Cornharrow Wind Farm Tip Height and Micrositing Extension

Comparative Environmental Impact Assessment Report
Volume I – Main Text

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CONTENTS

1 INTRODUCTION

Background

1.1 Planning permission was granted for Cornharrow Wind Farm at appeal on 6 July 2022 (references 21/1766/S42 and PPA-170-2160) which generated a new consent and set of planning conditions for the Site. The consented wind farm comprises up to seven wind turbines, the formation of access tracks, borrows pits, temporary construction compound, battery storage, on-site substation, and all other associated infrastructure. The planning application was accompanied by a Comparative Environmental Impact Assessment Report dated August 2021 (herein after referred to as the "2021EIAR").

1.2 This Comparative Environmental Impact Assessment Report (Comparative EIAR) is submitted in support of an application under Section 42 of the Town and Country Planning (Scotland) Act 1997 by Energiekontor UK Ltd ("the Applicant") to vary conditions 1 and 12 of planning permission 21/1766/S42 to allow an increase in the consented tip heights, to update the list of approved plans, in particular the approved layout plan (Figure 3.1) to reflect the layout changes required to access the new proposed turbine positions and micrositing at Cornharrow Wind Farm ("the Proposed Development"). A full updated set of application drawings is provided In Volume II of this Comparative EIAR.

1.3 This Comparative EIAR has been prepared by Energiekontor UK Ltd with specialist input where necessary and sets out the findings of a comparative Environmental Impact Assessment which has been undertaken to consider whether the Proposed Development would result in any additional significant environmental effects not identified in the previous EIAR for Cornharrow Wind Farm.

Site Location and Proposed Development

The Site and its Surroundings

1.4 The Site is located approximately 8.6km west of Moniaive, 11km east of Carsphairn on land adjacent to the B729. Access to the Site would be gained directly off the B729.

1.5 The Site is characterised by commercial coniferous woodland with a relatively complex topography with elevations ranging from circa. 300m on the site western boundary up to 450m AOD on the east of the Site. It is characteristic of a simple upland landscape which encompasses broad swathes of open moorland and continuous expanses of plantation forestry. The Site is visually contained by the surrounding topography including Benbrack to the north, Manquhill Hill to the west, Carroch Hill to the south and Wether Hill to the east along the eastern ridge.

1.6 There are no settlements within 5km of the Proposed Development and residential properties are limited to a small number of scattered dwellings / farmsteads mostly accessed from tracks off the B729.

1.7 The Site is located next to the 14 turbine Wether Hill Wind Farm which has been in operation since 2007. The Wether Hill turbines are 91m to tip and sited on higher ground to the east of the Site.

Description of Proposed Development

1.8 The key changes to Cornharrow Wind Farm introduced by the Proposed Development are set out in Table 1.1 below.

Characteristic	2021 EIAR	Proposed Development
Number of turbines	7	7
Turbine capacity	6.6MW	6.6MW
Tip height	180m	200m
Micrositing	100m	200m
Blades	3	3
Turbine colour	Light grey	Light grey
Turbine foundations	Approximately 18m diameter on an hexagonal base	Approximately 18m diameter on an hexagonal base
Predicted Annual Energy Production	145 GWh	154 GWh
Aviation lighting required	Yes	Yes
Crane Pads	Approximately 55m x 35m rectangle with adjacent 43m x 12m blade lay down area	As per current manufacturer requirements (see new Figure 1.7)

Table 1.1: Summary of changes due to Proposed Development

1.9 The principal changes are therefore:

- A reconfigured crane pad arrangement to reflect current manufacturer requirements, as illustrated on Figure 1.7;
- An increased micrositing allowance, from 100m to 200m, to improve turbine performance across the wind farm array and allow the final design to better respond to localised topographic constraints;
- An increase in the tip height from 180m to 200m, to improve turbine efficiency; and
- A redesigned infrastructure layout to accommodate the increased micrositing areas and new crane pad configurations (as illustrated on new Figure 1.3).

1.10 In order to aid the assessment of the proposed micrositing increase from 100m to 200m this application has identified new preferred positions for wind turbines within the enlarged micrositing areas. These are detailed in Table 1.2 below and have formed the basis of the EIA which accompanies this planning application. The micrositing areas and preferred locations are illustrated on Figure 1.13.

	Approved			Proposed			
Turbine	Easting	Northing	Tip Height	Easting	Northing	Tip Height	Distance from Approved Position
1	268667	595003	180m	268809	595138	200m	196m
2	267383	593947	180m	267216	593849	200m	193m
3	268952	594686	180m	269093	594637	200m	149m
4	268227	594890	180m	268257	595076	200m	188m
5	268477	594506	180m	268568	594560	200m	106m
6	267973	594481	180m	267787	594426	200m	194m
7	267787	594041	180m	267858	593871	200m	184m

Table 1.2: Approved and Proposed Turbine Details

1.11 Given that the turbine heights proposed would be over 150m, UK aviation policy requires that the turbines should be lit during night-time conditions. The following measures are proposed to mitigate the effects of lighting:

- The lights would be fitted with directional intensity mitigation shielding to focus the hub lighting in the horizontal plane (+ or – a few degrees);
- The lights would automatically dim to a nominal intensity of 200 candela during periods of meteorological visibility in excess of 5km; and
- Radar-based proximity activated lighting could be included to switch the lights on and off based on the presence or otherwise of aircraft.

1.12 All other elements of the existing planning permission for Cornharrow Wind Farm would remain as previously approved.

Design Rationale

1.13 The Proposed Development consists of an increased tip height for 7 turbines and an increase to the micrositing allowance of the wind farm. If planning permission is granted, the Applicant would commission detailed ground investigations and geotechnical surveys to determine the ground conditions. A 200m micrositing allowance is sought for the wind turbines, and all other new elements of the Proposed Development.

Structure of Report

1.14 This Comparative EIAR has been prepared by Energiekontor UK Ltd and sets out the findings of a comparative Environmental Impact Assessment which has been undertaken to consider whether the Proposed Development would result in any additional significant environmental effects not identified in the 2021 EIAR for the wind farm development.

