>	<b>5-13</b>
<b>6.</b>	<b>SOCIO ECONOMICS .....</b>	<b>6-14</b>
	<b>Economic Effects .....</b>	<b>6-14</b>
	<b>Employment effects.....</b>	<b>6-14</b>
	<b>Conclusion .....</b>	<b>6-15</b>
<b>7.</b>	<b>TRAFFIC AND TRANSPORT .....</b>	<b>7-16</b>
<b>8.</b>	<b>CLIMATE CHANGE AND CARBON BALANCE .....</b>	<b>8-17</b>
<b>9.</b>	<b>LANDSCAPE AND VISUAL IMPACT ASSESSMENT .....</b>	<b>9-19</b>
	<b>Context to Assessment.....</b>	<b>9-19</b>
	<b>Proposed changes to the Revised Consented Development layout .....</b>	<b>9-20</b>
	<b>Preliminary assessment of the FEI layout.....</b>	<b>9-20</b>
	<b>Assessment of the visual effects from the 19 Turbine Revised Consented         Development .....</b>	<b>9-21</b>
	<b>Conclusions .....</b>	<b>9-25</b>
<b>10.</b>	<b>CULTURAL HERITAGE .....</b>	<b>10-27</b>

<b>11.</b>	<b>ECOLOGY .....</b>	<b>11-28</b>
11.1	Summary .....	11-28
11.2	Introduction .....	11-28
11.3	Baseline Conditions .....	11-29
11.4	Change in Effects.....	11-29
11.5	Operational Effects.....	11-31
11.6	Decommissioning Effects .....	11-31
11.7	Assessment of Cumulative Effects .....	11-31
11.8	Mitigation .....	11-32
11.9	Assessment of Residual Effects.....	11-32
11.10	Monitoring .....	11-32
<b>12.</b>	<b>ORNITHOLOGY .....</b>	<b>12-33</b>
	Introduction .....	12-33
	Change in Effects.....	12-33
	Summary of residual effects .....	12-33
	Statement of Significance .....	12-34
	Potential Effects on Special Protection Areas (SPAs) .....	12-34
	References.....	12-35
<b>13.</b>	<b>GEOLOGY, HYDROLOGY AND HYDROGEOLOGY .....</b>	<b>13-37</b>
	Summary .....	13-37
	Peat Management .....	13-37
<b>14.</b>	<b>FORESTRY .....</b>	<b>14-39</b>
<b>15.</b>	<b>INFRASTRUCTURE, SHADOW FLICKER AND HEALTH &amp; SAFETY .....</b>	<b>15-42</b>

## TABLES

Table 2.1: Consultation Responses Received in Relation to the 2021 EIA Report of Relevance to the FEI

Table 3.1 Summary of Key Changes between the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development

Table 3.2 Expected turbine grid references and maximum tip heights

Table 8.1 Revised Potential CO2 Savings and Electricity Generation

Table 8.2 Revised Payback in Years for Each Scenario Used in the Carbon Calculator

Table 9.1 Summary of significant visual effects reported in the 2021 EIA Report LVIA

Table 9.2 Revised assessment of receptors identified in Table 9.1, with T22 and T23 removed

Table 11.1 Predicted Construction Effects on Ecological Features

Table 11.2 Predicted Operational Effects on Ecological Features

Table 12.1 Collision risk estimates

Table 14.1 Felling Comparisons

Table 14.2 Replanting

Table 14.3 Felling and Replanting Area Comparison

## **VOLUME 2: FIGURES**

- 3.1 Revised Site Layout
- 9.1 Comparative Blade Tip ZTV comparing the 21 turbine EIAR and 19 turbine FEI layouts
- 9.2 Comparative 90-degree wirelines for all LVIA viewpoints illustrating the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development.
- 11.1 NVC Survey Results
- 11.2 Potential GWDTE Locations
- 11.3 Protected Species Results May 2021
- 14.1 Limekiln Wind Farm Felling Plan
- 14.2 Limekiln Wind Farm Restocking Plan

## **VOLUME 3: TECHNICAL APPENDICES**

- 3.1 Letter regarding Peat Slide Risk Assessment to Energy Consents Unit
- 3.2 Letter regarding ScotWays response to S36C Application
- 3.3 Letter regarding RSPB response to S36C Application
- 3.4 Updated Peat Management Plan

## 1. Introduction

### Background

1.1.1. Limekiln Wind Limited ('the Applicant') submitted an application to the Scottish Ministers under Section 36C of the Electricity Act 1989 (the 1989 Act) on 21 July 2021 (ECU application reference: ECU00003303). The application sought to vary the 2019 Consent for Limekiln Wind Farm by:

- Increasing the maximum tip height of the 21 consented turbines from 126 and 135 m to up to 149.9m.
- Rerouting certain access tracks;
- Removing one borrow pit;
- Increasing the period of consent from 30 to 40 years; and
- Relocating the construction compound and increase its size from 100m x 100m to 150 x 100m.
- Relocating five watercrossings and inserting two more;
- Increasing the size of the crane hardstandings from 40 m x 22 m to 40 m x 35 m; and
- Removing of permanent anemometer mast.

1.1.2. The consultation response received from The Highland Council (THC) and dated 14 December 2021 raised no objection to the application subject to the removal of two turbines (T22 and T23) from the application.

### Purpose of this Further Environmental Information (FEI) Report

1.1.3. To address THC's response to raise no objection subject to the removal of two turbines, the Applicant has submitted Further Environmental Information (FEI) in order that Scottish Ministers can reach a reasoned conclusion on the likely significant effects of the 19 Turbine Proposed Varied Development, with reference to schedule 4 of the EIA regulations and has complied with Reg 20 regarding publication.

1.1.4. The purpose of this report is to identify and assess the changes, if any, to the likely significant effects reported in the 2021 Environmental Impact Assessment (EIA) Report as a result of the removal of T22 and T23.

1.1.5. Chapter 2 of this FEI report summarises the relevant consultee comments in relation to the 2021 EIA Report and sets out the response and or amendments made in response to objections.

1.1.6. Chapter 3 of this FEI report details the changes from the 21 Turbine Revised Consented Development to the 19 Turbine Revised Consented Development. The assessment of environmental effects is presented in Chapters 5-15.

- 1.1.7. The information presented here is to supplement the information already provided in the 2021 EIA Report, and therefore should be read alongside the 2021 EIA Report. The conclusions of the 2021 EIA Report remain valid, except where otherwise stated within this report or accompanying Appendices.
- 1.1.8. In accordance with regulation 5(5) of the EIA regulations, this report has been prepared by competent experts. Each of the following chapters 4 – 15 has been produced with input from the original chapter authors responsible for the preparation of the 2021 EIA Report.

### **Structure of Report**

- 1.1.9. The structure of this FEI Report is as follows:
- Chapter 2: Summary and response to relevant consultation responses.
  - Chapter 3: Description of the Revised Consented Development provides an overview of the 19 Turbine Revised Consented Development and describes the amendments made.
  - Chapter 4: Planning Considerations
  - Chapters 5-15: Summary of Changes of Likely Significant Effects in relation to different subject areas and assesses any changes, if any, in the significance of effects between the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development.

### **Terminology**

- 1.1.10. The following terminology has been used throughout the FEI:
- 2019 Consented Development (development as consented in June 2019, and described within the 2017 Supplementary Information and 2016 Section 36C EIA)
  - 21 Turbine Revised Consented Development (development as described in the 2021 EIA report); and
  - 19 Turbines Revised Consented Development (amended development as set out in this FEI document).

### **Obtaining Further Information**

- 1.1.11. Limekiln Wind Farm has a dedicated website. Please visit online at [www.limekilnwindfarm.co.uk](http://www.limekilnwindfarm.co.uk) where you can find the following information:
- The Limekiln Wind Farm 2012 Environmental Statement;
  - The 2016 Consented Development Environmental Statement;
  - 2017 Supplementary Information; and

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- 2021 36C EIA Report and supporting documentation.



## 2. Relevant Consultee Comments

- 2.1.1. As noted in Section 1, this FEI report has been prepared in relation to the response from the Highland Council who raised no objection subject to the removal of two turbines from the application.
- 2.1.2. Clarifications and responses have been made related to submissions made by consultees in response to the 2021 EIA Report of relevance to the FEI.

