

TIMARU



DISTRICT COUNCIL
Te Kaunihera ā-Rohe
o Te Tihi o Maru



YOUR PLAN OUR FUTURE
TIMARU DISTRICT PLAN REVIEW

Light S.32

May 2022



YOUR PLAN OUR FUTURE
TIMARU DISTRICT PLAN REVIEW
LAND USE PLAN

TIMARU DISTRICT COUNCIL
Section 32 Report
Light Chapter

May 2022

Contents.....	1
1 Light	4
1.1 Introduction	4
1.2 Community / Stakeholder / Iwi Engagement.....	4
1.3 Strategic Directions.....	5
1.4 Problem definition	7
1.5 Statutory and Planning Context.....	16
2. Approach to Evaluation	20
2.1 Scale and significance.....	20
2.2 Approach to managing light and changes proposed	21
2.3 Choice of Evaluation Method	22
3. Evaluation of Objectives	22
3.1 Proposed objectives.....	23
3.2 Evaluation of proposed objectives	23
4. Identification of Options	24
5. Evaluation of Options	25
5.1 Evaluation table	25
5.2 Risk of Acting or Not Acting	28
6. Preferred Option	28

1 Light

1.1 Introduction

Lighting is essential in our modern lives and is used in homes, to light up streets, car parks, advertisements, sports facilities, office buildings, rural productive activities and public areas. Lighting allows for longer work hours, recreation and social activities to occur. Lighting is also an important form of safety and protection at night. But, when artificial outdoor lighting creates problems, it is known as light pollution, which is a form of environmental pollution.

Light pollution comes in three main forms, being light trespass¹, glare and over illumination. Light trespass occurs when unwanted artificial light from, for instance, a floodlight or streetlight spills onto an adjacent property, lighting an area that would otherwise be dark.

Glare is created by light that shines brighter than general brightness in the environment. Glare can cause discomfort and reduce visibility of an object. The District Plan addresses direct glare, which results from bright luminaire in the field of vision. Reflected glare, arising from a reflection from a glossy or bright surface, is not addressed in the District Plan.

Over illumination refers to the use of artificial light well beyond what is required for a specific activity, such as keeping the lights on all night in a sports ground.

Light pollution can have environmental consequences for humans, wildlife, and climate². The effects of light pollution can be divided into the following broad categories: ecology, health, safety, amenity and the night sky. It can be a particular issue at zone interfaces, particularly between light sensitive areas and those which are typically brighter.

This report on lighting and glare focuses on the importance of lighting for the functioning of people's everyday activities while protecting amenity values by managing its effects.

1.2 Community / Stakeholder / Iwi Engagement

Feedback on the Draft District Plan was open between 7 October to 31 December 2020. We received a large number of feedback through open days, meetings, letters, email and the online platform.

Of this feedback only nine related to the contents of the Light Chapter. In summary the feedback on the Draft District Plan was:

We are continuing to work through the feedback and our informal consultation before we move into the formal consultation stage - the release of the Proposed District Plan. .

- There were concerns raised that given the presence of a Site of Significance to Māori, a light sensitive area has been identified that affects Waimataitai (Pacific Street) which could impact on the operation of industrial uses including Fresh Pork;
- Support for the provisions which recognise the need and benefits of artificial lighting which include safety and economic impacts;
- A request that rural production needs to be recognised as requiring night time working and the impacts of that;
- A change to LIGHT-P2 is required to remove the unclear reference to 'conflict'. Adverse effects is preferred;
- Waka Kotahi supports the recognition that the transport network is protected from conflicts with artificial lighting;

¹ All literature examined now refers to 'light trespass' as opposed to the previous term 'light spill'.

² <https://www.darksky.org/light-pollution>

- Significant concerns were raised in relation to the light chapter in relation to the operation of Prime Port in Timaru. The draft provisions were seen to impact on the safe and efficient operation of the Port.

There have been informal discussions regarding the creation of a Dark Sky Reserve in Geraldine. Council will replace streetlights at Peel Forest with 3000k LED lights to align with the International Dark Sky Association requirements for a Dark Skies Area. This will not be possible for Geraldine or District-wide, as Council has already obtained replacement 4000k LED lights for street lighting and other lighting owned/managed by Council. However, the examination of lighting through this report will facilitate the identification of areas that can and/or should be protected from obtrusive lighting through the District Plan.

1.3 Strategic Directions

The Strategic Directions Chapter sets out the overarching directions for the sustainable management of growth, land use and development of the Timaru District. The following strategic directions objectives are relevant to this chapter:

SD-O1 Residential Areas and Activities

- i. There is sufficient residential development capacity in existing and proposed urban areas to meet demand and household choice, provided through:
 - a. the use of existing zoned greenfield areas;
 - b. a range of densities in existing urban areas; and
 - c. higher residential densities in close proximity to the Timaru and Geraldine town centres, and Highfield Village Mall.
 - d. the new General Residential Zoned areas.
- ii. limited rural residential development opportunities are provided where they concentrate and are attached to existing urban areas, achieve a coordinated pattern of development and are capable of efficiently connecting to reticulated sewer and water infrastructure; and
- iii. limited residential opportunities are maintained in existing rural settlements, subject to adequate servicing.

Commentary

This objective seeks to achieve consolidated urban growth, while maintaining a good quality environment for all users. With consolidation comes increased density and potential for zone interface issues. The provision of outdoor lighting in conjunction with certain activities and areas will need to be considered to ensure these objectives are achieved. The provision of outdoor lighting to minimise effects on sensitive users is entwined with these objectives.

SD-O2 The Natural and Historic Environment

The District's natural and historic environment is managed so that:

- i. the health and wellbeing of the community are recognised as being linked to the natural environment;
- ii. an integrated management approach is adopted that recognises that all parts of the environment are interdependent;
- iii. the natural character of the coastal environment, wetlands and waterbodies is preserved and protected from inappropriate subdivision, use, and development;
- iv. important landscapes and features are protected from inappropriate subdivision, use, and development;
- v. significant indigenous vegetation and significant habitats of indigenous fauna are identified and their values recognised, protected and where appropriate, enhanced;
- vi. the life-supporting capacity of ecosystems and resources is safeguarded for future generations

Commentary

There is a need to ensure the provision of outdoor lighting protects the natural and built environment of the District. Improvements to the policy framework to lighting will assist in achieving these ends.

