APPENDIX 5.11: Landscape and Visual Assessment of Aviation Lighting

Appendix 5.11: Landscape and Visual Assessment of Aviation Lighting

1. Introduction

1.1.1 ASH design + assessment Ltd (ASH) has undertaken an assessment of the landscape and visual effects of the aviation lighting proposals for the Proposed Varied Development. This assessment is supported by a series of Zone of Theoretical Visibility (ZTV) Figures illustrating the theoretical extent of visible aviation lighting (see **Volume 3, TA Figures A5.11-1 to 5.11-5**). Daytime visualisations have been prepared from all viewpoints included in the assessment of the Proposed Varied Development. Each of the accompanying wirelines indicate which turbines would be lit. Photomontages have been prepared from three of the main LVIA viewpoints to illustrate the effects of the proposed lighting strategy (see **Figures V3a – 4.5, V3a – 5.5 and V3a – 8.5**).

1.2 Description of Proposed Lighting

1.2.1 This assessment is based on the lighting scheme proposed in Chapter 14: Aviation and Radar, **Appendix 14.2: Aviation Lighting Assessment,** and on the requirements of the CAA Policy Statement: *Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level*[1] (the CAA policy statement).

1.2.2 In line with the approved CAA lighting scheme and policy statement, the assessment is therefore based on the following assumptions:

- Each of the 7 cardinal turbines (T2, T4, T8, T9, T12, T16 and T19) would have an infrared light and a 2,000 candela (cd) red light fitted to the top of the nacelle (assumed to be at 132 m), visible in all directions;
- A second 2,000 candela light would be fitted to the nacelles of each of the 7 cardinal turbines (T2, T4, T8, T9, T12, T16 and T19) to act as a back-up to be used in the event of failure of the main light;
- Visibility sensors will be employed to dim medium-intensity lights from 2,000cd to 200cd when visibility is 5km (or greater), in line with CAA policy and NatureScot's preference.
- All lights would be steady (i.e. not flashing). However, depending on wind direction, moving turbine blades seen in front of lights may give an impression of flashing lights from some locations.

2. Proposed Mitigation

2.1.1 Due to the height of Proposed Varied Development (200m to tip), aviation lighting would be required in line with the Air Navigation Order[1]. Discussions between the Applicant and the CAA on a reduced aviation lighting scheme are ongoing. As such the lighting scheme outlined in **Appendix 14.2 Aviation Lighting Scheme** has been used as the basis for this assessment.

[1] The Air Navigation Order 2016, S.I. 2016 No.765, Article 222.

2.2 Cardinal Lighting Strategy

2.2.1 In order to limit the potential aviation lights visible from receptors, the proposed lighting scheme consists of a 2,000 candela steady red light on the nacelles of only 7 of the 18 turbines (T2, T4, T8, T9, T12, T16 and T19) together with infra-red lighting, not visible to the unaided human eye on the nacelles of the cardinal turbines.

2.3 Reduced Lighting Intensity at Different Vertical Angles

2.3.1 Light 'spill' caused by aviation lighting would be minimised, by adjusting the narrow vertical beam spreads of 3° (-1° to +2°) using shields or optical adjustments, ensures visibility to pilots at or above nacelle level while significantly reducing downward spill. This would maintain compliance with the CAA and ICAO's omnidirectional horizontal visibility requirements without excessive illumination[2, 3].

Table 1: Example Potential Reductions in Light Intensity at Different Vertical Angles[4]

Vertical Angle	Turbine Lighting Intensity 2000cd light	Turbine Lighting Intensity 200cd light
0 degrees to 3 degrees	2200/2500cd	220/250cd
0 degrees to -1 degrees	2200 to 980cd	220 to 98cd
-1 degrees to -2 degrees	980 to 420cd	98 to 42cd
-2 degrees to -3 degrees	420 to 220cd	42 to 22cd
-3 degrees to -4 degrees	220 to 170cd	22 to 17cd
Below -4 degrees	Below 170cd	Below 17cd

2.3.2 The implication of this is that lighting intensity will vary depending on the angle of receptors relative to the aviation lighting. This can represent a considerable reduction in the perceived brightness of the aviation lighting from receptors at lower levels. **Figure A5.11-1: Lighting Intensity ZTV** illustrates the ZTV for the proposed aviation lighting strategy taking account of the angles at which the lights would be seen.

2.3.3 The design of the lights can also be used to minimise the lighting spill onto the turbine nacelles, towers and blades.

[2] ICAO Annex 14 Chapter 6 Visual Aids for Denoting Obstacles
[3] CAA Policy Statement – Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level
[4] NatureScot (2024). Guidance on Aviation Lighting Impact Assessment. Available at: Guidance on Aviation Lighting Impact Assessment | NatureScot. Accessed August 2025.

2.4 Reduced Intensity Based on Meteorological Visibility

2.4.1 The visible lights on the on the seven cardinal turbines will be dimmed to 10% of their nominal intensity when the measured meteorological visibility exceeds 5km. These conditions are estimated to prevail in the north of Scotland for more than 90% of the time.[5] When meteorological visibility is less than 5km, the perceived brightness of the full intensity lights (2,000cd) would be reduced by the conditions requiring their use. This means that receptors located over 5km from the Proposed Varied Development are unlikely to experience the aviation lighting at full intensity.

3. Approach and Methodology

3.1.1 The cardinal aviation lighting assessment has been prepared with reference to Guidelines for Landscape and Visual Assessment (Third Edition) (GLVIA3)[6] and taking account of the guidelines provided by NatureScot[7,8].

3.1.2 GLVIA3 places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. As part of this assessment, professional judgement has been used in combination with structured methods and criteria to evaluate value, sensitivity, and magnitude and significance of effect. The assessment has been undertaken and by Chartered Landscape Architects at ASH design + assessment.

3.1.3 Methods promoted by GLVIA3 require an appreciation of the existing environment and the ability of its key components to accept the change proposed. An understanding of the potential effects which could occur and how these could affect the key components and the potential to mitigate adverse effects. The NatureScot Guidance emphasises the importance of appreciating the different sensitivities landscape and visual receptors have at night and the potential effects that aviation lighting specifically might have. There are four key stages to the assessment which are presented in the following sub-sections.

3.2 Establishing the Baseline

3.2.1 A 20 km Study Area was selected, being the area within which it is considered that significant effects from the cardinal aviation lighting could potentially be experienced. This area is consistent with the Detailed Study Area for the main LVIA of the Proposed Varied Development

3.2.2 The baseline has been determined through a combination of desk study and site survey, taking account of the appearance and intensity of existing visible lights. Desk appraisal has involved review of the ZTV and wirelines. Site survey was undertaken at twilight and in the subsequent hours of darkness on 5th August 2025.

[5] See for example Dr Stuart Lumsden, Technical Report on the Propagation of Light from the Proposed Aviation Warning Lights at the Clash Gour Wind Farm Development, CD 14.7, DPEA reference WIN-300-4, 31 July 2020, paragraph 6.5.7

[6] Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), (2013), *Guidelines for Landscape and Visual Impact Assessment, Third Edition. Routledge.*

[7] Scottish Natural Heritage, (2017), Visual Representation of Wind Farms (Version 2.2).

[8] NatureScot (2024). Guidance on Aviation Lighting Impact Assessment. Available at: Guidance on Aviation Lighting Impact Assessment | NatureScot. Accessed August 2025.

3.3 Appreciation of the Proposed Varied Development

3.3.1 An appreciation of the proposals has been developed through building an understanding of the proposed cardinal aviation lighting requirements and the surveyors experience of existing wind turbine sites with aviation lights of a similar intensity during the hours of darkness.

