

14 SHADOW FLICKER

14.1 Introduction

- 14.1.1 This chapter considers the potential for shadow flicker effects on receptors as a result of the Proposed Development.
- 14.1.2 Shadow flicker occurs when the sun passes behind the blades of a wind turbine and casts a moving shadow on nearby buildings. The effect can occur under certain combinations of geographical positioning, the time of day and time of year (i.e., when the sun is low on the horizon). Shadow flicker is caused when rotating wind turbine blades cause brightness levels to vary periodically, with the shadow created by the blades flickering on and off. The effect of shadow flicker is an issue inside buildings, where the flicker appears through windows, creating a nuisance for residents of the receptor. Shadow flicker can cause annoyance if it occurs for a significant time period.

14.2 Policy and Guidance

- 14.2.1 Relevant national policy is contained in National Planning Framework 4 (NPF4) (2023a). Policy 11(e) of NPF4 requires that project design and mitigation demonstrates how impacts, including shadow flicker, on communities and residential receptors have been minimised.
- 14.2.2 Local guidance on shadow flicker is provided in Policy 67 of the Highland-wide Local Development Plan (HwLDP) (2012) and its Onshore Wind Energy: Supplementary Guidance (2017). The HwLDP Policy 67 Renewable Energy Developments states that:

“The Council will support proposals where it is satisfied that they are located, sited and designed such that they will not be significantly detrimental overall, either individually or cumulatively with other developments ... having regard in particular to any significant effects safety and amenity of any regularly occupied buildings, including from shadow flicker.”

- 14.2.3 Furthermore, the Highland Council’s (“the Council”) supplementary guidance highlights the need for proposals to seek to avoid significant adverse effects on the safety of any residential or regular occupied property, including shadow flicker. It goes on to state that:

“Wind energy schemes should always be designed to avoid causing shadow flicker, blade glint, glare and light effects to any regularly occupied buildings not associated with the development. Where this cannot be achieved, the Council will expect wind energy developments to be located a minimum distance of 11 times the blade diameter of the turbine(s) from any regularly occupied buildings not associated with the development. Within a distance less than 11 times the blade diameter, a shadow flicker assessment will be required.”

- 14.2.4 As per Section 24(3) of the Town and Country Planning (Scotland) Act (1997), where there is incompatibility between a provision of the National Planning Framework and a provision of

a local development plan, whichever of them is later in date would prevail. Therefore, NPF4 (adopted in February 2023) holds primacy over the HwLDP and its supplementary guidance. This was further clarified by the Chief Planner's letter of 8th February 2023 (2023b), which states:

“Provisions that are contradictory or in conflict would be likely to be considered incompatible.”

- 14.2.5 In respect of shadow flicker, there is no incompatibility between NPF4 and HwLDP and its supplementary guidance. Both NPF4 and HwLDP outline expectations that developments should be designed to minimise the impacts of shadow flicker on communities and local residences. Therefore, while NPF4 takes precedence, this assessment has been undertaken in accordance with local planning policy and guidance, as these documents provide specific guidance on carrying out shadow flicker assessments and address mitigation.

14.3 Scope and Methodology

Study Area

- 14.3.1 It is generally accepted as outlined in Onshore Wind Turbines: Planning Advice (2014), that 10 rotor diameters from a wind turbine is the maximum limit within which significant shadow flicker effects can occur. The Council's Onshore Wind Energy: Supplementary Guidance (2017) requires that a shadow flicker assessment is required for all residential receptors within 11 rotor diameters of each turbine. Although the Highland-wide Local Development Plan (HwLDP) and supplementary guidance are not the primary planning policies for the Proposed Development, this assessment followed The Council's guidance by adopting an 11-rotor diameter threshold. Based on the candidate turbine's rotor diameter (155 m), plus an additional 50 m buffer to account for potential micro-siting, the zone of potential shadow flicker (ZPSF) for the Proposed Development's extends 1,755 m from each turbine.
- 14.3.2 Furthermore, shadow flicker can only occur where turbine blades pass between the sun and a receptor. As such, since the sun in the UK crosses the southern sky, shadow flicker effects can only hypothetically occur at locations 130° either side of north (Parsons Brinckerhoff 2011; UK Government, 2015).
- 14.3.3 Based on these criteria, the ZPSF for the Proposed Development has been defined as a radius of 1,755 m from each turbine and limited to 130° either side of north, as illustrated in **Figure 14.1**.

14.4 Baseline, Impacts and Effects

- 14.4.1 Whilst examining the established ZPSF in relation to potential shadow flicker receptors within the vicinity of the Site, it has been identified that no sensitive receptors or residential dwellings fall within the ZPSF. The nearest residential receptor is approximately 3.1 km away from the nearest turbine, well outside the ZPSF, as shown in **Figure 14.1**.
- 14.4.2 Therefore, no shadow flicker effects on any residential receptors are predicted, and no mitigation would be required.

14.5 References

Parsons Brinckerhoff (2011), 'Updates of UK Shadow Flicker Evidence Base Report'.

Scottish Government (2023a), 'National Planning Framework 4'.

Scottish Government (2023b), 'Transitional arrangements for National Planning Framework 4: Chief Planner letter - February 2023'.

Scottish Government (2014), 'Onshore wind turbines: planning advice'.

The Highland Council (2017), 'Onshore wind energy: supplementary guidance'.

The Highland Council (2012), 'Highland-wide Local Development Plan'.

UK Government (2015), 'Renewable and low carbon energy'.

UK Government (1997), 'Town and Country Planning (Scotland) Act 1997'.