

SOUTH WAIRARAPA DISTRICT COUNCIL

2 SEPTEMBER 2020

AGENDA ITEM C1

THE DRAFT WAIRARAPA INTERNATIONAL DARK SKY – OUTDOOR ARTIFICIAL LIGHTING PLAN CHANGE FOR PUBLIC NOTIFICATION PURPOSES

Purpose of Report

To present to Council the Draft Wairarapa International Dark Sky-Outdoor Artificial Lighting Plan Change for public notification purposes.

Recommendations

Officers recommend that the Council:

1. *Receive the Draft Wairarapa International Dark Sky Outdoor Artificial Lighting Plan Change Report.*
2. *Approve the Draft Wairarapa International Dark Sky Outdoor Artificial Lighting Plan Change for public notification, as part of progressing the Council initiated plan change.*

1. Executive Summary

The Draft Wairarapa International Dark Sky-Outdoor Artificial Lighting Plan Change has been compiled through Perception Planning and is ready for public notification. The Plan Change and accompanying Section 32 report is attached under Appendix 1. The Wairarapa International Dark Sky Reserve-Outdoor Artificial Lighting Plan Change Summary of Information is attached under Appendix 2.

The Plan Change will be subject to full public notification under the Resource Management Act 1991. Council approval is required to proceed to public notification, and notification is proposed for mid to late September. The Martinborough Dark Sky Society is in the process of applying to obtain accreditation from the International Dark Sky Society for International Dark Sky Reserve status for Wairarapa.

2. Background

Due to the current simple rule in our operative District Plan a Plan Change needs to be undertaken during 2020 to support the Martinborough Dark Sky Society's application for international accreditation for the new reserve. The dark sky reserve will initially encompass the territorial areas of South Wairarapa and Carterton districts.

When accredited, the reserve will become the largest International Dark Sky Reserve in the world. A future second stage of the reserve could extend into parts of Masterton District. However, there is significant evening light pollution currently there, which would need to be resolved as part of any future expansion and inclusion.

The South Wairarapa District Council along with Carterton and Masterton District Councils are responsible for approving Plan Changes to the current Wairarapa Combined District Plan (WCPD), and a Plan Change is the process required to change existing rules of an operative plan.

The International Dark Sky Reserve for Wairarapa project has involved discussion and ongoing support during 2018-2019 by the District Councils for the reserve. The Wairarapa Economic Development Strategy and Action Plan identifies the 'Martinborough Dark Sky experience' as one of the four best 'multi-season, multi day returns' tourism opportunities in the Wairarapa. For South Wairarapa District, Council gave approval in February for the development of a Council initiated Plan Change, this followed on from earlier support and liaison on the proposal. Following the Covid 19 lockdown period, on 6 June 2020 Carterton District Council gave approval for developing the Plan Change. Light pollution is the biggest threat to gaining certification.

3. Discussion

As part of the proposed establishment of the Wairarapa International Dark Sky Reserve changes to existing District Plan rules controlling outdoor lighting are required in order to minimise future levels of outdoor light pollution to the night sky. From an issues and options analysis, it was recommended that the Councils proceed with the Council initiated Plan Change, in combination with non-regulatory methods, such as community education on outdoor lighting.

A review of the operative WCDP reveals that the provisions that control light emissions within the district are not sufficiently specific to address light pollution that adversely affects the brightness and clarity of the night sky. The operative provisions also fail to meet the IDA requirements for dark sky reserve accreditation. The priority, in terms of the international dark sky reserve certification process, is to ensure that light emissions/pollution from new development within the proposed dark sky reserve area can be controlled.

The purpose of the proposed plan change is therefore to review the Plan's issues, objectives, policies, rules, methods and assessment criteria to:

1. Manage new lighting within the districts to minimise adverse effects from light pollution to protect the brightness and clarity of the night sky.
2. Manage new lighting to ensure that the requirements for obtaining international dark sky reserve status can be met.
3. Clearly signal to the community that the clarity and brightness of the night sky are important features of the Wairarapa and should be protected.
4. Allow for outdoor artificial lighting when the type and characteristics of lighting used will not have adverse effects on the brightness and clarity of the night sky.

