

# Assessment of Lighting Effects on Threatened and Endangered West Coast Species

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Contract Report No. 7158

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# Assessment of Lighting Effects on Threatened and Endangered West Coast Species

**Contract Report No. 7158**

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## 1.0 Introduction

Te Tai o Poutini Plan (TTPP) is the combined District Plan for the Buller, Grey and Westland District Councils. It will replace the current individual district plans. As part of the hearing process, questions were raised by the Commissioners in response to evidence presented regarding threatened and endangered species on the West Coast, including the tāiko/Westland petrel (*Procellaria westlandica*, At Risk-Naturally Uncommon).

The West Coast Regional Council has provided relevant reports that have been submitted to support the District Plan change. The Commissioners have asked the following questions:

- Assess the proposed provisions for appropriate methods to manage light and temporary activities, and provide recommendations of possible policies and rules which could be implemented.
- Address the following questions provided by the client:
  - Are the provisions under the Light rules (including LIGHT-P3 and curfew hours) fit to manage the effects of lighting on threatened and endangered species and are further amendments necessary?
  - Do the Light provisions need to be more specific and/or include specific rules to manage any threatened or endangered species. If so, what?

The Temporary Activities chapter will enable temporary activities, such as:

- Military training activities and emergency training for a maximum of 31 consecutive days.
  - Motorsport activities for a maximum of three days.
  - Other activities for a maximum of three consecutive days and three times in any one year.
- What are the potential effects of these activities that will affect ecological/biodiversity values, including threatened and endangered species that need to be managed?

## 2.0 Methods

The reports provided by the West Coast Regional Council were reviewed, and the proposed provisions were assessed for appropriateness for methods to manage light and temporary activities. This report provides suggestions for possible policies and rules which could be implemented in the TTPP.

The documents reviewed are:

- S42a Author Right of Reply Part 1 – General District Wide Matters: Earthworks, Lighting, and Temporary activities;
- Attachment 1: Recommended provisions; and
- Attachment 2: Light memorandum.

## 3.0 Lighting Review

The proposed non-curfew (7.00 am to 10.00 pm) and curfew (10.00 pm to 7.00 am) hours are appropriate for the various artificial outdoor locations. However, the vertical light levels during curfew are too high (e.g. LIGHT – R2 states 5 or 10 Lux, and LIGHT – RX1 2 Lux) as listed in Appendix 1 (Recommended Provisions). The curfew Lux level should not exceed 5 or 2 Lux (LIGHT – R2; Port and Industrial Zone; and Town Centre, Mixed Use, Commercial, Hospital, Stadium and Airport, respectively) and 1 Lux (LIGHT – RX1). This is because vertical light levels affect birds flying at night and can attract birds to an area. Furthermore, I disagree with Mr Belgrave (S422, Point 72); regardless of location, all

lights should be shielded above, and the edge of the shield should be below the whole of the light source, preventing any upward illumination and reducing horizontal light spread. This will greatly reduce any attraction of birds flying at night.

Similarly, as highlighted in Appendix 2 (Point 9), LIGHT – R4 does not include any control on upwards light. However, this appears to have been addressed in LIGHT – RX3 where all lights must ‘be fully shielded and mounted in a horizontal position; have a colour corrected temperature of no greater than 3000K (warm light) and a maximum of 1 Lux’.

This is very important as Procellariforme fledglings (e.g. petrels, terns, albatross, prions, and shearwater) can be drawn back to land as they fly out to sea, leading to crash landings (e.g. in cities, on boats and gas and oil fields). Light sources can affect them up to 15 kilometres away (Light Pollution Guidelines 2020). It is important to keep lighting at a minimum during fledging of tāiko/Westland petrel/tāiko (*Procellaria westlandica* At Risk – Naturally Uncommon) as fledglings leave their colony around early November to mid-January (peak around 26 December) and are susceptible to crash landing. Once on the ground, these birds cannot take flight and will die from starvation, injury or mammalian predation.

