



Prepared for: Hearing Commissioners – Te Tai o Poutini Plan
Prepared by: Paul Wilson, Expert Witness, Lighting, Xyst
Date: 07 May 2024
Subject: **Lighting**

Purpose of Report

1. The purpose of this report is to respond to the “Assessment of Lighting Effects on Threatened and Endangered West Coast Species”, dated April 2024 and prepared by Wildlands and whether further changes are needed to the LIGHT chapter under the Proposed Te Tai o Poutini Plan to manage the effects of lighting on threatened and endangered species.

Measurement of light under ASNZS 4284 (LIGHT-R1.1)

1. LIGHT-R1.1 requires that the measurement of light levels in all zones (other than NOSZ - Natural Open Space Zone, SETZ - PREC 3 - Settlement Zone - Coastal Settlement Precinct, and in All Zones where the site falls within the Outstanding Coastal Natural Character Overlay) is in accordance with ASNZS 4284. This means that light is to be measured in terms of how it is received *within* a neighbouring boundary (or at the property boundary for the exception noted above).
2. This can be done by measurement with an illuminance meter typically held 1.5m above ground level and facing towards the site or by computer calculation in the design phase. Where computer calculations are made, the vertical illuminance is calculated to the height of the highest light on the site.
3. Examples of the placement of the calculation plane is shown below in figure 1. For the NOSZ - Natural Open Space Zone, SETZ - PREC 3 - Settlement Zone - Coastal Settlement Precinct, and in All Zones where the site falls within the Outstanding Coastal Natural Character Overlay, the Calculation plane is located on the rele

