



APPENDIX F

LDP Lighting Response

WIAL Eastside NOR – Taxiway and Road AEE

Prepared for

Wellington International Airport Limited (WIAL)



INDEPENDENT ELECTRICAL & ILLUMINATION ENGINEERS

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on behalf of	Dean Coleman – Managing Director		

INDEPENDENT ELECTRICAL & ILLUMINATION ENGINEERS

EXECUTIVE SUMMARY

Based on LDP Ltd's experience and the detailed evaluation described in this report, the effects of aviation related lighting on the adjacent residential properties to the Eastside Area NOR will be less than the District Plan permitted activity limits and also less than the limits recommended in AS/NZS4282:2019. This will be confirmed by calculation as part of the detailed design.

The residential sites are at a higher elevation than the proposed flood and street lights. Therefore, in our opinion, light spill and glare effects from these lights to the residential properties on the eastern side of the WIAL site will be negligible.

It is our opinion that the light sweep effects at residential properties from a taxiing aircraft will be negligible as the lights are well controlled, localised and not used beyond the primary taxiway.

Overall, it is our opinion that any additional lighting effects from all new lighting associated with the WIAL Eastside Area NOR will be negligible.

1. INTRODUCTION

LDP Ltd have been asked by Wellington International Airport Ltd (**WIAL**) to provide an updated assessment in response to a request for additional information from the Wellington City Council (**WCC**).

WCC have requested that WIAL provide a revised lighting report based on AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.

WCC has also requested comment on the 'difference in the effects of light sweep arising from aircraft on the East Side Apron (**ESA**), as compared to the current circumstances and any alternatives for aircraft parking'.

The lighting design will be confirmed during the detailed design phase of the project. However, the concept lighting design features include;

- Apron area lighting: Nominal 25-30m columns with luminaires installed with zero upward tilt and no more than 1% direct upward light component. Lighting performance to suit operational needs.
- Roadway lighting: Nominal 8-12m columns with luminaires installed with zero upward tilt and no more than 1% direct upward light component. Lighting performance to suit the recommendations of AS/NZS 1158 Lighting for roads and public spaces.
- Navigational aids: Indicator lighting and signage as required to suit CAA requirements.

2. DISTRICT PLAN

The Operative Wellington District Plan (**WDP**) includes the following clauses relating to lighting. Specifically, they relate to the Permitted Activity Rules within the Airport and Golf Course Recreation Precinct Section 11.1.1.6 Permitted Activities;

2.1. Clause: 11.1.1.6 Lighting

11.1.1.6.1 Any non-aviation activity which requires the lighting of outdoor areas must ensure that direct or indirect illumination does not exceed 8 lux at the windows of residential buildings in any nearby Residential Area.

11.1.1.6.2 Subject to rule 11.1.1.6.1 any development which includes pedestrian routes and carparks available for public use during the hours of darkness must be lit at a minimum of 10 lux measured in accordance with [AS/NZS 1158.3.1:2005]^{PC57} and amendments.

3. AS/NZS 4282:2019

We understand that it is the intention of WCC to use AS/NZS 4282:2019 as the control for spill light and glare in the upcoming review of the District Plan. We agree that this is the most suitable standard currently available.

AS/NZS 4282:2019 was prepared by the Joint Standards Australia/New Zealand Committee LG-010, Obtrusive Effects of Outdoor Lighting, to supersede AS4282-1997.

The objective of AS/NZS 4282:2019 is to provide a common basis for assessment of the likely effects of developments that involve the provision of outdoor lighting.

It should be noted that the potentially obtrusive effects of the lighting will normally be only one of a number of environmental and ecological considerations that will need to be addressed. Conformance to this Standard, i.e. to the limits for the various light technical parameters (**LTP's**), will therefore not usually be the sole basis for the approval of particular development proposals.

4. Wellington District Plan Light Technical Parameters

The WIAL site is subject to the WDP "Airport and Golf Course Recreation Precinct" requirements. Lighting is a permitted activity, subject to the rules stated at section 11.1.1.6

The LTP's required in the lighting rules are as follows:

- ≤ 8 lux at any nearby residential window (ref WDP 11.1.1.6.1)
- ≥ 10 lux for pedestrian routes and public carparks (ref WDP 11.1.1.6.2)

In addition, notes beneath the rules are as follows;

- "The lighting rules are designed to ensure that areas or sites available for public use are adequately lit to keep people safe, and that where sites on the periphery of the airport areas are illuminated, the amenities of nearby residents are reasonably protected."
- *"In all cases the Council will seek to ensure that the adverse effects of glare from lighting sources are avoided, remedied or mitigated."*

The WDP appears not to address LTP's such as:

- Time limitations, (non-curfew/curfew) in relation to lighting effects at residential properties.

- Limitations on light intensity (i.e. glare). While the notes below rule 11.1.1.6.2 refer to glare, there is currently no rule in this regard.

5. Evaluation of Compliance

The functional lighting includes the AIAL roadway and apron edge area lighting and is analysed below.

5.1. WDP

The WDP requirement for no less than 10 lux in pedestrian routes and carparks in accordance with AS/NZS1158.3.1 will be readily achieved and proven by calculation in the detailed design.