1.15 The landscape and visual effects of the Proposed Development has the potential for materially different effects from those reported in the 2021 EIAR and has subsequently been assessed as part of the tip height proposal.

1.16 This Comparative EIAR is structured as follows:

- Section 1 provides a background to the Proposed Development;
- Section 2 presents a review of the key topics in the 2021 EIAR and any specific items within these topics which have the potential for materially different environmental effects as a result of the Proposed Development;
- Section 3 provides a detailed assessment of the landscape and visual effects arising from the Proposed Development;
- Section 4 provides a summary of the findings of the comparative environmental assessment.

The Applicant

1.17 Energiekontor UK Ltd is a renewable energy development company with offices in Glasgow and Leeds. The company was formed in 1999 and develops onshore wind and solar farms throughout the United Kingdom. The company operates eight existing wind farms in the UK with consents for a further eleven projects, nine of which are in Scotland and two of which are currently under construction as subsidy-free wind farms.

1.18 Energiekontor UK Ltd is part of the Energiekontor Group. The parent company, Energiekontor AG, was established in 1990 in Bremerhaven in Northern Germany. It has since grown to become one of the leading wind energy companies in Europe and is active in Germany, France, The Netherlands, Portugal, the USA and the UK. The company has built more than 100 onshore wind farms in Europe.

2 COMPARATIVE EIA SCREENING

Introduction

2.1 This Comparative EIAR has been prepared by Energiekontor UK Ltd and sets out the findings of a comparative Environmental Impact Assessment which has been undertaken to consider whether the Proposed Development would result in any additional significant environmental effects not identified in the 2021 EIAR for the wind farm. This section provides an appraisal of the potential for significant environmental effects to occur as a result of the Proposed Development.

Comparative EIA Screening

2.2 Table 2.1 below sets out the findings of the comparative EIA screening exercise.

Landscape and Visual Amenity	
Key findings from 2021 EIAR for the wind farm	There would be a slight reduction in effects on landscape fabric due to the omission of turbine 8. This would have a consequent reduction in the extent of new/upgraded track required and would reduce keyhole felling. The magnitude and significance of effects would remain Moderate/Minor and not significant. There would be no increase in the scale of landscape effects at any of the seven viewpoints located within this LCT. The characterising influence of the turbines would remain highly localised and contained within the upper Stroanfreggan/ Corlae Burn valley. Any potential increase in effects arising from the taller turbines is offset by the smaller site footprint and reduced number of turbines arising from the omission of turbine 8. In terms of visual effects; it was considered there were no increased levels of impact found at the viewpoints that were assessed under the original permission for the site. A total of eight residential properties were assessed as part of the Residential Visual Amenity Assessment (RVAA). Of these eight properties, there were only three residential properties that were identified as being likely to experience the highest magnitude of effects, one of these properties located within 2km of the site is financially involved. The RVAA determined the tip height increases would make the turbines appear marginally larger than for the consented scheme, slightly increasing effects. This is offset by the removal of turbine 8. The removal of T8 would also reduce the spread of the turbines in views from both properties. This balance of effects would also

	apply to the less affected properties considered within this RVAA. Due to the lack of settlement and screening by landform, there would be no significant effects on any settlements within the study area. Significant visual effects for road users would be limited to localised sections of the B729 travelling eastward as it passes south of the Proposed Development. Although there would be views of the Proposed Development from some short sections of the A713, A762, A712, A702 and B7000, no significant visual effects are predicted along any of the main travel routes (road or rail) as they travel across the study area. There would be no change from the previous consent to the effects predicted from the minor unclassified road network . In terms of the effects on recreational receptors, there would be a significant effect on part of the Southern Upland Way, notably near the Site (over a 6km section at distances ranging from 1.5-5km from the Site). This section of the SUW also forms Core Path 504. There would be no change from the previous consent to the effect predicted for visitors to three of the four Striding Arches Sculptures. From Core Path Nos. 51, 52, 216 and 446, which provide localised recreational access to: Benbuie; Troston Hill; Cairnhead; Blackmark Hill; Manquhill Hill; and Benbrack Hill, within 5km of the Site, there would be no change from the previous consent to the effect predicted on the visual amenity of users. No significant visual effects are predicted for users of the national cycle ways or other tourist destinations. It is evident from the LVIA that due to the site selection and iterative design process the extent of significant landscape and visual effects is very limited considering the scale of the proposal.
Potential for material change / significant effects as a result of the Proposed Development	There is potential for changes to the significant landscape and visual effects associated with the wind farm as a result of the increased tip height and as a consequence of night time effects due to the introduction of lighting. There is not considered to be any changes to the assessed landscape and visual effects associated with the wind farm as a result of the increased micrositing allowance.

Comment	Further assessment to determine the landscape and visual amenity effects associated with the Proposed Development is provided in Section 3 of this Comparative EIAR.
Ecology and Ornithology	
Key findings from 2021 EIAR for the wind farm	In relation to ecology, no significant effects are predicted in relation to important ecological features, either within the Site itself or the wider area. Similarly in relation to ornithology, no significant effects are predicted in relation to any bird species, either from the wind farm alone or in combination with other schemes.
Potential for material change / significant effects as a result of the Proposed Development	There is not considered to be any potential for material change or any alteration of the assessment of significant effects. These effects remain unchanged with the increase in tip height and micrositing allowance.
Comment	No change is predicted.
Cultural Heritage	
Key findings from 2021 EIAR for the wind farm	In relation to direct effects, the Proposed Development has been designed to avoid the known heritage assets. Two potential direct impacts on heritage assets have been identified, arising from the construction of the Proposed Development. A burnt mound (9), of medium sensitivity, lies close to the proposed access track to turbines T2 and T7 .and the remains of a sheep shelter (25), of low sensitivity, lie within the felling area around turbine T6 and close to the access track between turbines T4 and T6. In the absence of mitigation, it is assessed that the impact on the burnt mound (9) is potentially of major/moderate significance (significant in EIA terms and the impact on the sheep shelter (25) is assessed as being potentially of moderate significance and not significant. Mitigation measures are proposed to ensure the preservation in situ of both the burnt mound (9) and sheep shelter (25), through avoidance during the felling and construction phases. Whilst no areas have been identified as specifically requiring archaeological monitoring under a watching brief, other mitigation is proposed, through the provision of construction guidelines, to ensure an adequate level of recording in the event that archaeological remains are discovered during the course of construction work. There would be indirect effects on the settings of five heritage assets in the wider study area that are assessed to be of moderate significance (not significant in EIA terms).