5. Ensure that Plan provisions are sufficiently clear and direct, to assist decision-makers assessing and determining applications for lighting.
6. Ensure provisions clearly articulate Councils' expectations in relation to lighting.

The proposed changes will:

- Provide more specificity in terms of standards for the installation of lighting.
- Ensure that lighting that meets the prescribed standards is provided for 'as of right'.
- Ensure that lighting that does not comply with the standards requires an assessment of effects, including effects on the on the brightness and clarity of the night sky.
- Provide clear objectives, polices and assessment criteria when lighting does not meet the permitted activity standards and would require resource consent.

It is intended that the provisions proposed as part of this plan change will only apply to the South Wairarapa and Carterton districts. This area is to be identified within the Plan as the 'Dark Sky Management Area'.

The provisions proposed by this plan change will only apply to new lighting that is erected within the proposed Dark Sky Management Area once this plan change becomes operative. These provisions will not apply retrospectively to existing and established lighting. If lighting is replaced, however, the new provisions proposed in this plan change will apply.

This plan change has not reviewed the effectiveness and efficiency of current WCDP lighting provisions and whether they provide adequate protection of residential amenity. The scope is limited to ensuring that international dark sky reserve certification can be gained, and minimising light pollution to protect the brightness and clarity of the night sky. A review of the operative WCDP, including the lighting provisions that relate to effects on amenity, will be undertaken as part of the full plan review that is scheduled to be undertaken within the next three years. This plan change has been prepared with input from suitably qualified lighting engineers from Stephenson and Turner Lighting (S&T Lighting), Wellington.

For existing activities, non-regulatory methods such as education, undertaken by the Councils and Martinborough Dark Sky Society, would assist in highlighting to the public the benefits of lighting that would comply with the WCDP provisions. The intention of this process that the community would 'get on board' to voluntarily change lighting to reduce night-time light pollution.

3.1 Consultation

Consultation has recently been undertaken with external agencies including the International Dark Sky Association (IDA), Ministry for the Environment, the Department of Conservation and The New Zealand Transport Agency, the latter two giving their support to the plan change and dark sky reserve. Local consultation has involved liaison with the Maori Standing Committee, and the Martinborough Dark Sky Society has hosted a local educational evening about dark sky reserves at Stonehenge on 21 July.

The three Wairarapa councils have been open in their support of the Dark Sky Society's intention to gain International Dark Sky Reserve accreditation. The Wairarapa Combined Plan Hearings Committee will receive and hear submissions and make a recommendation back to the Councils on the adoptions of the Plan Change.

3.2 Legal Implications

The legal and legislative considerations relate to the plan change having to follow procedural requirements for processing Plan Changes under the Resource Management Act 1991, including Schedule 1 of the RMA.

3.3 Financial Considerations

Costs associated with the Plan Change would be covered under existing budgets for work on the District Plan Review. The process costs will be shared by the Councils.

4. Conclusion

That Council receive and approve the Draft Wairarapa International Dark Sky-Outdoor Artificial Lighting Plan Change for public notification purposes. This is a necessary step as part of requirements under the Resource Management Act 1991, and part of supporting the Martinborough Dark Sky Society's intention to achieve International Dark Sky Reserve status in Wairarapa. This is a joint process of South Wairarapa, Carterton and Masterton District Council.

5. Appendices

Appendix 1 - Plan Change and accompanying Section 32 report

Appendix 2 – Wairarapa International Dark Sky Summary of Information

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**Appendix 1 - Plan Change and accompanying
Section 32 report**

Appendix A: Marked up version of the WCDP

4 RURAL ZONE

4.1 Introduction

The majority of the Wairarapa's environment has a rural character, in which the environmental quality is largely determined by prevailing natural elements, whether the land is used for primary productive purposes or for conservation purposes. Under this District Plan, Wairarapa's rural environment is managed under a single Rural Zone, although the Zone's management policies recognise key differences in predominant land use patterns and environmental factors.

Rural land is a significant resource due to the economic value of primary production activities to the Wairarapa, and the associated processing and service industries. The use of this resource is constantly changing, in response to economic demands and conditions. The continued prosperity of the Wairarapa as a whole is largely dependent on the use of rural resources adapting to changing economic opportunities.

