BULLER PLATEAU CONTINUATION PROJECT

EXISTING INFRASTUCTURE

ASSESSMENT OF ENVIRONMENTAL EFFECTS – LIGHTING

Prepared for

Bathurst Resources Limited

INDEPENDENT ELECTRICAL & ILLUMINATION ENGINEERS

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DOCUMENT VERSION HISTORY

Revision	Prepared By	Description	Date
0	John Mckensey	Original	27/03/2026
1	John Mckensey	Amended	02/06/2026

DOCUMENT QUALITY ASSURANCE

Action	Name	Signed	Date
Prepared by	John Mckensey	[redacted]	27/03/2026
Reviewed by	Murray Grindley		27/03/2026
Approved by	John Mckensey		27/03/2026
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EXECUTIVE SUMMARY

LDP Limited (**LDP**) has been engaged by Bathurst Resources Limited (**BRL**) to provide an assessment of lighting effects associated with the existing infrastructure at the Buller Plateau Continuation Project (**BPCP**).

This relates to two locations – the Stockton Coal Mine (**Stockton**) and the Ngakawau Coal Handling Facility (**Ngakawau CHF**) – collectively termed **the Sites**. While the activities at the Sites are currently permitted by coal mining and ancillary coal mining licences, BRL seeks to renew and extend the existing authorisations to cover the remaining expected operational life of the mine and remediation activities.

There appears to be no direct visibility of lighting within Stockton from residential locations or public roads, with possible minor exceptions in terms of the lighting at the Stockton Main Gate, and Cableway Station #5, and only for motorists approaching Stockton on Millerton Road. In my opinion, effects are therefore negligible.

Fixed column and structure mounted lighting at Stockton and Ngakawau CHF is existing and not proposed to change.

There could potentially be a minor exception if mobile lighting towers were to be positioned at the north-west extremities of Stockton, potentially presenting limited visibility from the vicinity of Granity to Hector, nearby portions of SH67 and local roads. However, in my opinion, provided the conditions I propose in this report are adopted, any effects would be negligible to very low.

The lighting complies with the permitted activity requirements of the Operative Buller District Plan (**BDP**) and the Te Tai o Poutini Plan Decisions Version (**TTPP**), other than one potential minor non-compliance with the TTPP.

Overall, I am of the opinion that any lighting effects from Stockton will be negligible to very low and effects from Ngakawau CHF will be negligible to low. In planning terms, I consider the effects will be less than minor.

1.0 INTRODUCTION

Stockton and the Ngakawau CHF are well established with numerous sources of fixed lighting on columns and structures, mobile lighting towers for active work faces and access, and lighting mounted on mobile plant and vehicles (headlights, taillights, safety warning lights and working lights). The fixed lighting is typically mounted with zero upward tilt.

Existing operations are 24 hours/day, 7 days/week as an operational envelope/capability. Currently, specific operational timing is as follows:

- Stockton Open Pit Mining: operation is nominally 24-hour, 7-day depending on production, currently Monday to Friday shifts with small weekend crews.
- Ngakawau Rail Loadout: can operate 24/7 but generally operates 18 hours/day Monday to Friday; train loading commonly 8:00 a.m.-9:00 p.m., with weekend trains for significant unplanned disruptions.
- Aerial Ropeway ropeway: currently operates 7 a.m.-1 a.m. five days/week, with ability up to 24/7 depending on demand.

There is a faint sky glow evident above the Stockton site visible from Westport and surrounds.

Stockton:

There is no direct visibility of fixed lighting from residential areas, nor public roads, due to the nature of the topography. The only minor exceptions could possibly be lighting at the cableway station #5 and at the Main Gate, for motorists approaching the mine via Millerton Road. However, any such views are minimal, the lighting is well controlled and effects are very low.

The only other possible direct views might be afforded to some residents at Ngakawau, Hector and motorists in that vicinity (i.e. SH67 and local roads) when any operations are conducted with mobile lighting towers located on the seaward edge of the plateau at the north east extremities of Stockton. However, given the viewing angle and separation distance, effects would be negligible to very low.

Ngakawau CHF:

Lighting is well controlled and floodlights are tilted down such that the main beam is not directly visible from residential locations or directly in line with public roads. The Site is mostly screened from view by buildings, topography and foliage. This is discussed in greater depth later in this report.

Report Author

John Mckensey is the author of this report, acting on behalf of LDP. LDP is an independent Electrical and Illumination Engineering Consultancy, established in 1994. I hold the position of Executive

Engineer and have over 40 years' experience in relation to lighting design and the assessment of effects of lighting.

I have the following qualifications and expertise: I hold a Bachelor of Engineering (Electrical), am a Member of the Illuminating Engineering Society of Australia and New Zealand Inc. (MIES) and hold a number of relevant affiliations including CMEngNZ, MIEAust, CPEng(Aust), NER, APEC Engineer, IntPE(Aust). I am a member of the Resource Management Law Society of NZ Inc and the International Dark-Sky Association.

I have received 19 awards for lighting design from the Illuminating Engineering Society and other learned bodies, including 3 International awards and 3 lighting design awards from the Royal Astronomical Society of New Zealand (for "efficient, effective and sustainable lighting design – protecting the night environment").

In addition to advising local government in relation to Plan Development and Plan Changes (Auckland – AUP, Christchurch – DP updates, Hamilton – DP plan changes PC5 and PC9), I have provided evidence in the Environment Court for a number of resource consent applications.

I have provided advice regarding construction lighting effects for a range of resource consent applications including;

- Maramarua Coal Mine, Maramarua
- AC36 Americas Cup, Auckland
- Hydroelectric Drainage Canal, Tekapo
- Junction Road Power Plant, Taranaki
- Mt Munro Wind Farm, Wairarapa
- Amberfield Subdivision, Hamilton
- Titanium Park Industrial Expansion, Waipa

I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and this report has been prepared in compliance with that Code, as if it was expert evidence presented in proceedings before the Environment Court. Unless I state otherwise, this report is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this report.

Caveat

In order to limit repetition, where this report makes a statement regarding effects, any such statement is the opinion of the author.

2.0 CONSENT APPLICATION SCOPE

In general terms, the consent application is intended to obtain new or extend existing consents, sufficient to enable remaining coal mining operations from the Sites, subsequent land remediation and for transport of coal to Ngakawau and loadout to rail.