	There would be indirect effects on the settings of 11 heritage assets in the wider study area that are assessed to be of moderate/minor significance (not significant in EIA terms). There would be indirect effect on the settings of one heritage asset in the wider study area that is assessed to be of minor significance (not significant in EIA terms). Potential cumulative effects of moderate significance (not significant in EIA terms) on the settings of a group of assets within and around the Stroanfreggan ASA are predicted, arising from the Proposed Development in combination with the addition to the baseline of the proposed Shepherds Rig and Troston wind farms. Potential cumulative effects of moderate/minor significance (not significant in EIA terms) on the settings of a group of assets with designations of 'regional significance' within 5km of the Proposed Development are predicted, arising from the Proposed Development in combination with the addition to the baseline of the proposed Shepherds Rig Wind Farm
Potential for material change / significant effects as a result of the Proposed Development	The increase in tip height and micrositing allowancewould not lead to any additional direct or indirect effects on any cultural heritage assets, whether designated or otherwise. The magnitude of effect predicted in relation to the indirect effects would remain unchanged.
Comment	No change is predicted.
Noise	
Key findings from 2021 EIAR for the wind farm	Background noise measurements were carried out at a number of locations in order to determine suitable noise limits. The procedure for establishing noise limits is set out in the document *ETSU-R-97 Assessment and Rating of Noise from Wind Farms*. Environmental noise predictions were made for a range of wind speeds for the proposed wind farm. The predictions found that noise limits established by ETSU-R-97 would be satisfied. Operational noise from the wind farm has been assessed in accordance with national planning guidance and demonstrated to be within acceptable levels.
Potential for material change / significant effects as a result of the Proposed Development	The Proposed Development would continue to operate in accordance with the noise limits that are set out in the planning permission.
Comment	No change is predicted.
Traffic and Transport	

Key findings from 2021 EIAR for the wind farm	Disturbance to local residents and other road users due to abnormal load deliveries is a potential negative effect. However, given the low number of vehicles involved and mitigation measures proposed the amount of disturbance would be limited. HGV movements delivering construction materials would also result in negative effects on road users and local residents. The significance of the effects are considered to be low given the short duration of the works, the existing levels of traffic along most of the route and the mitigation measures proposed.
Potential for material change / significant effects as a result of the Proposed Development	The Proposed tip height change and increase in micrositing allowance would not impact on the amount of construction traffic associated with the wind farm.
Comment	No change is predicted.
Soil and Water	
Key findings from 2021 EIAR for the wind farm	The effects of the wind farm on the hydrological, hydrogeological and geological conditions of the Site are not significant in EIA terms.
Potential for material change / significant effects as a result of the Proposed Development	There is not considered to be any potential for material change or any alteration of the assessment of significant effects. These effects remain unchanged with the extended tip heights and micrositing allowance.
Comment	No change is predicted.
Forestry	
Key findings from 2021 EIAR for the wind farm	A total area of 22.98ha of trees would be removed to facilitate construction of the wind farm. Suitable compensatory planting would be created within the wind farm application area to comply with the requirements of the Control of Woodland Removal Policy.
Potential for material change / significant effects as a result of the Proposed Development	There is not considered to be any potential for material change or alteration of the assessment of significant effects. These effects remain unchanged with the extended tip heights and micrositing allowance.
Comment	No change is predicted.
Infrastructure and Shadow Flicker	
Key findings from 2021 EIAR for the wind farm	Wind turbines can interfere with broadcast transmissions such as radio and television. Consultation was undertaken with those organisations whose transmissions may be affected including mobile telephone service providers, emergency services, television companies etc. From the replies received it was predicted that there would be no disturbance to

	communications systems with the mitigation measures proposed. Wind turbines have the potential to affect aviation safety both through the interference with radar and navigation systems. Rotating wind turbine blades can cast moving shadows which can affect neighbouring properties. As the blades rotate, there can be alternating light and shadow, an effect known as shadow flicker. The effect occurs inside buildings, where the shadow falls on a window. The impact of shadow flicker has been assessed for properties within an arc of 130 degrees either side of north and within 10 rotor diameters (in this case 1.33km) of any turbine position. This assessment has quantified the likelihood of shadow flicker effects occurring at nearby properties as a result of the proposed wind farm, along with their times and durations. Overall the effects have been identified as being minor.
Potential for material change / significant effects as a result of the Proposed Development	There is not considered to be any potential for material change or any alteration of the assessment of significant effects. These effects remain unchanged with the extended tip heights and micrositing allowance.
Comment	No change is predicted.

Table 2.1: Comparative EIA Screening Summary

Summary

2.13 One topic area with the potential for materially different effects from those reported in the 2021 EIAR for the wind farm has been identified, namely landscape and visual effects. This topic is discussed further in the subsequent section.

3 LANDSCAPE AND VISUAL AMENITY

Introduction

3.1 This section presents an updated Landscape and Visual Impact Assessment (LVIA) in relation to the Proposed Development. The LVIA has been undertaken by Stephenson Halliday Ltd, chartered Landscape Architects responsible for the preparation of the LVIA included in the 2021 EIAR.