A wide range of land uses occur within Wairarapa's productive rural environment, the distribution of which is largely determined by natural patterns of landform, climate and soil type, as well as accessibility to markets and processing facilities. While the interaction of natural elements and differing human activities has resulted in a range of distinctive landscapes, there is still, nevertheless, a recognised rural character throughout this environment – variations occur due to topography, different types of primary production and the density of property-holdings. In the Wairarapa, the rural environment ranges from the extensive pastoral farming and forestry areas of the eastern hill country through to the intensively settled farming areas that fringe the versatile soils around Wairarapa's main towns. The character of the rural environment is shaped by the different forms of primary production that occur there but also by the range of other activities that rely on a location in the rural area and which contribute to the economic and social fabric of the Districts.

While rural properties vary in size, the rural environment is typically characterised by the following elements:

- Open space, natural landscapes, and vegetation predominate over the built environment;
- Working productive landscape, with a wide range of agricultural, horticultural and forestry purposes, with potential for associated effects, including noises and odours;

This section should be read in conjunction with those sections under District-wide issues, such as biodiversity, natural hazards, coastal environment and freshwater environment.

4.5 Rural Zone – Rules & Standards

NOTE: Unless otherwise stated in the rules below, the activity status and standards provided for in the rules of this Zone may be modified by the specific provisions of the District Wide Land Use Rules ([Section 21](#)). Any activity must comply with the District Wide Land Use Rules, before applying the following rules.

Refer to the policies for District-wide issues

4.5.1 Permitted Activities

The following are permitted activities:

- (a) Any activity listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in those rules and [Section 4.5.2](#), and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [4.5](#) or [21](#). Policy 4.3.5(a)
- (b) Any activity not listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in [Section 4.5.2](#), and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [4.5](#) or [21](#). Policy 4.3.5(a)

4.5.2 Standards for Permitted Activities

Permitted activities shall comply with all of the following standards for the Rural Zone:

- (a) Maximum Building Height Policy 4.3.2(d) and 4.3.5(c)
 - (i) Dwellings: 10 metres.
 - (ii) Other Buildings: 15 metres.
 - (iii) Within the Dark Sky Management Area identified within Appendix 13, Outdoor Sports Lighting Poles at Recreational Facilities: 18 metres Policy 4.3.2(d) and 4.3.5(c)
- (b) Maximum Height to Boundary
- (c) Minimum Building Setback (excluding dwellings) Policy 4.3.2(d) and 4.3.5(c)
 - (i) 10 metres from the front road boundary of sealed roads.
 - (ii) 25 metres from the front road boundary of unsealed roads.
 - (iii) 5 metres from all other boundaries.
 - (iv) 25 metres from any Significant Waterbody listed in [Appendix 1.9](#).
 - (v) 5 metres from any other waterbody.
 - (vi) In the South Wairarapa District, 20 metres of the banks of any river and stream whose bed which has an average width of 3 metres or more. (Note: For the purpose of this rule, 'bed' is the definition applied in Section 2 of the Resource Management Act for a 'bed' in relation to any river for the purposes of esplanade reserves).

DISCUSSION DRAFT

6 COMMERCIAL ZONE

6.1 Introduction

The Commercial Zone covers the business and retail areas in the towns of the Wairarapa. Although the commercial areas differ in size and complexity from town to town, they serve similar purposes and have similar elements, and have a cohesive and distinctive environmental character.

The Commercial Zone is a significant economic and community resource in the Wairarapa. It is essential that the Commercial Zone provide for continued development to accommodate changes in the economy, and in the nature and form of commercial activities.

A range of mixed use activities in the Commercial Zone assists in building vibrant town centres, and reinforces them as focal points for a range of retail, business, and community and lifestyle activities. The Commercial Zone is that of a working business environment, and the zone has Permitted Activity standards and a range of Permitted Activities that reflect that the amenity values and character of it are those for a commercial environment.

Commercial areas need to be effective business environments. They need to be accessible and attractive to customers and workers, economically vibrant and well serviced for goods delivery and parking.

The Commercial Zone is densely developed compared with the other zones. Commercial centres also attract large numbers of customers and workers and, therefore, have high demands for vehicle access, on-site parking and the provision of infrastructure such as public parking, civic amenity facilities and stormwater disposal.

