



Drumlins Park Wind Farm Substation & Grid Connection

Chapter 12: Shadow Flicker

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12.1 Introduction

This chapter addresses the likely effects of shadow flicker on nearby properties within the vicinity of the proposed development. The proposed development is, of itself, not a type of development which can cause shadow flicker to occur due to the absence of moving parts. However, given that the proposed development forms part of the overall Drumlins Park Wind Farm, which comprises 8 no. permitted wind turbines, it has been considered appropriate to re-evaluate the likelihood of significant shadow flicker effects to arise as a result of the entire project.

In addition to the absence of moving parts, the proposed development does not comprise particularly tall structures. The tallest structures associated with the proposed development are lightning masts within the proposed electricity substation and the proposed end masts which, at 16m, are both substantially smaller than the permitted wind turbines, at 180m.

As with all tall structures, wind turbines can cast long shadows on neighbouring areas when the sun is low in the sky. During sunny conditions and under certain combinations of geographical position, weather conditions and the time of day, the sun may pass behind the moving wind turbine blades and cause a shadow to flicker on and off of neighbouring properties. This is a phenomenon known as shadow flicker.

Dwellings and buildings may be affected by shadow flicker (i.e. when a turbine blade shadow passes an open door or window within a flicker zone) as the sunlight comes from one source. Shadow flicker is not as obvious outside as sunlight comes from all directions.

Shadow flicker generally lasts only for a short period and happens only in certain specific combinations of weather and geographic conditions such, as follows:

- The sun is shining and is at a low angle in the sky (after dawn and before sunset);
- The turbine is located directly between the sun and the affected property;
- The wind speed is high enough to move the turbine blades, and
- The turbine blades are orientated such that they are horizontal to the sun.

Given the very low likelihood of such conditions occurring simultaneously, the likelihood of significant shadow flicker effects is low.

12.1.1 Description of the Proposed Development

A full description of the proposed development is presented in **Chapter 3**. In summary, the proposed development comprises the following main components:-

- A 110 kilovolt (kV) 'loop-in/loop-out' Air-Insulated Switchgear (AIS) electrical substation, including single-storey control buildings and all associated electrical equipment;
- Approximately 700m of 110kV underground electricity lines;
- Replacement of 1 no. existing pole-set with 2 no. lattice-type end masts, to a maximum height of up to 16m; and
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure.

The entirety of the proposed development is located within the administrative area of County Monaghan; while candidate quarries which may supply construction

materials are also located within County Cavan.

12.2 Statement of Authority

This chapter has been prepared by members of the GES Environment & Planning Team, with specialist technical input provided by Cormac McPhillips, Project Technician at GES. Cormac has significant experience of preparing shadow flicker prediction models for a number of existing and permitted wind energy developments, including for a number of operational phase shadow flicker monitoring programmes, and has carried out visual inspections to confirm the efficacy of the prediction models and mitigation measures.

12.3 Assessment Methodology

Given that the proposed development forms part of an overall project which includes wind turbines, it is considered prudent to assess the entire development, as a whole, to account for any changes to baseline conditions since the completion of the Drumlins Park Wind Farm shadow flicker assessment (**Chapter 12, Volume III**).

However, as no part of the proposed development; substation, grid connection, site access tracks, site entrance and construction material haul routes; can generate shadow flicker, these elements have been screened out from further analysis and the following assessment will focus on the likelihood of significant shadow flicker effects arising from the permitted wind turbines in the context of current baseline conditions.

Concerns raised by local residents in previous submissions related to the Drumlins Park Wind Farm as they relate to shadow flicker were also assessed in the preparation of this chapter.

12.3.1 Receptor Survey

The location of all properties near the proposed development was recorded using Ordnance Survey Ireland (OSI) data, a detailed planning registry search and a physical survey of the area. The topography of the local area, the proposed development site and the elevation of nearby receptors was also modelled using OSI data.

No existing or permitted dwellings, additional to the 123 no. located within 1,800m (10-times overall tip height) of a (now) permitted wind turbine assessed at **Chapter 12 (Volume III)**, have been identified. It is noted that a dwelling was proposed¹ in the vicinity of the now-permitted turbine T6; however, An Bord Pleanála² refused to grant planning permission.

12.4 Description of the Existing Environment

The receiving baseline environment is rural and relatively remote and, as a result, the area is sparsely populated. The study area (1,800m [i.e. 10-times rotor diameter from a permitted wind turbine]) is characterised by one-off dwellings, often accompanied by agricultural buildings and contains a total of 123 no. residential dwellings.

12.5 Description of Likely Effects

The receiving environment has not changed since the assessment of likely shadow flicker effects arising from the Drumlins Park Wind Farm was undertaken as no

¹ Monaghan County Council Planning Register Reference 19/439

² An Bord Pleanála Reference ABP-306632-20

additional dwellings have been permitted or constructed. Therefore, a full re-assessment of the likely shadow flicker effects is not necessary.

The likely significant effects of shadow flicker; including construction, operational, decommissioning, cumulative and transboundary effects; arising from the Drumlins Park Wind Farm are assessed in full at **Section 12.5 (Chapter 12, Volume III)** and we refer An Bord Pleanála to same.

12.6 Mitigation & Monitoring Measures

Given that the proposed and permitted developments will not give rise to any likely significant effects additional compared to those assessed at **Chapter 12 (Volume III)**; no mitigation or monitoring measures additional to those set out at **Chapter 12 (Volume III)** are required.

12.7 Residual Effects

The mitigation measures proposed for the permitted Drumlins Park Wind Farm will ensure that any residual impacts which arise following their implementation will not result in any likely significant effects on any receptor.

The proposed mitigation measures will ensure that shadow flicker levels which may be experienced at receptor locations fall below the limits prescribed in both the *Wind Energy Development Guidelines for Planning Authorities 2006* and Condition No. 17(a) of the Drumlins Park Wind Farm Notification of Final Grant.

12.8 Summary

No part of the proposed development has the ability to generate shadow flicker and, therefore, these elements were screened out from further analysis in this chapter. Given that the proposed development forms part of an overall project which includes wind turbines, it was considered prudent to re-assess the development, as a whole, to account for any changes to baseline conditions since the completion of the Drumlins Park Wind Farm shadow flicker assessment.

However, as there have been no changes to the baseline environment and no dwellings have been constructed or permitted within the study area since the Drumlins Park Wind Farm shadow flicker assessment was completed; it is assessed that there is no likelihood of significant effects additional to those previously assessed, and considered to be acceptable, and a further cumulative assessment is not required.

Therefore, it can be confirmed that the proposed development; individually or in combination with other existing, permitted or proposed developments; will not give rise to significant effects (including transboundary) on the environment