Approach and Scope of Assessment

3.2 The methodology used remains consistent with that set out within the 2021 EIAR.

3.3 Potential construction phase effects and decommissioning effects would be predominantly unaltered from those described within the LVIA of the 2021 EIAR and are therefore not considered further in this chapter. This assessment focuses on potential changes to the assessed level of effect on key landscape and visual receptors during the operational phase of the Proposed Development. The increased height of the Proposed Development has led to a requirement for visible aviation lighting and as a result a night-time assessment has been included in this Comparative EIAR.

3.4 Since the 2021 EIAR, the only notable changes to the landscape and visual baseline that have occurred are the consent and construction of a number other wind farms as follows:

- **Pencloe** – this scheme was consented but subject to a further application to increase the tip height of turbines at the time of the previous assessment, which has since been consented.
- **South Kyle** – this scheme had started preliminary construction works at the time of the 2021 EAIR but no turbines had been erected. Construction at the site remains ongoing with the first turbines now erected and works on schedule to be completed in 2023.
- **Windy Rig, Twentyshilling Hill** – these schemes were partially constructed at the time of the 2021 EIAR and are now fully operational.
- **Margree, Fell** – these schemes were in planning at the time of the 2021 EIAR and have subsequently been consented.

3.5 The Site and surrounding area is covered by extensive areas of commercial forestry. Since the 2021 EIAR there have been some areas felled as part of the usual cycle of commercial forestry but this makes no substantive change to the landscape and visual baseline.

3.6 The scope of this comparative LVIA includes the following:

- ZTV and Viewpoint Analysis, with reference to potential changes in the nature / extent of visibility at each of the LVIA Viewpoints included within the 2021 EIAR;

- Assessment of Landscape Effects – focussed on any changed as a result of the Proposed Development compared to the EIAR;
- Assessment of Visual Effects – focussed on any changes as a result of the Proposed Development compared to the EIAR; and
- Cumulative Assessment – focussed on the changes to the cumulative situation and the impact the increased tip height makes to this situation;
- Residential Visual Amenity Assessment – updated with regard to the height of the turbines and requirement for visible aviation lights;
- Night-time assessment –- focussed on the changes as a result of visible aviation lighting including mitigation; and
- Summary - summaries the key changes to the landscape and visual assessment as a result of the Proposed Development.

3.7 The chapter is supported by the figures and visualisations in Volume II which include:

- Comparative ZTV 15km;
- Design Analysis;
- Landscape Character;
- Visual Receptors and ZTV;
- Cumulative Base Plan;
- Comparative Nacelle Light ZTV 15km;
- Existing Light Environment;
- Cumulative ZTV (operational, construction phase and consented);
- Cumulative ZTV (sites in planning); and
- Wirelines and Visualisations.

ZTV and Viewpoint Analysis

Zone of Theoretical Visibility Analysis

3.8 A comparative ZTV illustrating the difference in theoretical visibility between the consented and proposed development is shown on Figure 3.1. The comparative ZTV illustrates that within 5km, theoretical visibility of the turbines would arise from open areas of higher ground between the forestry. Between 5-10km, theoretical visibility of the site would be very intermittent and would remain largely confined to open and elevated areas although some visibility would occur from the lower lying areas extending along the Dalwhat Water valley to the southeast. Between 10km-20km, theoretical views of the Proposed Development would be largely restricted, in the east, to the Lowther Hills, whilst rising ground in the Southern Uplands will largely restrict views from the north.

3.9 New areas of visibility (shown in yellow), where the Proposed Development would potentially be visible but the Consented Development would not, are limited to some very minor extensions to areas of visibility and primarily arise within 10km to the east of the site. The most notable new area of visibility would potentially give rise to new views of up to three of the turbine blade tips along the valley of the Dalwhat Water 5-15km to the

southeast near Moniave, although these are likely to be seen through existing turbine blades at Wether Hill.

Viewpoint Analysis

3.10 Viewpoint analysis has been undertaken from a total of 9 representative viewpoints. These have been selected as a subset of those considered in previous LVIAs for Cornharrow wind farm, within 15km and representing receptors at a range of distances and directions.

3.11 The viewpoint locations are illustrated on Figure 3.1. The visualisations (comprising photographs of the existing view, comparative wireframes showing both the Consented and Proposed Developments, and photomontages) are illustrated with reference to Viewpoints 2, 3, 4, 5, 6, 7, 8, 9, & 11 – retaining the numbering used in previous assessments for ease of cross-reference.

3.12 The Viewpoint Analysis considers the sensitivity of the receptor, the nature of the predicted view and the scale of visual change at each viewpoint location. The wider geographic extent of the effect (beyond the individual viewpoint location) and its duration are considered in detail within either the landscape or visual assessment.

Table 3.2: Viewpoint Analysis Summary

VP	Location	Distance /Direction	Scale of Landscape Effect	Scale of Visual Effect
2	Southern Upland Way at Benbrack (Striding Arch)	2.0km, N	Large/medium	Large
3	Cairnhead Cottage/ Barn Sculpture (Striding Arch) (at foot of Conrick Hill)	2.5km, NE	Medium/small	Medium *
4	Minor road near Bennieloan	3.3km, S	Negligible *	Small *
5	B729 at Blackmark	2.6km, SW	Medium	Large/medium
6	Bail Hill (Striding Arch)	3.2km, NE	Medium/small	Medium/small
7	Colt Hill (Striding Arch)	4.0km, NNE	Small *	Medium /small *
8	Southern Upland Way crossing B729 at Culmark Moss	3.9km, SW	Medium/small	Medium
9	Southern Upland Way on Culmark Hill	5.1km, SW	Small *	Medium /small *

VP	Location	Distance /Direction	Scale of Landscape Effect	Scale of Visual Effect
11	Cairnsmore of Carsphairn, Knockgray Trail	8.8km, NW	Negligible *	Small

3.13 Effects marked * are different to those reported in the comparative EIA update for the Consented Development. The changes are primarily as a result of the changed future baseline which now includes consented wind farms at Glenshimmeroch, Troston Loch, Lorg and Margree. Whilst some of these were also consented when the EIA update was prepared, the assessment baseline was not updated at that time for ease of comparison with previous assessments. The increased effects at viewpoint 3 arise from the combination of micro-siting and tip height increase which makes one of the turbines notably more visible from this viewpoint compared to the Consented Development which would have mostly been seen as blades above forestry.

