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**Date:** 04/03/2019      **Our reference:** PP215371-AUME-L-02-C      **Your reference:** N/A

**RE: Shadow flicker impact from Jims Plain Wind Farm**

Dear Suki,

GHD Pty Ltd (GHD or the “Customer”) have engaged DNV GL to complete a review of the expected shadow flicker impact on buildings located in the vicinity of the proposed Jims Plain wind farm (the “Project”). This memo provides high-level commentary on the expected shadow flicker impacts.

This document has been prepared pursuant to DNV GL proposal L2C-165805-AUME-SFA-01-A dated 15<sup>th</sup> June 2018.

***Project input overview***

The following set of information was provided for the project:

- Development Area, *defining areas available for turbine placement.*
- Turbine layouts, *each with different turbine configurations.*
- Digital elevation model, *describing terrain elevation at a horizontal resolution of 1m.*

In order to capture the worst-case scenario in terms of shadow flicker impact, the turbine option with the largest rotor was considered; which corresponds to theoretical rotor diameter of 160m. Also, the project development area boundaries were used to define the worst-case shadow flicker zone of impact.

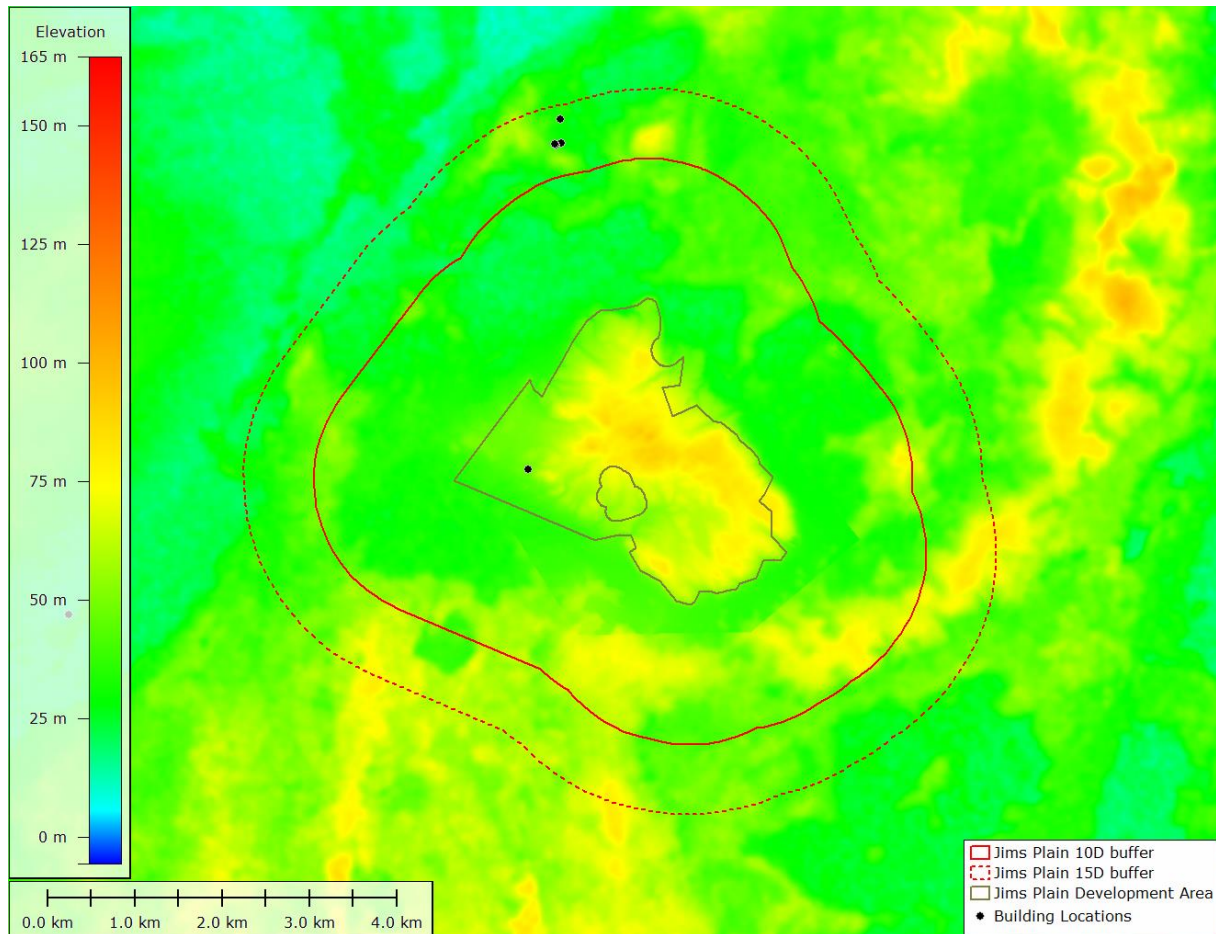
***Review of expected theoretical shadow flicker impact area***

The image shown below illustrates the proposed Development Area for the Project. In addition, DNV GL has generated buffers showing various distances from the Development Area, representing different shadow flicker impacts.

When shadow flicker modelling is conducted, an assumption is made regarding the distance to which shadow flicker impacts will be considered, typically referred to as the Distance Limit. The 10D (2200 m) buffer, where *D* correspond to the proposed turbine rotor diameter, represents a typical Distance Limit used for modelling which aims to predict shadow impacts above a “moderate level of intensity”, as recommended in the EPHC Draft National Wind Farm Development Guidelines (Draft National Guidelines)<sup>1</sup>.

The 15D (3300 m) buffer represents a distance within which it is considered possible that shadow flicker may be visible, however at distances greater than the 10D buffer, the shadow flicker is expected to be below a “moderate level of intensity”.

<sup>1</sup> Environmental Protection and Heritage Council (EPHC), “National Wind Farm Development Guidelines – Public Consultation Draft,” July 2010.



**Fig.2: Jims Plain Area buffers and dwellings**

This figure shows that there are several buildings within the Development Area, and the 10D and 15D buffers. Calculation of the theoretical annual shadow flicker duration was not part of the scope for this assessment. However, it is expected that the building located in the Development Area will be predicted to experience a significant shadow flicker duration above a “moderate level of intensity”. The buildings located with the 15D buffer to the north of the Development Area are not expected to be impacted by shadow flicker due to their distance from and orientation relative to the Project.

The Customer has indicated that the building identified within the Jims Plain Development Area is not a residence and that the proponent has a lease agreement in place with the landowner.

If a more detailed assessment of the shadow flicker impacts is required, it is recommended that detailed modelling be carried out.

Yours Sincerely

for DNV GL Australia Pty Ltd

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