3.4 Analysis of Receptors and Residual Effects

3.4.1 Establishing the baseline is followed by the systematic identification of likely effects on the receptors. This is a two-fold process, giving consideration to how effects could arise from a cardinal aviation lighting strategy for the Proposed Varied Development, and how these changes could be accommodated in the existing baseline.

Landscape and Visual Sensitivity

3.4.2 Sensitivity concerns the nature of the baseline landscape or visual receptor, and the ability to accommodate development of the type proposed without compromising the key characteristics and / or composition.

3.4.3 There are two aspects which contribute to the evaluation of landscape and visual sensitivity: value and susceptibility to change. The consideration of these two separate aspects in the differing assessments for landscape and visual amenity are outlined below.

3.4.4 Landscape sensitivity is reflective of the nature of the landscape and its ability to accommodate development of the type proposed without compromising its key characteristics and components. This involves the consideration of the baseline value of the landscape and its susceptibility to change. When considering value and susceptibility in the context of aviation lighting, the degree to which the character of the area is currently characterised by artificial lighting or a lack of it is particularly important. It should be noted that some characteristics that contribute to the daytime value of a landscape may not be as relevant at night and vice versa.

3.4.5 Visual sensitivity considers the nature and viewing expectation from the receptor and takes into account the perceived value of the existing view and the susceptibility of the visual receptor to change. The importance of the aspect of the view which would be changed contributes to the sensitivity evaluation. The sensitivity evaluation considers the value of views during low light conditions when aviation lights could be on, as well as during full darkness.

3.4.6 The value and susceptibility of receptors can differ at night. Features that are valued during the day may not be visible at night while other features such as the starry night sky may best be appreciated during the hours of darkness. Likewise, individuals seeking out activities that require darkness (i.e. stargazing) will have a higher level of susceptibility than others whose activities take place irrespective of the light levels (i.e. outdoor sporting clubs that gather under flood lights in the evening or commuters focused on the road).

3.4.7 Criteria for the evaluation of sensitivity to change are presented below in **Table 2**. These levels represent points on a continuum and, where required, interim ratings such as Low-Medium have been used to indicate the anticipated level.

Table 2: Landscape and Visual Sensitivity Criteria

Sensitivity Rating	Landscape Sensitivity	Visual Sensitivity
High	A landscape specifically recognised and valued and for its dark skies and has a notable susceptibility to new sources of light.	• Visual receptors occupying buildings, recreational routes or promoted locations where an appreciation of dark skies is a particularly noted and valued aspect of the view and there are no other lights or distracting features.
Medium	A landscape valued for some dark sky conditions but is influenced by some existing peripheral or localised sources of light.	• Visual receptors occupying buildings, recreational routes or other locations where an appreciation of dark skies is obtained and/or there are localised or peripheral sources of lighting within the baseline; or • Visual receptors occupying buildings, travelling on public roads or other transport routes, or at other locations where dark skies are present, but the activity of the receptor is less focussed on an appreciation of the dark sky conditions.
Low	A landscape less noted for dark sky conditions and/or is affected by existing baseline lighting leading to a limited susceptibility to new sources of light.	• Visual receptors occupying buildings, routes and other locations where existing lighting is prominent and/or distracting in the baseline leading to a less notable focus on the dark sky conditions; or • Visual receptors occupying buildings, travelling on public roads or other transport routes or at other locations where dark skies are affected by localised or peripheral sources of lighting within the baseline but the activity of the receptor is less focussed on an appreciation of the dark sky conditions.

Magnitude of Change on Landscape and Visual Receptors

3.4.8 Magnitude of change concerns the extent to which the existing landscape character or view would be altered by the Proposed Development. Elements specific to the evaluation of magnitude of change for the differing assessments of landscape and visual amenity are detailed below:

- Landscape
  - The degree to which features or characteristics may be removed, altered or added within the landscape;
  - The geographical extent of proposed changes;
  - Whether changes would be direct or indirect; and
  - The potential duration and reversibility of proposed changes (taking into consideration proposed mitigation measures where relevant).
- Visual Amenity
  - The scale or extent of proposed changes within the view;

- The location of proposed changes within the view, relevant to other existing features;
- The extent to which this may alter the composition or focus of the view; and
- The duration and reversibility of proposed changes (taking into consideration proposed mitigation measures where relevant).

3.4.9 Criteria for the evaluation of magnitude of change are presented below in **Table 3**. These levels represent points on a continuum and, where required, interim ratings such as Low-Medium have been used to indicate the anticipated level.

Table 3: Landscape and Visual Magnitude of Change Criteria

Magnitude Rating	Landscape	Visual
High	A notable change in landscape characteristics over an extensive area ranging to a very intensive change over a more limited area.	Where the Proposed Varied Development would result in a very noticeable change in the existing view.
Medium	A perceptible change in landscape characteristics over an extensive area ranging to a notable change in a localised area.	Where the Proposed Varied Development would result in a noticeable change in the existing view.
Low	A virtually imperceptible change in landscape characteristics over an extensive area or a perceptible change in a localised area.	Where the Proposed Varied Development would result in a perceptible change in the existing view.
Negligible	No discernible change in any landscape characteristics or components.	Where the Proposed Varied Development would result in a barely perceptible change in the existing view.

3.5 Assessment of Significant Effects

3.5.1 The purpose of this assessment in the context of the Proposed Varied Development is to identify predicted significant effects on the landscape and visual amenity arising from the proposed cardinal aviation lighting strategy. For the purposes of the assessment effects identified as being **Moderate** or above may be regarded as significant in term of The

Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 2017 EIA Regulations)[9].

3.5.2 The significance of effect for landscape and visual elements is considered as follows:

- The assessment takes into account identified effects upon existing landscape receptors resulting from the introduction of cardinal aviation lights on the Proposed Varied Development and assesses the extent to which these would be lost or modified, in the context of their importance in determining the existing baseline character.
- The assessment takes into account likely changes resulting from the introduction of cardinal aviation lights on the Proposed Varied Development to the visual composition, including the extent to which new features would distract or existing elements in the view or disrupt the scale, structure or focus of the existing view.[10]

3.5.3 Criteria used for the assessment of effects are presented below in **Table 4**. These levels represent points on a continuum and, where required, interim ratings such as Low-Medium have been used to indicate the anticipated level

Table 4: Landscape and Visual Significance of Effect Criteria

Effects Significance	Landscape Effects	Visual Effects
Major Adverse (significant)	The Proposed Development would comprise a clearly noticeable and detracting new light source within a landscape of particular value, leading to substantial deterioration of dark sky characteristics.	The Proposed Development would create a prominent and very detracting source of light within an existing highly valued view of a dark sky.
Moderate Adverse (significant)	The Proposed Development would form a noticeable new source of light within a landscape of generally dark skies, or a more detracting source of light within a landscape where some existing lights are present, leading to an appreciable reduction in the dark sky characteristics of the landscape	The Proposed Development would introduce a fairly prominent and somewhat distracting new light source within an important part of a view that is somewhat appreciated for its darkness, or would be more prominent within a less important part of generally dark view.
Minor Adverse (Not Significant)	The Proposed Development would form a perceptible new source of light within the landscape but would	The Proposed Development would form a perceptible new light source but would not distract from the

[9] Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed February 2020).