Assessment of Landscape Effects

3.14 Based on the viewpoint analysis above, the following character types would receive negligible scale effects due to distance and/or limited visibility and/or the effects of more nearby wind farms and are not considered in detail:

- D&GC LCT 18a (ii) Foothills with Forest: Rhinns of Kells Unit (10km, Southwest);
- D&GC LCT 21 Rugged Granite Uplands: Rhinns of Kells LCU (12.1km, West).

3.15 The effects on landscape character of the Proposed Development are assessed below.

Table 3.3: Revised Landscape Character Effects

Landscape Character Type	Sensitivity	Potential Changes	Consented Level of Effect	Revised Level of Effect
Host: LCT 19a Southern Uplands with Forest: Ken LCU	Medium/ Low	As set out in the viewpoint analysis in Appendix 3.3, the turbines would be seen in the foreground of existing and consented wind turbines, and the main change to character would arise as a result of the closer proximity of the Proposed Development rather than it being either a new element or affecting different views.	**Major/ Moderate to Moderate** and **significant** within 2.5km of the site No greater than Moderate/Minor and not significant beyond	**Major/ Moderate to Moderate** and **significant** within 2.5km of the site No greater than Moderate/Minor and not significant beyond
LCT 4 Narrow Wooded Valley: Ken Unit	High/ Medium	Small scale effects would arise in the area of visibility towards the southern end of the valley as indicated by Figure 3.1 - near Culmark Moss and Stroanfreggan. The proposed turbines would slightly increase the influence of wind energy development arising	**Moderate/Minor and Adverse (not significant)**	**Moderate/Minor and Adverse (not significant).**

Landscape Character Type	Sensitivity	Potential Changes	Consented Level of Effect	Revised Level of Effect
		from Glenshimmeroch and Wether Hill and extend its presence off the hill tops and skyline onto lower hill sides.		
LCT 9 Upper Dale (Valley): Upper Glenkens LCU	High/ Medium	Small scale effects would arise in the nearest part of the character unit up to 7km to the southwest of the Site. The Proposed Development would exist in an adjacent landscape which is often obscured and separated from the Glenkens by immediate and adjacent intervening landform and woodland. From more distant areas towards the south of the character unit, closer and larger scale wind farm development within the Glenshimmeroch/Margree/Troston Loch cluster would reduce the perceived change as a result of the Proposed Development.	**Moderate/minor and adverse (not significant)**	**Moderate/minor and adverse (not significant)**
LCT 19 (i) Southern Uplands: Carsphairn LCU	Medium/ Low	Small scale effects would arise in the areas of visibility away from the existing wind farms and within up to 7km from the site. As shown by Figure 3.1, this would affect an Intermediate extent of the LCU to the southeast of Cairnsmore of Carsphairn	**Minor and Adverse (not significant).**	**Minor and Adverse (not significant).**

3.16 The only significant effects on landscape character identified as a result of the consented development occurred within a highly localised part the host LCT. As set out above, effects arising as a result of the Proposed Development would be no different in terms of their geographic extent, magnitude or significance.

Designations

3.17 The Thornhill Uplands (RSA 8) are situated 5.1km northwest of the site. Effects on the character types within the RSA are considered in table 3 above and are limited to small scale effects in the areas of visibility within LCT19 (i) Southern Uplands: Carsphairn LCU away from the existing wind farms and within up to 7km from the site, affecting localised extent of the RSA to the southeast of Cairnsmore of Carsphairn. The magnitude of change would be Slight and taking account of the lower sensitivity upland areas affected, effects would be Minor and Adverse (not significant).

Assessment of Visual Effects

3.18 The assessment on visual effects focuses on groups of visual receptors. The assessment of effects focuses on the visual amenity from public spaces. These visual receptor groups are generally assessed as being of High susceptibility to the Proposed Development; those

within locally designated landscapes are judged to be of Regional value and those elsewhere Community value, resulting in a High/Medium sensitivity to the Proposed Development unless stated otherwise.

3.19 Based on the viewpoint analysis above, the following visual receptor groups and routes would receive negligible scale effects due to distance and/or limited visibility and/or the effects of more nearby wind farms and are not considered in detail: alongside the Stroanfreggan and Benbrack burns and over Manquhill Hill.

- Carsphairn, local roads, residents, and nearby core paths (10.6km West);
- A713 (Galloway Tourist Route) (9.1km West).

Table 6.3: Revised Visual Effects

Visual Receptor	Sensitivity	Potential Changes	Consented Level of Effect	Revised Level of Effect
Users of core paths within 2km (0.4km, West)	High/ Medium	As shown by Figure 3.4, this receptor group includes a number of routes to the west of the site running along the valleys. Users of these local routes (of Community Value) would have a High susceptibility to changes to views and would be High/medium sensitivity. Open areas, such as the summit of Manquhill Hill and alongside the Corlae and Stroanfreggan Burns, would allow more open views of the proposed turbines which would result in Large scale changes to views over a Localised extent of the routes.	**Moderate and significant**	**Major/moderate and Adverse (significant).**
Southern Upland Way	High	As illustrated by Figure 3.4, walkers using the route would have a High susceptibility to changes to views and High/medium sensitivity. VPs 2, 8 and 9 represent effects from the route (or nearby), indicating Large scale effects in the closest and most open views, reducing to Medium and Medium/small at distances of 4-5km south.	**Major/Moderate** and **significant** over a 6km section of the route between Culmark Hill and Manquhill Hill **Moderate** and **not significant** elsewhere	**Major/Moderate and Adverse (significant)**
Visitors to the Striding Arches sculptures	High/ Medium	As illustrated by the viewpoint analysis, the degree of visibility of the Proposed Development and resultant scale of	**Major to Moderate** and **significant** at	**Major/Moderate and Adverse (significant)**