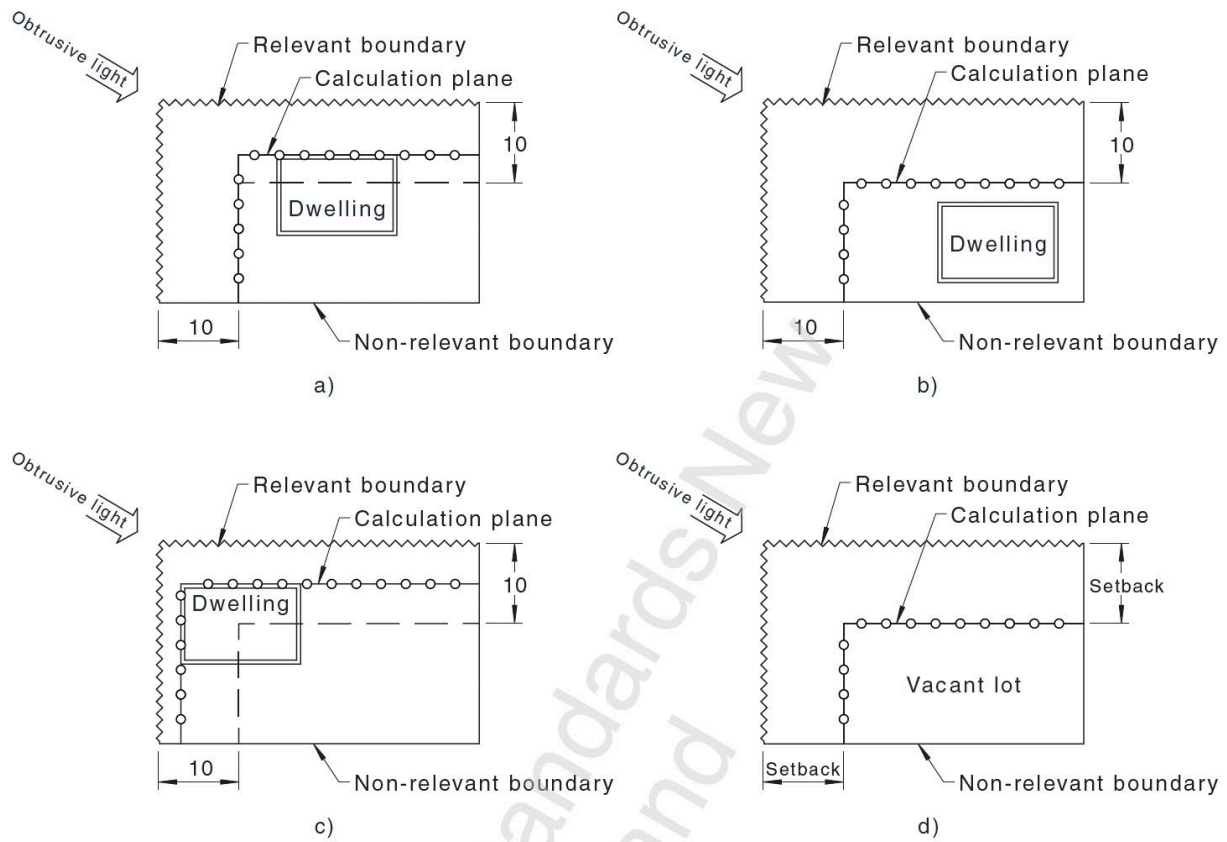


Figure 1 AS2482:2023 Examples of location of calculation plane

LIGHT-R2 and LIGHT-RX1 - vertical light levels and the shielding of light

4. I agree with Wildlands recommendation that all lights should be shielded to prevent any vertical light however I do not agree that maximum lux level which is measured as received at a neighbouring boundary needs to be reduced.
5. A lower lux level will not necessarily prevent high levels of vertical illumination *within* the site.
6. If the prescribed lux level at the property boundary was reduced to 5 lux as suggested there could still be significant vertical illumination if upward light spill is not controlled. Figure 2 illustrates this.