[10] The prominence of the cardinal aviation lights in the view will vary according to the prevailing weather conditions. The assessment has been carried out, as is best practice, by assuming the 'worst case' scenario. This is assumed to be in clear conditions in full darkness, unless the value of the view or effect would be greater in different lighting conditions. However, it is recognised that predicted effects could be reduced in some conditions (i.e. in the case of low cloud or haze).

Effects Significance	Landscape Effects	Visual Effects
	not lead to a noticeable deterioration of dark sky characteristics.	dark qualities of the view, or would be a more prominent feature within a setting where existing light sources are already present within view.
Negligible (Not Significant)	The Proposed Development would add an additional source of light to the landscape but would be well accommodated within the setting of baseline lighting.	The Proposed Development would form a barely perceptible feature within the existing view and would not reduce the appreciation of dark skies within the view.

3.6 Limitations of the Assessment

3.6.1 The use and limitations of ZTV diagrams are explained in **Appendix 5.1: Technical Methodologies for Visual Representation**. The appearance and brightness of the cardinal aviation lights has been estimated by the assessors, based on experience of similar intensity aviation lighting visited and observed during the hours of darkness.

4. Assessment of Effects

4.1 Existing Lighting Baseline

4.1.1 The site survey indicated that there were very low levels of artificial light within the 20 km Study Area. A few small settlements including Rosehall, Lairg and Bonar Bridge are the most notable contributors of artificial light. There are also scattered lights at individual properties and farms. Car headlights and break lights as well as reflections of these on other road markers result in randomised bright illuminations in the landscape, however the overall sense is of a dark landscape.

4.2 Potential Effects

4.2.1 Potential effects relate to the appearance of the proposed 2,000 candela nacelle lights on the seven cardinal turbines. The effect of lighting on the viewer could be influenced by both the number and the intensity of the lights potentially visible and the extent to which baseline lighting is present. The following issues have been considered in the assessment of predicted effects:

- Aviation lights are typically focussed on a horizontal plane with intensity of light reducing below a specified viewing angle. Therefore, a lesser effect may be experienced by a viewer situated at increased angles below the horizontal (see **Figure A5.11-2**). However, potential intensity at different viewing angles differs between lighting manufacturers.
- Perceived intensity of the aviation lights would diminish with distance. However, in some instances, combinations of greater numbers of aviation lights seen from further away could counter this effect to some extent.

- The CAA Policy Statement allows for the lights to be reduced to 10% of their nominal value during periods where the measured meteorological visibility exceeds 5km (i.e. 200 candela). This means that the cardinal aviation lights will emit a maximum intensity of 200 candela approximately 90% of the time; and when the higher light intensity lights are triggered by poor visibility, the lights will appear less bright to observers due to the atmospheric conditions.
- Nacelle aviation lights could lead to illumination of turbine blades as they pass through the horizontal plane of the beam and therefore in some situations the viewer would be able to perceive the movement of the turbines during darkness; and
- In certain wind directions and viewing angles, moving turbine blades in front of the aviation light would cause a flashing effect. Where a number of different turbines were aligned, this effect could be increased to a flickering impression.

4.3 Zone of Theoretical Visibility

4.3.1 A hub height ZTV (132 m above existing ground level), was generated to illustrate areas where views of the cardinal aviation lights would theoretically be obtained (**Figure A5.11-2**). Detailed technical information on the methods for production of ZTVs is included in the **Appendix 5.1: Technical Methodologies for Visual Representation**.

Intensity of Visible Aviation Lighting

4.3.2 **Figure A5.11-2** illustrates the theoretical intensity ZTV for the cardinal aviation lighting scheme. It shows that the greatest levels of theoretical intensity would generally be experienced on elevated hill tops and slopes approximately ranging from 15 to 30 km from the Site. Closer areas with greater levels of theoretical intensity include:

- Ben an Loin (approximately 5km to the west)
- Meall an Aonaich and Ben More Assynt (approximately 10-15km to the north-west)
- Beinn Uibhaidh and Meall Dheirgidh (approximately 10km to the south and south-west);
- Ben Hee (approximately 20km to the north); and
- Ben Kilibreck and Creag Riabhach na Greighe (approximately 15-20km to the north-east).

4.3.3 As majority the areas which would theoretically experience greater levels of lighting intensity are over 5km from the Proposed Varied Development, they would only experience the 200 candela lighting in clear meteorological conditions. While perceptible, at distances of over 10km the aviation lights would generally appear as distant points within the wider view. It should be noted that as these are also elevated areas it is likely that they would be seen in the context of aviation lighting on cumulative developments if constructed, such as the consented Garvary, Lairg 2 Redesign and Strath Oykel[11].

4.3.4 Many of the potential visual receptors at lower elevations are not shown to have theoretical visibility of the aviation lighting due to screening by intervening topography. Where theoretical visibility is shown, the aviation lights would likely be experienced at

[11] Strath Oykel Wind Farm has been consented but is currently the subject of a judicial review.

lower intensities due to the viewing angle. However, they would introduce new sources of artificial lighting in the upland landscape.

4.4 Visible Aviation Lighting Effects on Landscape Character Types and Designated and Protected Areas

4.4.1 The landscape character types and designated and protected areas within the Study Area are illustrated on **Figure A5.11-3** and **Figure A5.11-4**. The landscape receptors most likely to experience significant effects as a result of the introduction of aviation lighting are those directly affected by the development's location within them and those in close proximity where the aviation lighting would represent a notable change to the surrounding landscape.

4.4.2 The following landscape receptors within the Study Area were identified as having the potential to experience effects as a result of the cardinal aviation lighting:

- LCT 134: Sweeping Moorland and Flows
- LCT 135: Rounded Hills - Caithness & Sutherland
- LCT 139: Rugged Mountain Massif - Caithness & Sutherland
- LCT 142: Strath - Caithness & Sutherland
- Assynt – Coigach NSA
- Ben Klibreck and Loch Choire SLA
- WLA 34

4.4.3 During the hours of darkness, these landscapes are overwhelmingly characterised by their lack of artificial light. Artificial light is focussed around the settlements of Rosehall, Lairg and Bonar Bridge and scattered farmsteads and properties along the roads that pass through these landscapes at lower elevations. Passing vehicle headlights would also add to the baseline of artificial lights. Lights from more settled landscapes would be visible in the distance from more elevated areas.

4.4.4 Visibility from other landscape receptors within the Study Area is either very limited and / or located at a distance at which significant effects on landscape character and qualities would be unlikely and as such these are scoped out.

Effects Likely to be Significant

4.4.5 Significant effects were identified for localised parts of three landscape character types and WLA 34 – Reay Cassley. The cardinal aviation lighting on the Proposed Varied Development, would directly affect a localised part of the landscape character area within which it is located.

Landscape Character Types

LCT 134: Sweeping Moorland and Flows

4.4.6 The character of this LCT during hours of darkness is not specifically discussed within the NatureScot landscape character assessment. However, the LCT is generally a dark landscape with little artificial light beyond scattered crofts and farmsteads and passing vehicles. This lack of light contributes to the perception of the landscape as having a "strong sense of remoteness is associated within the largely uninhabited, inaccessible

core flows and moorlands of this landscape."[12] The characteristics of "Long, low and largely uninterrupted skylines…" and "Consistent views to distant… Rugged Mountain Massif" would be particularly apparent in views westward as the sun sets, backlighting these features. This LCT is considered to have a Medium sensitivity to the proposed turbine lights.