Visual Receptor	Sensitivity	Potential Changes	Consented Level of Effect	Revised Level of Effect
		effects from each of the sculptures varies and ranges between Large scale at the closest sculpture at Benbrack and Medium/small at the more distant sculptures on Bail and Colt Hills. The Proposed Development would give rise to Large scale changes to views over a Limited extent of the group at and in the vicinity of Benbrack. More widely, effects would be Medium or Medium/small scale over a Localised extent of the group.	the three hilltop sculptures **Moderate** and **significant** at the Byre near Cairnhead Cottage	
Dispersed settlement and routes within 6km south & south-west, including the B729	High/Medium	As illustrated by VPs 4, 5, 8 and 9, the people here, primarily local residents, would have a High susceptibility to changes to views which are of Community value and would have a High/medium sensitivity. Views from this area would typically give rise to Medium scale effects or less (Viewpoints 4, 8 and 9), where the turbines would be seen in the context of other nearby wind farms, although from a Localised area around Blackmark (Viewpoint 5) these would be up to Large/medium scale	**Moderate and Significant**	**Major/Moderate and Adverse (significant)**

Cumulative Assessment

3.20 Since the 2021 EIAR, the following key changes to the cumulative situation have occurred:

- **Pencloe** – this scheme was consented but subject to a further application to increase the tip height of turbines at the time of the previous assessment, which has since been consented.
- **South Kyle** – this scheme had started preliminary construction works at the time of the consent for Cornharrow, but no turbines had been erected. Construction at the site remains ongoing with the first turbines now erected and works on schedule to be completed in 2023.

- **Windy Rig, Twentyshilling Hill** – these schemes were partially constructed and are now fully operational.
- **Margree, Fell** – these schemes have been consented.

3.21 Proposals at Shepherds Rig, Euchanhead and Sanquhar II were all in planning at the time Cornharrow wind farm was consented and remain undetermined. The proposed variations at Glenshimmeroch and Fell are not considered likely to given rise to changes to cumulative effects arising as a result of the Proposed Development.

3.22 There are also a number of schemes at the pre-planning stages including Manquhill, Appin, Lorg, Knock and Rowancraig. Although there is the potential for some of these schemes to give rise to notable cumulative effects with the Proposed Development, they are not yet subject to valid applications and there can be little certainty that they will ultimately be submitted in the form presented at the pre-planning stage.

3.23 The potential for cumulative night-time effects as a result of the requirement for visible aviation lighting on structures above 150m in height is considered in the night-time effects section of this chapter.

Night-time Assessment

Summary of Visible Aviation Lighting Requirements and Mitigation

3.24 The Proposed Development will require visible aviation lighting. The current Civil Aviation Authority (CAA) policy statement (July 2017) requires that the lights will comprise a single 2000 candela steady red light mounted on the nacelle and a 32 candela steady red light mounted around the tower (three are required so as to be visible in all directions) at half the hub height.

3.25 Unlike many of the unmitigated aviation lights which currently exist in Scotland, such as on older wind turbines, bridges and large TV and radio masts, the proposed lights would include some further mitigation. The automatic dimming of the lights (controlled by sensors installed on the turbines) to a nominal intensity of 200 candela, during periods of good visibility (meteorological visibility in excess of 5 km) would mean the lights would still be visible but would be far less bright.

3.26 Directional Intensity which has the potential to reduce the intensity of the lights for nearby receptors located at elevations below the turbine nacelles

3.27 The switching on and off of the lights would be controlled by a timer, 30 minutes after sunset until 30 minutes before sunrise, and not by photocells or similar that respond to particular light levels, thereby not incurring effects in the daytime.

Approach and Scope of Assessment

3.28 The methodology used in this assessment is consistent with Guidelines of Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3).

3.29 There is a distinction between light pollution or nuisance and the effect of lighting on the character and amenity of the landscape at night. This is not a technical lighting assessment but focusses on the night-time effects as a result of the introduction of new artificial lighting within the landscape, with consequent effects.

3.30 This part of the assessment is still an emerging area of assessment regarding the scope and receptors which would be impacted as a result of the aviation lighting. It is clear that night-time impacts would occur on the visual amenity of the area, but there is some debate regarding the extent of impact on surrounding landscape character. One of the most recent and relevant determinations by Scottish Ministers (Page 12 of Crystal Rig Wind Farm Phase IV Scottish Ministerial Determination Letter dated 24 March 2021) stated that:

3.31 *"Reporters conclude that proposed aviation lighting would be a visual impact alone and consider that without being able to see and fully appreciate the features of the landscape and the composition of views, it is not possible to carry out a meaningful landscape character assessment. The Scottish Ministers concur with this conclusion."*

Potential Effects

3.32 The aviation lights would be visible as points of light, especially where there would be a high degree of contrast at the viewpoint (i.e. the lights were seen against a dark sky / dark landmass or where there would be little or no existing artificial light sources present).

3.33 During periods of greater ambient light, (e.g. sunset, twilight, dusk, dawn) there would be a reduced effect as the contrast of the aviation lighting against the background would be less. The lights would be switched on 30 minutes after sunset until 30 minutes before sunrise. This variation means that in summer the lighting would not be switched on when people are predominantly active and contrast with the background would be reduced. However, in winter the lighting would be switched on during peak active times.

3.34 Due to the location of the lighting on the turbines relative to the rotating blades, this can result in a blinking effect caused by the screening effect of blades as they travel past the lights. These effects are dependent upon the rotation speed of the blades, direction of wind and the location of the receptor. Where a number of lit turbines are present in the view, such blinking is likely to be at the same frequency but uncoordinated.

Sensitivity of Receptors

3.35 For landscape receptors, susceptibility is judged based on the degree to which they are currently characterised by darkness. Value is judged based on similar factors as for the daytime assessment unless suggested otherwise. For example, identification of a Dark Sky Park which would increase value; or if value is based on scenic qualities which are not appreciable at night, the value may decrease.