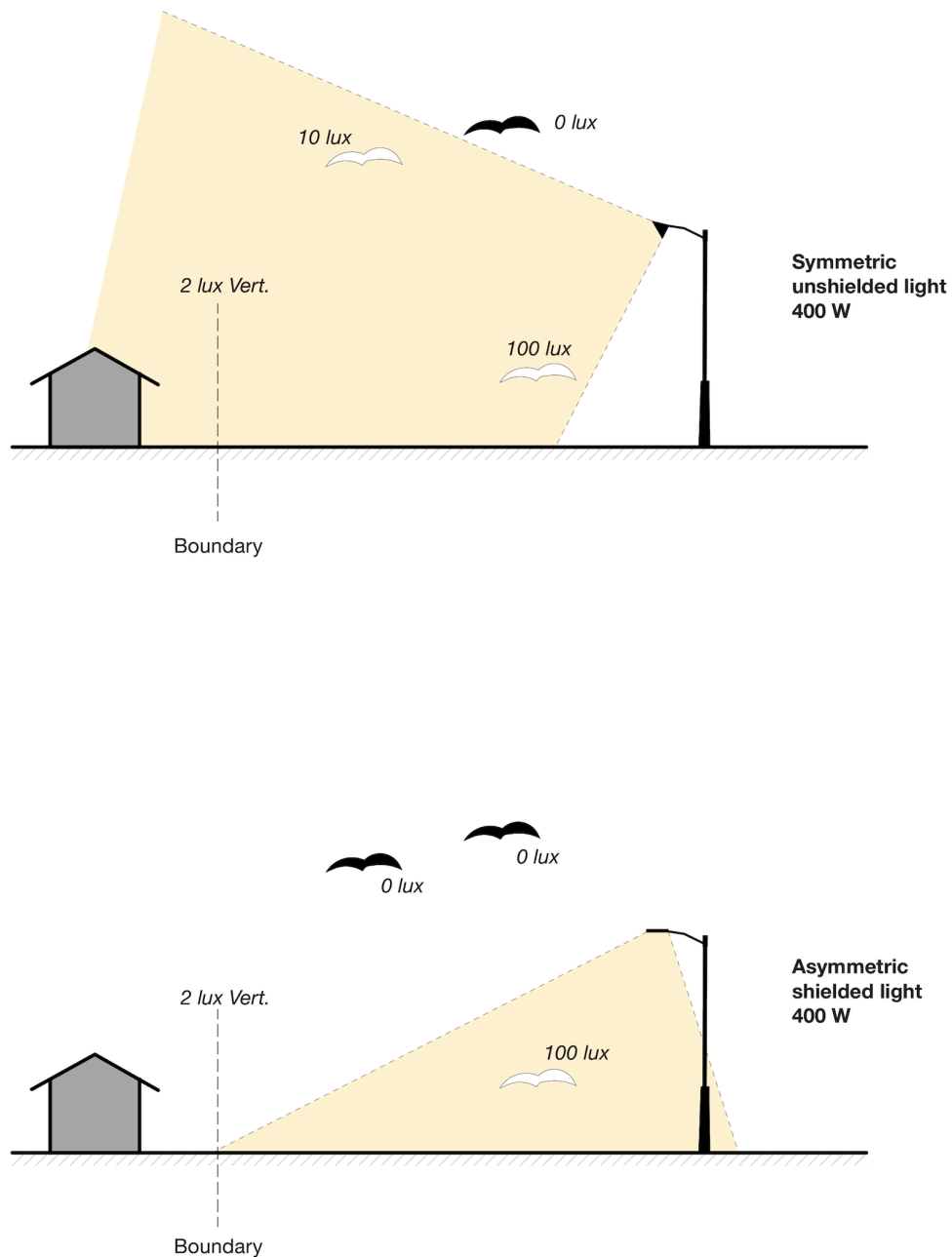


Figure 2 Effect of unshielded lights on vertical illuminance

7. I suggest that rather than focusing on the lux level at the receiving property boundary it would be more effective to control upward light as suggested by Wildlands.
8. ASNZS 4284 has introduced limits on the upward light ratio which are between 0.00 for light sensitive areas and 0.03 for areas of high district brightness. District Plans are beginning to adopt controls on upward light spill in line with ASNZS 4284 and greater

recognition of the impact of light spill on human health, ecological impacts and Astro-tourism. Examples include [Mackenzie District Council](#), [Proposed Wairarapa Combined District Plan](#) and [Proposed Timaru District Plan](#). Controls on upward light are typically imposed on light sensitive areas only however it has been applied district wide in Mackenzie District Council.

9. The curfew light levels for LIGHT-R2 (2 lux) recommended by Wildlands is lower than would typically be found in some district plans and ASNZS 4284. The recommended maximum vertical illuminance in ASNZS 4284 is 25 lux non-curfew /5 lux curfew in Zone A4 (Industrial and Port Areas)
10. The recommended light levels for LIGHT RX1 is possibly higher than that found in ASNZS 4284 being 10 lux non-curfew /2 lux curfew in Zone A3 (Medium district brightness) and 5 lux non-curfew / 1 lux curfew in Zone A2 (Low district brightness).
11. Table 1 illustrates comparable limits in other district plans

Table 1 Comparison of maximum vertical illuminance in district plans

Plan	Status	Zone	Non-Curfew (lux)	Curfew (Lux)
Tai o Poutini Plan	Proposed	LIGHT-R2 port and Industrial	25	10
Tai o Poutini Plan	Proposed	LIGHT-R2 Town centre, commercial, hospital, airport	25	5
Mackenzie	Adopted	Commercial and Mixed Industrial	25	5
Timaru	Proposed	Town Centre Zone; Local Centre Zone; Large Format Retail Zone; City Centre Zone; Sports and Active Recreation Zone; General industrial Zone	25	5

Tai o Poutini Plan	Proposed	LIGHT-RX1 Settlement, residential, open space	10	2
Mackenzie	Adopted	Any Residential Zone Any Recreation or Open Space Zone Any Special Purpose Zone	10	2
Timaru	Proposed	General Residential Zone; Medium Density Residential Zone; Neighbourhood Centre Zone	10	2
Timaru	Proposed	General Rural Zone; Settlement Zone; Open Space Zone; Māori Purpose Zone	5	1

12. I consider it may be difficult for Port and Industrial areas to meet the vertical illuminance levels recommended by Wildlands because of the likelihood that such sites may contain high structures which may require illumination and activities undertaken at height that may require illumination for health and safety reasons such as crane lifting, high forklift/telehandler operations etc.