4.4.7 The aviation lights could indirectly affect the perception of the profile of the ridge to the south-west of Loch Shin from the LCT sub-unit to the north-east of the loch. They would introduce artificial lights within Glen Cassley which would be perceived from the unit of this LCT at the head of the glen. These changes would represent a perceptible change in within the wider landscape from an extensive part of the LCT area ranging to a notable change in a localised area, particularly within 10km to the north-east of Loch Shin. The perceived intensity of the lighting would be reduced, as the distance from the site increased. This is reflective of a localised Medium magnitude of change reducing to Low-Medium overall. It was assessed that this would result in **Minor** (not significant) overall effects with areas of localised **Moderate** (significant) effect. This localised variation would relate to the potential for the proposed aviation lighting to influence the "Long, low and largely uninterrupted skylines" when seen across Loch Shin. The aviation lights are unlikely to affect the relationship of this LCT with the distinctive profile of the mountains around Ben More Assynt which would be back lit as the sun sets.

LCT 135: Rounded Hills - Caithness & Sutherland

4.4.8 This LCT occurs extensively across the Study Area and wider landscape. The rolling hills form broad rounded summits that often form the side slopes containing straths. These hills are incised by narrow burns and small lochans on the plateau summits. Wind farms are present within some units of the LCT and therefore the turbines of the Proposed Varied Development which would be located within this LCT, would not represent a new feature within the daytime context of the LCT. The key characteristics of the LCT as described in the character assessment do not describe the landscape during hours of darkness. However, where it occurs within the Study Area, this LCT can be characterised as a dark landscape with little influence of artificial light. This landscape is considered to have a Medium sensitivity to the type of development proposed.

4.4.9 The introduction of six lit turbines into this LCT would result in a Low overall magnitude of change with localised areas immediately around the site experiencing a Medium magnitude of change albeit the perceived intensity of the lighting would be reduced, due the change in vertical angle. Within the wider Study Area the magnitude of change to the LCT resulting from the aviation lighting would range from virtually imperceptible to locally perceptible with some areas experiencing notable changes due to proximity and therefore an overall Low-Medium magnitude of change.

4.4.10 It was assessed that this would result in **Minor** (not significant) overall effects with areas of localised **Moderate** (significant) effect in the immediate area of the site (approximately 5km) and from the western glen-side of Glen Cassley. This localised variation would

[12] Scottish Natural Heritage (2019) *Scottish Landscape Character Types Map and Descriptions – Sweeping Moorland and Flows Landscape Character Type 134 Description*. Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions [accessed March 2020]

relate to the potential for the proposed aviation lighting to influence the perception of remoteness within the LCT at night in the immediate area of the lit turbines.

LCT 142: Strath - Caithness & Sutherland

4.4.11 The Strath – Caithness and Sutherland LCT (142) includes all of the major straths and glens in Caithness and Sutherland. Within the Study Area this includes Glen Cassley and Glen Oykel. These straths create linear spaces, with open floors containing rivers. While there are properties and farms within the glens, these are dark landscapes at night with a distinctly rural sense and many of the properties are surrounded by trees. The main sources of artificial light come from the scattered dwellings and passing vehicles although these may be limited by surrounding vegetation. The sensitivity to artificial lights within this LCT was assessed to be Medium.

4.4.12 The introduction of the aviation lights on the seven of the turbines would result in a Medium magnitude of change to the north-west, west and south-west within Glen Cassley and around Rosehall, albeit the perceived intensity of the lighting would be reduced, due the change in vertical angle. Across the wider LCT the magnitude of change would be Negligible to Low. It was assessed that this would result in **Minor** (not significant) overall effects with areas of localised **Moderate** (significant) effect in areas nearest to the site within 5km.

Designated and Protected Areas

WLA 34 – Reay Cassley

4.4.13 The Proposed Varied Development is located within this WLA. The Key Qualities of the WLA do not include reference to dark skies nor do they describe the landscape during hours of darkness. However, the WLA may be perceived as more extensive at night due to the lack of artificial lighting within the surrounding context. Areas such as forestry and tracks which mark the boundaries of the WLA during the day, would be less perceptible during the hours of darkness as they fade into the wider dark landscape. The WLA's key qualities, most closely related to sanctuary and solitude within the remote interior will be intensified by the dark. These include:

- WLQ1 ("*A range of large, irregular, rocky mountains with steep, arresting slopes and a variety of lochs and lochans, possessing a strong sense of naturalness, remoteness and sanctuary"*),
- WLQ2 ("An awe-inspiring, broad scale expanse of cnocan *in which there is a complex pattern of features at a local level that contribute to the sense of naturalness and sanctuary*") and
- WLQ3 ("*A variety of spaces created by irregular landforms in which there is perceived naturalness, as well as a strong sense of sanctuary and solitude"*).

4.4.14 The exterior parts of the WLA already experience some degree of artificial light. These take the form scattered farmsteads, passing headlights along the A836 and A838 to the east and A837 to the west, seen from the edges of the WLA along the south-eastern boundaries that extend above and around Glen Cassley. The key qualities relating to the form and shape of the surrounding landscape would be less readily apparent at night, although they would be somewhat sensitive to the introduction of tall lit structures. WLQ4 ("*Extensive, elevated peatland slopes whose simplicity and openness contribute to a perception of awe, whilst highlighting the qualities of adjacent mountains"* is most

closely related to the proposed development site. The simplicity of the upland landscape would be directly affected both by the introduction of the turbines and the aviation lighting. Therefore, given the limited influence of artificial light within the WLA, it is considered to have a High sensitivity to aviation lighting.

4.4.15 Theoretical visibility of the aviation lights within the WLA is focused along the upper glen-sides above Glen Cassley within 5km. The theoretical intensity ZTV (Figure A5.11-4) indicates that, the cardinal aviation lights would be experienced at a range of vertical angle across the WLA. Within the site itself the intensity of the aviation lighting would be reduced due to shielding built into the design. However, they would likely still be noticeable. While the aviation lights would indicate the presence of nearby human development, they would represent a small change to one part of the open and dark landscape. Uninterrupted dark skies would still be experienced in other directions particularly to the north-west within the interior of the WLA. This area focussed around Glen Cassley within 5 km of the site would therefore experience a perceptible ranging to noticeable change and therefore Medium magnitude of change. Beyond 5km from the Proposed Varied Development, the ZTV shows that theoretical visibility would become much more scattered and intermittent, it would be focussed on south-east facing slopes at higher elevations, particularly around Ben More Assynt and other hills within 15km. Large expanses of the WLA would experience no theoretical visibility. As such there would be a Low-Medium magnitude of change to the south-east within 15km with the remainder of the WLA experiencing a Negligible-Low magnitude of change.

4.4.16 Although the perceived extent of the WLA at night may be reduced around Glen Cassley, the lack of theoretical visibility within the core areas of the WLA and distance, would mean that the impression of an extensive undeveloped area would remain. It was therefore assessed that this would result in a localised **Moderate** (significant) effect to WLQ4 within 5km. While there may be an effect on the remoteness expressed in WLQ1, this is unlikely to be significant as the WLQ is most strongly related to the interior of the WLA where visibility is limited. The remainder of the WLA where theoretical visibility is very limited, would likely experience either no discernible or an inappreciable reduction in scenic quality or change to the key qualities of the WLA. Largely due to the limited theoretical visibility and distance at which the cardinal aviation lights would be experienced it, was assessed that the effect on the remainder of the WLA would be **Minor** (not significant).