**Table 2.1: Consultation Responses Received in Relation to the 2021 EIA Report of Relevance to the FEI**

Consultee	Summary of consultation response	Applicant response
Caithness West Community Council	Object to the application. They highlight the planning history of the development and the impact of the consented scheme. It raises particular concern with regard to visual impact, residential amenity, impact on peat, proximity of the turbines to the core path, safety of turbines, impacts of turbines in the environment. It also raises concerns over the applicant's consideration of economic viability of the development.	Concerns relating to peat, core paths, other environmental impacts are covered in individual assessments/in responses below.
Ironside Farrar for Scottish Ministers	Requested minor revisions to the Peat Landslide Hazard Risk assessment	Response set out in letter dated 5 <sup>th</sup> November 2021 on behalf of (Appendix 2.1)
ScotWays	Object to the application. Maintain concern over the proximity of the turbines to core path CA11.03.	Clarification was provided by the Applicant on 4th October 2021 confirming the turbines within 149.9m of the core path. It was noted that while Wales offers advisory guidance, at present there are no legal requirements in Scotland regarding separation distances between turbines and core paths. Windfarm access tracks often draw in members of the public for recreational purposes including running, biking and horse-riding. The Limekiln Wind Farm access track would become an extension of the core path CA11.03 offering additional route options around the Limekiln Wind Farm site (Appendix 2.2).
RSPB	Object to the application.  Concerns are raised over: <ul style="list-style-type: none"> <li>Impact of Golden Eagles, Greylag Goose and Common Scooter; and</li> <li>Impact on peat as a result of modified access tracks.</li> </ul>	Letter provided on 5th November 2021 responded to the Ornithological issues raised in the RSPB concerns and is included at Appendix 2.3.  Responses relating to Peat are contained within the responses to SEPA below and within the updated Peat Management Plan (Appendix 13.1).



Consultee	Summary of consultation response	Applicant response
	It is generally supportive of the habitat management plan, but recommends enhancements, including provision of additional peatland restoration, compensatory planting, new native woodland planting and sward management.	The comments and recommendations relating to the Habitat Management Plan (HMP) are noted. A fully revised HMP will be produced in relation to the comments noted. It is expected that an HMP will be required as part of the planning conditions and the version that has already been submitted to discharge the conditions for the consented scheme would be revised and submitted again.
SEPA	<p>Object to the application: Concerns over impacts on peat and carbon loss. Noted that objection will be withdrawn if development is amended to reduce volume of peat disturbed, or significantly enhanced restoration proposals are included to mitigate.</p> <p>Requested an update to Habitat Management Plan</p>	<p>The removal of 2 turbines from the scheme in addition to further amends are set out in section 3.</p> <p>Following further dialogue between the applicant and SEPA, The Peat Management Plan has been updated to reflect the outcomes of these discussions and is included at Appendix 13.1.</p> <p>The comments and recommendations relating to the Habitat Management Plan are noted. A fully revised HMP will be produced in relation to the comments noted. It is expected that an HMP will be required as part of the planning conditions and the version that has already been submitted to discharge the conditions for the consented scheme would be revised and submitted again.</p>

### 3. Description of the Revised Consented Development

3.1.1. The Revised Consented Development would comprise up to 19 turbines, associated infrastructure and ancillary development. Figure 3.1 shows the layout amendment from the 21 Turbine Revised Consented Development.

3.1.2. Table 3.1 below provides a summary of the changes between the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development.

**Table 3.1 Summary of Key Changes between the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development**

	<b>21 Turbine Revised Consented Development</b>	<b>19 Turbine Revised Consented Development</b>	<b>Summary of Key Change</b>
Maximum No. of Turbines	21	19	Reduction of two turbines
Maximum Turbine tip height	149.9 m	149.9 m	No change
Turbine Foundation (per turbine)	645 m <sup>3</sup>	645 m <sup>3</sup>	Reduction of two turbine foundations
Crane Hardstandings (per turbine)	40 m x 35 m (1,400 m <sup>2</sup> )	40 m x 35 m (1,400 m <sup>2</sup> )	Reduction of two crane hardstandings
On-site access track length	12.15 km*	12.15 km*	No Change
Floating track length	3.7km	5.4km	Extended use of floating road where feasible in peat depths between 0.5m and 1m deep
Temporary Construction Compound	Located to the north west of T22, 100 m x 150 m (15,000 m <sup>2</sup> )	Located to the north west of T22, 100 m x 150 m (15,000 m <sup>2</sup> )	No change
Watercourse crossings	7	7	No Change
Borrow Pits	1	1	No Change
Substation	1	1	No Change
Permanent Anemometer mast	0	0	No Change
Operational lifetime	40 years	40 years	No Change

\* Access track lengths do not include the sections already consented and constructed. A 3.1km section of access track has already been constructed.

3.1.3. The proposed turbine locations for the remaining 19 turbines remain identical to the positions provided in the 2021 EIA Report. Table 3.2 specifies the expected NGR for each of the proposed turbines.

**Table 3.2 Expected turbine grid references and maximum tip heights**

<b>Turbine no.</b>	<b>Grid ref.</b>	<b>19 Turbine Revised Consented Development Maximum turbine tip height (m)</b>
25	NC 96988 61338	149.9
26	NC 97552 61453	149.9
27	NC 98118 61260	149.9
30	NC 99161 61256	149.9
31	NC 97093 60848	149.9
32	NC 97731 60965	149.9
33	NC 98265 60800	149.9
35	NC 98659 61115	149.9
36	NC 99273 60738	149.9
42	NC 97270 60386	149.9
43	NC 97751 60475	149.9
44	NC 98367 60322	149.9
51	NC 98779 60595	149.9
54	NC 97607 60006	149.9
55	NC 98078 59956	149.9
56	NC 98809 60117	149.9
57	NC 99328 60196	149.9
60	NC 98510 59713	149.9
61	NC 99015 59669	149.9

3.1.4. In addition to the removal of two turbines, a small number of associated changes are proposed in response to comments received from SEPA and subsequent dialogue:

- Reduction of each blade laydown area from 797.5m<sup>2</sup> to 435m<sup>2</sup> by the use of three “fingers” of hardstanding rather full hardstanding; and
- Replacement of a 2.9km of cut access track with floating access track compared to the consented scheme (i.e. 5.4km compared to 2.5km).

3.1.5. These changes will achieve a reduction of 14,949m<sup>3</sup> of excavated peat compared to the 21 Turbine Revised Consented Development. This is an increase of 61m<sup>3</sup> compared to the 2019 Consented Development.

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- 3.1.6. In terms of the proposed re-use of peat. All proposed reinstatement will be to a maximum depth of 0.5m with the exception of the borrow pit (which will be restored to an average depth of approximately 1.22m) and temporary infrastructure where peat will be reinstated to its current depth (i.e. blade laydown areas, cable trenches and the temporary construction compound).
- 3.1.7. All other components of the Revised Proposed Development remain as described in Chapter 3 of the 2021 EIA Report.

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## **4. Planning considerations**

- 4.1.1. There have been a number of developments in terms of renewable energy policy and national planning policy since the 2021 EIA Report was submitted, therefore the opportunity has been taken to update the policy position relevant to the determination of the application. In this regard, a Planning Statement Update has been prepared. This is provided as a Supporting Document to the FEI.

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## **5. Noise**

- 5.1.1. Chapter 17: Noise of the 2021 EIA Report concluded that predicted operational noise levels from the 21 Turbine Revised Consented Development would meet the noise limits applied to the 2019 Consented Development. The removal of two turbines is predicted to reduce the overall noise associated with the 19 Turbine Revised Consented Development, and as such the conclusions of the 2021 EIA Report remain unchanged.
- 5.1.2. Predicted cumulative noise levels from the 21 Turbine Revised Consented Development acting with the proposed Limekiln Wind Farm Extension also meet the noise limits applied to the 2019 Consented Development, and cumulative operational noise levels including other nearby consented wind farms will also remain within normal ETSU-R-97 limits as detailed in the 2021 EIA Report.

## 6. Socio Economics

- 6.1.1. 'Chapter 6: Socio economics, Tourism and recreation, and Land Use' in the 2021 EIA Report assessed the potential effects on population, health, employment and economy, tourism and recreation and land use as a result of the proposed variation to the 2019 Consented Development. The report found that there would be no significant effects predicted in an EIA context for population, health or tourism and recreation and land use from the construction, operation, and decommissioning phases of the Revised Consented Development. The assessment of economic and employment effects found that that there would be significant beneficial effects at a local (Council ward) level, and that there would be beneficial effects, which were not significant, at a regional and national level.
- 6.1.2. The reduction in turbines from 21 to 19 would not have any impact on the assessments on population, health, tourism recreation or land use, but in order to assess any change to the likely significant effect of removing two turbines on the local economy, consideration has been given to the economic and employment implications of the reduced scheme.