The setback of the residential properties and their higher elevation relative to the airport will readily enable the 8 lux limit at windows to be achieved. This will also be proven by calculation in the detailed design.

In our opinion, the WDP permitted lighting rules at section 11.1.1.6 of the WDP can and will be readily achieved.

5.2. AS/NZS 4282:2019

In order to evaluate the proposed WIAL development against AS/NZS 4282:2019, the following will need to be considered:

- Applicable Limits for Light Technical Parameters.
- Basis for differentiation of limits according to area type.
- Basis for differentiation of limits for vertical illuminance (Ev).
- Basis for differentiation of limits for Intensity (I) [aka Brightness] according to precedent.

LDP note that the current WDP does not effectively address the above considerations.

5.2.1. Spill Light

AS/NZS 4282:2019 Clause 3.3.1.3 differs from the WDP in that the calculation plane for spill light and glare is not at the window of the residential property but 10m within the residential property line. However, if the window line of the property is setback $\leq 10\text{m}$, the calculations will be taken at the window line.

Section 3 Table 3.1 Environmental Zones, provides guidance to establish the lighting environmental zone that the WIAL is situated within.

We have determined that WIAL is situated within a high district brightness environmental zone as defined in Table 3.1 of AS/NZS4282:2019 for residential areas abutting commercial areas (i.e. Zone A4).

The maximum permitted values of spill light at this setback for Zone A4 are;

- 25 Lux Non Curfew
- 5 Lux Curfew

The non-curfew period (recommended as 7am-11pm in AS/NZS 4282:2019) allows a higher illuminance limit. The illuminance limit is then reduced in that same area after the non-curfew period switching to a curfew time zone. It is noted that non-curfew/curfew time zones are not applied in the current WDP for the WIAL precinct.

The setback of the residential properties and their higher elevation relative to the airport will readily enable the spill light limits to be achieved. This will be proven by calculation in the detailed design.

In our opinion, the spill light limits in AS/NZS4282:2019 can and will be readily achieved.

5.2.2. Glare

AS/NZS 4282:2019 for zone A4 recommends a maximum luminous intensity received from any luminaire at the windows of a residential property, to be no more than;

- 25,000 candelas Non-curfew
- 2,500 candelas Curfew

Subject to detailed design, the nominal height of Apron Lighting columns will be nominally 25-30m and Road Lighting columns nominally 8-12m. In both cases, the luminaires will be installed with zero upward tilt and will produce no more than 1% direct upward light.

The closest houses to the proposed lighting are located to the east of the intervening golf course and at higher elevation than the airport. In our opinion, given the setback and height differential, luminous intensity (i.e. glare) will be well below the most stringent (i.e. curfew) 2,500 candela limit.

5.2.3. Other Obtrusive Light Limits

AS/NZS 4282:2019 also recommends limits for lighting zone A4, in terms of glare to motorists on public roads (i.e. 20% Threshold Increment at 5cd/m² adaptive level) and Skyglow (i.e. Maximum 3% Upward Light Ratio).

The considerable distance of any of the proposed lighting from any public road will ensure compliance with the Threshold Increment requirement.

As stated above, the Apron Lighting and Road Lighting luminaires will have no more than 1% direct upward light component (i.e. Upward Light Ratio).

Therefore, the proposed lighting will satisfy the recommendations in AS/NZS 4282:2019 in terms of;

- Glare to motorists, and
- Sky Glow

Summarising the above, we are of the opinion that the lighting proposed as part of this development will be able to achieve compliance with both the light spill and glare requirements of the WDP and AS/NZS 4282:2019. This will be confirmed during detailed design.

6. CAA LIGHTING REQUIREMENTS

Lighting requirements within the proposed new designation area are defined in New Zealand Civil Aviation Authority (NZ CAA) Rule Part 139 - Appendix E.3 Lights and NZ CAA Advisory Circular AC139-6 section 5.3 Lights.

In the aircraft manoeuvring areas this will include: taxiway centre line lighting, apron edge area lighting and illuminated information signs.

The apron edge area lighting has been considered in section 6 above as part of the functional lighting.

The taxiway centre line lighting and illuminated information signage are navigational aids.

The effects of such elements are well controlled and localised. In our opinion, they will not be obtrusive to residential properties.

7. AIRCRAFT LIGHT SWEEP

Our understanding of the operation of the nose and wing landing lights is that they are used only for the landing operation and not used as the aircraft exit the main taxiway onto the secondary taxiways where the lights are no longer required.

It is our opinion that the light sweep from a taxiing aircraft is kept to a minimum as the lights are well controlled and localised. They will not be obtrusive to residential properties in our opinion.

8. CONCLUSIONS

AS/NZS 4282:2019 sets out requirements for the control of the obtrusive effects of outdoor lighting and complements the provisions as set to the WDP when determining light technical parameters for the airport and golf course recreation precinct.

In our opinion, given the relative height and setback of the residential properties, that the lighting proposed as part of this development will be able to achieve compliance with both the light spill and glare requirements of the WDP and AS/NZS 4282:2019. This will be confirmed during detailed design.

As aircraft landing lights are turned off as the aircraft leaves the main taxiway, effects will be negligible in our opinion.

In summary, in our opinion, any additional lighting effects from all new lighting associated with the WIAL Eastside Area NOR will be negligible.