In reviewing the Xyst Ltd report (Appendix 2), I agree that the mining activities would most likely occur in areas A1 (Dark – Relatively uninhibited rural and coastal areas) and A2 (Low District Brightness – sparsely inhabited rural and semi-rural areas). However, I believe an error has occurred in Point 7. It appears that the maximum of 5 Lux curfew and 1 Lux non-curfew (A2) and 2 Lux curfew and 0.1 Lux non-curfew (A1) have been written in the incorrect order. I agree with these recommended lighting levels if corrected to 1 Lux curfew (A2) and 0.1 Lux curfew (A1).

Appendix 1 for LIGHT – R2, LIGHT – RX1, and LIGHT – RX2 does not discuss the proposed colour corrected temperature of the outdoor lighting. Seabirds have eyes which are well adapted to see colour and can see different regions of the colour spectrum and this can lead to attraction and crash landings. This is especially prevalent when outdoor lighting uses cool lighting (3500-5000K) which is highly attractive to seabirds as it contains blue light and UV light. All lights should be of a low colour temperature (no greater than 3000K warm white) and low intensity as practical, (Light Pollution Guidelines 2020).

I also agree with Points 20 to 23 of the Xyst Ltd report (Appendix 2) and Mr Belgrave (Point 103). A Light Management Plan would provide specific operations requirements which can address using very warm light sources in areas where light is required for safety, and no light during the breeding season in areas which coincide with breeding areas and flight paths or migration routes.

I agree with the recommendations from the Xyst Ltd report (Points 12 – 14) and Mr Belgrave (Point 99) with regard to the lighting requirements for Okarito (LIGHT – R3 2a and LIGHT – R3 2b) which have been revised in LIGHT – RX3.

I have reviewed the Light Objectives (LIGHT – 01 and 02) and Light Policies (LIGHT – P1/P2/P3), and I have no further comments or recommended changes.

## 4.0 Temporary Activities

The proposed Temporary and Military Training Activities and Emergency Management Training (TEMP – R1) identify a maximum of 31 consecutive days per year (excluding set up and pack down activities). Although this is a single time period, if these activities occur during the tāiko/Westland petrel breeding season, any unshielded lights (vertical light spill) and lights containing blue light and UV light (3500-5000K) could attract and cause grounding of adult and fledging young, especially if the

activity is within their flight path to and from the sea. It is recommended that the deployed lighting should adhere to the recommendations for LIGHT – RX2 or LIGHT – RX3.

Furthermore, as identified in Point 4 (TEMP – R1), that the activity does not occur on a Site or Area of Significance to Māori identified in Schedule Three. However, there are no restrictions on activities occurring within significant habitat for indigenous fauna. This is a concern as indigenous species, including tāiko/Westland petrel, whio/blue duck (*Hymenolaimus malachorhynchos*, Threatened – Nationally Vulnerable), roroa/great spotted kiwi (*Apteryx maxima*, Threatened – Nationally Vulnerable), rowi/Okariti brown kiwi (*Apteryx rowi*, Threatened – Nationally Endangered), or kororā/southern blue penguin (*Eudyptula minor minor*, At Risk – Declining), can be adversely affected by light, noise and human activity, particularly during the breeding season of these species (May to February).

I have reviewed and considered the permitted activities for the Temporary Motorsport Activities (TEMP – R3), Other Temporary Activities and Buildings (TEMP – R6), and have considered the effects on tāiko/Westland petrel. As these activities will generally occur near residential areas, during daylight hours or within the early hours of the curfew period (e.g. before midnight), and for a short duration (up to a maximum of three days in a given period), it is not expected that tāiko/Westland petrel will be adversely affected.

## 5.0 Conclusions

It is recommended that all lights are shielded to prevent any vertical light spill, and the maximum curfew light level is not greater than Lux 5 or Lux 2 for LIGHT – R2, or 1 Lux for all other zones. All lights should be of a low colour temperature (3000K) and low intensity as practical. It is also recommended that a Light Management Plan is developed to provide specific operations requirements. With regards to TEMP – R1, it is highly recommended that these temporary activities do not occur in areas of significant habitat for indigenous fauna and that any lights that are used are fully shielded, have a colour corrected temperature of no greater than 3000K (warm light) and a maximum of 2 Lux during curfew.