Further details have been provided in the Mitchell Daysh Assessment of Environmental Effects.

2.1 Project Description

BRL have prepared a detailed Project Description. This is available as a separate document titled "Buller Coal Plateaux Continuation Project – Project Description".

3.0 EXISTING ENVIRONMENT AND RECEIVING ENVIRONMENT

The existing environment comprising and surrounding the Sites (shown in Figure 1) is described in detail in the Mitchell Daysh AEE.

The surrounding receiving environment within which the BPCP is located is as follows:

Stockton: As described below, there is sparse inhabitation to the north, west and south. The land to the east is uninhabited.

Ngakawau CHF: The facility is located within the Ngakawau township and across the Ngakawau River from the township of Hector. There are residential properties immediately to the west, north & south as well as across Ngakawau River to the north and east.

3.1 Site Visit

The author undertook a site visit on Tuesday 21/01/2025 of the Stockton Mine, the Ngakawau CHF and surrounding areas both day and night to appreciate existing and potential lighting effects.

The weather was fine and clear.

Further details and observations are included in section 6.1 of this report.

3.2 Analysis

Further to my site visit, I set out some observations below regarding the environment and the current operations.

Figure 1. Stockton and surrounds

The Sites include:

- Stockton; and
- Ngakawau CHF

Stockton is shown in Figure 2 and Ngakawau CHF is shown in Figure 3.

Figure 2. Stockton

Coal is currently transferred from Stockton to the Ngakawau CHF via overhead cableway as shown in Figure 4. It is then usually transported to Lyttleton via rail.

Whilst understood to be rarely required, should rail not be available, then transport to Lyttleton would occur by road.

The cableway supports and cars are not lit.

Figure 4. Cableway (section near the Ngakawau CHF)

The Sites are located on land zoned as;

- Stockton: Rural; and
- Ngakawau CHF: Industrial

A proposal has also been notified in the TTPP to create a "Buller Coalfield Special Purpose Zone" (**BCZ**) which, if created, would encompass the Sites. While the TTPP decisions version is now operative in part, the BCZ is under appeal.

Observations relating to the relative location of nearby land with a residential use, are described in Table 1.

ITEM	SITE	CLOSEST RESIDENTIAL USE	OBSERVATIONS
1.1	**Stockton**		
1.1.1		***Residential Area 1*** (Millerton)	Located north of Stockton. All properties are screened from views of lighting at Stockton by topography and vegetation. There was no measurable light present from Stockton. Hence, light spill at the nearest boundaries was zero.
1.1.2		***Residential Area 2*** (Denniston)	Located south-west of Stockton. The closest residences are at least 2km distant from Stockton and currently have no visibility of lighting at Stockton. There was no measurable light present from Stockton. Hence, light spill at the nearest boundaries was zero.
1.1.3		***Residential Area 3*** (SH67: Fairdown to Granity)	Located west of Stockton, near sea level. The topography is such that there is no visibility of lighting at Stockton. There was no measurable light present from Stockton. Hence, light spill at the nearest boundaries was zero.
1.1.4		***Residential Area 4*** (Westport)	The topography is such that there is no visibility of lighting at Stockton. Westport is also some 20km from the nearest part of Stockton. There was no measurable light present from Stockton. Hence, light

			spill at the nearest boundaries was zero.
1.2	**Ngakawau CHF**		
1.2.1		***Residential Area 5*** [redacted])	Located north-west of the CHF, on the opposite side of the road from a maintenance facility in the CHF that is typically lit at night. While there is some screening from foliage, properties with windows facing the CHF will be able to see the lighting. The maximum light spill measured at the property boundary was 1.4 lux. It would be less than this at 2m into the property.
1.2.2		***Residential Area 6*** [redacted]	Located east of the CHF, on elevated land and heavily screened by vegetation. Lighting at the CHF is predominantly aimed away from these locations. There was no measurable light present from Stockton. Hence, light spill at the nearest boundaries was zero.
1.2.3		***Residential Area 7*** [redacted]	Located north-east of the CHF, across the Ngakawau River from the CHF. Light spill at the nearest boundary was zero.

Table 1. Closest Residential Use

Using the guidelines provided in AS/NZS 4282:2023 (Control of the obtrusive effects of outdoor lighting), the ambient light conditions at the Sites could best be described as shown in Table 2.

ITEM	LOCATION	ENVIRONMENTAL ZONE (per AS/NZS 4282:2023)	AMBIENT LIGHT CONDITIONS
2.1	**Sites**		
2.1.1	**Stockton**	A4	High district brightness (Industrial lighting)
2.1.2	**Ngakawau CHF**	A4	High district brightness (Industrial lighting)
2.2	**Surrounds**		
2.2.1	***Residential Areas 1 & 2*** (Millerton & Denniston)	A2	Low district brightness (Sparsely inhabited, dense vegetation & no road lighting)
2.2.2	***Residential Area 3*** (SH67: Fairdown to Granity)	A3	Medium district brightness (In populated areas – road lighting and suburban residential lighting)
2.2.3	***Residential Areas 5, 6 & 7*** (Ngakawau & Hector)	A3	Medium district brightness (In populated areas – road lighting and suburban residential lighting)
2.3	**Distant Views**		
2.3.1	***Residential Area 4*** (Westport)	A3	Medium district brightness (Road lighting & views of lit suburban areas) Note: The Westport Town Centre (i.e. principally Palmerston St) would be category A4 – high brightness

Table 2. Ambient light conditions

The definition of the environmental zones is described in table 3.1 of AS/NZS 4282:2023, repeated below as Table 3 for reference.

Environmental Zones	Ambient Light Conditions	Descriptions/Examples
A0	Intrinsically Dark	UNESCO Starlight Reserve IDA: Dark Sky Parks, Reserves or Sanctuaries Major optical observatories Other accreditations of dark sky places for example astro-tourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
A1	Dark	Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas)
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas Generally, roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A3	Medium district brightness	Suburban areas in towns and cities Generally, roadways with streetlighting through suburban, rural or semi-rural areas
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and port areas Transport Interchanges
TV	High district brightness	Vicinity of major sport and event stadiums during TV broadcasts
NOTE: Zones A0 and A1 would normally have a minimum area of 50 ha (0.5 km^2). There may be smaller environmentally sensitive areas.		