13. The Proposed Timaru District Plan recognises the industrial nature and scale of the Timaru Port, its strategic importance and 24-hour operation. Due to the nature of operations at the port, a Light Management Plan (LMP) has been prepared by PrimePort, the managers and operators of the port, in collaboration with Council. It is envisaged that the LMP will act as a tool to minimise adverse effects of light spill on adjoining areas, while recognising the operational requirements of the port, many of which are existing. The Port Zone is therefore exempted from some of the provisions of this Chapter, but with some protection to neighbouring residential properties and a reliance on the LMP to

minimise effects, particularly where outdoor artificial lighting is adjoining light sensitive areas.

14. I consider that a LMP will be a more effective means to develop solutions that meet the needs of individual circumstances while protecting wildlife and neighbours from the effects of lighting.
15. I have included an example illustration in Appendix 1 which Timaru District Plan has included in the Proposed Timaru District Plan. This may assist in understanding the differences between shielded and unshielded lights. Shielded lights must be kept flat and not tilted up otherwise these will omit significant amounts of upward light spill also.

LIGHT-RX2

16. A maximum vertical illuminance of 0.1 lux is a very low level of lighting typical of what is applied to a cycle path so that an approaching cyclist can see another approaching cyclist.
17. The practical effect of either 1 lux or 0.1 lux is that if lighting is designed and installed considering the effects of lighting, and aimed inward towards the site then the vertical limits at the boundary can be readily achieved in my opinion. However, given the measurement of light is based on light received at a neighbouring boundary, the requirement for a curfew level of 0.1 lux would not prevent higher levels of light within the site.

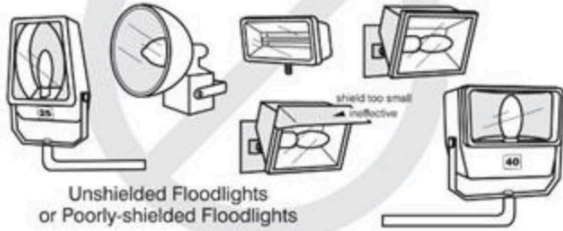


Paul Wilson
Director

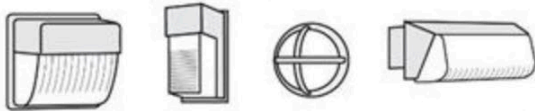
Examples of Acceptable / Unacceptable Lighting Fixtures

Unacceptable / Discouraged

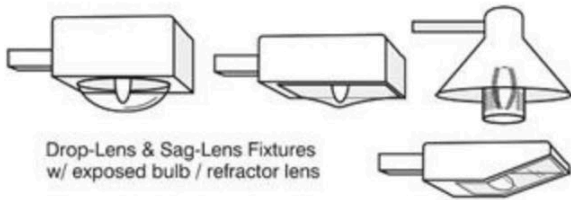
Fixtures that produce glare and light trespass



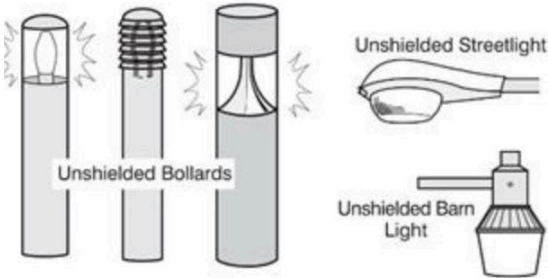
Unshielded Floodlights or Poorly-shielded Floodlights



Unshielded Wallpacks & Unshielded or Poorly-shielded Wall Mount Fixtures



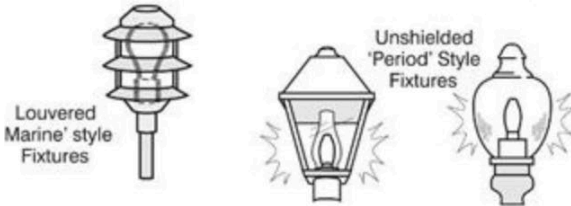
Drop-Lens & Sag-Lens Fixtures w/ exposed bulb / refractor lens