Effects Likely to be Not Significant

Landscape Character Types

LCT 139: Rugged Mountain Massif - Caithness & Sutherland

4.4.17 The Rugged Mountain Massif are characterised by high mountains with a rugged and predominantly irregular and complex form and massive scale. Their peaks form distinctive recognisable landmarks. Due to their inaccessibility, unmodified character and ruggedness, they have a strong sense of remoteness and wild character.

4.4.18 The aviation lights could indirectly affect the perception of the profiles of the north-western units of this LCT around Ben More Assynt in views where the peaks would be back lit as the sun sets. However, once it is completely dark these profiles and their relationship to the cardinal aviation lights would be much less apparent. Furthermore there are few areas which would experience the lit turbines in the foreground of this

range. As a result, this LCT is considered to have a Medium sensitivity to the proposed cardinal aviation lights.

4.4.19 The introduction of the aviation lighting to the south-east in a different LCT would result in a perceptible, but distant change within a localised part of this LCT and therefore a **Low** magnitude of change. It was therefore assessed that while the aviation lighting could result in a slight, localised alteration to the sense of isolation this would represent a small deterioration overall and would therefore be a **Minor** and thus not significant effect to the LCT.

Designated and Protected Areas

Assynt – Coigach NSA

4.4.20 As with most of the Study Area, this landscape is considered to be characterised by darkness at night. While the Proposed Varied Development could increase the presence of wind turbines in the surrounding context during the hours of daylight. The Special Qualities do not reference dark skies or describe the landscape during hours of darkness, the qualities '*A landscape of vast open space and exposure'* and '*Significant tracts of wild* land' are considered to be the most sensitive to the introduction of aviation lighting. The parts of the NSA that would be influenced by the aviation lights are generally located over 10km from the Proposed Varied Development. These areas relate to LCT 139: Rugged Mountain Massif - Caithness & Sutherland.

4.4.21 While the aviation lights could indirectly affect the perception of the ridgeline around Ben More Assynt in views north-west where they would be back lit as the sun sets, there are few areas which would experience the lit turbines in the foreground to the NSA. The aviation lights are more likely to be experienced in the context of views outwards from the NSA. As a result, this LCT is considered to have a Medium sensitivity to the proposed cardinal aviation lights.

4.4.22 The introduction of the aviation lighting to the south-east would result in a perceptible, but distant change within a localised part of the NSA on its south-eastern edge. This would represent a Low magnitude of change. While they could be locally intrusive in a few locations, given the small areas affected and the distance, the introduction of aviation lighting would be very unlikely to lead to any discernible reduction to the scenic quality of the NSA at night or change to the intrinsic landscape characteristics or special qualities discussed in Appendix 5.6. It was therefore assessed that while the aviation lighting could result in a slight, localised alteration to the sense of isolation and a localised **Minor** (not significant) there would be a **Negligible** (not significant) effect overall.

Ben Klibreck and Loch Choire SLA

4.4.23 The Ben Klibreck and Loch Choire SLA is characterised by distinctive mountains, secluded glens, and extensive views from Ben Klibreck and Ben Armine. There is limited human influence within the SLA and a strong sense of remoteness and wildness. Further details on the special qualities of the SLA are included in Appendix 5.4. Although the characteristics of the SLA during the hours of darkness are not specifically discussed in the citation, the area's sense of isolation and remoteness are undoubtedly enhanced by the dark nature of the surrounding landscape at night. While the SLA itself would be highly sensitive to the introduction of artificial lighting within its boundaries, the cardinal aviation lighting on the Proposed Varied Development would be located approximately

16 km to the south-west. Additionally, theoretical visibility of the aviation lights would be limited to a few south-west facing slopes. Other distant sources of artificial lighting can already be seen from within the SLA and as such, the aviation lighting would not introduce a wholly new feature into the surrounding landscape context. As a result, the SLA has been assessed has having a Medium level of sensitivity. Due to the predicted perceptible, but distant changes in very localised parts of the SLA a **Low** magnitude of change was identified.

4.4.24 Given the above it was assessed that the aviation lighting on the Proposed Varied Development would result in an inappreciable alteration to the special qualities of the SLA. A **Minor** (not significant) effect was therefore identified for the SLA.

WLA 37 – Foinaven – Ben Hee

4.4.25 This WLA is located around 11.6km to the north of the Site and is comprised of extensive open peatlands in its southern half whilst its northern area is characterised by a remote and rugged mountainous landscape. The WLA was scoped out of the main LVIA assessment as significant effects were deemed to be unlikely given the localised and distant nature of the areas which would potentially be affected by the Proposed Varied Development. However, WLA37 is included in the assessment of potential effects of visible aviation lighting given the sensitivity of Key Qualities associated with sanctuary, solitude and remoteness to changes in the artificial lighting baseline.

4.4.26 The Key Qualities of the WLA do not include reference to dark skies nor do they describe the landscape during hours of darkness. However, the WLA may be perceived as more extensive at night due to the lack of artificial lighting within the surrounding context. The WLA's key qualities, most closely related to sanctuary, solitude and remoteness which will be intensified by the dark include:

- WLQ2: A remote, secluded interior with very few human elements and a strong perception of sanctuary and solitude
- WLQ3: A variety of shelves, corries and basins carved into the mountain landforms that harbour a strong sense of sanctuary and solitude – some with lochs, rivers and waterfalls
- WLQ6: Extensive peatland slopes that appear awe-inspiring in their simplicity and contrast to neighbouring mountains, and allow wide open views of the surrounding area

4.4.27 Further details on the key qualities of the WLA are included in 2021 EIAR.

4.4.28 The exterior parts of the WLA already experience some degree of artificial light. These take the form scattered farmsteads, passing headlights along the A838 to the west and the A836 to the east. However, the WLA's sense of isolation and remoteness are undoubtedly enhanced by the dark nature of the surrounding landscape at night. While the WLA itself would be highly sensitive to the introduction of artificial lighting within its boundaries, the cardinal aviation lighting on the Proposed Varied Development would be located over 10 km to the south.

4.4.29 Theoretical visibility of the aviation lights is focused on south-facing slopes in the southern part of the WLA. The theoretical intensity ZTV (Figure A5.11-4) indicates that, the aviation lights would be experienced at higher elevations, however these would be somewhat reduced due to the distance, with the highest levels intensity being experienced beyond 20km. Other distant sources of artificial lighting can already be seen

from within the area and as such, the aviation lighting would not introduce a wholly new feature into the surrounding landscape context. However given the limited influence of artificial light within the core of the WLA, it is considered to have a High sensitivity to aviation lighting.

4.4.30 While the aviation lights would indicate the presence of human development within the wider landscape, they would represent a small change to one part of the open and dark landscape. Uninterrupted dark skies would still be experienced in other directions particularly to the north-west within the interior of the WLA. The changes would be perceptible but distant, occurring in a localised parts of the WLA resulting in a **Low** magnitude of change.

4.4.31 The core areas of the WLA, would remain unaffected by the aviation lighting and the impression of an extensive undeveloped area within and beyond the bourndaries of the WLA would remain and no significant effects are anticipated for any of the WLQs. The parts of the WLA where there is theoretical visibility are limited, and would likely experience either no discernible or an inappreciable reduction in scenic quality or changes to the key qualities of the WLA. Largely due to the limited theoretical visibility and distance at which the cardinal aviation lights would be experienced it was assessed that the effect on the WLA would be **Minor** (not significant).

Summary of Visible Aviation Lighting Effects on Landscape Designations / Protected Areas and LCTs

4.4.32 Anticipated effects on designated and protected landscapes and LCTs are summarised in Table 5 below. For the purposes of this assessment, effects with a **Moderate** rating or greater are considered to be significant.