### Economic Effects

- 6.1.3. The Review of the Generation Costs and Deployment Potential of Renewable Energy Technologies in the UK report (DECC, 2011) estimates the total capital cost of a wind farm greater than 5MW constructed in 2015 to be between £1.17m and £1.80m per MW installed. The reduction to 19 turbines with a power output of 79.8MW, would give an estimated capital cost of between £93m and £143m. For comparison the 21 turbines capital cost was estimated to be between £103m and £158.7m.
- 6.1.4. The Onshore Wind: Economic Impacts in 2014 report (Renewables UK, 2015) states that 12% of the total construction costs of an onshore wind farm (i.e., including turbine manufacturing, balance of plant and grid connection) are typically spent locally (Highlands), 36% spent in the Region/Nation (Scotland). For the 19 turbine scheme, this results in a range of between £11.2m (12% of £93m) and £17.2m (12% of £143m) being spent locally, and a range between £33.5m (36% of £93m) and £51.5m (36% of £143m) being spent in Scotland.

### Employment effects

- 6.1.5. In the Renewables UK 2015 report, Table 6: GVA and Employment Ratios (Construction Phase) estimates that the weighted average shows there is one employee per £137,942 in turnover. If replicated during the construction of the 19 turbine development, this could result in local employment across The Highland Council ranging from 81.2 FTE (£11.2m ÷ £137,942) to 124.7 FTE (£17.2m ÷ £137,942), and Scottish level employment ranging between 242.8 FTE (£33.5m ÷ £137,942) and 373.3 FTE (£51.5m ÷ £137,942) throughout the construction period.



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## Conclusion

- 6.1.6. Taking the above into account, the reduction to 19 turbines suggests a small reduction in the total Capex and therefore the socio economic effects.
- 6.1.7. However, the above calculations are based on a direct comparison using the candidate turbine in the 21 Turbine Revised Consented Development. It is anticipated that as more powerful and efficient turbines are now available, and the available grid connection determines the maximum total installed capacity of the project as well as the power output, by deploying the latest wind turbine technology, the full available grid capacity can still be utilised. The total installed capacity of the 19 Turbine Revised Consented Development will not change from the 21 Turbine Revised Consented Development. As the community benefits are calculated as an amount per installed MW, the removal of two turbines will not change the community benefit fund payments.
- 6.1.8. Given the large scale of the overall costs and employment levels and the fact that the total installed capacity is not anticipated to change, the reduction in the beneficial economic and employment effects as a result of this change will be negligible and would not be sufficient to alter the conclusions on significance in the 2021 EIA Report, all of which remain the same and include significant benefits at the local (Council ward) scale.

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## **7. Traffic and Transport**

- 7.1.1. The removal of T22 and T23 will result in a minor decrease in construction phase traffic but this will not materially change the Traffic and Transport assessment or its conclusions as reported in the 2021 EIA Report (Chapter 7: Traffic and Transport (EIA Report Volume 1)). The previous assessment remains a worst case assessment scenario and as such no further update to this chapter is considered necessary.

## 8. Climate Change and Carbon Balance

- 8.1.1. The conclusion of Chapter 8 of the 2021 EIA Report was that the effects of the 21 Turbine Revised Consented Development on climate change would not be considered significant. It highlighted a positive net carbon savings impact and a significant positive effect when considered cumulatively with UK-wide renewable energy deployment. This conclusion remains unaffected with the removal of two turbines.
- 8.1.2. For the 19 Turbine Revised Consented Development, it is predicted that the carbon loss will be paid back in ~2.5 years (6.3% of the 40-year operational life); previously this figure was ~2.3 years for the 21 Turbine Revised Consented Development. Even considering the maximum scenario, the 19 Turbine Revised Consented Development would pay back the carbon loss within ~4.3 years (10.8% of the 40-year operational life); previously ~4.0 years.
- 8.1.3. In the 2021 EIA Report it was calculated that the 21 Turbine Revised Consented Development would have potential annual CO<sub>2</sub>e savings of 124,054 tonnes/year (based on the figure of 446 g of CO<sub>2</sub> savings per kWh and a site-specific capacity factor of 36%). For the 19 Turbine Revised Consented Development this figure would be 112,239 tonnes/year. In the 2021 EIA Report it was also stated that the Revised Consented Development could result in a total carbon saving of approximately 4,962,152 tonnes over its 40-year operational life; this figure for a 19-turbine development is 4,489,560 tonnes. The 19 Turbine Revised Consented Development would generate annual electricity sufficient to meet the electricity demand of 74,190 homes equivalent (based on mean average consumption per domestic meter in Scotland), a figure which had previously stood at 81,977.
- 8.1.4. Chapter 8: Climate Change and Carbon Balance in the 2021 EIA Report contained Table 8.3 and 8.4. Below are revised versions of these tables, which reflect the change in the number of turbines at the Revised Consented Development.

**Table 8.1 Revised Potential CO<sub>2</sub> Savings and Electricity Generation**

Capacity Factor (%)	Electricity Generation (MWh per year) <sup>1</sup>	Homes Equivalent (based on average consumption) <sup>2</sup>	Carbon dioxide savings (Tonnes of CO <sub>2</sub> per year) based on Renewable UK savings figure
<b>27%</b>	188,743	55,640	84,179
<b>36%</b>	251,657	74,190	112,239

<sup>1</sup> For example, using a 27% capacity factor, figures are derived as follows: 79.8 MW × 8,760 hours/year × 0.27 (capacity factor) = 188,743 MWh.

<sup>2</sup> This is calculated using the 2019 mean average domestic consumption per domestic meter in Scotland is 3,392 kWh/yr (2019 used as a pre-Covid proxy for reality)

**Table 8.2 Revised Payback in Years for Each Scenario Used in the Carbon Calculator**

<b>Fuel source</b>	<b>Carbon payback time (years) Expected value</b>	<b>Carbon payback time (years) Minimum value</b>	<b>Carbon payback time (years) Maximum Value</b>
<b>Coal fired</b>	1.2	0.7	2.1
<b>Grid mix</b>	4.4	2.4	7.6
<b>Fossil fuel mix</b>	2.5	1.3	4.3

## 9. Landscape and Visual Impact Assessment

### Context to Assessment

- 9.1.1. This chapter of the Further Environmental Information ('FEI') has been prepared by Optimised Environments Limited ('OPEN') on behalf of the Applicant to address changes to the design of the Limekiln Wind Farm Section 36C Variation Application ('the 21 Turbine Revised Consented Development'), submitted to the Energy Consents Unit in July 2021.
- 9.1.2. The assessment of landscape and visual effects of the 21 Turbine Revised Consented Development is set out in the Landscape and Visual Impact Assessment ('LVIA'), presented in Chapter 9 of the June 2021 Environmental Impact Assessment (EIA) Report. This FEI should be read in conjunction with the submitted 2021 EIA Report LVIA, the findings of which remain relevant to the assessment carried out in this Chapter of the FEI. The FEI updates the findings of significance, in response to further revisions to the layout for the Revised Consented Development.
- 9.1.3. The 2021 EIA Report LVIA assesses the significant landscape and visual effects that are likely to arise as a result of the 21 Turbine Revised Consented Development. It has considered the effects on landscape and visual receptors, as well as the cumulative effect of the 21 Turbine Revised Consented Development in combination with other wind farm developments on these receptors.
- 9.1.4. The 2021 EIA Report LVIA reports significant effects will arise as a result of the 21 Turbine Revised Consented Development in the Limekiln Coniferous Woodland Plantation LCT, Beinn Ratha Moorland Slopes and Hills and in localised parts of five other closely surrounding LCTs; from seven viewpoints; in two settlements; from sections of two routes, including coinciding parts of NC500 and NCR1 and from nine local core paths. The effects from the 21 Turbine Revised Proposed Development on the wildness qualities of the East Halladale Flows Wild Land Area were assessed to be not significant, in Appendix 9.E to the 2021 EIA Report.
- 9.1.5. The cumulative assessment considers the effect of the 21 Turbine Revised Consented Development in conjunction with all relevant operational, under construction and consented wind farms in Cumulative Scenario 1, and the effect of the 21 Turbine Revised Consented Development in conjunction with all relevant operational, under construction, consented and application stage wind farms in Cumulative Scenario 2.
- 9.1.6. In respect of Cumulative Scenario 1, significant cumulative effects are reported to arise in localised parts of two LCTs; from two viewpoints; in one settlement, from a short section of one route, including coinciding parts of NCR1, and from one core path, all as reported in the 2021 EIA Report. In respect of Cumulative Scenario 2, significant cumulative effects are reported to arise in localised parts of four LCTs; from four viewpoints; in one settlement, from short sections of two routes, including coinciding parts of NC500 and NCR1, and from one core path.
- 9.1.7. The significant effects arise principally as a result of the close proximity of the immediate LCT and closely surrounding LCTs to the large-scale turbines of the

Revised Consented Development whose influence will alter the character of these LCTs, despite there already being an influence from other baseline wind farm developments. These effects on landscape character extend out to a maximum distance of 7 km from the 21 Turbine Revised Consented Development.