Unshielded Streetlight

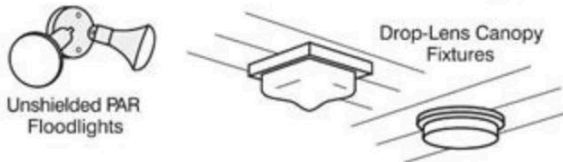
Unshielded Bollards

Unshielded Barn Light



Louvered Marine' style Fixtures

Unshielded 'Period' Style Fixtures

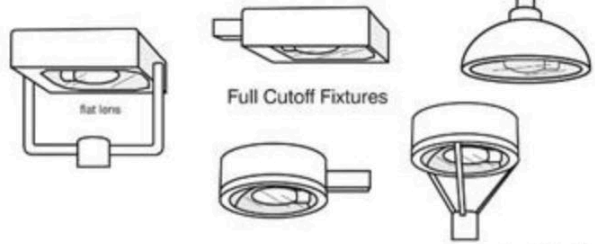


Unshielded PAR Floodlights

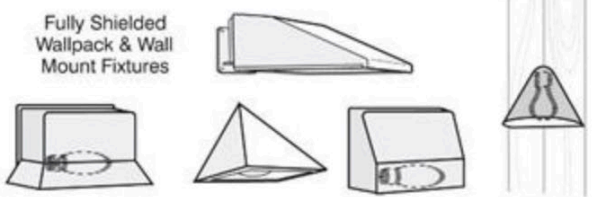
Drop-Lens Canopy Fixtures

Acceptable

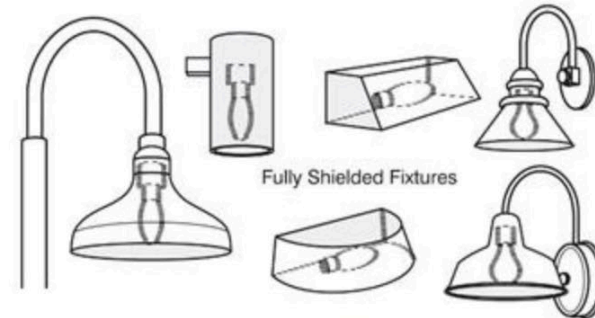
Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



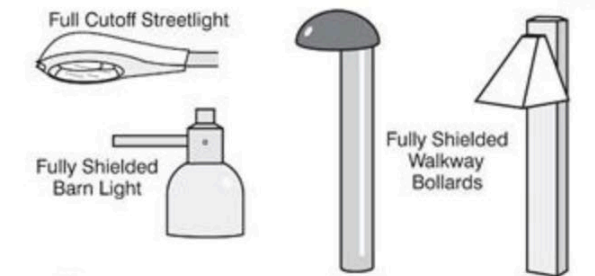
Full Cutoff Fixtures



Fully Shielded Wallpack & Wall Mount Fixtures



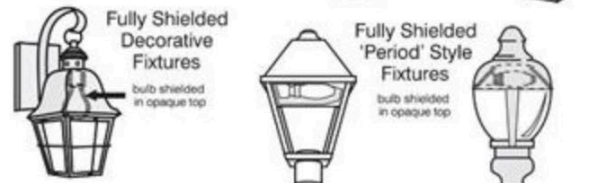
Fully Shielded Fixtures



Full Cutoff Streetlight

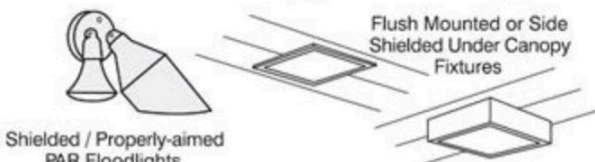
Fully Shielded Barn Light

Fully Shielded Walkway Bollards



Fully Shielded Decorative Fixtures

Fully Shielded 'Period' Style Fixtures



Shielded / Property-aimed PAR Floodlights

Flush Mounted or Side Shielded Under Canopy Fixtures

Illustrations by Bob Crelin© 2005. Rendered for the Town of Southampton, NY. Used with permission.

Appendix 1 Unshielded and Shielded lights (TDC Proposed Plan)