There are two distinct types of environment within the zone: pedestrian-oriented and vehicle-oriented commercial areas. Pedestrian-oriented commercial environments are focused on providing customers a range of shops and services accessible by foot, usually protected by verandahs. These pedestrian areas are located in the five town centres, as well as a number of smaller neighbourhood shopping centres.

The Wairarapa's town centres are the historic heart of urban settlement, and contain many buildings and sites of heritage value. Indeed the collective heritage values of Featherston, Greytown and Martinborough are significant assets to the Wairarapa. While there may be street parking in the town centres, it is often supplemented with public parking areas that service businesses in their immediate locality, particularly in the larger towns.

Elsewhere, the Commercial Zone is less densely developed and is dominated by the need for vehicle access and parking. Often the activities are larger in scale, such as bulk retailing, warehouses and servicing depots, which require large lots and onsite car parking, as well as high visible presence on the street.

The differentiation between the pedestrian and vehicle oriented parts of the Commercial Zone recognises a functional division that has important implications for environmental management. The pedestrian precincts need to be 'people friendly' with safe, easy pedestrian movement and a level of amenity that encourages people to use and enjoy the precincts. Pedestrian precincts benefit from compact and cohesive building forms and parking sited away from key pedestrian routes. The vehicle-oriented areas do not have or require the same level of connected building form, but they rely on large areas of on-site

6.5 Commercial Zone – Rules & Standards

6.5.1 Permitted Activities

The following are Permitted Activities:

- (a) Any activity listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in those rules and [Section 6.5.2](#), and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [6.5](#) or [21](#). *Policy 6.3.2(a) and 6.3.2(b)*
- (b) Any activity not listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in [Section 6.5.2](#), and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [6.5](#) or [21](#).

6.5.2 Standards for Permitted Activities

Permitted activities shall comply with all of the following standards for the Commercial Zone.

- (a) Maximum Building Height *Policy 6.3.2(a)*
 - (i) 15 metres;
 - (ii) 7 metres for coastal settlements.
 - (iii) 18 metres for Outdoor Sports Lighting Poles at Recreational Facilities within the Dark Sky Management Area identified within Appendix 13, *Policy 6.3.2(a) and 6.3.8(a)*
- (b) Maximum Height to Boundary
 - (i) For sites adjoining the Residential Zone, the building shall meet the height recession requirement for the Residential Zone in relation to the relevant boundary. This shall not apply to road boundaries.
- (c) Minimum Building Setback *Policy 6.3.2(a) and 6.3.8(a)*
 - (i) 3 metres from any boundary with the Residential Zone or Rural Zone;
 - (ii) 5 metres from any waterbody
- (d) Maximum Fence Height *Policy 6.3.2(a) and 6.3.8(a)*
 - (i) 1.8 metres for fences, walls and screens on any boundary with the Residential Zone or Rural Zone, except at road intersections of Strategic Arterial roads identified on the Roding Hierarchy on the Planning Maps, no obstruction exceeding 1.0 metre in height is permitted within a 6.0 metres by 6.0 metres triangle measured from a boundary intersection point (Refer to [Figure 32.1](#) in [Appendix 5](#)).

7 INDUSTRIAL ZONE

7.1 Introduction

The Wairarapa contains a number of industrial areas, which are managed under a single Industrial Zone. Some of the industrial activities contained within the Zone are large-scale enterprises, employing many people and generating significant income for the area. Other activities are small scale, often located on small parcels of land, scattered within the towns.

The industrial activities contained within the Zone are an important resource for the Wairarapa, and consequentially for its social and economic wellbeing. The greenfields opportunities within the Industrial Zone (i.e., land zoned but not yet used for industrial purposes) also represent a significant potential for further development and growth in the Wairarapa.

Industrial activities can potentially create significant adverse effects on the immediate and wider environment. This is due in part to the nature of the processes and operations involved, as well as the impacts on the transport and service infrastructure, and the scale and utilitarian nature of the industrial buildings.

For example, industrial activities may generate high traffic volumes of both heavy and light vehicles, occupy large sites where much of the area is covered by structures or impervious surfaces, need large utilitarian buildings, and use expansive outdoor storage areas.

Some industrial activities generate high levels of noise, odour and dust. While such activities must also meet regional council requirements for discharges into the environment, it is preferable these activities are buffered by distance from potentially sensitive uses, particularly residential areas.