3.36 For visual receptors, the value attached to night-time views are considered to be low unless there is a particular feature that can be best appreciated in the hours of darkness. This may include views of stars and the night sky that are only possible in particularly dark areas or views of well-known landmarks that are lit up at night. The susceptibility of visual receptors also differs at night reflecting the different activities people undertake in the

hours of darkness. For example, drivers using roads at night tend to be more focused on the road and the area illuminated by their headlights than during the day and may have oncoming headlights, cats eyes or other reflective signage drawing their attention, resulting in lower susceptibility. This is particularly the case on unlit rural roads that may be narrow and winding. On the other hand, people taking part in activities requiring darkness, such as stargazing, would be of higher susceptibility.

Existing Night-time Environment of the Study Area

3.37 Figure 3.7 gives a broad impression of the level of existing lighting within the study area based on satellite observations of light pollution. It illustrates that the existing night-time environment in the study area is typically very dark although is punctuated by lighting associated with settlements. Generally, the larger the settlement the more intense the light levels are and the more these extend to affect the surrounding landscape. This pattern is largely supported by on site observations.

3.38 Roads across the study area, outside of settlements, are largely unlit and have relatively little traffic at night, particularly across inland areas. Occasional traffic is evident as headlights seen moving through areas that are otherwise dark, frequently flicking in and out of view as a result of the undulating topography of the area, woodland cover and roadside hedgerows.

3.39 The Galloway Forest Dark Sky Park (DSP) lies over 10km west of the outermost turbines with a small forested area of the DSP within 15km, and the Core Area lying more than 21km to the southwest. The Site lies within the Dark Sky Park Transition Zone, which extends to a radius of 10 miles or 16km from the Park's boundary. The Scottish Dark Sky Observatory lies over 21km north west.

Zone of Theoretical Visibility

3.40 Figure 3.6 illustrates the ZTV for the hub height of turbines within the Proposed Development and illustrates the maximum extent that the 2000 cd nacelle lights would potentially be visible from. It illustrates that visibility of the proposed aviation lighting would be limited in extent and even within 5 km there would be large areas where lights are not visible. Close to the site, views of lights would generally be confined to open views of most or all of the lights from areas of higher ground that are unforested; and more restricted views of some of the lights from the valleys of Gorlae Burn and Stroanfreggan Burn to the west and southwest of the site.

3.41 Further afield, visibility is generally limited to elevated hilltops in the western half of the study area. although there are more limited, isolated hilltops to the east where views of lights may also occur. To the northwest there would be views from east facing slopes to the east of Cairnsmore of Carsphairn, at distances of up to 10km from the site. To the southwest, visibility would be more patchy but would extend to greater distances. There would be no visibility of the aviation lighting from the Dark Sky Park within 15km of the site.

3.42 Effects on landscape or visual receptors outside the areas of visibility shown on the ZTV study would be Negligible and are not considered further.

Landscape Character

3.43 In terms of the potential for landscape character effects at night, these are almost exclusively concerned with perceptions of darkness and an absence of development, as the key characteristics of landscapes which distinguish the landscape character areas described in character assessments are generally obscured after dark.

3.44 As detailed above, Figure 3.6 indicates that the primary areas of theoretical visibility of the aviation lights and Figure 3.7 shows the comparative light levels across the study area.

3.45 The landscapes affected would be those which are predominantly dark (the upland areas) and are sufficiently close to the Site and distant from other operational and consented wind farms requiring visible aviation lights (Windy Standard 3, Margree, Fell) that the introduction of visible aviation lighting nearby would be fundamentally different to existing sources of artificial lighting.

Visual Effects

3.46 The impact on visual receptors at night is different from the impact in the daytime presented in the main LVIA. The receptors potentially affected are different and their sensitivity may also be different.

3.47 People in settlements would remain of similar sensitivity. However, road users would attribute a lower value to the view, as amenity value would be limited from the roads at night, which reduces their overall sensitivity. Core Paths and other outdoor recreational locations are generally unlikely to be used at night and would have limited amenity value, they are therefore not considered.

3.48 However, recreational users specifically gazing at the night sky would be sensitive to changes in the night sky. Night-time visitors to the DSP have been included as the main recreational users.

<u>Residents and Communities</u>

3.49 Views of people at night within the surrounding settlements and dispersed rural properties are judged to be of High susceptibility and Community value, resulting in a High/Medium sensitivity to the proposed aviation lighting.

3.50 As illustrated by the ZTV on Figure 3.6, the only area of settlement likely to have views of aviation lighting are the small number of dispersed properties along Stroanfreggan Burn and the B729 approximately 4km southwest of the site. There is no street lighting, and the baseline night-time environment tends to be very dark. As illustrated by viewpoints 5 and 8, the Proposed Development would introduce visible aviation along a dark skyline, though the number of lights visible in this area would vary markedly, tending to be fewer than 3 lights from the B729, which connects the few dwellings. In periods of good atmospheric visibility the automatic dimming of the lights would reduce the brightness. In this area of dark, dispersed settlement, local residents would see the lights as they leave and return to their properties during hours of darkness, and when moving around outdoors at night and the Permanent effects arising from the introduction of aviation lighting would be Large/medium scale over an Intermediate extent. Local residents would experience a

Substantial/moderate magnitude of change to night-time views and Major/moderate effects (significant).

3.51 Users of the B729 would experience views of one or two of the lights for approximately 2.5km of the route when travelling east in the same area as described above. For westbound drivers the lights would be behind the direction of travel. Medium scale effects on Low sensitivity road users passing through this area on the B729 would affect a Limited extent of the route. Effects would be Moderate/slight magnitude and Minor (not Significant).

3.52 **Cumulative effects** – As shown by viewpoints 4, 5 and 8, visibility of the lighting on the turbines at Euchanhead and/or Sanquhar II would be very limited for the visual receptors discussed above, and effects in the context of a consent for one or either of those wind farms would be the same as for the Proposed Development alone.

3.53 Glenshimmeroch would be located at a similar distance to the Proposed Development and would be seen in the opposite direction from a short stretch of the B729 (viewpoint 8). Effects in the context of a consent for Glenshimmeroch would be the same as for the Proposed Development alone.