SD-O7 Centres

The District's city and town centres:

- i. are maintained and enhanced as vibrant, attractive community focal points, providing a high level of amenity and opportunities for social interaction;
- ii. are the primary focus for retail, office and other commercial activity;
- iii. provide for the highest density of business, residential and visitor accommodation, and for intensification opportunities.

Commentary

The effective lighting of public areas, focal points and buildings of significance can help realise this objective to a certain extent.

SD-O8 Infrastructure

Across the district

- i. improved accessibility and multimodal connectivity is provided through a safe and efficient transportation network that is able to adapt to technological changes;
- ii. the provision of new network infrastructure is integrated and co-ordinated with the nature, timing and sequencing of new development;
- iii. drinking water supplies are protected from the adverse effects of subdivision, use and development;
- iv. the benefits of regionally significant infrastructure and lifeline utilities are recognised and their safe, efficient and effective establishment, operation, maintenance, renewal and upgrading and development is enabled while managing adverse effects appropriately

Commentary

New and replacement public lighting can be provided for to ensure these objectives are achieved in a timely and systematic manner.

SD-O9 Rural Areas

A range of primarily productive activities are enabled in the rural environment to enable the ongoing use of land for primary production for present and future generations, while:

- i. protecting versatile soils for productive uses;
- ii. managing the adverse effects of intensive activities on sensitive activities;
- iii. managing the adverse effects of new sensitive activities on primary production;
- iv. avoiding activities that have no functional/operational need to locate in the rural area;
- v. identifying and maintaining the character, qualities and amenity values of rural areas;
- vi. ensuring Future Development Area overlay remains available for future urban or rural lifestyle development.

Commentary

The lighting associated with certain activities and buildings can influence whether these objectives are achieved. Consideration therefore needs to be given to the location of activities that require outdoor lighting and/or are sensitive to lighting associated with everyday rural activities. Reverse sensitivity effects from lighting also need to be considered.

SD-O10 Community and Open Space

A range of recreational, social and community facilities and open spaces that meet the long-term needs of the community are enabled, including:

- i. the provision of public access to and along the coastal marine area and margins of identified rivers; and
- ii. the provision of a network of facilities and open spaces to support densification and new growth areas, including co-location.

Commentary

There is a need to ensure community and open space activities that require outdoor lighting are sympathetic to the surrounding environment and land uses.

1.4 Problem definition

1.4.1 The efficiency and effectiveness of the Operative District Plan

The Operative District Plan has five zones listed in Parts D (1) to D (5) as Rural, Residential, Commercial, Industrial and Recreation Zones respectively. Each zone addresses the effects of light and glare. Additionally, there are general rules, some of which mention lighting.

The two main categories where lighting is mentioned is in relation to adverse effects on people and landscape, with no provisions specifically relating to ecology, health or the night sky.

Artificial lights can disrupt ecosystems as nocturnal animals sleep during the day and are active at night. Light pollution alters their night-time environment by turning night into day. Glare from artificial lights can also impact wetland habitats that are home to amphibians such as frogs and toads. Artificial lights disrupt nocturnal activity, interfering with reproduction and reducing populations³.

In relation to human health, exposure to light in late evening, at night or early morning disrupts the circadian rhythm and the production of melatonin, and hence has an effect on sleep, mood and cognition. Exposure to blue light at night is particularly harmful. Unfortunately, most LEDs used for outdoor lighting create blue light.

The following is a summary of the objectives, policies, rules and performance standards that relate to lighting.

Rural Zones

Rural	Performance Standards	Policy
Rural 1 (general)	No lighting exceeding 20 lux measured in the horizontal or vertical planes <u>shall fall on adjoining properties</u> .	There is no general amenity policy relating to lighting in the Rural 1, 2 or 3 Zone.
Rural 2 (high quality land)		
Rural 3 (coastal)	All exterior lighting shall be directed away from roads to avoid the incidence of light overspill which may affect the <u>safety of motorists</u> .	
Rural 4A Zone (Geraldine Downs)	Except street lighting, no lighting exceeding 5 lux measured in the horizontal or vertical plane <u>shall fall on adjoining properties</u> . All outdoor lighting (including street lighting) shall be shielded from above in such a manner that the edge of the shield shall be below the whole of the light source. All fixed exterior lighting shall be directed away from <u>adjacent roads and properties</u> .	Policy (2.4) requires exterior lighting to be managed so that it does not have a significant adverse effect on the landscape character and amenity values, as it is recognised that exterior lighting can have significant adverse effects on landscape character and amenity values. This will be implemented through performance standards setting minimum standards for exterior lighting.
Rural 4B (Blandswood)	No lighting exceeding 20 lux measured in the horizontal or vertical plane shall fall on <u>adjoining properties</u> .	
Rural 5 Zone (hill & high)	No spill light from a permanently fixed artificial light source shall exceed 1 lux , measured in the vertical plane <u>at the windows of household units on any other site</u> between the hours 10.00pm and 7.00am, and 10 lux at all other times.	

³ Source: International Dark Sky Association.

Rural Residential (Brookfield Road) Zone	No objectives or policies, but Method (1) requires compliance with the performance standards and rules for lighting. However, there are no rules or performance standards listed.
---	---

Summary

The performance standards in each of the rural zones 1-5 set a maximum lux measured in the horizontal or vertical plane ranging from 1 to 20 lux falling on property. Rural Zones 1-4 limit this lighting to falling on adjoining properties, whereas Rural Zone 5 specifies at the ‘...*windows of household units...*’. Rural Residential Brookfield Road Zone contains no form of control.

Rural Zones 1-4A mention the need to direct outdoor light overspill away from roads. Rural Zones 4B, 5 and Brookfield are all silent on the potential effect to motorists.

The Rural 4 Zone links the performance standards to a policy thus explaining the ‘why’. The Rural 5 Zone mentions no control regarding landscape or wildlife even though most of the land in this zone is recognised as being Outstanding Landscape Areas and/or Amenity Landscape Areas.