The following table summarises the suggestions for the TTPP policy wording around lighting:

Light	Recommendations for TTPP Policy Wording
<b>LIGHT - R2</b>	<b>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</b>
<b>Activity Status Permitted</b>	
Where:	
1. Outdoor artificial lighting must not exceed the following vertical or horizontal light levels:	
a. 7.00am – 10.00pm: 25 Lux;	No change
b. 10.00pm – 7.00am: 10 Lux in the PORTZ - Port Zone and all INZ - Industrial Zones; and	b. 10.00pm – 7.00am: 5 Lux in the PORTZ - Port Zone and all INZ - Industrial Zones; and
c. 10.00pm - 7am: 5 Lux in the TCZ - Town Centre, MUZ - Mixed Use, COMZ - Commercial, HOSZ - Hospital, STADZ - Stadium, AIRPZ - Airport	c. 10.00pm - 7am: 2 Lux in the TCZ - Town Centre, MUZ - Mixed Use, COMZ - Commercial, HOSZ - Hospital, STADZ - Stadium, AIRPZ - Airport
	a. Be fully shielded and mounted in a horizontal position ; b. Have a colour corrected temperature of no greater than 3000K (warm white);

Light	Recommendations for TTPP Policy Wording
<b>LIGHT – RX1</b>	<b>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</b>
<b>Activity Status Permitted</b> Where:	
1. Outdoor artificial lighting must not exceed the following vertical light levels:	
a. 7.00am – 10.00pm: 10 Lux; and	No change
b. 10.00pm – 7.00am: 2 Lux.	b. 10.00pm – 7.00am: <b>1</b> Lux.
	a. Be fully shielded and mounted in a horizontal position ; b. Have a colour corrected temperature of no greater than 3000K (warm white);
<b>LIGHT – RX2</b>	<b>Artificial Outdoor Lighting in all Rural Sones and MINZ – Special Purpose Mineral Extraction Zone</b>
<b>Activity Status Permitted</b> Where:	
1. Outdoor artificial lighting must not exceed the following vertical light levels:	
a. 7.00am – 10.00pm: 5 Lux; and	No change
b. 10.00pm – 7.00am: 1 Lux	No change
	a. Be fully shielded and mounted in a horizontal position ; b. Have a colour corrected temperature of no greater than 3000K (warm white);
<b>LIGHT – RX3</b>	<b>Artificial Outdoor Lighting in locations not provided for in Rule LIGHT - R2 or LIGHT – RX1 or LIGHT-RX2, and in locations within the Outstanding Coastal Natural Character Overlay, Outstanding Natural Landscapes Overlay and Outstanding Natural Features Overlay</b>
<b>Activity Status Permitted</b> Where:	
1. Artificial outdoor lighting must not exceed the following vertical light levels:	No change
a. 7.00am – 10.00pm: 2 Lux; and	
b. 10.00pm – 7.00am: 1 Lux; where	
c. This is measured at the boundary of the site.	
2. Where the artificial outdoor lighting is located within the SETZ - PREC 3 - Settlement Zone - Coastal Settlement Precinct of Okarito it must:	No change
a. Be fully shielded and mounted in a horizontal position ;	
b. Have a colour corrected temperature of no greater than 3000K (warm white); and	
c. Be installed in a manner that precludes operation of lights greater than 500 lumens for durations greater than five minutes between 10pm and 7am the following day.	
3. Where the artificial outdoor lighting is located within the Outstanding Coastal Natural Character Overlay it must:	No change