Table 3. Environmental zones (per AS/NZS 4282 Table 3.1)

4.0 LIGHTING

The anticipated effects resulting from lighting at the Sites are anticipated to be consistent with the currently experienced lighting effects which are occuring as part of the ongoing mining activities. Assessments of existing lighting are therefore very useful as this enables an accurate assessment of likely effects resulting from the Project.

4.1 Stockton

Sources of lighting at Stockton include permanent lighting, mobile lighting towers and lighting attached to mobile plant and vehicles. Note that "CHPP" presented in Figures 5 and 6 refers to the existing Stockton Coal Handling and Processing Plant (CHPP).

Permanent Lighting

Permanent lighting is fixed to columns and structures in locations shown in Figures 5 and 6.

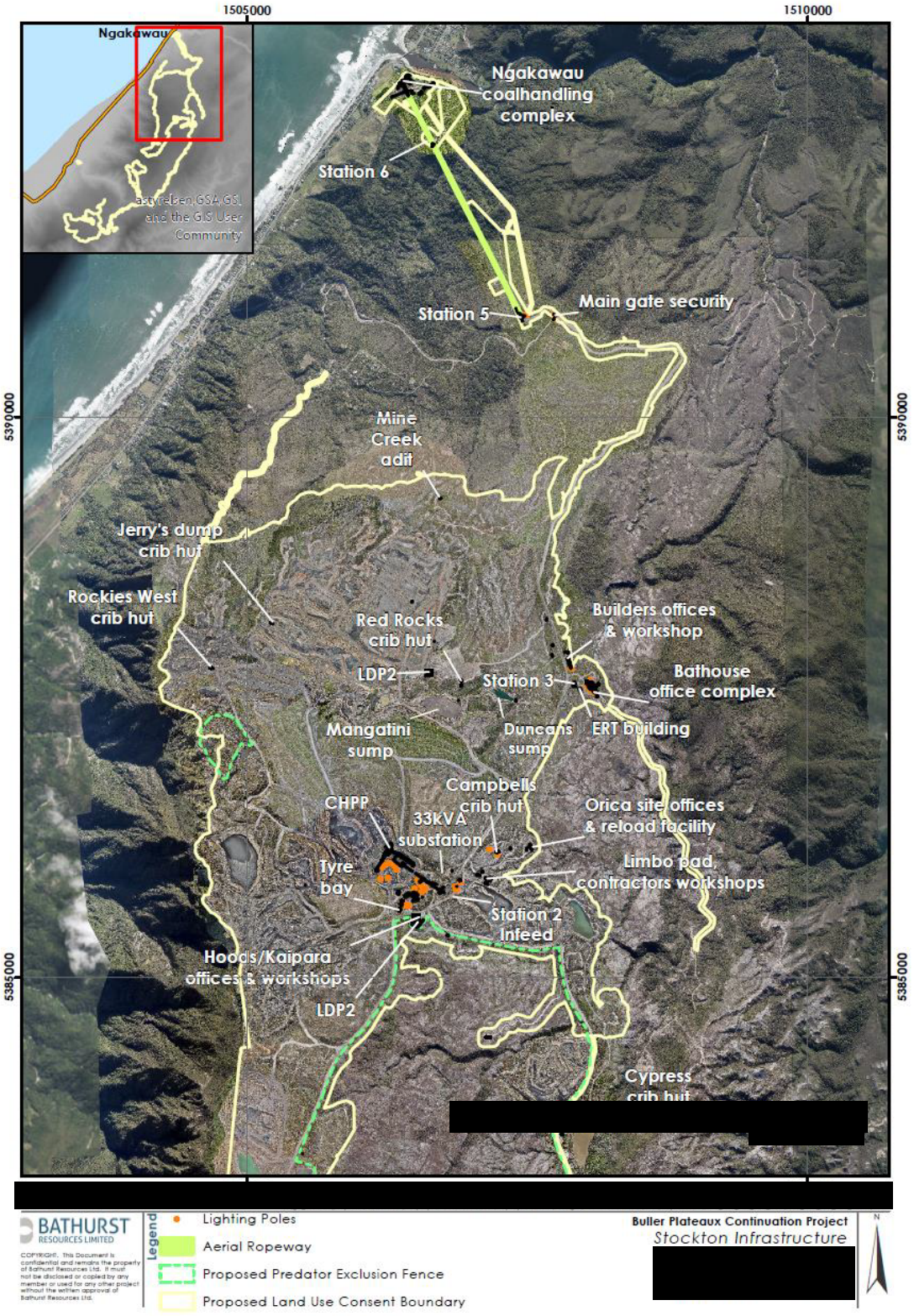
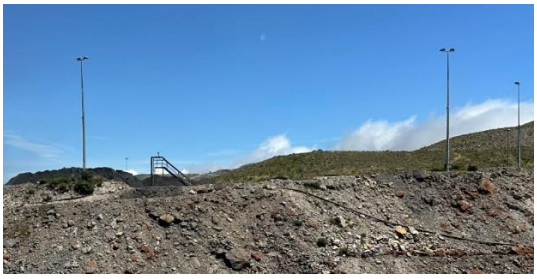