- 9.1.8. While significant and cumulative significant effects are reported to arise within the first 7 km radius of the 21 Turbine Revised Consented Development, the remaining receptors will undergo not significant effects or no effects. Not all receptors within a 7km radius of the 21 Turbine Revised Consented Development will be significantly affected.

### **Proposed changes to the Revised Consented Development layout**

- 9.1.9. Following preliminary evaluation of the likely landscape and visual effects by OPEN, and consultation with Officers at The Highland Council in October 2021 concerning the design and appearance of the Revised Proposed Development, the decision was taken by the Applicant to remove two turbines from the north eastern edge of the proposed turbine layout (the 19 Turbine Revised Proposed Development). These are turbines T22 and T23 as shown in FEI Figure 2.1. The turbine removal has also required elements of the proposed site infrastructure to be removed, as described in FEI Chapter 3.
- 9.1.10. Preliminary evaluation by OPEN, with the benefit of comparative wirelines and a comparative ZTV, has shown that the removal of T22 and T23 will bring some localised reduction in the magnitude and nature of the visual effects at close range viewpoints. These effects are evaluated further within this Chapter of the FEI.
- 9.1.11. The removal of two turbines from the edge of the Revised Proposed Development does not have the potential to increase the number, extent or magnitude of significant landscape and/ or visual effects identified in the LVIA. On this premise, this FEI Chapter focuses on the significant effects identified in the 2021 EIA Report LVIA and the following section undertakes a preliminary screening of those effects to allow the updated assessment to focus on the principal relevant changes that would arise from the turbine removal.
- 9.1.12. This chapter of the FEI is supported by the following additional figures:
- Figure 9.1: Comparative Blade Tip ZTV comparing the 21 turbine EIAR and 19 turbine FEI layouts;
  - Figure 9.2: Comparative 90-degree wirelines for all LVIA viewpoints illustrating the 21 Turbine Revised Consented Development and the 19 Turbine Revised Consented Development.

### **Preliminary assessment of the FEI layout**

- 9.1.13. The comparative Zone of Theoretical Visibility ('ZTV') in FEI-001 demonstrates that the ZTV of the 19 Turbine Revised Proposed Development covers substantially the same geographical extent as the 21 Turbine Revised Proposed Development. There are a very small number of areas where the 21 Turbine proposal would theoretically be seen, from where there is no visibility of the 19 Turbine variant (as indicated by the red shading on FEI-001). From a landscape

and perspective, the removal of two turbines does not make a meaningful change to the likely perceived geographical influence of the Revised Proposed Development.

- 9.1.14. A review of the comparative wirelines has confirmed that the beneficial effects of the revision to the layout are primarily visual in nature and will only lead to a small reduction in the direct landscape effects on the Limekiln Forest as a resource, where forestry is no longer removed to accommodate the access tracks and two turbines. The 2021 EIA Report LVIA assesses a not significant effect from the 21 Turbine Revised Proposed Development on the landscape fabric of the Limekiln Forest and the removal of two turbines will not alter that finding, albeit a smaller area of forestry will be removed to accommodate the reduced development.
- 9.1.15. In a similar way, the removal of two turbines will not change the landscape character assessment, as the perceived changes to the landscape character types assessed in the 2021 EIA Report LVIA will continue to arise with the 19 Turbine Revised Consented Development. Following a preliminary review of the landscape character assessment, OPEN is satisfied that no changes to the assessed effects on landscape character would result from the removal of two turbines and therefore the 2021 EIA Report LVIA findings remain valid for the revised proposal. This finding also remains consistent for the assessment of effects on the wildness qualities of the East Halladale Flows Wild Land Area. The removal of two turbines from the corner of the proposed development site that is furthest from the WLA, and which would be separated from the WLA by the 19 Turbine Revised Consented Development, would not alter the findings set out in Appendix 9-E of the 2021 EIA Report.
- 9.1.16. On the basis of the preliminary review, it is considered that all landscape effects, including cumulative landscape effects, can be screened out of further evaluation in this FEI Chapter, with the focus of the assessment relating to the changes to visual effects that would arise from the removal of T22 and T23. The landscape findings set out in the 2021 EIA Report LVIA therefore remain valid for the 19 Turbine Revised Consented Development.

### **Assessment of the visual effects from the 19 Turbine Revised Consented Development**

- 9.1.17. As explained in the preceding section, the removal of two turbines does not have the potential to increase the visual impact of the Revised Proposed Development. None of the not-significant visual effects identified for the 21 Turbine Revised Proposed Development in the 2021 EIA Report LVIA have the potential to become significant with this alteration, and they can be scoped out of further evaluation in this FEI. Conversely, there may be the potential for some significant visual effects to be reduced in magnitude and the focus of the FEI is on those potential changes to the assessment. The removal of two turbines will not affect the sensitivity of any receptors to the Revised Proposed Development.
- 9.1.18. Furthermore, it has been assessed using the comparative wirelines that there is no prospect of any change to the findings of the cumulative visual assessment, as the 19 Turbine Revised Consented Development will continue to have the same



cumulative interactions with other baseline wind farm assumptions in Scenarios 1 and 2, notwithstanding the removal of two turbines. The cumulative visual assessment presented in the 2021 EIA Report LVIA therefore remains valid for the 19 turbine Revised Consented Development.

9.1.19. The 2021 EIA Report LVIA summarises the visual effects from the 21 Turbine Revised Proposed Development in Table 9.31 on page 9-209. Significant visual effects were identified for the following viewpoints and visual receptors in Table 9.1 below:

**Table 9.1: Summary of significant visual effects reported in the 2021 EIA Report LVIA**

Viewpoint	Magnitude of change (operation)	Significance of effect (operation)
1. A836, Drum Hollistan Layby (4.53km)	Medium-high	Significant
2. Reay Footpath (2.68km)	High	Significant
3. A836, Reay Church, A836 (2.93km)	High	Significant
4. Shebster (3.76km)	Medium-high	Significant
5. Sandside Bay Harbour (4.32km)	Medium-high	Significant
14. Borlum Hill (1.58km)	High	Significant
15. Beinn Ratha (1.57km)	High	Significant
Other visual receptors:		
Reay community	Medium-high	Significant
Shebster community	Medium	Significant
A836 Westbound	Medium-high / Medium	<b>Significant</b> between Dounreay and Reay
A836 / NC500 Eastbound	Medium-high / Medium	<b>Significant</b> between Drum Hollistan and Reay
Shebster Minor Road Westbound	Medium-high / Medium	<b>Significant</b> between Bardnaheigh access and Achvarasdal
NCR1 Westbound	Medium-high / Medium	<b>Significant</b> between Bardnaheigh access and Reay
Core paths:		
CA11.02 Achvarasdal Wood	Medium-high	Significant
CA11.03 Limekiln Forest	High	Significant
CA11.04 Sandside Head	Medium-high	Significant
CA11.05 Achins / Helshetter	High	Significant
CA11.06 Reay Roadside Link	Medium-high	Significant
CA11.07 Reay Golf Course via Mary's Cottage	Medium-high	Significant
CA11.08 Reay Golf Course via Clubhouse	Medium-high	Significant
CA11.09 Borlum Circuit	High	Significant
CA11.10 Achvarasdal East Drive	Medium-high	Significant

9.1.20. Each of the receptors identified as having the potential to experience significant visual effects in relation to the 21 Turbine Revised Proposed Development is re-assessed in Table 9.2, below, to identify any potential changes to the magnitude

of change and significance of effect, during operation of the wind farm, and resulting from the removal of T22 and T23.

9.1.21. Where changes to the magnitude of change and / or significance of effects assessed within the LVIA are identified, the boxes have been shaded grey.