Residential Zones

Residential	Performance Standards	Issues, Objectives, Policies & Methods
Residential 1 (suburban)	Exterior lighting directed <u>away from neighbouring sites and roads</u> .	Methods list that performance standards or rules for lighting require compliance. It is recognised (Issue 3) that light spill from commercial, industrial, and sporting facilities can also have an adverse effect on residential activities. Issue 4 recognises residential activities such as street lighting produces adverse environmental effects.
Residential 2 (high density)	<u>Other than street lighting</u> , no spill light from a permanently fixed artificial light source shall exceed 10 lux , measured in the vertical plane, at the <u>boundary of any other residential zoned sites</u> between the hours of 10.00pm and 7.00am and 20 lux at all other times.	
Residential 3 (township)		
Residential 4 (low density)		
Residential 5 (future residential)		
Residential 6 (medium density at Gleniti)		

Summary

The same lighting standard applies to all the residential zones, which relate to limiting effects on neighbouring sites and roads.

Commercial Zones

Commercial	Performance Standards	Issues, Objectives, Policies & Methods
Commercial 1A, 1B & 1C (inner urban); Commercial 1 (Temuka; Geraldine & Pleasant Point)	All exterior lighting on commercially zoned sites shall be directed <u>away from residentially zoned land and from the carriageway of any roads</u> .	To allow for more permissive light levels in commercial areas than provided for in Residential Zones of the District.

Commercial 2 (suburban)	Other than street lighting, no spill light from a permanently fixed artificial light source shall exceed 10 lux , measured in the vertical plane <u>at the boundaries of any other sites in Residential Zones</u> , between the hours 10.00pm and 7.00am and 20 lux at all other times.	Acknowledges that commercial activities in commercial areas generate effects from light. Residential activities locating in Commercial Zones must anticipate higher spill light levels characteristic of Commercial Zones.
Commercial 2A Large Format Store (retail park)		
Commercial 3 (neighbourhood)		

Summary

The same lighting standard applies to all the commercial zones, relating to effects on residentially zoned land and road carriageways.

Industrial Zones

Industrial	Performance Standards	Issues, Objectives, Policies & Methods
Industrial L Industrial H	<p>All exterior lighting to be directed <u>away from residentially zoned land, [sic] from dwellings on allotments in the Rural 2 Zone adjoining Lot 3 DP 58403 and from roads.</u></p> <p>Other than street lighting, no spill light from a permanently fixed artificial light source shall exceed 10 lux, measured in the vertical plane <u>at the windows of household units in Residential Zones</u> between the hours 10.00pm and 7.00am, and 20 lux at all other times; and 1 lux measured in the vertical plane <u>at the windows of household units on any other sites in Rural Zones</u>, between the hours 10.00pm and 7.00am, and 10 lux at all other times.</p>	<p>To allow for more permissive levels in industrial areas than provided for elsewhere in the District while acknowledging that some restriction on light levels is required when sensitive uses, e.g., residential or natural areas, or the Rural 2 Zone adjoining Lot 3 DP 58403, share a boundary with an industrial area.</p> <p>Recognises that many industrial activities generate high light levels but that it is possible to provide for many of these activities in less sensitive locations.</p>

Summary

The same lighting standard applies to both industrial zones, relating to residentially zoned land, road carriageways and rural areas.

Recreation Zones

Recreation	Performance Standards	Issues, Objectives, Policies & Methods
Recreation 1 (holiday residential)	Other than street lighting, no spill light from a permanently	Acknowledges that lighting of sports grounds can have adverse

	<p>fixed artificial light source shall exceed:</p> <p>10 lux measured in the vertical plane at the boundaries of <u>any other sites in Residential Zones</u> between the hours 10.00pm and 7.00am, and 20 lux at all other times.</p> <p>1 lux measured in the vertical plane <u>at the windows of household units on any other sites in Rural Zones</u> between the hours 10.00pm and 7.00am, and 10 lux at all other times.</p>	<p>effects arising from glare and the extension of the hours of use of the facility. The nature of the activity in relation to the character of the neighbourhood and the frequency of use can have a considerable effect on the amenity values of neighbouring activities within and outside of the Zone. This is particularly relevant to the Falvey Road motor racing circuit.</p>
Recreation 2 (urban)	<p>Lighting for security, display or practice purposes is permitted, other outdoor lighting discretionary.</p> <p>Same performance standards as Rec 1 & 3 Zones.</p>	
Recreation 3 (rural)	<p>Same performance standards as Rec 1 & 2 Zones.</p>	

Summary

The same lighting standards apply to all three recreation zones, relating to effects on residential zones and household units in the residential zones.

General Rules

	Rules & Performance Standards
Subdivision	Any subdivision in the Residential 6 Zone, should be designed to be consistent with the urban design guidelines set out in Part B 11c, Issue 5, Policy 1, in relation to street lighting and associated services and facilities.
Roading	Any subdivision that creates a new road or that extends the requirement for street lighting shall be required to design and construct a street lighting layout in accordance with NZS 6701:1983 Code of Practice for Road Lighting, except for any subdivision in the Rural Residential (Brookfield Road) Zone where street lighting shall be limited to lights at the intersection of Brookfield Road and bollard lighting within the Zone for the purpose of pedestrian guidance only.
Public Works	Lighting authorised within the boundary of the airport designation is permitted.
Signs	No sign to be erected on or adjacent to a road that will use intermittent or revolving lights if visible from a Residential Zone or erected on or adjacent to a state highway.

Summary

The general rules relating to lighting are directed at specific effects, such as the operation of the airport. No zone or General Rule explains what 'lux' is and how it should be assessed and/or monitored.

1.4.2 Issues identified

Based on an analysis of the preceding rules and standards, the following issues with the operative Plan have been identified:

Issue 1: Rural Zones

It is recognised there are varying degrees of rural amenity existing and expected in the different rural zones. This can be addressed by using the same terminology in each zone.

In the Rural 3 Coastal Zone and Industrial Zones there is no mention of the effect of lighting associated with Port or industrial activities. As Port and industrial activities need to co-exist with coastal activities, this is a potential area that can be addressed in the review while recognising the importance of maintaining the health and safety of Port activities and its economic significance.