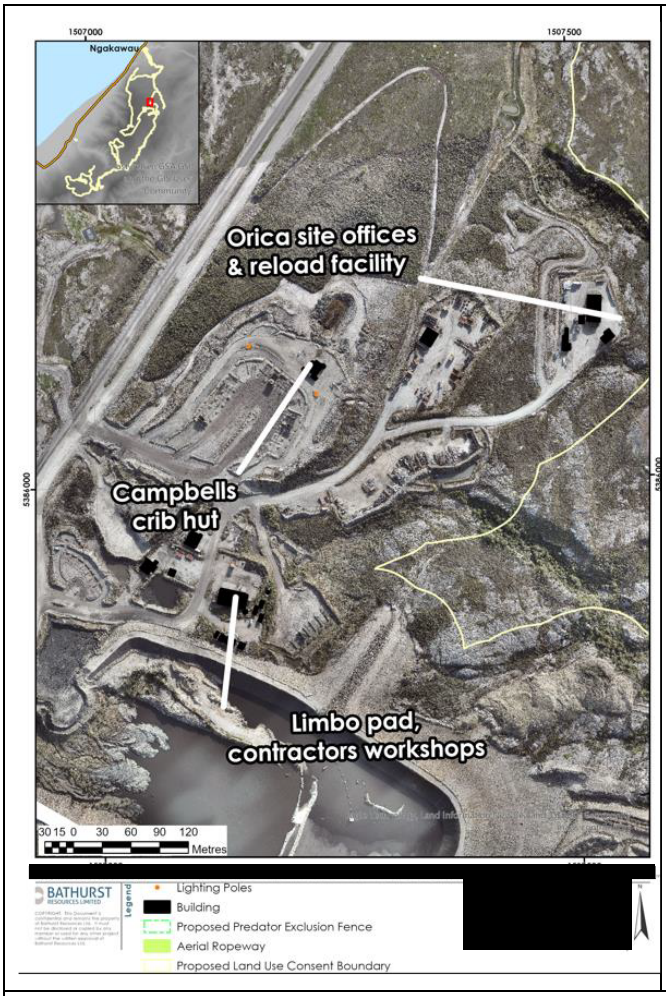
Figure 5. Stockton permanent lighting

As observed at the time of my site visit, permanent lighting is sparse and completely screened from view from residential locations and public roads beyond the site by topography.

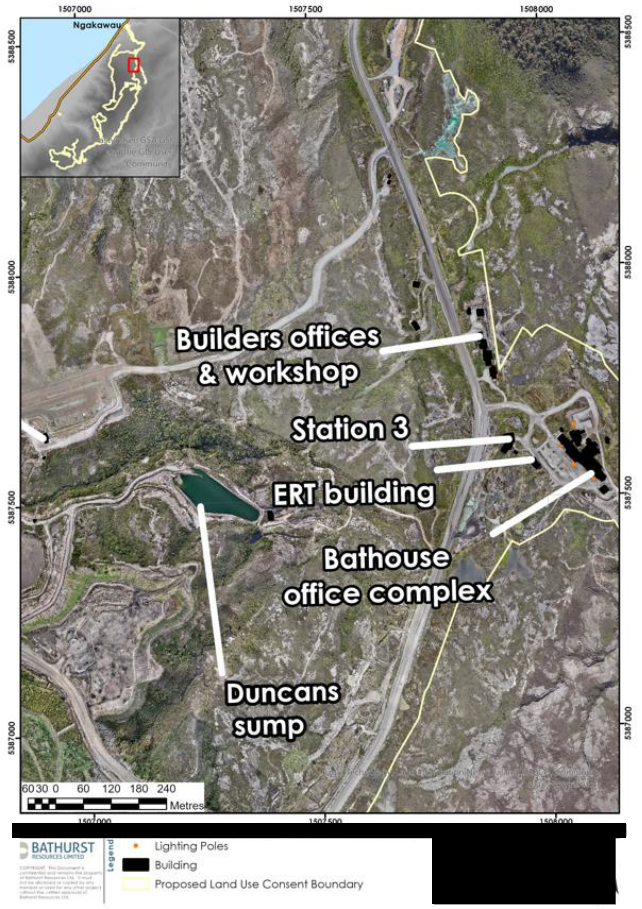
Daytime examples of the lighting are shown in Figure 6. Orange dots represent lighting poles. Red blocks represent buildings – typically with lighting attached. The images in the right-hand column are representative of lighting present at the locations shown in the left-hand column.



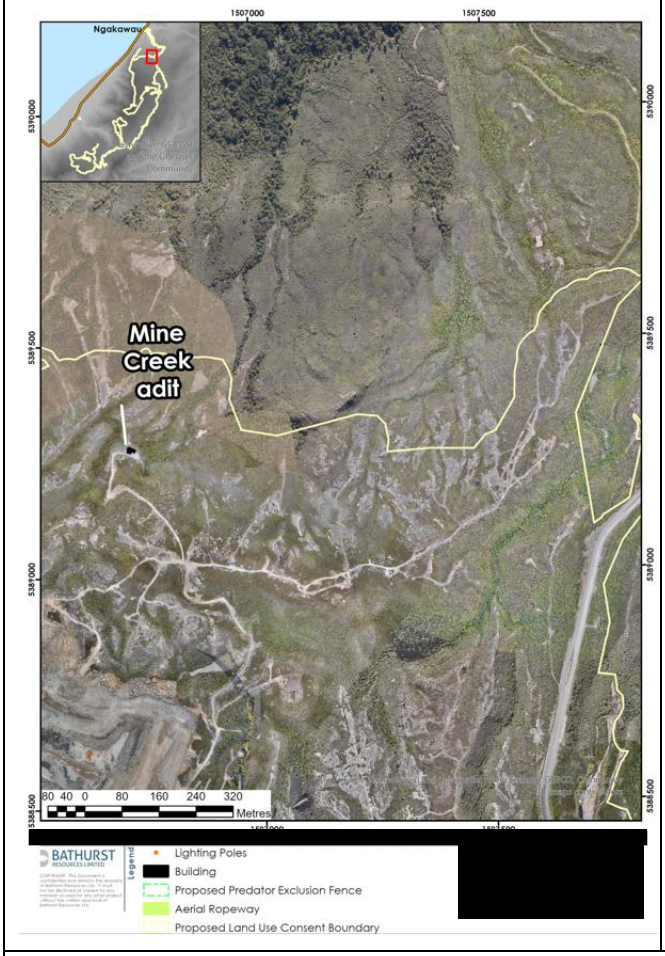
6A. CHPP & Temporary unwashed coal stockpile



6B. Campbells, Orica & Limbo Pad



6C. ERT, office, workshop & crib



[Note: There is only one light. It is tilted down and screened from view from residential areas and Millerton Road by the canopy on the left, vegetation and topography]

6D. Mine Creek Adit

6E. Main Gate

Figure 6. Stockton – permanent lighting examples

Whilst not present at the time of my visit, I understand that there could occasionally be a requirement for mobile lighting tower(s) at the north-west extremities of Stockton. As shown in the (zoomed) images in Figure 7, this location could potentially be visible from the vicinity of Granity, Ngakawau and Hector, as well as adjacent parts of SH67 and local roads.

