Assessment of lighting effects on Threatened and Endangered West Coast species - Addendum

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1.0 Introduction

Te Tai o Poutini Plan (TTPP) have requested Wildlands prepare an addendum report which identifies acceptable alternative options for areas which are provisioned under the Light rules R2, RX1 and RX2.

Constraints and limitations identified by the TTPP include:

1. Operational requirements for lighting in certain zones/locations, such as commercial or port areas.
2. A warmer light of 3000K can be sourced for low power applications or residential light fixtures, but may be more difficult to source at larger commercial scales.
3. Spatial areas will need to be clearly identified and mapped, for example, SNAs.
4. The lux levels permitted in the LIGHT chapter relate to the measurement of light received at the boundary or a neighbouring site. A lower lux level does not always result in less lighting overall.

TTPP have requested alternative recommendations which may include:

1. Applying additional light restrictions (vertical shielding and warmer K value) for higher risk areas, for example, a set distance from the coastal marine area, or mining activities.
2. Would 4000-4500K being acceptable given 3000K may be difficult to source at scale.
3. Provide recommendations of option would be more effective if only one form of restriction was implemented – vertical shielding or a warmer K value. However, this would not preclude applying both in certain environments, such as under Rule RX3.

This report assesses the constraints and limitations and provides alternative recommendations to address these issues.

2.0 Methods

2.1 Desktop Evaluation

A report was provided by the West Coast Regional Council from the Lighting Expert, Paul Wilson from Xyst Limited (2024), in response to the Wildlands (2024) report outlining areas of agreement and further background lighting information. This letter and above questions provide the basis of this report.

3.0 Discussion

Wildlands (2024) outlines the issues with vertical lighting affecting birds flying at night and attracting birds to an area. In reviewing the Xyst Limited report (2024), both parties agree that all lights must be shielded to prevent any vertical light. However, reducing the illuminance levels, as recommended by Wildlands, is difficult in certain areas, and alternative recommendations are outlined below. Furthermore, the recommendations focus on addressing lighting during curfew hours.

3.1 Light – R2: Artificial Outdoor Lighting in the TCZ - Town Centre, MUZ - Mixed Use, COMZ - Commercial, PORTZ - Port, HOSZ - Hospital, STADZ - Stadium, AIRPZ- Airport and all INZ - Industrial Zones

Due to human and safety requirements at the Port and Industrial areas, lighting can be increased to 4,500–5,000 kelvin, with low light intensity, long wavelength (e.g. over 560 nanometres), and downward-facing lights as close to the ground as possible. Illuminating only the intended object or area as practicable, including motion sensor lighting where appropriate. Lux levels can be increased in accordance with human and safety requirements (curfew 10 Lux).

For other areas around the Town Centre, Mixed Use, Commercial, Airport, Hospital, and Stadium, it is still recommended that 3000 kelvin is used and no greater than 3,500 kelvin be within 15 kilometres of all coastal areas. Areas further inland than 15 kilometres can increase to no greater than 4,500 kelvin. Lux levels can be increased in accordance with human and safety requirements (curfew 5 Lux).

Light intensity may be more important than colour for seabirds. Very bright light will attract seabirds regardless of colour (Raine *et al*. 2007). It is important to keep light intensity to a minimum (National Light Pollution Guidelines 2020; Longcore *et al*. 2018). Light intensity should be appropriate for the activity, and only use the minimum number of lights to meet the requirements.

3.2 Light – RX 1 and RX2: Artificial Outdoor Lighting in all Residential Zones, SETZ – PREC 2 – Settlement Zone – Settlement Centre Precinct, SETZ – PREC 4 – Settlement Zone – Rural Residential Precinct, OSZ – Open Space Zone, and OSRZ - Open Space; and Recreation Zone and Artificial Outdoor Lighting in all Rural Sones and MINZ – Special Purpose Mineral Extraction Zone

As for Light – R2, it is still recommended that 3000 kelvin is used and no greater than 3,500 kelvin within 15 kilometres of all coastal areas. Areas further inland than 15 kilometres can increase to no greater than 4,500 kelvin. However, as tāiko/Westland petrel (*Procellaria westlandica*, At Risk-Naturally Uncommon) only breed on the West Coast and are highly susceptible to being attracted to lighting. A 15 kilometre wide buffer should be applied to either side of the tāiko/Westland petrel flight path from the breeding colony to the ocean. Lighting within this flight path should be no greater than 3,000 kelvin to prevent crash landing, especially as fledglings leave their colony around early November to mid-January (peak around 26 December).

In areas of Special Purpose Mineral Extraction or Mining Zone, lighting can be increased to no greater than 4,000 kelvin in accordance with human and safety requirements if within 15 kilometres of the coast and not within the tāiko/Westland petrel flight path. If coastal and within the petrel flight path, no works should be carried out during curfew unless lighting can be reduced to no greater than 3,000 kelvin. It is understood that adjustable lighting is in development but has not yet reached the market.

For areas over 15 kilometres inland from the coast and not within the tāiko/Westland petrel flight path, lighting can be increased to 4,500–5,000 kelvin in accordance with human and safety

requirements. If the mining activity is within the petrel flight path, no works should be carried out during curfew, unless lighting can be reduced to no greater than 3,000 kelvin.

4.0 Conclusion

The following measures should be implemented for all new and replacement lights:

- All lights should be fully shielded and mounted horizontally, preventing upward illumination and reducing horizontal light spread.
- Use LEDs with as low a colour-correlated temperature as practicable, preferably as low as 3,000 kelvin (warm light), but no greater than 5,000 kelvin in Light-R2 areas needing to meet specific health and safety requirements (e.g. port and industrial). If up to 5,000 kelvin is used, control of light spread and intensity is imperative.
- Coastal areas within 15 kilometres of the ocean should use preferably as low as 3,000 kelvin (warm light), but no greater than 3,500 kelvin.
- A buffer of 15 kilometres should be established on either side of the tāiko/Westland petrel flight path from breeding colony to the ocean. The lighting should be no greater than 3,000 kelvin, especially between November to late January.
- Areas further inland than 15 kilometres should be around 3,000 kelvin. However, if source at larger commercial scale is challenging, the lighting should be as low as practical, but not greater than 4,500 kelvin.
- In areas of mineral and mining activity, for coastal areas (<15 kilometres) and not within the tāiko/Westland petrel flight path, lighting can be up to 4,000 kelvin.
- If inland (> 15 kilometres) and not within the petrel flight path, lighting for mineral and mining activity can be increased 4,500–5,000 kelvin in accordance with human and safety requirements.
- If mineral and mining activity is within the petrel flight path, works should only occur during curfew hours if the lighting can be reduced to 3,000 kelvin.
- All lights must have as little or no short wavelength (380-500 nanometres) violet or blue light as possible.

5.0 References

Longcore T., Rodriguez A., Witherington B., Penniman J.F., Herf L. and Herf M. 2018: Rapid assessment of lamp spectrum to quantify ecological effects of light at night. *Journal of Experimental Zoology Part A Ecological and Integrative Physiology*. 12 pp.

National Light Pollution Guidelines 2020: National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds 2020. *Australian Government Department of the Environment and Energy*. 107 pp.

Wildland Consultants (2024). *Assessment of lighting effects on threatened and endangered West Coast species*. Wildland Consultants Contract Report No. 7158. Prepared for West Coast Regional Council. 9pp.

Xyst Limited 2024: *Lighting*. Prepared for Hearing Commissioners – Te Tai o Poutinit Plan. 7pp.