**Table 9.2: Revised assessment of receptors identified in Table 9.1, with T22 and T23 removed**

Viewpoint	Magnitude of change (during operation) without T22 and T23	Significance of effect (during operation) without T22 and T23
1. A836, Drum Hollistan Layby (4.53km)	Field of view affected reduces. Remains Medium-high.	Significant
2. Reay Footpath (2.68km)	Small reduction in overlapping. Narrows perceived field of view affected. Remains High.	Significant
3. A836, Reay Church, A836 (2.93km)	Narrows perceived field of view affected. Improves containment of wind farm behind Borlum Hill. Remains High.	Significant
4. Shebster (3.76km)	Slight reduction in perceived field of view affected. Remains Medium-high.	Significant
5. Sandside Bay Harbour (4.32km)	Slight reduction in perceived field of view affected. Remains Medium-high.	Significant
14. Borlum Hill (1.58km)	Reduces prominence of closest turbines. Helps to set wind farm back. Small reduction in overlapping turbines. Remains High.	Significant
15. Beinn Ratha (1.57km)	Field of view affected reduces. Remains High.	Significant
Other visual receptors:		
Reay community	Field of view affected reduces. Remains Medium-high.	Significant
Shebster community	Slight reduction in perceived field of view affected. Remains Medium.	Significant
A836 Westbound	Separation distance to closest turbines increases by 500m, setting wind farm further back from road. Remains Medium-high/ Medium.	<b>Significant</b> between Dounreay and Reay
A836 / NC500 Eastbound	Field of view affected reduces. Remains Medium-high/ Medium	<b>Significant</b> between Drum Hollistan and Reay
Shebster Minor Road Westbound	Slight reduction in perceived field of view affected. Remains Medium-high/ Medium	<b>Significant</b> between Bardnaheigh access and Achvarasdal

Viewpoint	Magnitude of change (during operation) without T22 and T23	Significance of effect (during operation) without T22 and T23
NCR1 Westbound	Separation distance to closest turbines increases by 500m, setting wind farm further back from road. Remains Medium-high/ Medium.	<b>Significant</b> between Dounreay and Reay
CA11.02 Achvarasdal Wood	Slight reduction in perceived field of view affected. Remains Medium-high/ Medium	Significant
CA11.03 Limekiln Forest	Reduces prominence of closest turbines at northeast corner of site. Helps to set wind farm back on approach from Reay. Small reduction in overlapping turbines. Remains High.	Significant
CA11.04 Sandside Head	Slight reduction in perceived field of view affected. Remains Medium-high.	Significant
CA11.05 Achins / Helshetter	Small reduction in overlapping. Narrows perceived field of view affected. Remains High.	Significant
CA11.06 Reay Roadside Link	Small reduction in overlapping. Narrows perceived field of view affected. Remains Medium-high.	Significant
CA11.07 Reay Golf Course via Mary's Cottage	Reduces prominence of closest turbines at northeast corner of site. Helps to set wind farm further back. Small reduction in overlapping turbines. Remains Medium-high.	Significant
CA11.08 Reay Golf Course via Clubhouse	Reduces prominence of closest turbines at northeast corner of site. Helps to set wind farm further back. Small reduction in overlapping turbines. Remains Medium-high.	Significant
CA11.09 Borlum Circuit	Small reduction in overlapping. Narrows perceived field of view affected. Reduces prominence of closest turbines at northeast corner of site. Remains High.	Significant
CA11.10 Achvarasdal East Drive	Reduces prominence of closest turbines at northeast corner of site. Helps to set wind farm further back. Small reduction in overlapping turbines. Remains Medium-high.	Significant

9.1.22. It is also relevant to consider how the removal of turbines T22 and T23 from the Revised Consented Development affects the findings of the Residential Visual Amenity Assessment ('RVAA'), presented within 2021 EIAR Appendix 9.F. Appendix 9.F is accompanied by a set of wirelines with numbered turbines, and it is possible to evaluate the likely removal of T22/ T23 using these wirelines.

9.1.23. The location of the residential properties considered within the RVAA is shown on 2021 EIA Report Figure 9.117. The positions of turbines T22 and T23 are identified on this Figure. Turbines T22 and/ or T23 are visible to differing degrees in the wirelines for all of the 14 properties that are assessed. In this sense the visual amenity at all of the properties will benefit from the turbine removal. In respect of the following properties the removal of T22 and T23 will lead to a meaningful reduction in visual impact:

- Property No. 1: Loanscoribest – removal of two turbines at close range.
- Property No. 3: Creag Leathan - removal of closest turbine (T22).
- Property No. 4: Milton Cottage - removal of closest turbine (T22).
- Property No. 5: Achins – reduction in field of view affected.
- Property No. 6: Isauld Lodge – reduction in overlapping turbines.
- Property No. 8: Birkness – removal of prominent turbine (T22).
- Property No.11: Sandydene – reduction in perceived field of view affected.
- Property No. 13: Rathlin – removal of two closest turbines.

9.1.24. In respect of the above properties, the magnitude of visual effect is assessed to reduce with the removal of T22 and/ or T23, although not sufficiently to alter the findings of significance presented in Appendix 9.F of the 2021 EIA Report. The exception to that is the case of Creag Leathan, where the resulting visual effect will reduce to a Not Significant level.

## Conclusions

9.1.25. This FEI chapter has evaluated how the proposed removal of two turbines (T22 and T23) from the 21 Turbine Revised Consented Development would alter the findings of significance presented within the 2021 EIA Report LVIA. The re-assessment has found that in the case of only one receptor would the turbine removal lead to a previously assessed significant visual effect becoming not significant. That is in respect of one of the closest residential properties to the 19 Turbine Revised Proposed Development, at Creag Leathan.

9.1.26. While no material change to the findings of significance are reported, it is the case that the removal of two turbines would improve the perceived relationship of the wind farm with sensitive receptors positioned to the north of the Limekiln Forest. The revised wind farm would be positioned some 500 metres further back into the forest which would help to improve the relationship when seen alongside the distinctive landforms around Borlum Hill, reducing the potential for adverse conflicts of scale and helping to add a greater sense of space between receptor and turbines. The turbine removal would also lead to a slight reduction in the perceived field of view that would be occupied by turbines, when viewed from the north and west, therefore resulting in a more compact overall form to the 19 Turbine Revised Consented Development.

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- 9.1.27. In landscape and visual terms, it is considered that the proposed turbine removal would improve the integration of the 19 Turbine Revised Consented Development into the landscape of Limekiln Forest and that it would be a beneficial improvement to the proposed development.

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## **10. Cultural Heritage**

- 10.1.1. Chapter 10: Cultural Heritage in the 2021 EIA Report concludes no significant adverse effects upon cultural heritage as a result of the 21 Turbine Revised Consented Development. This would remain unchanged with the removal of turbines T22 and T23 for the 19 Turbine Revised Consented Development.
- 10.1.2. The 2021 EIA Report identifies no direct (physical) impacts upon any known heritage assets within the site boundary as a result of the proposed 21 Turbine Revised Consented Development. This would remain unchanged with the removal of turbines T22 and T23.
- 10.1.3. The 2021 EIA Report also identifies that there may be potential for previously unknown archaeological remains and so a Written Scheme of Investigation (WSI) will be submitted and agreed with The Highland Council to carry out monitoring and mitigation during construction. This recommendation remains unchanged. Following mitigation there would be residual construction effects of a negligible adverse level on any currently unknown archaeological remains that may be identified during mitigation watching briefs.
- 10.1.4. In relation to anticipated operational effects through development within the setting of heritage assets in the wider area, all conclusions remain unchanged with the removal of turbines T22 and T23: i.e. Minor Operational Effects (not significant in EIA terms) upon three scheduled monuments (SM90078, SM476 & SM441).
- 10.1.5. No further update to Chapter 10: Cultural Heritage in the 2021 EIA Report is considered necessary.

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## **11. Ecology**

### **11.1 Summary**

- 11.1.1. This chapter of the Further Environmental Information (FEI) Report considers any changes in the predicted likely significant effects on terrestrial ecology as a result of removal of Turbine 22 and Turbine 23 from the scheme.
- 11.1.2. No further baseline studies were undertaken.
- 11.1.3. No significant construction, operational, decommissioning or cumulative effects are predicted as a result of the alternations to the 21 Turbine Revised Consented Development.
- 11.1.4. The following figures detailing the layout of the scheme have been updated to reflect the changes
- **Figure 11.1** NVC Survey Results
  - **Figure 11.2** Potential GWDTE Locations
  - **Figure 11.3** Protected Species Results May 2021
- 11.1.5. Residual effects on all ecological receptors are considered to be not significant under the terms of the EIA regulations.

