

Appendix 4.6 – Shadow Flicker

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Appendix 4.6 - Shadow Flicker

Executive Summary

No residential or sensitive receptors are located within the shadow flicker study area and therefore no significant shadow flicker effects are anticipated, and no further assessment is required. This position was agreed through consultation with The Highland Council (THC) Environmental Health department.

Introduction

Shadow flicker occurs when, “[In] certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as ‘shadow flicker’. It occurs only within buildings where the flicker appears through a narrow window opening” (Scottish Government, 2014, Onshore Wind Turbines).

The magnitude of shadow flicker effects varies both spatially and temporally, and depends on a number of environmental conditions coinciding at a particular point in time, which include:

- time of day and year;
- wind direction;
- height of wind turbine and blade length;
- position of the sun in the sky;
- weather conditions;
- proportion of daylight hours in which the turbines operate;
- distance and direction of the wind turbine from the receptor.

The flickering effect caused by shadow flicker also has the potential to induce epileptic seizures in patients with photosensitive epilepsy. The National Society for Epilepsy (NSE) advises that around 1 in 131 people have epilepsy and up to 5 % of these have photosensitive epilepsy (NSE, 2011). The common rate or frequency at which photosensitive epilepsy might be triggered is between 3 and 30 hertz (Hz, flashes per second). Large commercial turbines rotate at low speeds resulting less than 3 flashes per second are therefore unlikely to cause epileptic seizures (Harding et al., 2008; Smedley et al., 2010). Therefore, there are not considered to be any health effects associated with the Proposed Development and this assessment therefore addresses the effects of shadow flicker related to local amenity.

This assessment has been undertaken by Jonas Beaugas (BSc, BEng, AMIEnvSc) and overseen by Rebecca Todd (BSc (Hons), PIEMA) who has 7 years’ experience undertaking shadow flicker assessments for wind farms.

Shadow Flicker Assessment

As part of the 2018 Scoping Opinion (refer to Appendix 4.2) in paragraph 2.37 (page of 9) THC stated that “shadow flicker should be addressed in the EIAR”. Further, in the section entitled Development Plans response (page 50) THC stated that the shadow flicker assessment should consider a study area of 11 times the rotor diameter.

This assessment has assessed the design which includes turbine layout F and infrastructure layout 4 as described in Chapter 2. For the purpose of this assessment, it has been assumed that the Proposed Development turbines will not exceed 135 m to blade tip. In addition, the candidate turbine that has been used to inform the assessment has a hub height of 77.8 m and rotor diameter of 117 m. It is recognised that turbine selection will be subject to commercial tendering and availability and the specific parameters of hub height and rotor diameter may therefore vary; it is however unlikely that a change to the hub height or rotor diameter from that assessed would result in a material change in the findings of the assessment.

The study area within which receptors could potentially be affected by shadow flicker has therefore been set at a distance of 11 times the rotor diameter (117 m) from each turbine and 130 degrees either side of north (relative to each turbine), as noted within Update of UK Shadow Flicker Evidence Base report (DECC, 2011). The relevant study area for the Proposed Development therefore includes an area 1,287 m from each turbine and 130 degrees either side of north.

The study area and nearest sensitive receptors to the Proposed Development are shown on Appendix 4.6 - Figure 1.

As shown on Appendix 4.6 - Figure 1 there are no sensitive receptors within the study area and therefore no significant effects are anticipated, and no further assessment is required.

Consultation with THC Environmental Health was undertaken on the 14th of July 2020 to seek agreement that shadow flicker can be scoped out of the EIAR for the Proposed Development.

THC Environmental Health confirmed on the 5th of August 2020 that shadow flicker can be scoped out of the EIAR.

References

DECC- Department of Energy and Climate Change (16 Mar 2011). Update of UK Shadow Flicker Evidence Base. Prepared by Parsons Brinckerhoff.

Harding G, Harding P & Wilkins A (2008). Wind turbines, Flicker and photosensitive epilepsy: Characterising the flashing that may precipitate seizures and optimising guidelines to prevent them. *Epilepsia*. Vol. 19 (6): 1095-1098.

NSE- The National Society for Epilepsy (2011, reviewed – April 2019). Available at: <http://www.epilepsysociety.org.uk/AboutEpilepsy/Whatisepilepsy/Triggers/Photosensitiveepilepsy/windturbines>. Accessed on 25 October 2019.

Scottish Government (updated May 2014). Scottish Government Online Renewables Planning Advice: Onshore Wind Turbines. Available at: <http://www.gov.scot/Resource/0045/00451413.pdf>. Accessed on 25 October 2019.