The rural residential zone at Brookfield was created through Plan Change 20 in 2015, at which time efforts were made to ensure the lighting of the area was limited through subdivision rules. However, lighting standards were not specifically addressed in the zone rules. With the potential creation of other rural residential areas through the Proposed District Plan process, the environmental outcomes relating to amenity and character effects of lighting rural residential areas could potentially be identified.

Issue 2: Residential Zones

The Residential Zones have a maximum standard of 10 lux spill, while in the Rural Zones it is 20 lux. Although amenity values need to be maintained in the residential zones, this disparity is surprising given that rural zones are generally expected to be darker places than urban environments. This creates a lack of consistency and rationale for the actual outcomes sought.

Issue 3: Commercial Zones

The terminology needs to be consistent between all zones. For example, the Commercial 2A Zone refers solely to 'glare' as opposed to 'obtrusive light' being referenced in the other commercial zones.

Residential activities in commercial zones do not have the same protection as in other zones. For instance, there is no requirement to direct lighting away from first/second floor windows, where residential apartments would generally be in commercial zones. This may need to be considered in terms of ensuring mixed use development is encouraged and attractive in the town centres.

Issue 4: Industrial Zones

There is an anomaly in requiring the light spill from industrial zones to be more restrictive on the rural zones than the rural zones are required to be on other adjacent zones.

Issue 5: Recreation Zones

The objective and policy relating to lighting acknowledges effects of recreational lighting on adjoining land uses. However, all lighting for security, display or practice purposes is permitted, meaning anything goes. This creates inconsistency and provides no relief to adjoining activities or occupants on the adverse effects of lighting and glare. The collective effect of light spill from recreational activities and sportsgrounds should be addressed.

Issue 6: General Rules

- The Plan has no requirement for lighting to be consistent with National Guidelines for Crime Prevention through Environmental Design (CPTED). There should be more specific details of what lighting is to achieve and how its effects can be mitigated.
- When roads and walk/cycleways are being constructed there is a requirement to provide street lighting, but there is no guidance of what this street lighting should achieve. Only through subdivision is there a requirement to provide a '*...street lighting layout in accordance with NZS 6701:1983 Code of Practice for Road Lighting*'. This code of practice has been superseded by subsequent standards. This standard is an engineering standard and does not relate to resource management outcomes.
- Every zone and general rule are silent on lighting and glare in relation to the adverse effects on ecology, health and the night sky. This topic does not extend to include detailed assessment of these matters but a general acknowledgement that known effects should be mentioned. These matters can now be addressed.
- There is no explanation of what 'lux' is and how it should be assessed and/or monitored.
- The rules do not consider the existing quality of the night sky and the desirability of protecting intrinsically dark areas from light pollution.

Summary of Issues

- There is inconsistent terminology between different zones
- There is no definition of 'lux' or how it should be measured
- No regard for the effects of lighting on coastal ecosystems
- Disconnect between objectives, policies and rules
- Inconsistency with lux spill in different zones and on adjoining activities
- The effects of glare and light trespass are not addressed
- Commercial zone and mixed-use interfaces not addressed
- Light spill from recreational activities inconsistent
- Inconsistent with the CPTED guidelines
- Every zone and general rule are silent on lighting and glare in relation to the adverse effects on ecology, health and the night sky.

1.4.3 Best practice / other council approaches

A review of the below second-generation Plan's has been undertaken to evaluate best practice. These are documented as follows:

Plan	Local Authority	Description of Approach
Operative Christchurch District Plan, 2017	Christchurch City Council	<p>Outdoor lighting is managed under the General Rules and Procedures Chapter, Sub-chapter 6.3 Outdoor lighting.</p> <p>The approach is quite generic with the aim of, '<i>...managing the potential adverse effects of light spill and glare</i>'.</p> <p>There is one objective and policy describing the issue and intent of the chapter; followed by separate rules relating to glare and light spill.</p>

		<p>The standards relate to horizontal or vertical lux spill, and the permitted levels in each zone. Where the light from an activity spills onto another site in a zone with a more restrictive standard, the more restrictive standard shall apply to any light spill received at that site.</p> <p>Link: https://districtplan.ccc.govt.nz/pages/plan/book.aspx?exhibit=DistrictPlan</p>
Operative Hurunui District Plan, 2018	Hurunui District Council	<p>This plan addresses light emissions through rules in each of the Zones and Chapters. There are no Strategic Directions provided for in this Plan and therefore no links.</p> <p>Link: https://dp.hurunui.govt.nz/eplan/</p>
Proposed Queenstown District Plan, legal effect since March 2019	Queenstown Lakes District Council	<p>The strategy for Urban Development and Rural Zones ensures lighting standards avoid unnecessary adverse effects on views of the night sky. This permeates through to each of the zones and relevant district wide matters. However, there is no discrete chapter dedicated to lighting.</p> <p>This Plan is the only one to give direction on the provision of low-level lighting and its downward direction, in particular in relation to considering the effects on the views of the night sky.</p> <p>Link: https://www.qldc.govt.nz/planning/district-plan/district-plan-review-proposed-district-plan/proposed-district-plan-decisions-version/</p>
Proposed Selwyn District Plan notified October 2020	Selwyn District Council	<p>This PDP has been prepared under the National Planning Standard format, so has a standalone chapter on Light. It contains one objective that recognises the benefits of artificial lighting such as work, recreation and entertainment, but in the context of needing to protect the District's natural darkness and natural environment, and while maintaining the health, safety and amenity of people.</p> <p>The three policies focus on:</p> <ul style="list-style-type: none"> - managing light spill on to adjoining or other properties; - enabling temporary lighting associated with temporary activities, health and safety or emergency purposes; - minimising night glow from upward lighting. <p>There are rules controlling light spill, glare and night glow, with the rules and associated requirements for light spill being more stringent in the General Rural Zone. There are rules for certain artificial lighting not to be on between 10pm and 6am. There are also rules regarding the impact of lighting on the transport network.</p> <p>Link: https://eplan.selwyn.govt.nz/review/#Rules/0/284/1/0/0</p>
Proposed New Plymouth District Plan, notified 2019	New Plymouth District Plan	<p>This PDP has been prepared under the National Planning Standard format, so has a standalone chapter on Light.</p>