### **11.2 Introduction**

- 11.1.6. This chapter considers any changes in predicted significant effects on terrestrial ecology as a result of the removal of two turbines (Turbine 22 and Turbine 23) from the Revised Consented Development, Changes in potential effects on terrestrial ecology during the construction, operation and decommissioning of Limekiln Wind Farm Section 36C variation application are considered.
- 11.1.7. In response to the Environmental Impact Assessment (EIA) Report for the 21 Turbine Revised Consented Development on 20<sup>th</sup> September 2021, NatureScot indicated that they were satisfied with the conclusions of the 2021 EIA Report and proposed that the Revised Consented Development could be progressed if the proposed mitigation measures were strictly followed.
- 11.1.8. In their response dated 6<sup>th</sup> October 2021, RSPB raised concerns over ornithological sensitives and deep peat, carbon payback and suggested amendments to the Habitat Management Plan. It is expected that an HMP will be required as part of the planning conditions and the version that has already been submitted to discharge the conditions for the consented scheme would be revised and submitted again. Concerns relating to peat have been addressed through changes to the Revised Consented Development and also addressed within the updated Peat Management Plan (Appendix 13.1).
- 11.1.9. The principles of the Ecology assessment within the 2021 EIA Report remain valid and appropriate and therefore have not been reassessed unless otherwise stated.



Figures detailing the layout of the proposed development have been updated to reflect the change:

- **Figure 11.1** NVC Survey Results
- **Figure 11.2** Potential GWDTE Locations
- **Figure 11.3** Protected Species Results May 2021

### **11.3 Baseline Conditions**

- 11.1.10. No further fieldwork was completed as elements were removed from the scheme rather than added to it. The ecological baseline is considered to remain as described within the 2021 EIA Report.

### **11.4 Change in Effects**

#### **Construction Effects**

- 11.1.11. This section provides an assessment of the change in potential effects of construction phases on important ecological features as a result of the removal of T22 and T23 from the scheme.
- 11.1.12. As the access routes remain the same, no change is expected to the predicted effects on any ecological features except habitats. The removal of the two turbine bases will lead to a reduction in the permanent loss of habitats (See 11.4.3). Each of the other ecological features are discussed in Table 11.1.

**Table 11.1 Predicted Construction Effects on Ecological Features**

Ecological Feature	Rationale
Otter	There is no reduction in the number of water crossings proposed (seven) due to the removal of the two turbines. Construction would still be covered under a Species Protection Plan (SPP) detailing methods of mitigation for protecting otter.
Water Vole	T22 and T23 would have been over 500 m from the nearest identified water vole colony on Achvarasdal Burn, therefore the removal of these structures is considered to have a neutral effect on water vole. Construction would still be covered under an SPP detailing mitigation measures to protect water vole populations and suitable water vole habitats.
Pine Marten	T22 and T23 were more than 250 m from the nearest potential pine marten den, therefore the removal of these structures is considered to have a neutral effect on pine marten. Construction would still be covered under an SPP detailing mitigation measures to protect the local pine marten population.
Bats	No roost features were identified within 200 m of T22 or T23 and as access would still be constructed through the plantation at this location, the removal of these structures is considered to have a neutral effect on foraging or commuting bats during construction. Construction would still be covered under an SPP detailing mitigation measures to protect any foraging or commuting bats.
Reptiles	Access would still impact upon habitats considered suitable for reptiles therefore the removal of T22 and T23 is considered to have a neutral effect on any local reptile population. Construction would still be covered under an SPP detailing mitigation measures to protect any reptiles found on site during construction.
Fish and Fish Habitats	T22 and T23 are approximately 450 m and 250 m from the Achvarasdal Burn, therefore the removal of the structures is not considered to change the potential effects on aquatic habitats. Construction would still be covered under an SPP detailing mitigation measures to protect aquatic life within the Achvarasdal Burn and associated tributaries.
Deer	As the access routes will remain the same, the removal of T22 and T23 is considered to have neutral effect on deer displacement during construction. Construction would still be covered under the Deer Management Plan (DMP) and Deer Fence Management Plan (DFMP) to minimise the effects of deer displacement during construction.

## Habitats

- 11.1.13. Construction effects under the revised scheme would be similar to those described within the 2021 EIA Report, with the 19 Turbine Revised Consented Development remaining largely the same, including the proposed access tracks which would have served T22 and T23 remaining.
- 11.1.14. Due to the removal of the two turbines and associated bases, there would be a slight decrease in permanent loss of a number of the habitats detailed in Table 11.1 of the 2021 EIA Report.
- 11.1.15. Removal of T22 and T23 would result in the loss of wet heath habitat being reduced from 3.05 to 2.80 ha. Preservation of a further 0.25 ha is positive, as wet heath is an Annex I habitat, but it only represents 1.8 % of the wet heath habitats within the study area and is therefore not considered to have a significant effect on this habitat.

- 11.1.16. The alterations would also lead to a reduction in permanent loss of coniferous woodland of 0.7 ha as a direct result of not constructing the turbine bases for T22 and T23.

## 11.5 Operational Effects

- 11.1.17. The operational effects identified within the 2021 EIA Report would remain unchanged as a result of removing T22 and T23 from the scheme as detailed in Table 11.2

**Table 11.2 Predicted Operational Effects on Ecological Features**

Ecological Feature	Rationale
Habitats	No change in effects predicted; operational works will be limited to constructed tracks and hardstanding. Restoration areas would be managed under a Habitat Management Plan (HMP).
Otter	No change in effects predicted. There may be a slight decrease in operational activities; e.g. maintenance visits, due to the removal of two turbines however it is not considered a significant change.
Water Vole	No change in effects predicted. Routine visits and maintenance will be limited to hardstandings and therefore will not encroach on suitable water vole habitats.
Pine Marten	No change in effects predicted. There may be a slight decrease in general disturbance related to operational activities; e.g. maintenance visits, due to the removal of two turbines however it is not considered a significant change.
Bats	The removal of two turbines does not decrease the risk level identified in the EIAR for bats (medium) and the slight impact on the bat population due to the risk posed by the development remains unchanged.
Fish and Fish Habitats	No change in effects predicted. Routine visits and maintenance will be limited to hardstandings and therefore will not encroach on suitable fish habitats.
Deer	There may be a slight decrease in general disturbance related to operational activities; e.g. maintenance visits, due to the removal of two turbines however it is not considered a significant change. The DMP and DFMP would remain during the life of the windfarm.

## 11.6 Decommissioning Effects

- 11.1.18. The lifespan of the windfarm remains unchanged at >30 years before decommissioning, at which time further surveys would be undertaken to update the baseline of the ecological features on site to assess any potential effects of decommissioning activities.

## 11.7 Assessment of Cumulative Effects

- 11.1.19. The 2021 EIA Report assessed cumulative effects for two additional proposed windfarm developments. The removal of two turbines is not considered significant and the predicted effects remain largely the same as identified within the 2021 EIA Report would remain unchanged. No significant cumulative effects were predicted for:

- Designated sites

- Habitats
- Otter
- Bats
- Water vole
- Pine marten

### **11.8 Mitigation**

- 11.1.20. The mitigation proposed in the 2021 EIA Report would remain unchanged as there is no change to the significance of effects as detailed in the 2021 EIA Report.

### **11.9 Assessment of Residual Effects**

- 11.1.21. There is no change in the assessment of residual effects as described within the 2021 EIA Report.

### **11.10 Monitoring**

- 11.1.22. As there is no change in the significance of effects on any of the identified ecological features, no change is required to the monitoring proposals as set out within the 2021 EIA Report.

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## **12. Ornithology**

### **Introduction**

12.1.1. Chapter 12: Ornithology of the 2021 Environmental Impact Assessment Report (EIA Report) established a baseline for the site and assessed in detail the potential for likely significant effects on ornithology receptors resulting from the construction, operation and decommissioning of the 21 Turbine Revised Consented Development. This assessment considers any changes to the significance of effects as a result of the proposed changes set out in Section 3 of this report.

12.1.2. In order to assess the effects of the 19 Turbine Revised Consented Development on ornithological receptors, consideration was given to the implications of the changes (i.e., removal of two turbines) during construction, operation and decommissioning.

### **Change in Effects**

#### **Construction**

12.1.3. Construction effects would be similar to those described within the 2021 EIA Report. The extent of the wind farm is reduced, which in turn would reduce the scale and magnitude of spatial and temporal effects. As such, the significance of effects identified within the 2021 EIA Report remain unchanged.

#### **Operation**

12.1.4. The operational effects identified within the 2021 EIA Report would also remain unchanged. The 2021 EIA Report demonstrated that there is no requirement for any further assessment, including collision risk assessment, due to so few records and so little flight activity for any species recorded.