Table 5: Summary of Visible Aviation Lighting Effects on Landscape Designations / Protected Areas and LCTs

	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
LCT 134: Sweeping Moorland and Flows			**x**		L		
LCT 135: Rounded Hills - Caithness & Sutherland			**x**		L		
LCT 139: Rugged Mountain Massif - Caithness & Sutherland			**x**				
LCT 142: Strath - Caithness & Sutherland			**x**		L		
Assynt – Coigach NSA	**x**		L				
Ben Klibreck and Loch Choire SLA			**x**				
WLA 34 – Reay Cassley			**x**		**L**		

	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
WLA 37 – Foinaven – Ben Hee			x				

4.5 Visible Aviation Lighting Effects on Visual Receptors

Viewpoints

4.5.1 Ten of the viewpoints included in the LVIA fall within the study area for the aviation lighting assessment. These are listed below. These VPs are considered to be representative of the range of views likely to be obtained during low light or dark conditions. Wirelines indicating turbines which would be lit are provided for all VPs included within the LVIA (**Figures V3a – 1.3 - V3a – 15.3**). In consultation with NatureScot three of these viewpoints were selected as the locations for visualisations of the aviation lighting as detailed below.

- VP1: A836 above the Crask Inn;
- VP2: A836 bridge by Dalnessie entrance;
- VP6: Rosehall (see Figure V3a – 4.5 for photomontage);
- VP9: Achnairn caravan and camping site entrance (see Figure V3a – 5.5 for photomontage);
- VP10: Ben More Assynt;
- VP11: Glencassley road to south of Castle;
- VP12: Glencassley road by Langwell Hill (see Figure V3a – 8.5 for photomontage);
- VP14: A838 near West Shinness;
- VP16: Minor road at Inveroykel forest access; and
- VP21: Meall an Aonaich.

Settlements and Residential Receptors

4.5.2 Settlement within the study area is largely limited to the settlements of Rosehall, Lairg and Bonar Bridge and scattered farms and properties to the north-east of Loch Shin. As indicated on **Figure A5.1-5**, theoretical visibility of aviation lighting from Lairg and Bonar Bridge would be very limited. Intervening vegetation and properties within and around these settlements would likely restrict visibility further. Artificial lighting is already present in each of these communities in the form of streetlights, domestic lights and other lights such as at the local hotels. While these are not brightly lit landscapes it is unlikely that the introduction of the proposed aviation lighting would be perceptibly detracting even on the outskirts given the existing baseline lighting and screening by trees and buildings.

4.5.3 The following residential receptors within the study area were identified as having the potential to experience effects as a result of the aviation lighting (see Figure A5.1-5).

- RRL4 – Dalmichy
- RRL6 – Achfrish

- RRL7 – Achnairn (upper)
- RRL8 – Achnairn (lower)
- RRL9 - Shinness Lodge and West Shinness
- RRL28 - Ochtow and Inveroykel Lodge
- RRL29 - Rosehall village

Routes

4.5.4 Based on the theoretical lighting intensity ZTV, the following route receptors within the Study Area were identified as having the potential to experience effects as a result of the aviation lighting (see Figure A5.1-5):

- R4: A838 Dalchork to Corrykinloch;
- R9: U2117 Cassley Bridge – Duchally Road;
- R12: SU21.03: Allt an Tuir Burn Walk; and
- R17: Scottish Hill Track 332.

Effects Likely to be Significant

4.5.5 The majority of the representative VPs, residential groupings, and routes were selected for inclusion within the aviation lighting assessment, have been identified as likely to experience similar effects to those identified for the main LVIA (Chapter 5). Receptors identified as likely to experience significant visual effects as a result of the aviation lighting discussed below.

Viewpoints

VP6: Rosehall (see Figure V3a – 4.5 for photomontage)

4.5.6 This VP is representative of views obtained by residents and visitors of Rosehall village and travellers passing through on the A837. The VP has relatively contained views of buildings interspersed with trees and woodland with a backdrop of forest-clad hill slopes with open summits. Much of this detail of the settlement would be lost during the hours of full darkness. Streetlights, residential properties and passing cars provide some baseline artificial light. The aviation lights would be seen to the north-east sitting over the ridgeline above the settlement.

4.5.7 The introduction of aviation lighting on the Proposed Varied Development would result in a Medium magnitude of change to a viewpoint with Medium visual sensitivity. It was assessed that this introduction would form a noticeable feature within the view and result in a **Moderate** (significant) effect to the viewpoint.

VP11: Glencassley road to south of Castle;

4.5.8 This VP offers low vantage views, framed by valley sides to north and south enclosed and directed by the steep heather-clad and forested glen sides. Although there may be some passing cars and distant farmsteads providing some baseline artificial lighting, it is overwhelmingly a dark landscape.

4.5.9 Given the lack of other sources of artificial lighting, the sensitivity of this view is considered to be Medium. Given the proximity of the lights and the otherwise dark nature of the surrounding landscape it was judged that the introduction of aviation lights would

result in a Medium magnitude of change. Although they would be seen at a reduced intensity due to the angle of the view, they would form a new and noticeable feature to the north sitting above the ridgeline resulting in a **Moderate** (significant) effect to the viewpoint.

VP12: Glencassley road by Langwell Hill (see Figure V3a – 8.5 for photomontage);

4.5.10 This VP is representative of views obtained by travellers and recreational users of the rural road through Glen Cassley. It has low vantage views, framed by the low valley sides to north and south, up and down the open glen floor. Much of this detail is lost during the hours of darkness and these views are characterised by a lack of artificial lighting.

4.5.11 Given the lack of other sources of artificial lighting, the sensitivity of this view is considered to be Medium. Given the proximity of the lights and the otherwise dark nature of the surrounding landscape it was judged that the introduction of aviation lights would result in a Medium magnitude of change. The turbine lights would form a new and noticeable feature to the south-east sitting above the ridgeline resulting in a **Moderate** (significant) effect to the viewpoint.

VP16: Minor road at Inveroykel forest access; and

4.5.12 This VP is representative of views obtained by travellers on this rural road and from nearby rural properties at Ochtow and Inveroykel. While travellers are unlikely to stop at this VP at night it is representative of open, passing, side view for travellers views from this stretch of road. Night-time views are generally of a dark landscape. The aviation lights would be seen over the ridge line to the north. This would result in a Medium magnitude of change to a viewpoint with Low-Medium visual sensitivity. It was assessed that this would form a noticeable feature within the view and result in a **Moderate** (significant) effect to the viewpoint.

VP21: Meall an Aonaich.

4.5.13 During daylight this elevated viewpoint offers 360° views. However as the sun sets the main view is likely to be more focused to the west as other features fade. The aviation lights would be seen at over 12km away from this Medium sensitivity viewpoint. They would represent a perceptible change within the wider dark landscape and a Medium magnitude of change. They would result in small change to the much larger dark landscape, therefore it was assessed that they would have a **Moderate** (significant) effect.

Settlements and Residential Receptors

RRL7 – Achnairn (upper)

4.5.14 This grouping is representative of residents and visitors to this small group of around 15 properties, and a camp-site in an elevated position to the north-east of Loch Shin. Existing artificial lighting at night is limited to the properties, wayfinding around the campground and individual camp sites. Given the dark nature of the surrounding landscape it is likely that most activities undertaken after sunset will take place indoors or with the aid of outdoor artificial lighting. These properties have elevated views to south-east and south-west over Loch Shin during the day, which in some cases are partially reduced by trees, vegetation and out-buildings. Where visible the aviation lights would appear in the otherwise dark landscape to the south-west across Loch Shin. This RRL is considered to

have a Medium-High sensitivity because of the orientation of properties to take advantage of views of and across Loch Shin. The aviation lights would represent a new feature within this part of the view. However, they would likely be perceived in the context of artificial lighting in and around individual properties and the campground. It is predicted that this would lead to a Medium magnitude of change leading to a **Moderate** (significant) effect.