<p>(hearing on Light held in August 2021 but no decision available at the time of writing)</p>		<p>There are two objectives, the first which enables the use of artificial lighting for operational and functional purposes and to provide for safety of people and property; while the second seeks to control the location, design and operation of artificial lighting to maintain the character and amenity of areas, the safety of people and the transport network and views of the night sky.</p> <p>There are also two policies which allow for artificial lighting at an appropriate functional level providing the predominant character and amenity of the zone can be maintained; and the other which controls light overspill, light spill effects on adjacent properties, health and safety and views of the night sky.</p> <p>The rule framework is primarily based around setting a limit on lux at notional boundaries.</p> <p>Link https://districtplan.npdc.govt.nz/eplan/#Rules/0/171/1/0/0</p>
---	--	---

Commentary

There is a range of approaches that can be taken to address the effects of light, be it in the traditional manner of effects on people and road safety as undertaken in most first-generation plans, or in a more universal capacity.

A key observation of the Christchurch District Plan is that it does not clearly address what the effects of light spill and glare are, and how these can be adequately addressed. This creates scope for individual interpretation and/or ambivalence to its effect and mitigation requirements. This can be easily addressed in the DPR.

‘Lux’ is the international system (SI) unit of illuminance⁴ and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre. However, there is no explanation of what ‘lux’ is and how it should be assessed and/or monitored in any of the District Plans. An explanation with accompanying diagrams could be included to illustrate what the lighting requirements seek to achieve, how they can be controlled, and met.

None of the older Plans identifies tangata whenua issues associated with lighting, but the New Plymouth District Plan does make reference to the cultural importance of the night sky.

The majority of second-generation Plans focus on the effects on people, but do not contain rules or standards that minimise effects on other aspects of the environment including energy usage, ecology, health, safety, and the night sky.

⁴ Luminance is the measures of brightness, which is a function of concentration or density of luminous intensity (i.e. Candelas) in a given direction per unit area, measured in Candela/m² (Cd/m²)

1.5 Statutory and Planning Context

District plans are part of a hierarchy of RMA policy and planning instruments. The RMA prescribes how district plans are to align with other instruments, and this is summarised in the table below:

Statutory document	Alignment requirement for Proposed District Plan	Comment
NZCPS	Give effect to	Implement according to the applicable policy statement's intentions.
NPS/NES		
CRPS		
Regional Coastal Environment Plan	Not be inconsistent with	Are the provisions of the Proposed DP compatible with the provisions of these higher order documents? Do the provisions alter the essential nature or character of what the higher order documents allow or provide for?
Canterbury Land and Water Plan		
Specific management plans and strategies prepared under other legislation	Have regard to	Give genuine attention and thought to the matter.
Adjoining district plans: <ul style="list-style-type: none"> • Ashburton District Plan • Waimate District Plan • Westland District Plan • Mackenzie District Plan 	Have regard to the extent to which there is a need for consistency	As above
Iwi Management Plan of Kati Huirapa Te Whakatau Kaupapa Ngai Tahu Resource Management Strategy for the Canterbury Region	Take into account	Address the matter and record.

1.5.1 Resource Management Act 1991 (RMA)

The key provisions of the RMA of direct relevance to this topic include:

Section 5 – Purpose and Principles

Section 5 establishes that the purpose of the RMA is to promote the sustainable management of natural and physical resources. The use of lighting is a crucial element in residential, commercial, industrial, rural and recreational operations.

Section 6 – Matters of National Importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

- (a) *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
- (b) *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
- (c) *the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:*
- (d) *the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
- (e) *the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*

Lighting forms part of urban and rural environments and plays an integral role in adding to the vibrancy, safety, accessibility, and viability of towns. Lighting also aids some of these functions while providing benefits regarding health and safety, recreation, and security. The control of lighting in certain sensitive environments can assist in protecting:

- the natural character of the coastal environment, wetlands, lakes and rivers
- outstanding natural features and landscapes
- areas of significant indigenous vegetation and significant habitats of indigenous fauna
- the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga

If provided sensitively, lighting can also assist in the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers. However, a balance needs to be struck in maintaining natural values and providing lit access to these areas.

Section 7 – Other Matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

- (b) *the efficient use and development of natural and physical resources*
- (b)(a) *the efficiency of the end use of energy*
- (c) *the maintenance and enhancement of amenity values*
- (d) *intrinsic values of ecosystems:*
- (f) *maintenance and enhancement of the quality of the environment*
- (i) *the effects of climate change:*
- (j) *the benefits to be derived from the use and development of renewable energy.*

Section 7 of the RMA outlines other matters that should be considered when exercising functions and powers in achieving the purpose of the RMA. Section 7(c) is considered relevant in controlling the extent of light trespass and glare through rules in the District Plan, which will assist in containing the amenity values of the various Zones within the District. Greater management of cumulative effects and enhanced integrated management through the plan review will help address the matters above.

The provision and use of lighting can contribute to the overall efficient use of our resources, and energy which is an important consideration when developing an appropriate lighting strategy for our District.

Section 31 – Functions of territorial authorities

(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

- (a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district:
- (b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—
 - (iii) the maintenance of indigenous biological diversity:

Provisions in the Plan will enable the management of potential adverse effects of lighting and glare to minimise impacts on the environment and the natural and physical resources of the district.

1.5.2 National Policy Statements

National Policy Statements	Relevance
New Zealand Coastal Policy Statement 2010	<p>Section 75(3)(b) of the RMA requires the District Plan to give effect to any NZCPS. Objective 6 seeks the enablement of people and communities to provide for their social, economic, and cultural wellbeing and their health and safety, through subdivision, use, and development.</p> <p>It recognises that the coastal environment is vulnerable to loss or damage from inappropriate subdivision, use, and development, while also functionally some uses, and developments can only be located on the coast or in the coastal marine area.</p> <p>Timaru has an active port and a long coastline. For this reason, regard should be given to the NZCPS and the effect lighting has on this environment.</p>

1.5.3 National Environmental Standards

Section 75 of the RMA requires that a District Plan must give effect to any National Environmental Standard. There are no provisions within any National Environmental Standard of direct relevance to lighting.