#### **Decommissioning**

12.1.5. Decommissioning effects would be similar to those described within the 2021 EIA Report. The extent of the wind farm is reduced, which in turn reduces the scale and magnitude of spatial and temporal effects. As such, the significance of effects identified within the 2021 EIA Report remain unchanged.

#### **Cumulative Effects**

12.1.6. The cumulative effects identified within the 2021 EIA Report would remain unchanged; the predicted in-isolation effects are considered to have no potential to contribute to cumulative effects and therefore the cumulative effects assessment from the 2021 EIA Report remains unchanged which identified cumulative effects as being non-significant.

#### **Summary of residual effects**

12.1.7. The revisions to the proposed Development will result in no change to the magnitude of effects on ornithological receptors overall, including cumulative

effects. The assessment of significance of effects remains unchanged from that outlined within the 2021 EIA Report.

### Statement of Significance

- 12.1.8. Effects on ornithology associated with the s36c Application for the 21 Turbine Revised Consented Development are considered to be not significant. This represents no change to the conclusions outlined in the 2021 EIA Report.

### Potential Effects on Special Protection Areas (SPAs)

- 12.1.9. Most of the effects identified within the Habitats Regulations Appraisal (Infinergy, June 2021) would remain unchanged; the exception to this is collision risk which would be altered due to the reduction in the number of turbines from 21 to 19. As a result, collision risk modelling (CRM), using the same methodology as laid out in the 2021 EIA Report, has been re-run.
- 12.1.10. The Predictable Flight Method (PFM)<sup>3</sup> of the Collision Risk Model (CRM) (Band et al., 2007) was used to estimate predicted collision mortality for greylag goose during the non-breeding season. The width of the Risk Window presented by the Revised Consented Development was measured, as the maximum extent of the 19-turbine layout plus a 500 m buffer, at 3,605 m. This was multiplied by the risk window height (140 m) to give an estimated Risk Window of 504,700 m<sup>2</sup>. The area of the Risk Window occupied by the proposed rotors was  $19 * (\pi * 66.52) = 263,965 \text{ m}^2$  or about 0.52 of the Risk Window. Flights considered at risk of collision involved those recorded at height bands 10 - 30m, 30 - 50m, 50 - 100m and 100-150m.
- 12.1.11. Other parameters and values in the modelling process are shown in Annex 6.1 and included a precautionary provision that 25% of flights were not observed because they occurred in the hours of darkness (estimates of daylight hours according to latitude followed the algorithm of Forsythe et al., 1995), a turbine operation rate of 85%, and a precautionary avoidance rate of 99.8% for geese (SNH, 2010 updated 2018). Detailed calculations are presented in Annex 12.1: Revised Collision Risk Modelling to Inform a Habitats Regulations Appraisal.
- 12.1.12. Table 12.1 shows the results of the re-run CRM. Estimated collision risk has decreased from the estimates provided in the 2021 EIA Report due to the fact that the number of turbines has decreased from 21 to 19.

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<sup>3</sup> The Band CRM involves two methods to predict estimated collision fatalities, depending on the pattern of flight of the species involved: 'predictable' and 'unpredictable' flight methods. The predictable flight method (PFM) is appropriate when birds tend to move through an area in a relatively consistent direction, such as when on migration or when moving between localised feeding and roosting sites. The unpredictable flight method (UFM) is more appropriate when flights are not in any particular direction and assumes that they are random.

**Table 12.1 – Collision risk estimates.**

Species	19-turbine development		21-turbine development (June 2021, for comparison)	
	Estimated collision per year	Number of years per collision	Estimated collision per year	Number of years per collision
Greylag goose	0.24	4.2	0.31	3.2

- 12.1.13. A decrease in the collision rate is predicted for greylag goose; as a result, the Habitats Regulations Appraisal from the 2021 EIA Report which identified that collision risk would not compromise the Conservation Objectives of the Caithness Lochs SPA remains unchanged.

## References

Band, W., Madders, M., & Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (Eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp. 259- 275. Quercus, Madrid.

Forsythe, W.C., Rykiel, E.J., Stahl, R.S., Wu, H. & Schoolfield, R.M. (1995). A model comparison for day length as a function of latitude and day of year. Ecological Modelling. 80: 87 – 95.

SNH. (2010, updated 2018). Avoidance rates for the onshore SNH Wind Farm Collision Risk Model. SNH, Battleby, UK.



## Annex 12.1 – Revised Collision Risk Modelling to Inform a Habitats Regulations Appraisal

### Greylag goose

#### Greylag goose

	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	
Dawn/dusk observations	7.35	12.43	18.72	13.15	21.89	11.13	6.67	6.13	
Daytime observations	17.65	42.07	31.28	15.85	23.11	26.87	48.33	63.37	
No. birds observed in risk window at dawn/dusk	0	0	37	0	0	0	0	32	
No. birds observed in risk window at daytime	0	267	99	0	0	0	0	1	
No. birds per hour of observation at dawn/dusk	0.00	0.00	1.98	0.00	0.00	0.00	0.00	5.22	
No. birds per hour of observation at daytime	0.00	6.35	3.16	0.00	0.00	0.00	0.00	0.02	
Available hours for flight activity at dawn/dusk	64	124	120	124	124	116	124	120	
Available hours for flight activity at daytime/25% night	203.73	348.53	282.97	258.91	274.73	292.51	382.03	428.35	Predicted total flights
Potential no. birds in risk window during month	0.00	2211.94	1132.77	0.00	0.00	0.00	0.00	633.19	3977.90

#### Calculation of available hours

	16	31	30	31	31	29	31	30
Days in month	12.31	10.32	7.91	6.47	7.15	9.26	11.76	14.37
Daylight hrs	11.69	13.68	16.09	17.53	16.85	14.74	12.24	9.63
Nighttime hrs	10.31	8.32	5.91	4.47	5.15	7.26	9.76	12.37
Day minus dawn/dusk	9.69	11.68	14.09	15.53	14.85	12.74	10.24	7.63
Night minus dawn/dusk	64	124	120	124	124	116	124	120
Total Dawn/dusk hrs	203.73	348.53	282.97	258.91	274.73	292.51	382.03	428.35
Total Day + 25% night hrs								

Potential no. of birds thru risk window	Area of risk window	Area of rotors	Proportion of risk window taken up by rotors	Potential no. of birds thru rotors	% collision risk	Assuming no avoidance No. of birds killed per year	Assuming 99.8% avoidance No. of birds killed per year
3977.90	504,700	263,965	0.52	2080.497	6.8%	119.7	0.24

K: [1D or 3D] (0 or 1)

NoBlades

MaxChord

Pitch (degrees)

BirdLength

Wingspan

F: Flapping (0) or gliding (+1)

Bird speed

RotorDiam

RotationPeriod

integration interval

Bird aspect ratio:  $\beta$

#### Calculation of alpha and p(collision) as a function of radius

					Upwind:			Downwind:			
NoBlades	3		r/R	c/C	$\alpha$	collide length	p(collision)	y(x)	collide length	p(collision)	y(x)
MaxChord	3.5 m		radius	chord	alpha						
Pitch (degrees)	6										
			0				1.00	0		1.00	0
BirdLength	0.83 m		0.05	0.575	3.67	13.56	0.53	0.05311	13.14	0.51	0.05147
Wingspan	1.64 m		0.1	0.622	1.83	7.20	0.28	0.05643	6.75	0.26	0.05287
F: Flapping (0) or gliding (+1)	0		0.15	0.781	1.22	5.61	0.22	0.06593	5.04	0.20	0.05922
			0.2	0.939	0.92	4.84	0.19	0.07589	4.16	0.16	0.06512
Bird speed	15 m/sec		0.25	0.971	0.73	4.03	0.16	0.07901	3.32	0.13	0.06511
RotorDiam	133 m		0.3	0.923	0.61	3.30	0.13	0.07761	2.63	0.10	0.06174
RotationPeriod	5.10638 sec		0.35	0.875	0.52	2.77	0.11	0.07607	2.13	0.08	0.05851
			0.4	0.827	0.46	2.45	0.10	0.07685	1.85	0.07	0.05788
integration interval	0.05		0.45	0.780	0.41	2.22	0.09	0.07829	1.65	0.06	0.05817
			0.5	0.732	0.37	2.03	0.08	0.07959	1.50	0.06	0.05861
Bird aspect ratio: $\beta$	0.51		0.55	0.684	0.33	1.87	0.07	0.08075	1.37	0.05	0.05918
			0.6	0.637	0.31	1.74	0.07	0.08178	1.27	0.05	0.05988
			0.65	0.589	0.28	1.62	0.06	0.08267	1.19	0.05	0.06073
			0.7	0.541	0.26	1.52	0.06	0.08342	1.13	0.04	0.06171
			0.75	0.494	0.24	1.43	0.06	0.08404	1.07	0.04	0.06282
			0.8	0.446	0.23	1.35	0.05	0.08452	1.02	0.04	0.06408
			0.85	0.398	0.22	1.27	0.05	0.08486	0.98	0.04	0.06547
			0.9	0.350	0.20	1.21	0.05	0.08507	0.95	0.04	0.06699
			0.95	0.303	0.19	1.14	0.04	0.08514	0.92	0.04	0.06865
			1	0.255	0.18	1.09	0.04	0.08507	0.90	0.04	0.07045