Figure 7. Granity to Hector – viewed from the north-west edge of Stockton (day & night)

[Note: The day-time image at the top is looking towards Granity. The night-time images are a wider view also including Ngakawau & Hector]

Mobile Lighting Towers

Mobile lighting towers are used as required at night at work faces and principal mine road bends and intersections for safety. Examples of the mobile lighting equipment are shown in Figure 8.

When erected, each lighting tower is typically up to 11.5m high.

Figure 8. Mobile Lighting Tower Examples

Mobile Plant and Vehicles

Mobile plant and vehicles are equipped with headlights, safety lights and work lights. Examples of the machines are shown in Figure 9.

Figure 9. Mobile Plant and Vehicle Examples

Night-time Lighting

Examples of the lighting detailed above are shown in Figure 10, with the photographs being taken within the Site.

10A: Mobile lighting tower – rear and side view

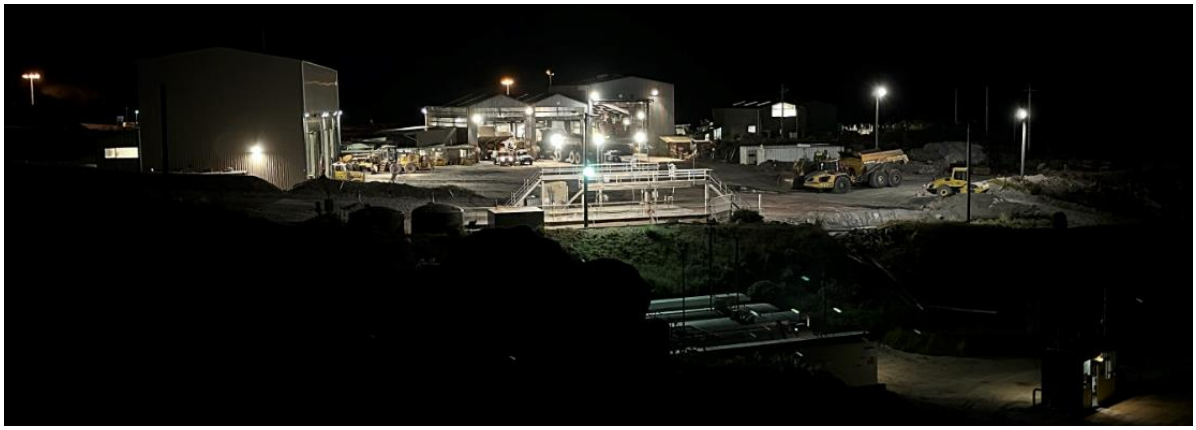
10B: Mobile lighting tower – coverage

10C: Typical extraction activities

10D: Temporary unwashed coal stockpile

10E: Coal processing plant

10F: Workshops & offices



10G: Fuel farm

10H. Water cart	**10I. Excavator**
10J. Cableway station 5 (left) & Main gate (right)	

Figure 10. Stockton – Night-time lighting examples

4.2 Ngakawau CHF

Sources of lighting at Ngakawau CHF comprise permanent lighting, mounted on buildings, structures and dedicated lighting columns. Typical examples of the lighting are shown in Figure 11.

11A. Offices-Workshops: Bulkhead lights	**11B. Carpark: Pole lights**

11C. Conveyor: Pole & Structure floodlights

11D. Road: Pole lights & CHF: Wall lights

11E. Maintenance: Linear lights

Figure 11. Ngakawau CHF – Day-time lighting examples

Night-time views are shown in Figure 12.

12A. Lab/maintenance facility on Dole St

12B. Residences opposite lab/maintenance facility

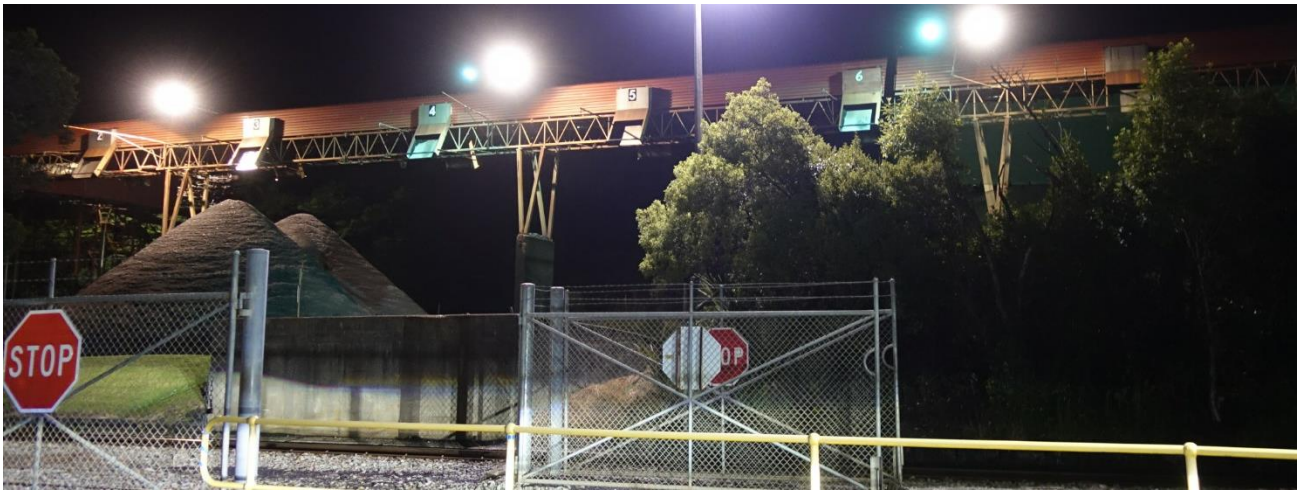
12C. Workshop (viewed from Dole St)

12D. Main Gate (Dole St)

12E. CHF (viewed from River Rd, Hector)

12F. CHF (viewed from Tyler Rd)

12G. View from west (wall lights on CHF, pole light on road, floodlights on conveyor)



12H. Conveyor & stockpiles (floodlights)

12I. Rail approach to CHF (pole lighting)

Figure 12. Ngakawau – Night-time lighting examples

The brighter lighting elements are screened from view beyond the CHF by buildings, topography and foliage.

