

12th July 2022

Kaikoura Business Park 2021 Limited
C/- Baseline Group

Attention: Dennis Thompson

Dear Dennis,

KAIKOURA BUSINESS PARK PRIVATE PLAN CHANGE – LIGHTING ASSESSMENT

Introduction

Kaikoura Business Park 2021 Limited are undertaking a private plan change (PPC) within the Kaikoura District to enable industrial development at the corner of State Highway 1 and inland Kaikoura Road, Peketa. The subject site is approximately 20 ha and is zoned Rural under the operative District Plan. It is envisaged that 'business and industrial type' activities will occur on the site and will eventually be subdivided into smaller allotments.

This lighting assessment considers the environmental effects of exterior lighting that can be expected to be required in this new Light Industrial zone.

Future outdoor artificial lighting within the Light Industrial site

To establish the extent of light effects that can be expected to be associated with activities within the Light Industrial site we would expect exterior lighting to be present to support the following activities:

- Premises perimeter security lighting.
- Lighting for staff and visitor entry and parking on site.
- Activity lighting for transport and material movements within the site.
- Signage lighting.
- Building interior lighting radiating out through perimeter windows and skylights.

Surrounding dwellings

The aerial view below shows the proximity of the subject site to existing dwellings (identified by the yellow pins).



District Plan lighting standards

The Kaikoura District Plan includes the following relevant performance standards for exterior lighting.

Section 20 Business Zones

20.6 Performance Standards

- 1. Lighting
 - a. Exterior lights shall be directed away from adjacent sites and roads.
 - b. Exterior lights shall not result in lux spill which exceeds:
 - 3 lux maximum (horizontal and vertical) onto adjacent residential sites or
 - 10 lux maximum (horizontal and vertical) onto adjoining non-residential sites.
 - c. Light spill shall be measured at any point more than 2m inside the adjoining unit.

Section 22 Rural Zone

22.8 Performance Standards

1. *Lighting* *Exterior lights shall be directed away from adjacent residential units and roads and shall not result in lux spill which exceeds 3 lux maximum (horizontal and vertical) onto adjacent residential units, measured at any point more than 2m inside the notional boundary of the adjoining Residential unit.*

22.13 Performance Standards

The following performance standards apply to Scheduled Activity S1 (Kaikoura Dairy Factory).

1. *Lighting* *All fixed exterior lighting shall be directed away from adjacent sites and roads.*

Comment

If the DP Business Zone lighting performance standards 20.6.1 were applied to the proposed Light Industrial zone, it is my opinion that these standards would adequately protect the amenity of the inhabitants of surrounding dwellings. I would recommend that the wording is amended to include reference to rural sites and non-rural sites, with the 3 lux limit appropriate for rural sites and the 10 lux limit appropriate for non-rural sites such as adjacent sites/allotments within the Light Industrial Zone:

- b. *Exterior lights shall not result in lux spill which exceeds:*
- *3 lux maximum (horizontal and vertical) onto adjacent residential and rural sites or*
 - *10 lux maximum (horizontal and vertical) onto adjoining non-residential and non-rural sites.*

Kaikoura Dark Sky Trust Project

We were requested to also consider how the lighting effects could be controlled so that they meet the objectives of the Kaikoura Dark Sky Trust to have responsible lighting that has minimised its effects on the quality of views of the night sky over the Kaikoura District.

We referred to the Trusts publication "Responsible Lighting Guidelines for Kaikoura" and comment on relevant guidelines:

The Immense Value and Importance of Preserving Natural Darkness

Respect and protect darkness, this involves deliberately keeping designated areas free from artificial light and/or having well controlled levels of illumination to create ecologically safe havens and sanctuaries.

Responsible Lighting Guiding Principals

1. *All lights have a clear, specific purpose (task specific).*
2. *Use fully-shielded, full cut-off light sources. Ensure LEDs have recessed diodes and chips.*
3. *Use LEDs with optical diffusers and hidden/covered diodes for safety and visual comfort.*
4. *Choose warm, amber lighting (1600-2200K).*

5. *Position and angle light sources carefully and direct light only to where it's needed.*
6. *Control lighting via dimmers, curfews, sensors and/or timers.*
7. *Less is more. Use low lumen output LEDs and low lighting levels to reduce contrast.*
8. *Aim for quality lighting – warm, softly dispersed, even distribution, indirect light to improve visibility, safety and comfort.*
9. *Use vertical lighting to assist visibility and orientation. Avoid horizontal lighting.*
10. *Use lighting only when required and switch off when not in use.*
11. *Avoid light clutter. A few well-designed lights are better than numerous glary, poor quality luminaires.*
12. *As soon as it gets dark, close curtains and louvres, and cover skylights to prevent interior light escaping outside.*
13. *Prioritise nocturnal placemaking whenever possible and practical.*

The International Dark Skies Association (IDA) recommends using lamps rated at 2200K CCT,

If using white light sources (2700-3000K) choose low lumens, lower the intensity via dimming and apply automatic sensors and/or timers.