Light	Recommendations for TTPP Policy Wording
<ul style="list-style-type: none"> <li>a. Be fully shielded and mounted in a horizontal position;</li> <li>b. Have a colour corrected temperature of no greater than 3000K (warm white); and</li> <li>c. Be installed in a manner that precludes operation between 10pm and 7am the following day.</li> </ul>	
<b>TEMP - R1</b>	<b>Temporary and Military Training Activities and Emergency Management Training</b>
<b>Activity Status Permitted</b> Where:	
1. These are for a maximum of 31 consecutive days per year (excluding set up and pack down activities) ;	No change
2. No permanent structures are erected unless they are lawfully established in accordance with relevant zone and overlay chapter rules in this Plan;	No change
3. No earthworks are undertaken except where they are in accordance with relevant Earthworks and overlay chapter rules (or resource consent is obtained for the earth works);and	No change
4. These do not occur on a Site or Area of Significance to Māori identified in Schedule Three	No change
	All activities should: Avoid the tāiko/Westland petrel breeding season, especially around early November to mid-January (peak around 26 December); Not within a known tāiko/Westland petrel flight path.
	Alternatively, all light should: c. If activities must proceed within an area over which the tāiko/Westland petrel fly to and from the sea, all lights must be fully shielded and mounted in a horizontal position; and d. Have a colour corrected temperature of no greater than 3000K (warm white); e. Maximum of 2 Lux during curfew.
	f. Restrictions should be implemented on activities occurring within significant habitat for indigenous fauna, particularly during the breeding season (May to February).
<b>TEMP - R3</b>	<b>Temporary Motorsport Activities</b>
<b>Activity Status Permitted</b> Where:	
1. There are no ancillary buildings or structures; 2. No earthworks or vegetation clearance are undertaken except where they are in accordance with relevant Earthworks and Overlay Chapter rules (or resource consent is obtained for the earth works); and	No change

Light	Recommendations for TTPP Policy Wording
<p>3. Notice of the activity is provided to the relevant district council a minimum of 30 days prior to the event; and</p> <p>4. The event occurs for a maximum of 3 days at one site in anyone calendar year.</p> <p><b>Advice Note:</b></p> <p>It is the organiser's obligation to contact the relevant road controlling authority (Waka Kotahi New Zealand Transport Authority) if the activity is accessed from a State Highway, and the relevant District Council (if accessed from any other roads) to arrange an appropriate traffic management plan to avoid traffic safety hazards being generated from the activity.</p>	
TEMP - R6	Other Temporary Activities and Buildings
<p><b>Activity Status Permitted</b></p> <p>Where:</p>	
<p><b>1. These are aircraft or helicopter movements; or</b></p> <p><b>2. These are temporary activities associated with a Māori Purpose Activity on Māori Purpose Zoned land; or</b></p> <p><b>3. Community markets occur a maximum of 1 day/week at anyone site; or</b></p> <p><b>4. For other activities and events:</b></p> <p style="padding-left: 20px;"><b>a. These are for a maximum of 3 times in any one year at one site;</b></p> <p style="padding-left: 20px;"><b>b. These only occur for a maximum of 3 consecutive days at any site;</b></p> <p style="padding-left: 20px;"><b>c. In all zones except the Open Space and Recreation Zones the relevant Permitted Activity NOISE and LIGHT standards are met; and</b></p> <p style="padding-left: 20px;"><b>d. In the Open Space and Recreation Zones a temporary activity may exceed the zone Permitted Activity NOISE and LIGHT standards on a site on one occasion in a 3month period and for a maximum of 3 days; or</b></p> <p><b>Advice Note:</b></p> <p><b>1. It is the organiser's obligation to contact the relevant road controlling authority (Waka Kotahi - NZ Transport Agency) if the activity is accessed from a State Highway, and the relevant District Council (if accessed from any other roads) to arrange an appropriate traffic management plan to avoid traffic safety hazards being generated from the activity.</b></p>	<p>No change</p>

## Reference

Light Pollution Guidelines (2020). *National light pollution guidelines for wildlife: including marine turtles, seabirds and migratory shorebirds*. Commonwealth of Australia. 111 pp.

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