1.5.4 National Planning Standards

Released in April 2019, the purpose of the National Planning Standards (NPS) is to improve consistency in plan and policy statement structure, format and content for the preparation of the Proposed District Plan. Paragraph 32 on page 34 of the NPS states that:

'If provisions for managing light are addressed, they must be located in the Light chapter. These provisions may include:

- a. provisions for light spill and glare (including light spill limits) for different zones, receiving environments or other spatially defined area*
- b. specific requirements for common significant light generating activities'.*

Changes to lighting provisions in the Proposed District Plan should be consistent with the NPS.

1.5.5 Canterbury Regional Policy Statement 2013

A district plan must give effect to any regional policy statement. The only reference to Light in the Canterbury Regional Policy Statement (CRPS) is in 'Chapter 12 - Making Applications and Providing Information' which specifies that methods to deal with nuisance arising from light will need to be mitigated. However, the CRPS contains no specific objectives and policies that apply to lighting and glare.

The importance of urban design is acknowledged in the CRPS, particularly throughout Chapter 5. The relationship between urban design, amenity values, and health and safety are all relevant to the topic of lighting and glare. In any given area, there is a clear lighting topography, with each area (town centre, residential areas, industrial areas and roading) requiring a specific level of lighting based on how it is used. In terms of urban design, the use of lighting involves combining utility with aesthetics. Consequently, changes to the District Plan in terms of lighting can give effect to the increased emphasis on urban design.

1.5.6 Canterbury Air Regional Plan 2017

Chapter 1 – Introduction – Understanding of the Canterbury Air Regional Plan recognises that the clear air and lack of light pollution in the Mackenzie Basin provides for excellent visibility of the night sky that has received international recognition. There is no other reference to light in this plan. Air quality is otherwise addressed through the National Environmental Standard for Air Quality.

1.5.7 Iwi Management Plans

Neither the Iwi Management Plan of Kāti Huirapa nor the Te Whakatu Kaupapa Ngai Tahu Resource Management Strategy for the Canterbury Region contain any specific provisions relating to lighting.

1.5.8 Other relevant documents

The National Guidelines for Crime Prevention through Environmental Design (CPTED), 2005

Another relevant document for this topic is CPTED. Lighting is a primary consideration and integral to the overall principals of CPTED. The CPTED recognise that the correct use of lighting sends the right messages to the public about the safe and appropriate use of space at different times of day and night.

Lighting should be considered for places that are well used at night (e.g. car parks, major pedestrian and bicycle routes, public spaces, building entrances, public toilets, access and egress routes) and for areas where safety risks have been identified.

However, the CPTED also recognise that lighting should not be provided in areas not intended for night-time use, therefore avoiding a false impression of safety.

CPTED suggest that policies on lighting, signage, landscaping and street furniture should complement each other and be approached in a consistent and integrated manner.

Australian / New Zealand Standard – Control of the obtrusive effects of outdoor lighting (AS/NZS 4282:2019)

The objective of AS/NZS 4282:2019 is to provide a common basis for assessment of the likely effects of new developments that involve the provision of outdoor lighting. The aspects of potential obtrusiveness considered are light falling on surrounding properties, the brightness of luminaires in the field of view of nearby residents, glare to users of adjacent transport systems, the effects on astronomical observations and the impact on protected dark environments. Public lighting is not within the scope of this Standard. For control of these effects, limiting values of light technical parameters have been developed taking account of

- a. the level of lighting existing in the area
- b. the times that the proposed lighting is to operate
- c. the type of lighting technology available to light the task
- d. the use of readily available and easily understood technical data on the lighting installations that can easily be verified at the design and assessment stages.

This standard is a relevant and useful reference to assist in assessing the potential obtrusiveness of outdoor lighting installations.

2. Approach to Evaluation

2.1 Scale and significance

The table below sets out the scale and significance of managing light in the District in terms of Council’s statutory obligations, who may be affected by any proposed changes to the management regime, the type of effects that may occur and where in the District is mostly likely to be affected by the proposed changes to the District Plan. This will inform the nature and extent of the analysis of the proposed changes to the lighting provisions. For example, proposed provisions that will result in an overall high level of scale and significance will require a more in-depth analysis of proposed objectives, policies and rules including, potentially, an economic analysis, compared to changes that will have a low-level significance.

Issue: Management of Lighting and Glare		
	Scale	Significance
Reasons for change in policy	District Plan Review	Low
Relevant Statutory Considerations / Drivers	RMA Sections 6, 7 and 31	Low
Degree of shift from status quo required	A low shift to recognise the effect of light pollution on energy usage, ecology, health, safety, and the night sky	Low
Who and how many will be affected?	This is a district wide matter, with everybody potentially affected, mostly positively.	Medium

Degree of impact on, or interest from iwi / Māori	May impact sites of cultural interest to iwi / Māori	Low
When will effects occur?	Effects will occur on an on-going basis, as requirements for protection of natural and physical resources and the environment evolve.	Low
Geographic scale of impacts / issue	District wide	Low
Type of effect(s)	Positive effect, with potentially beneficial consequences. All aspects of the environment have the potential to be positively affected, with a potential impact on social, cultural and economic well-being.	Low
Degree of policy risk, implementation risk, or uncertainty	People are becoming more aware of the effects of light pollution, which reduces the risk of resistance to any change.	Low
Overall Assessment of Scale and Significance		Low

2.2 Approach to managing light and changes proposed

The objective and policy framework is intended to provide clarity on the need to manage light in the District Plan.

There is an increasing awareness in the community of the effects of light pollution. In addition, other communities, have recognised the benefits associated with astro-tourism and enhanced quality of life by protecting the night sky from the effects of light pollution. Almost all District Plans contain rules to limit the effects of spill light and glare from adjacent uses, but few currently include objectives to limit light pollution and control the type and quantity lighting that can be installed as of right.