Preferably, industrial activities should be clustered within defined areas where they may operate and generate comparable effects relatively unhindered. Therefore, the Industrial Zone is separated as much as practicable from sensitive activities in other zones to protect the amenity in those zones. However, minimum levels of amenity should still be maintained within existing developed parts of the Industrial Zone, particularly those within the towns. Amenity values can be protected by noise standards, odour controls, screening, setback distances and other techniques, particularly in reference to visibility from major public arterial routes and from residential areas.

Most of the Industrial Zone is contained within the urban environment, with many industrial areas forming an integral part of Wairarapa's towns. However, there are a few large sites located in the rural environment. In particular, the industrial area at Waingawa, west of the State Highway 2 Bridge over the Waingawa River, is the Wairarapa's principal heavy industrial area, where large industrial activities have been co-located to concentrate the adverse effects and to take advantage of excellent road and rail accessibility, and labour market and services provided by the nearby towns. This area is a logical centre for further growth in large-scale industrial development, and therefore requires a certain amount of appropriately zoned greenfields land.

7.5 Industrial Zone – Rules & Standards

7.5.1 Permitted Activities

The following are Permitted Activities:

- (a) Any activity listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in those rules and Section [7.5.2](#), [7.5.3](#) and [7.5.4](#) and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [7.5](#) or [21](#). Policy 7.3.2(b)
- (b) Any activity not listed as a District Wide Permitted Activity in the rules in [Section 21.1](#), and which complies with the relevant standards in Section [7.5.2](#), and which is not otherwise specified as a controlled, restricted discretionary, discretionary or non-complying activity under Sections [7.5](#) or [21](#). Policy 7.3.2(b)
- (c) Except that in the Opaki Special Management Area, where permitted activities shall be limited to the following provided they comply with the standards specified in Rule [7.5.3](#), and those within the Waingawa Industrial Area that are subject to the standards in Rule [7.5.4](#): Policy 7.3.8(a)
 - (i) Secondary industry, except any industry listed in [Rule 7.5.9\(b\)\(ii\)](#) as a non-complying activity;
 - (ii) Reserves and recreational facilities;
 - (iii) Community amenity facilities;
 - (iv) Parking areas.
- (d) Except that in the Bidwills Industrial Park Zone, where permitted activities shall be limited to the following provided they comply with the standards specified in Rule [7.5.4](#) Plan Change 3858
 - (i) Secondary industry, except any industry listed in [Rule 7.5.9\(b\)\(ii\)](#)

7.5.2 Standards for Permitted Activities

Permitted activities shall comply with all of the following standards for the Industrial Zone, except for those within the Opaki Special Management Area that are subject to the standards in Rule [7.5.3](#):

- (a) Maximum Building Height Policy 7.3.2(c)
 - (i) 15 metres.
 - (ii) Within the Dark Sky Management Area identified within Appendix 13, Outdoor Sports Lighting Poles at Recreational Facilities: 18 metres Policy 7.3.2(c) and 7.3.2(g)
- (b) Maximum Height to Boundary
 - (i) For sites adjoining the Residential Zone, the building shall meet the height recession requirement for the Residential Zone in relation to the relevant boundary. This shall not apply to road boundaries. Policy 7.3.2(c) and 7.3.2(g)

19 GENERAL AMENITY VALUES

19.1 Introduction

“Amenity values” refers to those environmental characteristics of an area that contribute to the pleasantness and attractiveness of that area as a place to live, work or visit. Inherently, amenity values are subjective in nature, although there are qualities that are commonly accepted and shared by most people.

Many factors contribute to the perception of an area’s amenity values. These values derive from a range of environmental characteristics, including the built form (the scale, density appearance, condition, age and other values of buildings), as well as from the absence of buildings – open space, planting, and the naturalness of an area. Other important contributors to amenity values include the level and types of noise, privacy, access to sunlight and types of odour, and the ability to clearly view the night sky.

In general, the combined amenity values of an area go towards defining the character of that area. Thus, amenity values within the Wairarapa vary from location to location, and largely depend upon the perceived character of each area. In other words, the amenity values of an industrial area differ from that say of a residential area; and older residential areas will have different character to other more recently developed residential areas.