5.0 STATUTORY REQUIREMENTS

Compliance has been assessed against both the Operative Buller District Plan (**BDP**) and the Te Tai o Poutini Plan Decisions Version (**TTPP**). As the anticipated effects from the project are consistent with the current effects which can be observed as a result of existing mining activities, this section provides an analysis of both existing compliance and anticipated future compliance.

5.1 BDP

The current lighting provisions applicable at the Sites are those presented in Section 7.9 of the BDP.

The relevant parts of section 7.9 of the BDP are shown in Table 4, with an analysis in terms of compliance.

PROVISION	**COMPLIANCE**
7.9.4. Glare and light spill	
7.9.4.1. All exterior lighting shall be designed, installed and maintained so that:	
7.9.4.1.1. Light emitted does not cause a distraction or glare which could create a traffic hazard on any road, or interfere with the correct operation of navigational aids;	1. Stockton: There is no visibility of lighting on any public road 2. Ngakawau CHF: The lighting is well controlled and in my opinion any glare effects are low and unlikely to cause distraction to motorists 3. The Sites: There are no navigational aids close to either of the Sites 4. Analysis: In my opinion, the lighting will not create any significant distraction, glare or interfere with navigational aids 5. Compliance: **Complies**
7.9.4.1.2. There is no adverse effect on residents or activities adjacent to the area being illuminated.	Since any lighting will have some effect, I understand that the intent of this clause is to ensure that there is no significant adverse effect (i.e. a more than minor effect). On that basis; 1. Stockton: There is no visibility of lighting from any residential site 2. Ngakawau CHF: Floodlights are tilted down such that the primary beam is not directly visible from any residence. Linear batten

	lights visible from residences [redacted] are of a style that would ensure compliance with glare limits recommended in AS/NZS 4282:2023 3. Analysis: In my opinion, the lighting will result in no more than minor adverse effects 4. Compliance: **Complies**
7.9.4.2. Any activity shall ensure that no greater than a 10 lux spill (horizontal or vertical) of light shall enter any adjoining property, measured 2.0 metres inside the boundary of the adjoining site.	During my site visit, I measured the light spill at the nearest boundaries of adjacent properties. These measurements are conservative as spill light reduces with distance, so the spill light at 2m within the property will be less than that measured at the boundary. 1. Stockton: There was no visible light from Stockton present at any adjacent site. Hence, light spill was zero 2. Ngakawau CHF: The maximum value measured was 1.4 lux 3. Analysis: Light spill is less than 10 lux 4. Compliance: **Complies**

Table 4. BDP Compliance

5.2 TTPP

The proposed lighting provisions applicable at the Sites are those presented in Section LIGHT R1, R4 and R6 of the TTPP. While the TTPP in now operative in part, the LIGHT chapter is under appeal.

The relevant parts of LIGHT R1, R4 and R6 of the TTPP are shown in Table 5, with an analysis in terms of compliance.

PROVISION	**COMPLIANCE**
LIGHT R1	**All Zones: General Permitted Activity Standards**
All activities must comply with the following relevant standards: 1. Lighting limits must be measured and assessed in accordance with AS/NZS 4282 Control of the Obtrusive Effects of Outdoor Lighting.	1. The lighting has been assessed in accordance with the recommendations in AS/NZS4282:2023.

2. For measurement of light levels in 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 shall be taken at the property boundary. 3. All exterior lighting shall be directed towards the area within the site that is intended to be illuminated.	2. None of the sites are within NOSZ SETZ PREC 3, nor the Outstanding Coastal Natural Character Overlay. 3. All exterior lighting is directed downwards towards where it is required **Complies**
LIGHT R4	**Artificial Outdoor Lighting in the GRUZ - General Rural Zone, RLZ - Rural Lifestyle Zone, MPZ - Māori Purpose Zone, FUZ - Future Urban Zone, BCZ - Buller Coalfield Zone and MINZ - Mineral Extraction Zone**
1. Outdoor artificial lighting must not exceed the following vertical levels measured at the boundary of the property: *i. 7.00am – 10.00pm: 5 Lux; and* *ii. 10.00pm – 7.00am: 1 Lux;*	1. Stockton: There is no measurable spill light at any adjoining property boundary or window at any time. **Complies** 2. Ngakawau CHF: The only measurable spill light is at the property boundaries opposite the CHF [redacted]. The maximum light spill measured was 1.4 lux. This is more than the 1 lux limit. **Does not comply. Assessed below under LIGHT R6 as a Restricted Discretionary Activity**
LIGHT R6	**Artificial Outdoor Lighting in any zone not meeting Permitted Activity Standards outside of the Outstanding Coastal Natural Character Overlay**
Activity Status Restricted Discretionary ***Discretion is restricted to:*** a. *The number, placement, design, height, colour, orientation and screening of light fittings and light support structures;* b. *The amount of light spill and sky glow and associated effects on views to the night sky;*	Ngakawau CHF: The existing light spill at the boundary of the residential properties on the opposite side of Dole Street exceeds the Permitted Activity limit of 1 lux under LIGHT 4, at the boundary of nos. [redacted] The maximum value measured being 1.4 lux.

c. *Effects on visual amenity;* d. *Effects on the safety of the transport network;* e. *Effects on established uses and their operation;* f. *Effects on coastal natural character;* g. *Effects on indigenous biodiversity, including mahinga kai species;* h. *Any positive effects generated from the use of artificial lighting;* i. *The functional or operational need of the activity; and* j. *Other measures as identified in any Light Management Plan.*	The setback of each residence from the boundary will ensure that the spill light at the windows of the residences will not exceed 1 lux. LIGHT R1 requires that "Lighting limits must be measured and assessed in accordance with AS/NZS 4282 Control of the Obtrusive Effects of Outdoor Lighting." AS/NZS4282:2023 recommends a limit of 1 lux in this situation at the windows rather than the boundary. Hence, the lighting complies with this recommendation. LIGHT R3 sets a boundary limit of 2 lux for a development in the Settlement Zone (SETZ), so there is an inconsistency in this situation. i.e. If the Ngakawau CHF were located in the SETZ, then the lighting across the road would comply as a Permitted Activity. Considering the Discretionary Criteria: a) The lighting is located under the eaves of the building and generally aimed downwards b) The lighting is minimal – approximately 3 fixtures mounted on the building as low as feasible for their purpose c) Effects are only local to the immediate area and consistent with their purpose for security and safety lighting of the area immediate to the building d) The lighting fixtures are setback from the road and not excessively bright. They do not present a significant hazard to the transport network e) – h) Not applicable in this instance i) The lighting is required for security and safe operation j) Not applicable in this instance In conclusion, it is my view that the existing lighting at the Ngakawau CHF is the minimum

	required for safe operation and effects to the [redacted] are no more than low.