Recognising the risks that light pollution poses and the benefits of protecting the night sky, greater controls are proposed within the district plan on the type of and nature of lighting that is permitted, controlled, or prohibited.

The 'TDC Lighting District Plan Report' was prepared by Paul Wilson of Xyst Limited in 2020⁵ to provide advice on lighting standards within the Proposed District Plan. This report makes the following recommendations in terms of the future approach to managing light in the Proposed District Plan:

1. AS/NZS 4282:2019 contains a useful introduction that should guide lighting rules. In particular it discusses the factors that have been used in setting the limiting values of the light technical parameters used in the Standard such as:
 - a. the level of lighting existing in the area

⁵ TDC Lighting District Plan Report; 2022, Paul Wilson Xyst (<https://www.timaru.govt.nz/pdp-supporting-info>)

- b. the times the lighting is to operate
 - c. the type of lighting technology available
 - d. the use of readily available and easily understood technical data on lighting installations that can be easily be verified at the design and assessment stages.
2. The level of lighting existing in an area is relevant as intrinsically dark areas should be protected to retain the quality of the night sky that already exists. Furthermore, intrinsically dark areas generally require less artificial light to provide effective lighting for humans as opposed to intrinsically bright areas which may require more light to counter the effects of the adaptive state of the human eye.
 3. The times the lighting is to operate is relevant as a high level of control can be exercised by simply turning lights off or dimming lights during the late evening or early morning when there is generally less human activity and greater demand for observations of the night sky.
 4. The type of lighting technology that is available is also important, noting that over the life of the district plan, lighting technology will most likely evolve. There is little point specifying technical parameters for which the market can currently not provide in New Zealand.
 5. The availability of technical data, software, equipment, expertise and methods need to be considered so that lighting can be designed to achieve the desired outcomes and the likely effects of a proposed lighting design can be reliably calculated and the actual resulting light effects post-installation can be readily measured.

Subsequent to the preparation of that report, feedback on the Draft District Plan and discussions with Primeport, led to a ‘bespoke’ approach to lighting and its effects, for the Port. This approach acknowledged the existing light environment, including glare and glow into the night sky and the operational needs of the Port, where often unloading and loading of ships can occur at night, and where the need for very careful management of health and safety is paramount.

The approach has resulted in the production of a Light Management Plan⁶ by Primeport in collaboration with Council. This report sits outside of the District Plan, but will be an important tool for managing the existing and consented lighting at the Port. This Plan outlines the existing light conditions, how the Port operates, potential future development at the Port and how light effects such as glare and light spill can be managed and mitigated into the future. It was determined this approach was more practical than seeking to manage an already highly modified light environment and consented to be further modified in the future, with specific rules to cover all possible future scenarios in the range of zones surrounding the Port.

2.2.2 Quantification of Costs and Benefits

Section 32(2)(b) of the RMA requires costs and benefits to be quantified where practicable. However, there are no quantifiable costs and benefits relating to lighting. The cost to landowners and developers will be dependent on the overall design of roads, buildings and structures.

2.3 Choice of Evaluation Method

The approach to evaluation for this topic is a qualitative approach as the issue is of low significance and because it is difficult to monetise the benefits and costs.

3. Evaluation of Objectives

⁶ Lighting Management Plan, Primeport, 2022 (<https://www.timaru.govt.nz/pdp-supporting-info>)

3.1 Proposed objectives

The proposed objectives for this topic are:

LIGHT-O1 Artificial outdoor lighting
Artificial outdoor lighting is designed and located to minimise its adverse effects, is compatible with the character and qualities of the surrounding area and protects the values and characteristics of light sensitive areas.
LIGHT-O2 Benefits of artificial lighting
The benefits of artificial lighting are recognised while any adverse effects generated do not compromise the health and safety of people and communities, including road safety.

3.2 Evaluation of proposed objectives

The table below sets out how the proposed objectives achieve the purpose of the RMA (section 32(1)(a) RMA).

Category	Criteria	Comments
Relevance	Directed to addressing a resource management issue	Achieves: The objectives enable lighting to assist a range of activities that provide for the health and wellbeing of the community, economic development, as well as contributing to the amenity and character of the surrounding area. It also acknowledges the potential effects of lighting and glare that can occur within the zones, whilst protecting the risk to people, places, and the environment.
	Focused on achieving the purpose of the RMA	Achieves: The objectives achieve section 5. The objectives seek to achieve sections 6 (a) to (e) by protecting all aspects of the environment from adverse effects of light and glare. The objectives achieve section 7 through the efficient use and development of natural and physical resources by protecting amenity values and the quality of the environment.
	Assists a council to carry out its statutory functions	Achieves: The objectives fall within s31 functions.

	Within scope of higher-level documents	Neutral: The higher-level documents do not specifically provide for lighting and glare. However, they do seek to manage the impacts of development and activities on people and property.
Feasibility	Acceptable level of uncertainty and risk	Achieves: The level of risk and uncertainty regarding the light and glare provisions is low.
	Realistically able to be achieved within Council's powers, skills and resources	Achieves: The proposed objectives can be achieved within Council's powers, skills, and resources.
Acceptability	Consistent with identified iwi/Māori and community outcomes	Uncertain: The consistency with outcomes is uncertain at this stage. However, adverse effects should be minimised, ensuring compatibility with Sites and Areas of Significance to Maori.
	Will not result in unjustifiably high costs on the community or parts of the community	Achieves: The proposed objectives will not result in unjustifiably high costs on the community or parts of the community as they provide a greater level of certainty to the Council and the public on the acceptable lighting parameter values anticipated in each zone. This will assist with preparing applications and decision making.

4. Identification of Options

Option 1 Retain Existing Standards

Retain the existing lighting standards identified in the operative Plan, but consolidate them into one discrete chapter as required by the NPS.

Option 2 Retain Standards and Broaden Scope

This option includes creating a Light chapter, complying with the NPS, and introducing a framework of objectives, policies and rules that recognise the important purpose of lighting while managing its adverse effects. Work with Primeport on developing and implementing a light management plan.

Option 3 Delete the lighting standards from the District Plan and administer through a different standard

Delete the current lighting provisions and address through engineering standards, for example the street lighting standard used in NZ, AS/NZ1158. Effectively, no resource management controls over lighting.