Overall p(collision) =

Upwind

7.6%

Downwind

6.0%

Average

6.8%

## **13. Geology, Hydrology and Hydrogeology**

### **Summary**

- 13.1.1. The 2021 EIA Report highlighted several potential effects on site hydrology and hydrogeology, primarily during wind farm construction, but potentially also during site operation. These effects are associated with a range of activities, most notably access track construction. The most serious potential effects are associated with sediment-laden runoff from exposed ground entering watercourses.
- 13.1.2. Mitigation measures incorporated into the scheme's design would reduce the likelihood and magnitude of a pollution event or other impact resulting from the 21 Turbine Revised Consented Development'. These mitigation measures have been defined for each element of the on-site development. The measures would be undertaken in accordance with current best practice and would ensure that there are no significant effects on hydrological or hydrogeological receptors as a result of the 21 Turbine Revised Consented Development. The 2021 EIA Report also predicted no significant operational, decommissioning or cumulative effects as a result of the 21 Turbine Revised Consented Development.
- 13.1.3. The removal of T22 and T23 from the Revised Consented Development will would result in a minor decrease in construction phase effects on hydrology and hydrogeology, but this will not materially change the Hydrology and Hydrogeology assessment or its conclusions as reported in the 2021 EIA Report (Chapter 13: Geology, Hydrology and Hydrogeology (EIA Report Volume 1). The previous assessment remains a worst case assessment scenario and as such no further update to this chapter is considered necessary.

### **Peat Management**

- 13.1.4. A revised Peat Management Plan (PMP) is included at Appendix 13.1,
- 13.1.5. This addresses SEPA's response to the 2021 EIA Report, in which it was stated that SEPA objected to the 21 Turbine Revised Consented Development due to impacts on peat, but that they would withdraw the objection if a) the development is amended to reduce the volume of peat disturbed, and/or b) significantly enhance restoration proposals are included to mitigate for the larger volume of peat that would be disturbed.
- 13.1.6. In brief, the PMP quantifies how the removal of two turbines (T22 and T23) from the Revised Consented Development, in addition to amends to the blade laydown areas and track (Section 3) would result in a reduction of excavated peat amounting to 18,544m<sup>3</sup> compared to that reported in the 2021 EIA Report and a small increase of increase of 61m<sup>3</sup> compared to the 2019 Consented Development.
- 13.1.7. All excavated peat can be beneficially re-used within the Development Site. All proposed reinstatement will be to a maximum depth of 0.5m with the exception of the borrow pit (which will be restored to an average depth of approximately 1.22m) and temporary infrastructure where peat will be reinstated to its current

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depth (i.e. blade laydown areas, cable trenches and the temporary construction compound).

## 14. Forestry

- 14.1.1. The purpose of this section of this FEI report is to identify and assess the changes to forestry, if any, to the likely significant effects reported in the 2021 EIA Report as a result of the removal of T22 and T23.
- 14.1.2. Chapter 14: Forestry in the 2021 EIA Report concludes there were no significant effects assessed for the Consented Development and no significant effects for the 21 Turbine Revised Consented Development. The proposed variation to the Limekiln Plantation forest structure through both temporary felling and permanent felling is considered to be not significant as compared against the Amended Limekiln Plantation Long Term Forest Plan (LTFP). With off-site planting as mitigation the effect on total woodland area is considered to be not significant.
- 14.1.3. The 2021 EIA Report described effects of the 21 Turbine Revised Consented Development as the woodland loss through felling and not replanting the permanent wind farm infrastructure, including new access tracks, wind turbine bases and the ground required to mitigate bat collision risk through the calculated off-set of trees from turbines.
- 14.1.4. The 2021 EIA Report reflects on the Scottish Government's Policy on Control of Woodland Removal with regard to minimising woodland loss and the requirement for mitigating woodland loss through compensatory planting (CP). The area figures for the Amended Limekiln Plantation LTFP are compared with the proposed areas within the Revised Consented Development in Table 14.5 of 2021 EIA Report.
- 14.1.5. This FEI compares the implications of the removal of T22 and T23 with the 2021 EIA Report Forestry Chapter in the felling and restocking plans and overall forest structure.
- 14.1.6. The removal of the two turbines has no overall effect of the total areas of felling. The proposed revised felling plan is shown as Figure 14.1. However, there are a small change in the phasing of felling as shown in Table 14.1.

**Table 14.1 Felling Comparisons**

Activity	2021 EIA Report Felling Area (ha)	2022 FEI Report Felling Area (ha)
Infrastructure	4.87	0.42
Phase 1		2.87
Phase 2		1.58
<b>Total</b>	<b>4.87</b>	<b>4.87</b>

- 14.1.7. The consequences of removing two turbines is a reduction in requirements for permanent infrastructure in terms of hardstand and unplanted offset as bat mitigation. There remains a requirement for some loss of woodland as a result of infrastructure in terms of the access track. Table 14.2 compares the replanting areas and describes the species to be replanted and in which phase. The species selection follows the design within the Limekiln Plantation LTFP. The table shows an increase of 4.45 ha of land to be replanted. The revised figure is taken forward

for the recalculation of CP. The proposed replanting is shown as revised Figure 14.2.

**Table 14.2 Replanting**

Activity	2021 EIA Report Replanting Area (ha)	2022 FEI Report Replanting Area (ha)
Access Tracks Not Replanted	4.87	0.42
Sitka spruce (phase 1)		0.76
Sitka spruce (phase 2)		1.49
Norway spruce (phase 1)		0.10
Scots pine (phase 1)		1.71
Scots pine (phase 2)		0.39
<b>Total</b>	<b>4.87</b>	<b>4.87</b>

14.1.8. The removal of T22 and T23 reduces the permanent woodland loss by 4.45 ha. The comparison of the iterations is shown in Table 14.3.

**Table 14.3 Felling and Replanting Area Comparison**

Description	Amended Limekiln Plantation Felling Plan	2021 EIA Report 21 Turbines	2022 FEI Report 19 Turbines
	Area (ha)	Area (ha)	Area (ha)
Wind farm Infrastructure (Permanent woodland loss)	60.15	73.19	68.74
Phase 1 (2018-2022)	150.4	148.92	151.79
Phase 2 (2023-2027)	243.5	234.44	150.5
Phase 3 (2028 -2032)	192.55	192.44	192.44
Phase 4 (2033 & beyond)	140.7	138.31	138.31
Retentions	17.71	17.71	17.71
Open Ground	300.21	300.21	300.21
SSSI	134.86	134.86	134.86
Total	1240.08	1240.08	1240.08

14.1.9. Permanent Woodland Loss is the area of woodland not replanted due to the requirements of the permanent infrastructure and unplanted ground as bat mitigation. The area of Permanent Woodland Loss for the 19 Turbine Revised Consented Development is recalculated as 68.74 ha against the 21 Turbine Revised Consented Development in which 73.19 ha is lost.

14.1.10. Accordingly, the requirement for CP has been reduced by 4.45 ha with off-site planting for at least 68.74 ha.

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- 14.1.11. The applicant has arrangements in place for nearby off-site CP and undertakes to provide a revised CP plan including this increase. The CP plan will meet the requirements of UKFS.
- 14.1.12. In summary, the removal of T22 and T23 has reduced the Permanent Woodland Loss on site by 4.45 ha. The areas previously required for hardstand and bat mitigation shall now be replanted in keeping with the Limekiln Plantation LTFP.

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## **15. Infrastructure, Shadow Flicker and Health & Safety**

- 15.1.1. No significant changes to other issues as a result of the removal of T22 & T23 are predicted. Full details of impacts identified can be found in Chapter 15: Infrastructure, Chapter 16 Health and Safety and Chapter 18 Shadow Flicker of the 2021 EIA Report.

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