These differences in character are important factors in determining which environmental characteristics may be acceptable in one area while not in another. For example, the level of signs within a commercial area would generally not be acceptable in a residential neighbourhood.

Many of the factors that are influential in creating a pleasant environment can be managed, at least in part, by the Plan: for example, the amenity values derived from the density, bulk, height and design of built form. Many of these aspects are managed under the District Plan policies for the various environmental zones and management areas, as these factors directly relate to the management of the character and environmental quality of each of these parts of the Wairarapa.

This section addresses those environmental conditions that can generally affect amenity values across all of the Wairarapa, including the effects of temporary or transitory activities, odour, noise and excessive light and glare.

19.2 Significant Resource Management Issues

1. Temporary activities can potentially create adverse effects on amenity values.
2. Odour or noise can have an adverse effect upon people’s health and neighbourhood amenity.
3. Glare from, for example, outdoor lighting and reflective surfaces, can annoy people and distract motorists.
4. Light emitted from outdoor lighting can cause adverse effects on the brightness and clarity of the night sky

19.3 Objectives, Policies and Methods

19.3.1 Objective GAV1 – General Amenity Values

To maintain and enhance those general amenity values which make the Wairarapa a pleasant place in which to live and work, or visit.

19.3.2 GAV1 Policies

- (a) Recognise that temporary activities generally have a minor effect on amenity due to their short duration, provided that some limitations are imposed as necessary to avoid significant, albeit short-term, effects.
- (b) Control the levels of noise, based on existing ambient noise and accepted standards for noise generation and receipt.
- (c) Manage the interface of different environmental zones to protect the sensitive zones from more noisy areas.
- (d) Ensure vibrations occurring through the use of equipment or machinery does not cause adverse effects on the comfort of occupants of adjacent properties.
- (e) Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, ~~and to protect the clarity and brightness of the night sky.~~
- (f) Within the Dark Sky Management Area, manage the light colour temperature, shielding and hours of operation of outdoor artificial lighting to mitigate skyglow to protect the clarity and brightness of the night sky.
- (g) Manage activities with unacceptable visual effects on amenity values, in accordance with the qualities of each environmental zone. As a guide to determining if an activity has unacceptable visual effects, consideration will be given to other policies relevant to a particular activity or environmental zone.
- (h) Manage the levels of odour and dust by avoiding inappropriate odours and dust from adversely affecting sensitive activities on adjoining properties.
- (i) Avoid, remedy or mitigate the potential effects of subdivision and development on street trees.
- (j) Allow for activities undertaken on either reserve land which are consistent with the Reserve Management Plan for that reserve where one exists, or on public land dedicated for community, recreational, sporting, educational, cultural, festive, and ceremonial or gala/market day purposes.

19.3.3 Explanation

This Plan seeks to maintain and enhance the amenity values within all neighbourhoods. To this end, the policies recognise the importance of amenity to health and welfare and the inclusion of rules that will maintain amenity values are important Plan methods.

Temporary activities that only have minor effects should be permitted activities: for example, galas and fairs, construction works and sports events, and temporary filming. The impact of such activities may be quite large at the time when they occur, but requiring resource consent would be out of proportion to their overall longer-term impact. In general, because their duration is short-term, and there are economic social and cultural benefits from such activities, the adverse effects are largely accepted by the community. However, where such effects may become unacceptable if too frequent or too lengthy, maximum durations may need to be specified for some temporary activities. Other special

standards may also need to be applied to limit the potential adverse effects of some types of temporary activities.

Residential amenity is particularly sensitive to noise, artificial light and other site-specific adverse effects. These effects can seriously impact upon the health and create considerable animosity between neighbours. The policies and methods have been established to protect residents from such adverse effects.

Noise limit standards are directed at two main types of potential adverse effects: first, the potential for disturbed sleep, particularly during night hours, and second, the interference with people's enjoyment of activities undertaken, particularly in residential and rural areas.

Vibration from land use activities can range in effect from structural damage to buildings to the disturbance of sleep and general annoyance. Such effects can be effectively managed through the imposition of recognised national standards.