Table 5. TTPP Compliance

5.3 Compliance

In summary, the current lighting is compliant with the Permitted Activity requirements in both the Operative Buller District Plan and the Te Tai o Poutini Plan Decisions Version, with one minor exception as described above. In my opinion, for the reasons given above, the effect of the exception is no more than low.

5.4 AS/NZS 4282:2023

Neither the BDP nor the TTPP appear to require compliance with the recommended obtrusive light limits in AS/NZS 4282:2023 (Control of the obtrusive effects of outdoor lighting) (**AS/NZS 4282**). However, the standard is mentioned. Hence, for completeness, I have also assessed compliance in relation to AS/NZS 4282;

1. Table 3.1 - Environment Zone: As noted earlier in Table 2, the lighting categories applicable range from A2 to A4. A2 ("low district brightness") is the most stringent of these and for simplicity has conservatively been used for this assessment.
2. Table 3.2 – Light technical parameters:
    a. Light spill: Not relevant as addressed above under TTPP LIGHT R4
    b. Threshold increment (TI) (i.e. glare to motorists): Recommended ≤20%. This can only be calculated as it is not measurable. However, from my experience I am of the opinion that TI on any public road will be approximately 0%. In this regard, I note that I have undertaken a considerable number of such calculations to date and I am both a Highway Lighting Advisor to NZTA and a Roadway Lighting Advisor to Auckland Transport.
    c. Upward Light Ratio: Recommended ≤1%. This limit applies in aggregate to all lighting in an installation. I observed that the majority of lighting is tilted down with little upward tilt. In my opinion, the lighting will comply with this requirement.
3. Table 3.3 – Maximum luminous intensity: Recommended ≤1,000 candelas (cd) during curfew hours (i.e. the most stringent). This can only be calculated as it is not measurable. However, from my observations and experience, the lighting visible from any residential location will readily satisfy this requirement.
4. Table 3.4 – Maximum luminance of surfaces: Not applicable (This relates to lighting of signs and highlighting building facades, none of which is relevant in this instance.

Hence, while compliance with the recommended obtrusive light limits in AS/NZS 4282 does not appear to be required by either the BDP or the TTPP, in my opinion they would be satisfied.

6.0 ENVIRONMENTAL EFFECTS

I have considered the potential effects of the lighting required (ie continuation of activities at the Sites) as part of the Project (Section 2.1) with respect to potential sensitive receivers (**Observers**).

Observers could include:

- Occupants of residential dwellings with direct visibility of the Sites (**Residents**)
- Motorists on public roads (**Motorists**)
- Nocturnal biota (**Biota**)

This section of my report addresses the potential effects of lighting on Observers, including:

- relevant site observations;
- categories of potential effects; and
- an assessment of the effects.

The Quality Planning website proposes a scale[1] as below for the determination of adverse effects. I have added an abbreviated expression in square brackets to simplify the reference to each category for brevity;

- **Nil Effects [Nil]**
  No effects at all.
- **Less than Minor Adverse Effects [Less than minor]**
  Adverse effects that are discernible day-to-day effects, but too small to adversely affect other persons.
- **Minor Adverse Effects [Minor]**
  Adverse effects that are noticeable but will not cause any significant adverse impacts.
- **More than Minor Adverse Effects [More than minor]**
  Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.
- **Significant Adverse Effects that could be remedied or mitigated [Significant]**
  An effect that is noticeable and will have a serious adverse impact on the environment but could potentially be mitigated or remedied.
- **Unacceptable Adverse Effects [Unacceptable]**
  Extensive adverse effects that cannot be avoided, remedied or mitigated.

Working within the context of the above definitions, I have correlated these planning terms with my view of technical effects, to provide a technical effect rating as shown in Table 6.

[1] Quality Planning – Determining the extent of adverse effects (https://www.qualityplanning.org.nz/node/837)

EFFECT RATING	PLANNING DETERMINATION
Very high	Significant
High	Significant
Moderate-high	More than minor
Moderate	More than minor
Low-moderate	Minor
Low	Less than minor
Negligible-very low	Less than minor

Table 6. Technical vs planning effects terminology

Operations occur 24/7. Operational fixed lighting on buildings and static lighting columns remains on all night to ensure safe use, orientation, early recognition of obstructions, hazards and people and for safe movement of staff.

Sensor lighting has been considered but is not viewed as a suitable approach for these reasons. The fixed lighting duration changes throughout the year as the length of night varies – approximately 15 hours in mid-winter to 9 hours in mid-summer.

Vehicles and mobile plant with associated navigation, work and safety lighting operate throughout the night, moving through the site as required to suit the nature of their activities. Mobile lighting towers operate throughout the night – typically at current excavation locations and at significant bends/intersections of roads within the site.

6.1 Site Visit Observations

Given that the anticipated effects arising from the Project are consistent with those currently occurring at the Sites, site visits provide a useful means of assessing potential effects resulting from the Project.

I undertook day and night site visits to view the proposed Work Sites and the surrounding receiving environment on 21/01/2025.

I undertook a day time visit, commencing at Westport, driving SH67 to Ngakawau CHF and surrounds, then to Stockton and Millerton.

After sunset, I repeated the visit – first at Stockton, then Millerton, Ngakawau, Hector, then back along SH67 to Westport.

