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Date:	**Our reference**:	**Your reference**:
04/03/2019	PP215371-AUME-L-01-C	N/A

RE: Shadow flicker impact from Robbins Island 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 Robbins Island 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 15th 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 220m. 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)[1].

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".

[1] Environmental Protection and Heritage Council (EPHC), "National Wind Farm Development Guidelines – Public Consultation Draft," July 2010.

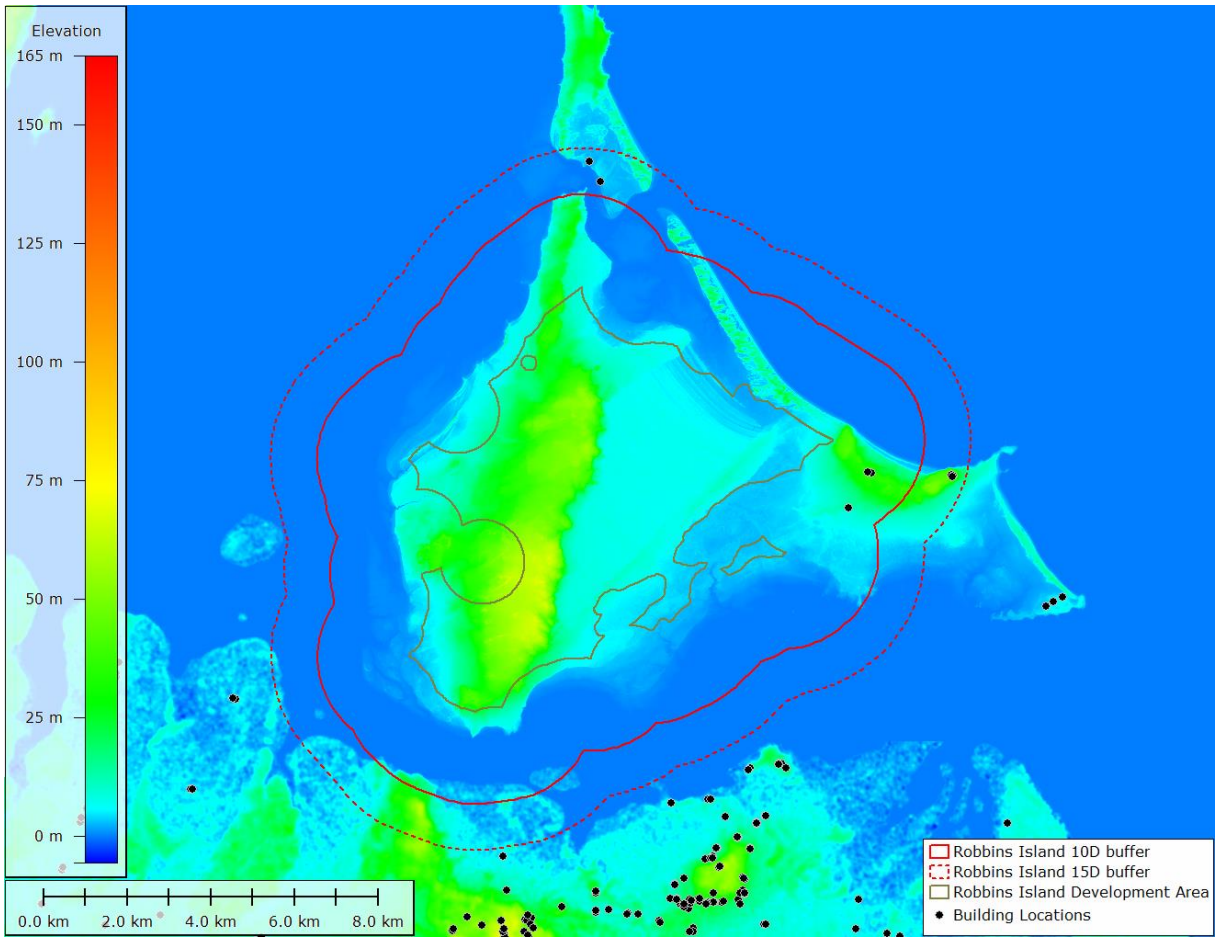

Fig.1: Robbins Island Area buffers and dwellings

This figure shows that there are several buildings within 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 buildings east of the Development Area and within the 10D buffer will be predicted to experience shadow flicker above a "moderate level of intensity". For the building outside of the 10D buffer but within the 15D buffer, it is possible that shadow flicker may be visible, however impacts are expected to be below a "moderate level of intensity"

The Customer has indicated that the buildings identified on Robbins Island and Walker Island are not used as dwellings[2], and that the proponent has a lease agreement in place with the land owners.

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

Jenny Majeed	Jules Jobin	Trenton Gilbert
Engineer	*Senior Engineer*	*Head of Section*
Developer Support Services	*Developer Support Services*	*Developer Support Services*

[2] "FW: Shadow Flicker Comment", Email from Daniel Elson (GHD) to Jules Jobin (DNV GL), 04 March 2019.