Additionally

- *Any lighting for roads, public walkways and cycle paths should be managed to improve visibility visual comfort and safety, minimize sky glow, and avoid light shining on areas of water.*
- *In ecologically sensitive areas non-residential lighting is best avoided between 11pm to 5am in summer and 10pm to 6am in winter.*
- *Self-illuminated signs (with an internal light source) should be avoided. Instead downlighting a matt surface with dark background for signage.*
- *Skylights lights in buildings are acceptable if they have adequate louvres/blinds.*

Responsible Lighting to Protect Ecology

Includes the following relevant guidance:

- That different organisms vary in their response to different wavelengths and intensity of light- that best lighting practice can minimize the impact of artificial lighting at night.
- The broader the spectrum of artificial light the broader the group of artificial organisms affected by it.
- These impacts have multiple disruptive, complex, cascading consequences across all species so best lighting practice is critical.
- That the impact of poor light practice provides a barrier to many species which prevents them from moving around habitats and undertaking essential behaviors that support biodiversity.
- Wherever possible minimise lighting areas of greenery because plants require darkness at night

Responsible Outdoor Lighting Guidelines for Surfaces and Materials

Recommends the choosing of dark textured /matt / low reflectance value surfaces. Dark coloured permeable and porous surfaces for pavements, driveways and courtyards are helpful to manage stormwater, they also help reduce light pollution as the surfaces are textured therefore less likely to reflect light from any light source.

Responsible Outdoor Lighting Guidelines for Buildings, Landscapes and New Subdivisions

Recommends bollards are an effective way to illuminate streets, paths, and cycleways instead of using streetlights, favour amber (1600-2200K) however 2700-3000K is acceptable as long as bollards are well designed. Select low lumen output LEDs to keep lighting levels low, apply dimming and operate via sensors and/or timers.

Responsible Exterior Lighting Fixture Guide

Recommends luminaires should be fully shielded/full cut off. Light directed downwards and soft diffused and evenly distributed, wall mounted light sources that emit light upwards are acceptable if they are positioned under a balcony or the eaves of a building so the upwards light is capped to prevent it from escaping into the sky.

Overall lighting design will ensure the use of luminaires that are fully shielded and have especially developed optics that produce precise downward beam distribution, these will mitigate any direct light component that may normally be radiated above the horizontal plane of the luminaire. The lighting should be operational according to use. Integrating the use of motion sensor, programmable automation, and timer controls. outdoor luminaires shall not to be directed towards adjoining boundaries; and shall to not exceed the prescribed level of brightness.

Responsible Lighting for Steps Decks Ramps Handrails Decking and Pavements

Recommends lighting is recessed and positioned so the diodes/chips are hidden or covered, Light is soft diffused and evenly distributed and warm in color, can be turned off when not in use via timers and or sensors.

Responsible Lighting for Carparks

Recommends lighting at night in large carparks, should be significantly dimmed, or even better, turned off and activated so it turns on with activity.

Responsible Security Lighting

Proposes that brighter lighting that's left on all night, does not equate to improved safety and less crime. Its more effective to turn lights off when not in use and automatically activate from movement via sensors, this shocks intruders and alerts others to their presence.

Responsible Landscape Lighting

Recommends trees and foliage should not be illuminated. Although amber and red is generally less disruptive to wildlife and insects than broad spectrum white lights, plants and trees are still adversely affected. Avoid landscape lighting all together.

Responsible Lighting for Retail Outlets, Signage, Advertising and Self-illuminated Billboards and Displays

Comments that self-illuminated billboards and signage cause light pollution, light-trespass and are an environmental stressor. Ideally signage is lit with shielded downlights and the signage surface is matt.

Responsible Architecture, Facade and Media Architecture Lighting

Recommends such lighting needs to be restricted to built environments (A4 Zone – High district brightness).