Galloway Dark Sky Park

3.54 Visual receptors within the DSP would have a High susceptibility to the proposed aviation lighting in this area which is identified by the Dark Sky Lighting SG as being of National value for tourism. Overall sensitivity of these users to the proposed aviation lighting is judged to be High.

3.55 The closest part of the DSP that is specifically promoted as a location for stargazing or viewing the night sky is the south end of Loch Doon, located approximately 20km west of the site, from where there would be no visibility of the lights.

3.56 As shown by Figure 3.6, there would be no visibility from the DSP within 15km of the turbines and at slightly greater distances (within roughly 20km) would be restricted to very small areas of visibility from east facing slopes looking out of the Dark Sky Park from the DSP 'buffer zone' in areas to the west and southwest of the site.

3.57 The aviation lighting would not result in any sky glow and would not be located in a position where it would interfere with observations of the night sky which, as a rule, involve looking upwards rather than in a horizontal plane. During periods of good visibility the automatic dimming of hub lights to 200 cd would significantly reduce the intensity of visible lights.

3.58 Permanent effects on night-time visitors to the DSP would be no greater than Small scale over a very Limited extent of the area which would result in a Negligible magnitude of change. Considering the High sensitivity of the DSP visitors, this would result in Minor effects which would be Not Significant.

3.59 **Cumulative effects** – Given the limited effects from the proposal alone it would not contribute to cumulative effects on the DSP when added to a baseline including other proposed wind farms.

Designations

3.60 As shown by Figures 3.4 and 3.9, the only designated landscape within notable visibility of the aviation lighting would be the Galloway Hills RSA. The areas of that designation which are specifically valued at night are designated as the Dark Sky Park, valued for its views of the night sky and considered above.

Summary

3.61 Construction and decommissioning stage effects would be substantively the same as for the Consented Development. They would involve short-term activities and effects which would be Not Significant.

3.62 The greatest effects during the construction phase would arise from the standing turbines, and large cranes used to erect these, during the final stages of construction – by which point the effects would be the same as for those during operation.

3.63 Significant visual effects would arise for users of core paths within 2km to the west of the site; for visitors to the Striding Arches sculptures (within 4km to the north and northeast); for users of local roads (including the B729) and local residents within 7km southwest of the site and for walkers using the Southern Upland way as it passes the site (particularly those heading north). However, the magnitude of change from the 2021 EIAR is only deemed as moderate.

3.64 No significant effects would arise upon national or local designations. Localised effects on the RSA 8 Thornhill Uplands would be Minor and Adverse, and would arise primarily as a result of changes to character in an area 5-7km west of the site to the southeast of Cairnsmore of Carsphairn.

3.65 A detailed cumulative assessment has been undertaken considering the effects that would arise from the addition of the Proposed Development to Euchanhead, Sanquhar II and/or Shepherds Rig wind farms.

3.66 For the most part, within 4km of the Site would remain unchanged to those for the proposed development alone. Effects to the west and southwest would reduce more rapidly as the influence of Shepherds Rig in this area would be more pronounced than that of the Proposed development.

3.67 Effects would remain the same as for the Proposed Development alone, except for minor reductions to non-significant effects on character areas beyond 4.5km west and southwest (LCT 9 Upper Dale (Valley): Upper Glenkens LCU and LCT 19 (i) Southern Uplands: Carsphairn LCU) and RSA 8 Thornhill Uplands in the same area.

3.68 There are a number of other consented wind farm developments within the 15km study area that will require visible aviation lighting. Significant visual effects arising from proposed aviation lighting would arise within the area of dispersed rural settlement within approximately 4km southwest of the Site. Elsewhere, including from the Galloway Dark Sky Park, effects of visible aviation at night would be not significant.

4 CONCLUSIONS

Introduction

4.1 Planning permission was granted for Cornharrow Wind Farm at appeal on 6 July 2022 (PPA-170-2160). The consented wind farm comprises seven wind turbines with tip heights of up to 180m, micrositing up to 100m and associated infrastructure. The planning application was accompanied by a Comparative Environmental Impact Assessment Report dated August 2021.

4.2 This Comparative Environmental Impact Assessment Report (Comparative EIAR) is submitted in support of an application under Section 42 of the Town and Country Planning (Scotland) Act 1997 by Energiekontor UK Ltd ("the Applicant") to vary conditions 1 and 12 of planning permission 21/1766/S42to allow an increase in the consented tip heights and micrositing at Cornharrow Wind Farm.

4.3 This Comparative EIAR has been prepared by Energiekontor UK Ltd with specialist input where necessary and sets out the findings of a comparative Environmental Impact Assessment which has been undertaken to consider whether the Proposed Development would result in any additional significant environmental effects not identified in the previous EIAR for Cornharrow Wind Farm.

Comparative EIA Screening

4.4 One topic area with the potential for materially different effects from those reported in the 2021 EIAR has been identified, namely:

- Landscape and visual effects.

Landscape and Visual Effects

4.5 The Proposed Development would involve an increase to the micrositing allowance for the turbines from 100m to 200m and a tip height increase from 180m to 200m. There would also be minor changes to tracks, turbine foundations and crane pads. However, these would not result in any changes to effects on landscape fabric, or landscape and visual receptors compared to the Consented Development.

Overall

4.6 The potentially significant environmental effects associated with the Proposed Development have been considered. There would be no significant effects on landscape character as a result of the Proposed Development. Visual effects that would arise from visual receptors up to 7km southwest of the site, have been deemed as a moderate magnitude of change from the 2021 EIAR. No significant effects would arise upon national or local designations. No other new potentially significant environmental effects arising from the Proposed Development are predicted which have not already been considered as part of the 2021 EIAR.

4.7 The increase in energy generation as a consequence of the increase in tip height is a powerful consideration in favour of the proposal, particularly when taking the overall neutral environmental effect that the tip height proposal would have compared to the consented project.