RRL8 – Achnairn (lower)

4.5.15 This grouping is representative of residents and visitors of a group of around 10 houses at low elevation alongside the A838 on north side of Loch Shin. Existing artificial lights are limited to the properties and given the dark nature of the surrounding rural landscape it is likely that most activities undertaken by residents after sunset will take place indoors or with the aid of outdoor artificial lighting. During the daytime, main views are to south-west across Loch Shin with some roadside and garden trees filtering the view. Existing turbines are visible on the skyline in oblique south-easterly views down Loch Shin, in the middle distance. Where visible the aviation lights would appear in the otherwise dark landscape to the south-west across Loch Shin. This residential grouping is considered to have a Medium-High sensitivity because of the orientation of properties to take advantage of views of and across Loch Shin. The aviation lights would represent a new feature within this part of the view. However they would likely be perceived in the context of artificial lighting in and around individual properties. It is predicted that this would lead to a Medium magnitude of change leading to a **Moderate** (significant) effect.

RRL9 - Shinness Lodge and West Shinness

4.5.16 This grouping is representative of residents and visitors of a group of approximately 15 houses including cottages, farm properties and lodges, in elevated position to north of Loch Shin and at lower elevation alongside the A838 road. Existing artificial lights are limited to the properties and given the dark nature of the surrounding rural landscape it is likely that most activities undertaken by residents after sunset will take place indoors or with the aid of outdoor artificial lighting. During the daytime, views are predominantly orientated to the south-west, elevated across Loch Shin and to the hills on the opposite side. Ben More Assynt forms a focus in views to the west-north-west and existing turbines are present obliquely in the view to the south-south-west. Where visible the aviation lights would appear in the otherwise dark landscape to the south-west across Loch Shin. This residential grouping is considered to have a Medium-High sensitivity because of the orientation of properties to take advantage of views of and across Loch Shin. The aviation lights would represent a new feature within this part of the view. However they would likely be perceived in the context of artificial lighting in and around individual properties. It is predicted that this would lead to a Medium magnitude of change leading to a **Moderate** (significant) effect.

RRL28 - Ochtow and Inveroykel Lodge

4.5.17 This grouping is representative of occupants and visitors to a large 2-storey shooting lodge and nearby farm set in a wooded, but elevated position overlooking River Oykel. Daytime views are oriented to the north and north-east across the strath floor. Baseline artificial lighting is largely limited to the properties themselves. The details of the view across the strath would fade during the hours of darkness leaving a generally dark landscape apart from baseline artificial lighting around Rosehall in the main view. It was

therefore considered that this grouping would have a Medium sensitivity. The aviation lights would be seen over the ridge line to the north against the sky within main views, resulting in a Medium magnitude of change. It was assessed that this would form a noticeable feature within the view and result in a **Moderate** (significant) effect.

RRL29 - Rosehall village

The Rosehall Village grouping is representative of residents and visitors to the small village including houses and cafe / shop set at the confluence of Glen Cassley and Glen Oykel. Views from the settlement are mixed and many towards other properties and contained by vegetation and trees. During the daytime, views can be obtained through breaks in the vegetation and buildings towards the forest-clad hills and slopes to the north-west. During the hours of darkness these more distant views outside of the village would fade. Streetlights, passing vehicles and lighting at adjacent properties would set a baseline of artificial lighting within the village. This residential grouping was considered to have a Medium sensitivity. Although night-time views would be largely inward looking and feature other sources of artificial lighting views outwards from the village would remain characterised by darkness. Where visible, the aviation lights would be seen to the north-east sitting over the ridgeline against the dark sky. As this is an area that doesn't feature existing artificial lighting this would result in a Medium magnitude of change. It was assessed that this introduction would result in a **Moderate** (significant) effect.

Routes

R9: U2117 Cassley Bridge – Duchally Road

4.5.18 This route is a single-track dead-end road with passing places through Glen Cassley. It is used by recreational users, estate workers and residents, although very few would be using it at night. During the daytime this route has varying views when travelling up and down the glen. In the lower section south of Glen Rossal, views are generally more enclosed by woodland around the river but occasional breaks in the trees give views of surrounding glen-side hills. Views become increasingly open after Glen Rossal. North of Glencassley Castle views are panoramic across, up and down the flat glen floor. Ben More Assynt is seen to the north-west, framed through Gleann na Muic. These views would become much less defined during the hours of darkness and the overwhelming character would be that of a dark strath contained by landform and trees. The sensitivity of the route is therefore considered to be Medium. Users' attention would generally be focused on the immediate area in front of the car illuminated by the headlights given the narrow, undulating and winding nature of the road. The aviation lighting would be perceived in oblique and side views to the north-east in an elevated position. It was considered that they would result in a Medium magnitude of change leading to a **Moderate** (significant) effect.

R12: SU21.03: Allt an Tuir Burn Walk

4.5.19 This route is a recreational footpath commencing in Rosehall at the the Invercassley Tea Room. During the day views from the route vary from open fields near the village to enclosed woodland along the river and commercial forestry with areas felling at the northern end of the route. Artificial lighting along the route is largely limited to the stretches closest to the village. The more northern parts of the route would be characterised by darkness further emphasised by the enclosure provided by the commercial forestry. The sensitivity of the route is therefore considered to be Medium-

High. Aviation lighting would be perceived in open views to the east. Although walkers' using the route during the hours of darkness attention may be focussed on their footing, they are also likely to be travelling at a slower speeds more likely to notice changes to their environment. It was considered that they would result in a Medium magnitude of change leading to a **Moderate** (significant) effect.

R17: Scottish Hill Track 332

4.5.20 This route is a rough path track that makes up part of a marked hill track. During the day the route offers panoramic views to the east as it rises over the shoulder of Meall an Anoxic. The sensitivity of this route is considered to be Medium-High. Walkers using this route at night would be likely be seeking to experience dark and remote landscapes. The aviation lighting would be seen to the south-east and represent a noticeable change to views in this direction and thus a Medium magnitude of change. It was assessed that there would be a **Moderate** (significant) effect to this route.

Effects Likely to be Not Significant

Viewpoints

VP1: A836 above the Crask Inn;

4.5.21 This VP offers slightly elevated, panoramic views across peatland landscape to south and west. The aviation lights would appear in distant south-westerly views over the ridgeline. While the change to this Medium sensitivity view would be perceptible and would be within the main view of those travelling south, the view would brief and would represent a small, distant and not detracting change to only one part of the much larger dark surroundings seen in the context of intermittent passing vehicle headlights. This would result in a **Low** magnitude of change and a **Minor** (not significant) effect.

VP2: A836 bridge by Dalnessie entrance;

4.5.22 This VP offers lower level open passing views across the peatland landscape to the west obtained by road users. However, the details of the landscape would be lost during the hours of darkness. Passing vehicles provide some intermittent baseline artificial light. While the change would be perceptible, it would be in side views of those travelling north and south. It would represent a small, distant and not detracting change to only one part of the much larger dark surroundings seen in the context of passing vehicle headlights. This would result in a **Low** magnitude of change to a viewpoint with Medium visual sensitivity and a **Negligible-Minor** (not significant) effect.