Responsible Lighting for Interior and Accommodation Providers

Comments its important to provide properly fitted curtains to make rooms completely dark at night, this prevents light intrusion as well preventing light from the inside spilling outside into the night scape.

Wairarapa International Dark Sky Reserve – Outdoor Artificial Lighting Plan Change

I was South Wairarapa District Councils lighting expert for their Wairarapa International Dark Sky Reserve – Outdoor Artificial Lighting Plan Change.

The plan change by the Councils was in support of an application from the Wairarapa Dark Sky Association to the International Dark Sky Association for part of the region to be certified as an International Dark Sky Reserve. The plan change includes policies, rules and other methods to control outdoor lighting throughout the two districts to minimise effects on the darkness of the night sky.

As an example of lighting provisions introduced to minimise effects on the darkness of the night sky, the plan change resulted in the following provisions in Chapter 21 District Wide Land Use Rules:

21.1.11 Outdoor Artificial Light

(a) *The emission of outdoor artificial light (including glare) meets the following standards:*

- (i) *A maximum artificial light level of 8 lux (lumens per square metre) measured at 1.5m above ground level at the site boundary.*
- (ii) *Within the Dark Sky Management Area identified within **Appendix 15**, all outdoor lighting shall have a colour temperature of light emitted of 3000K Kelvin or lower.*
- (iii) *Within the Dark Sky Management Area identified within **Appendix 15**, all outdoor lighting with a light output of 500 lamp lumens or greater shall be shielded or tilted so as to not emit any light at or above a horizontal plane measured at the light source.*

Exceptions:

- (iv) *Lighting controlled by motion-activated switches limiting the duration of illumination to less than five (5) minutes after activation are exempt from complying with standards (ii) and (iii) above.*
- (v) *Night-time works for the construction, maintenance and upgrading of network utilities and energy generation facilities undertaken by a network utility operator or wind energy facility operator are exempt from complying with standards (ii) and (iii) above.*
- (vi) *Lighting on existing buildings or structures erected or maintained pursuant to civil aviation or maritime transport legislation are exempt from complying with standards (ii) and (iii) above.*
- (vii) *Lighting from or mounted to moveable vehicles.*

Conclusions

There can be expected to be future light effects from the proposed Light Industrial site activities, exterior and interior lighting that if not controlled could have obtrusive effects on the occupants of dwellings within the surrounding rural zone and contribute to sky glow that is detrimental to the quality of dark sky aspirations of the Kaikoura Dark Sky Trust.

To ensure that such effects are adequately mitigated we recommend that lighting performance standards are defined in a Lighting Management Plan.

Recommendations on Lighting Management Plan

We propose the following lighting performance standards are included in a Lighting Management Plan (LMP). All artificial lighting proposed for the Light Industrial site should then comply with this LMP.

Lighting Management Plan

Artificial lighting is required to enable site activities to be carried out efficiently and safely, it is also required for security and signage. All site artificial lighting shall comply with the following:

1. *Outdoor lighting:*
 - a. *All lights are to have a clear, specific purpose (task specific). Do not light gardens.*
 - b. *Lighting levels shall be the minimum levels required to carry out each site activity.*
 - c. *Lighting spill and glare shall comply fully with District Plan performance standard for Light Industrial Zone.*
 - d. *All light fittings when installed shall not project any light at or above the height of their light source.*
 - e. *All light emitted from light fittings shall have a correlated colour temperature of 2700K (Kelvin) or less. 2200K with minimum colour rendering index of 70 preferred,*
 - f. *All light fittings are to be low lumen output, maximum*
 - g. *The lighting is to have automatic presence and daylight controls such that the lights are on from dusk to dawn, and when presence has been detected, maximum on time of 5 minutes.*
2. *Outdoor illuminated signs:*
 - a. *Self-illuminated signs and billboards (with an internal light source) are not permitted.*
 - b. *Signs that are to be illuminated shall have a matt surface with dark background.*
 - c. *Signs to be illuminated by shielded downlights, lights to be dimmable and lighting level set to the minimum level required for the sign to be legible from the adjacent road.*
 - d. *Sign illumination shall not to operate between 11pm and 5am*
3. *Interior lighting*
 - a. *All perimeter windows in buildings are to be fitted with curtains, blinds or shutters to stop interior lighting from radiating out through windows. Curtains, blinds or shutters to be closed when the interior lighting is to be used at night.*
 - b. *Skylights in buildings are acceptable if they have adequate louvres/blinds.*

Yours faithfully

Stephenson & Turner NZ Limited



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