5. Evaluation of Options

5.1 Evaluation table

OPTION 1			
<i>Retain existing standards</i>			
Benefits			
Environmental	Economic	Social	Cultural
Maintains planning regulations associated with lighting, therefore ensuring some protection of amenity values.	No cost for Council and no change in cost to the community.	Retains the established approach that parties are familiar with.	Some protection and recognition of the cultural significance of some sites may occur in an ad hoc manner.
Costs			
Environmental	Economic	Social	Cultural
Does not provide a framework to consider the amenity, characteristics and purpose of different zones or areas. This could be costly to the Council and community as activities that undermine the character and amenity of an area could be established.	There are no costs associated with existing, lawfully established activities.	Would retain what appears as inconsistent provisions.	No protection of the culturally significant sites or the night sky afforded.
Efficiency	This approach is low cost as it would not require any changes to the plan. However, it would not address the identified issues, and therefore not be an efficient option.		
Effectiveness	This option would not achieve the certainty of plan administration that would be achieved by Option 2. This option addresses standards in relation to lighting. However, they are difficult to implement and monitor. The lighting provisions as they stand within the Operative Plan are ineffective as they make plan implementation and administration difficult.		
Strategic Direction(s)	The strategic directions seek that the values of important natural areas, the coastal environment, landscapes and indigenous biodiversity are identified and protected. The existing lighting provisions do not achieve these goals.		

Overall Appropriateness of Option 1	This option is not an appropriate way to achieve the preferred objective as the standards are too one dimensional and there is a lack of differentiation in the rules and standards to provide for the particular characteristics and amenity associated with each environment and zone.
--	--

OPTION 2 <i>Retain Standards and Broaden Scope</i>			
Benefits Environmental	Economic	Social	Cultural
Provides a framework to consider the effects of lighting on the different amenity and diverse characteristics of the district. This will enable the Council to determine if an activity can be appropriately located (i.e. not undermine the intent of the zone).	<p>Can retain some existing provision direction that parties are familiar with but improves the approach and administration of the provisions. Simpler plan implementation, more flexibility in plan administration.</p> <p>Maintains the value and amenity of adjoining properties by managing potential lighting effects.</p>	Enables future public, recreation, economic and social needs to be met, while protecting the community's health and wellbeing.	Protection and recognition of the cultural significance of some sites can occur if required.
Costs Environmental	Economic	Social	Cultural
Activities requiring lighting may conflict with maintaining and enhancing ecological, landscape, heritage, natural and amenity values.	<p>Would result in change from the status quo – Plan users would need to become familiar with new provisions.</p> <p>Potential cost to the Council of administering the new provisions in terms of processing consent applications specifically for light or glare breaches; and likewise, to developers having to apply for such consents.</p>	May be perceived to be more restrictive than current approach.	Allowing lighting of some activities / areas may conflict with cultural and historic heritage values.
Efficiency	It is considered that this option is an efficient method of meeting the objective given the benefits identified above.		

Effectiveness	This option is the most appropriate and effective as it addresses lighting and glare effects, whilst ensuring that lighting mitigates effects and provides for the social, recreational, economic and spiritual needs of the community.
Strategic Direction(s)	This would achieve the strategic objective by providing for a range of activities while managing the effects of lighting within and on adjoining sites.
Overall Appropriateness of Option 2	This set of provisions is appropriate given that the benefits outweigh the costs, and there are considerable efficiencies to be gained from adopting these provisions.

OPTION 3

Delete the lighting standards from the District Plan and administer through a different standard

Benefits Environmental	Economic	Social	Cultural
No environmental benefits identified.	Would enable lighting of some areas and activities 24-hour per day, benefiting certain economic activities.	Would allow the community longer use of open space and recreation areas (this may also be a 'cost').	None.
Costs Environmental	Economic	Social	Cultural
Other standards would only address lighting in relation to the standard it addresses, not the environmental effects of its use on for example residential areas, rural environments and amenity values. Would lose the significance of the adverse effect of lighting by deleting the standard.	Not all standards are consistent and may result in lighting provisions being lost within various standards, therefore increasing inconsistencies with the plan.	Could result in detrimental effect to communities through the infiltration of light pollution in all environments.	Allowing lighting of some activities / areas may conflict with cultural and historic heritage values.
Efficiency	This option is inefficient in addressing the issue.		
Effectiveness	This option is ineffective as it transfers all regulation of lighting and does not provide for any environmental protection.		
Strategic Direction(s)	This option would not help in achieving the strategic objectives of the Plan.		

<p>Overall Appropriateness of Option 3</p>	<p>This option is both inefficient and ineffective, with no real benefits, but many costs.</p>
---	--

5.2 Risk of Acting or Not Acting

Where there is uncertain or insufficient information, an evaluation of the risk of acting or not acting is important. In this case it is considered that there is certainty in the issue or the potential significance of the issue. Given the use of lighting for everyday use, the current best practice detailed in Section 1.4.4 and the Council’s understanding and knowledge of how lighting is used, there is sufficient information to act. It should be noted however, that it has not been a priority of Council to direct funding or resources into researching lighting and its associated effects.

It is concluded that there is a low risk of acting in the proposed manner to introduce updated and replacement provisions to appropriately manage lighting and glare throughout the District.

6. Preferred Option

This evaluation has been undertaken in accordance with section 32(1)(a) of the RMA in order to examine the extent to which the objectives of the proposal evaluated are the most appropriate way to achieve the purpose of the RMA. In doing so, the evaluation shows that Option 2 is more appropriate than the alternatives considered for the following reasons:

- The option is efficient and effective at addressing the issues identified.
- The provisions assist with implementing the strategic objectives of the District Plan Review.
- They are in accordance with the functions of territorial authorities in section 31 of the RMA and the sustainable management purpose of Part 2 of the RMA.
- The option recognises the range of different characteristics and competing demands across areas of the District.

Overall, it is considered that the preferred option is the most appropriate given that the benefits outweigh the costs, and there are considerable efficiencies and benefits to be gained from adopting the preferred option.