VP9: Achnairn caravan and camping site entrance (see Figure V3a – 5.5 for photomontage);

4.5.23 This VP is representative of views obtained by residents and visitors (including campers), to this small settlement area and campsite. The VP has elevated views to south-east, down Loch Shin and Achany Glen and south-west across Loch Shin, partially reduced by trees and roadside vegetation. While travellers are unlikely to stop at this VP at night it is also representative of views from this stretch of road. Night-time views are generally of a dark landscape to the south with lights from a few scattered properties along the road and the campsite to the north. The introduction of the aviation lighting would be seen in the otherwise dark landscape to the south from this Medium sensitivity viewpoint.

Although the aviation lights would represent a new feature within this part of the view they would not introduce artificial lighting into the wider landscape. It is anticipated that this would lead to a Low-Medium magnitude of change. It was judged that this would lead to a **Minor-Moderate** (not significant) effect.

VP10: Ben More Assynt;

4.5.24 This viewpoint is representative of elevated views from the NSA and WLA39 – Reay Cassley. During daylight hours it provides 360˚ panoramic views feature layers of receding mountains to the south, through west and north to east but are more open across forested areas and towards eastern settled coastal areas to the south-east. However, as the sun sets the main view is likely to be focused to the west as other features fade. Artificial lights are present in the distance to the south-east, focussed around settlement clusters and transportation routes. The aviation lights would be seen at over 15km away from this Medium sensitivity viewpoint. While they may be perceptible, at this distance they would represent a **Low** magnitude of change. The introduction of the aviation lights would represent a small, distant and not detracting change to only one part of the much larger dark landscape within which distant lights from Rosehall and Lairg as well as passing vehicle lights would likely be seen. Therefore it was assessed that they would have a **Minor** (not significant) effect.

VP14: A838 near West Shinness;

4.5.25 This VP is representative of views obtained by residents and visitors to nearby properties and road users on the A838. It provides slightly elevated views across Loch Shin to the heather-clad ridge line on far side, with forest and woodland on lower slopes. The details of these views would fade as the darkness set in. Residential properties and infrequent vehicle headlights provide baseline artificial lighting on the near side of Loch Shin. The introduction of the aviation lighting would be seen in the otherwise dark landscape to the south-west from this Medium sensitivity viewpoint. Although the aviation lights would represent a new feature within this part of the view they would not introduce artificial lighting into the wider landscape. Given the distance and angle of the view it is anticipated that this would lead to a Low-Medium magnitude of change. It was judged that this would lead to a **Minor-Moderate** (not significant) effect.

Settlements and Residential Receptors

RRL4 – Dalmichy

4.5.26 Residents of 1.5 storey house with garden set on small mound with surrounding pine trees and outbuildings below. The main daytime views from this grouping are to the south-west filtered by trees. Sensitivity of this grouping is considered to be Medium. Passing vehicles provide some intermittent baseline artificial light beyond the properties themselves. The aviation lights would be seen in the distance and are unlikely to be represent a detracting change within the wider view. It is predicted that this would lead to a Low magnitude of change leading to a **Minor** (not significant) effect.

RRL6 – Achfrish

4.5.27 This grouping is representative of residents and visitors of a small group of properties (including some holiday pods) in a slightly elevated position to the north-east of Loch Shin. Existing artificial lighting at night is limited to the properties themselves. Given the

dark nature of the surrounding landscape it is likely that most activities undertaken after sunset will take place indoors or with the aid of outdoor artificial lighting. Main daytime views are largely oriented to the south-east towards Lairg and down Achany Glen. There are some secondary views to south-west across the loch but these are often obscured by garden vegetation. These views would largely fade during the hours of darkness. This residential grouping is considered to have a Medium sensitivity because of the orientation of properties to the south and south-east away from the site. Where visible the aviation lights would be seen to the south-west partially filtered by garden vegetation in the context of baseline artificial lighting at other properties. It is predicted that this would lead to a Low-Medium magnitude of change leading to a **Minor-Moderate** (not significant) effect.

Routes

R4: A838 Dalchork to Corrykinloch

4.5.28 This route is a single track road used by travellers and recreational along the northern side of Loch Shin. Daytime views are predominantly across, up or down Loch Shin, depending on the direction of travel, sometimes restricted by roadside trees or woodland. These views would be further limited during the hours of darkness. Driving this road during hours of darkness or even low light, requires the full attention of the driver on the road ahead. Passengers' views would be somewhat limited by roadside vegetation, but would occasionally open up over the dark landscape. With the exception of the properties that make up RRL8 – Achnairn Lower and RRL9 - Shinness Lodge and West Shinness, this road is generally dark with no street lighting and limited artificial light from sources other than vehicle headlights. The sensitivity of the route is therefore considered to be Medium. Whilst the aviation lighting would be theoretically visible from sections of this road, drivers' attention would generally be focused on the immediate area in front of the car illuminated by the headlights. As a result, the aviation lighting would be perceived in oblique views as part of the wider background sometimes filtered by vegetation and thus somewhat more likely to be perceptible by passengers. As a result, it was considered that they would result in a **Low** magnitude of change. Due to the intermittent and oblique nature of visibility along this route, predicted effects were assessed to be **Minor** (not significant).

Table 6: Visible Aviation Lighting Effects on Landscape Receptors Summary

	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Viewpoints							
VP1 - A836 above the Crask Inn			x				
VP2 - A836 bridge by Dalnessie entrance		x					
VP6 - Rosehall					x		

	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
VP9 - Achnairn caravan and camping site entrance				x			
VP10 - Ben More Assynt			x				
VP11 - Glencassley road to south of Castle					x		
VP12 - Glencassley road by Langwell Hill					x		
VP14 - A838 near West Shinness				x			
VP16 - Minor road at Inveroykel forest access					x		
VP21 - Meall an Aonaich					x		
Residential Receptors							
RRL4 - Dalmichy			x				
RRL6 - Achfrish				x			
RRL7 - Achnairn (upper)					x		
RRL8 - Achnairn (lower)					x		
RRL9 - Shinness Lodge and West Shinness					x		
RRL28 - Ochtow and Inveroykel Lodge					x		
RRL29 - Rosehall village					x		
Routes							
R4 - A838 Dalchork to Corrykinloch			x				
R9 - U2117 Cassley Bridge – Duchally Road					x		
R12 - SU21.03: Allt an Tuir Burn Walk					x		
R17 - Scottish Hill Track 332					x		

5. Conclusion

5.1.1 While the cardinal aviation lights would be theoretically visible from large parts of the Study Area, the majority of landscape and visual receptors are located over 5 km away, meaning that they would only ever perceive the aviation lighting at lower levels of intensity. The aviation lights would generally represent a small but perceptible change within the wider landscape and views. Given the rural nature of the Study Area, there are relatively few places outside of the settlements and routes, where receptors would regularly be present to experience the effects of the cardinal aviation lights.

5.1.2 However, as summarised in **Tables 5 and 6** above, significant effects (i.e. Moderate or above) were identified for localised parts of three LCTs and one WLA. Significant effects

were also identified for five viewpoints, five residential groups and three routes included in the assessment of visible aviation lighting. These effects would largely be due to the proximity of these receptors to the Proposed Varied Development, open views towards the turbines and the absence of other artificial light within the surrounding area.

5.1.3 Further discussions with aviation stakeholders are also underway regarding other mitigation measures which would have the potential to reduce potential effects further.