In particular, for the existing lighting at the Sites, I observed;

- Stockton:
    - I was not able to see any lighting at Stockton from residential locations
    - The only lighting visible from any public road was at Cable Station 5 and the Main Gate – both from nearby on Millerton Road. The lighting was not of concern with respect to glare or distraction
- Ngakawau CHF:
    - Lighting at Ngakawau CHF is visible from some parts of Ngakawau and Hector, although mostly well screened by vegetation and buildings from the majority of locations within the townships
    - The only measurable light spill was at the residences [redacted] opposite the CHF. The light spill was well within the limits prescribed by the BDP. Glare was well controlled by the nature of lights and downward tilt in the case of floodlights
- General:
    - I was not able to see the lighting from either of the sites from any location south of Ngakawau
    - When looking from darker locations near Westport, a very faint skyglow was evident above Stockton

6.2 Residents

While not all types of obtrusive light effects will necessarily affect Residents, the following potential effects have been considered;

1. ***Sky glow***: Light scattered in the atmosphere reducing visibility of the night sky;
2. ***Light spill***: Direct light trespass, as measured in lux, typically at the window of a dwelling;
3. ***Glare***: Brightness of a light source when viewed in contrast to the immediate surrounds;
4. ***Amenity***: Views of the night sky; and
5. ***Health:*** Sleep disturbance & seizures.

Light spill is a governed by the requirements of the BDP. Glare and sky glow are recommended by a standard (AS/NZS 4282:2023). Amenity and health effects are good practice elements assessed by expert opinion.

Sky Glow

Sky glow is typically noticed as the glow visible above an artificial lighting installation at night when viewed from a distance, as a result of direct and reflected upward light from artificial lighting, striking particles in the atmosphere and scattering the light.

The sky glow from the Sites lighting is negligible.

Hence, sky glow effects on Residents is negligible, or less than minor.

Light Spill

The nominal illuminance (spill light) at the window of a dwelling from a point source can be calculated by the formula;

$E = I/d^2$ (E=Illuminance, I=Luminous Intensity, d=distance)

In other words, spill light reduces geometrically with distance from the light source.

As mentioned previously, the only measurable light spill from the Sites at residential locations occurs in [redacted]. The maximum spill light measured was 1.4 lux, which is well within the BDP limit of 10 lux. Light spill is low at those locations and negligible elsewhere.

Hence, light spill effects to Residents will be negligible to low, or less than minor.

Glare

Glare (luminous intensity) will vary with viewing angle but not distance.

As viewed during my site visit, effects were negligible to low.

However, if mobile lighting towers were to be placed at the north west extremities of Stockton, the potential could exist for glare effects to residential locations between Granity and Hector.

Provided my proposed conditions are adopted, any such lighting would be directed away from residents.

Also, while it is true that the numerical value of luminous intensity does not vary with distance, the actual effect of the apparent brightness does lessen as distance increases, since the light source occupies a progressively smaller part of the view.

A comparison could be made with our Sun. It is a star, with a similar size and order of brightness as many others we see in the night sky. However, our Sun is much closer than the other stars and thereby too bright to look at directly. Whereas other more distant stars are comfortable to view.

In my opinion, glare effects to Residents will be negligible to low, or less than minor.

Amenity

When considering enjoyment of views of the night sky, the existing lighting environment is typically the limiting factor.

In this instance, the Sites are existing as is the associated lighting and it is well controlled.

As mentioned above, the only potential exception could be for mobile lighting at the north west extremities of Stockton. However, provided my proposed conditions are adopted, any such lighting would present a negligible to very low incursion to night time views and then only potentially to residents between Granity and Hector.

In my opinion, amenity effects to Residents will be negligible to very low, or less than minor.

Health

Excess light at night can negatively affect sleep. However, there is minimal lighting visible from residential locations as described above, no persistent flashing lights and the lighting complies with the BDP light spill provisions.

In my opinion, the effects on health to Residents will be negligible, or less than minor.

Summary of effects of Residents

In my opinion, lighting effects to residential locations will be negligible to low, or less than minor, provided the conditions I propose are adopted.

6.3 Motorists

While not all types of obtrusive light effects will necessarily affect Motorists, the following potential effects have been considered;

1. ***Glare***: The relative brightness of a light source in the driver's field of view and the potential of this to affect vision; and

2. ***Distraction***: The potential for a flashing light to distract the driver's attention.

Glare

An analysis of glare effects to motorists is similar to that for Residents. The effect will lessen with distance due to the reduction in the size of the light source size in the motorist's view.

Provided the conditions I propose are adopted, lighting effects to nearby public road users will be satisfactorily mitigated.

Glare to motorists is evaluated by the term Threshold Increment (**TI**). AS/NZS 4282:2023 recommends a maximum TI of 20%. TI is primarily related to the visibility of the main beam of each luminaire, but in this instance, the luminaires are aimed down and/or away from the road. Hence, the TI will be approximately 0%.

In my opinion, glare effects to Motorists will be negligible, or less than minor.

Distraction

Flashing lights can be distracting to a motorist. This would be particularly so in an otherwise dark environment.

Mobile plant and equipment at Stockton do use flashing safety warning lights, but they are concealed from view from public roads by topography.

No such lights were observed during the site visit at Ngakawau CHF. Such lighting may possibly be present on mobile plant and vehicles operating with in the Ngakawau CHF site on occasions, but if present I expect that they would occur infrequently and be no more obtrusive than typical road maintenance vehicle warning lights.

Hence, in my opinion, distraction effects to Motorists will be negligible, or less than minor.

Summary of effects on motorists

In my opinion, effects to motorists will be negligible, or less than minor.

[redacted]

I have considered the above with respect to lighting effects and agree with that view.

6.5 Overall Summary of effects

In my opinion, effects from the lighting will be negligible to low, or less than minor.

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[2] Ecological Solutions Limited. 2025a. Buller Plateaux Continuation Project - Terrestrial Ecological Impact Assessment Report. Unpublished report prepared for Bathurst Resources Limited. November 2025. Ecological Solutions Limited, Kāeo. 101pp plus appendices.

7.0 PROPOSED CONDITIONS

In order to satisfactorily manage lighting effects from the BPCP, I recommend the following condition be included if consent is granted;

LIGHTING

1. *Mobile lighting towers: Where a lighting tower is visible from any residential property or public road beyond the Buller Coal Plateau, it shall not be aimed toward any public road or residence. The height shall not exceed 12m.*

8.0 CONCLUSION

Overall, provided the conditions I propose are implemented, it is my opinion that lighting effects will remain no more than low, or less than minor.