Artificial lighting, particularly in residential areas, can adversely affect people's ability to sleep and ability to view the night sky. The two main causes are the general loss of night sky from the cumulative effects of urban lighting, and the nuisance caused by single sources that emit high levels of glare. The visibility of the night sky is most affected by artificial lighting that is projected upwards and excessive lighting that is reflected upwards, in particular by lighting that creates more blue light (cooler colour temperatures). Again such effects can be mitigated through compliance with standards on light emission, including those that control levels across property boundaries, light temperature and light shielding.

Offensive or objectionable odours and excessive dust can result from a range of activities. Odours and dust can detrimentally affect the enjoyment and amenity values of living and working environments. Therefore, it is important these effects are contained within the boundaries of the subject site to an acceptable degree.

Street trees contribute to the overall visual quality of an area. Inappropriate works on the street trees themselves, or on land surrounding the street trees could potentially compromise their special qualities.

There is a variety of public reserve land owned and administered by the Councils. Given the range of land, and diverse legal and reserve status of these different areas of land, different management approaches are used throughout the Wairarapa. It is important the reserve land can continue to be used and maintained for a variety of purposes.

19.3.4 Methods to Implement General Amenity Policies

- (a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa.
- (b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards.
- (c) Conditions on resource consent to control adverse effects of activities.
- (d) Education and information on ways to avoid remedy or mitigate adverse effects on amenity values.
- (e) The allocation of funding through the Long Term Council Community Plan (LTCCP) process for services or initiatives that support the policies on general amenity.
- (f) The use of other statutory powers to support the policies, such as Bylaws, Road Controlling Authority controls and Reserve Management Plans.
- (g) Liaison with Road Controlling Authorities to promote the use of streetlighting with a colour temperature of 3000 Kelvin or lower, shields and other devices on streetlights to direct light downwards.

19.3.5 Principal Reasons for Adoption

Noise limits have been set to control intrusive noise in each of the zones and are within range of limits recommended in New Zealand Standards relating to acoustics.

The methods for artificial light, glare and access to sunlight allow for flexible use and development, while setting minimum amenity standards. This will ensure the amenity for neighbouring properties is not compromised by activities and development on adjacent sites.

There are a number of other methods outside the RMA that can assist in the managing the adverse effects of activities on amenity values. For example, as road controlling authorities under the Local Government Act, Councils have controls over activities occurring within roads.

19.4 Anticipated Environmental Outcomes

- (a) The maintenance of amenity values appropriate to the surrounding environment.
- (b) Minimised conflict over amenity between established uses and temporary activities.
- (c) Preservation of the brightness and clarity of the night sky within the Dark Sky Management Area.

21 DISTRICT WIDE LAND USE RULES

NOTE:

- (i) The permitted activity rules listed below shall apply within all Environmental Zones and Management Areas unless otherwise specified under the rules below.
- (ii) All of the listed permitted activities under this section shall also comply with the relevant standards for permitted activities specified within the underlying Environmental Zones and Management Areas unless otherwise stated in the rules below.

21.1 Permitted Activities

The following are permitted activities, provided they comply with the relevant standards for permitted activities specified below and within the underlying Environmental Zones and Management Areas.

21.1.1 Notable Trees and Street Trees

- (a) Any activity affecting any tree listed in [Appendix 1.4](#) which meets the following standards:
 - (i) No activity shall result in more than minor trimming of any tree in [Appendix 1.4](#), where minor trimming means:
 - (1) The removal of broken branches, deadwood or diseased vegetation;
 - (2) The removal of branches interfering with buildings, structures, overhead wires or utility networks, but only to the extent that the branches are touching those buildings, or structures, or interfering with those overhead wires or utility networks; or
 - (3) Other trimming necessary to maintain the health of a listed tree, certified by a person with an appropriate level of expertise.
 - (ii) The minor trimming of any tree shall not adversely affect the health or appearance of the tree.
 - (iii) No activity within the earth below the dripline of a listed tree shall result in:
 - (1) The destruction, removal or partial removal of the listed tree;
 - (2) The alteration of existing ground levels by excavation or deposition of soil including thrust boring and directional drilling;
 - (3) The covering of the ground by any building or structure or the storage of goods, including the parking of vehicles;
 - (4) The laying of any impervious surface; or

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Note: An approval under Part IIIA of the Forests Act 1949 means the harvesting of indigenous timber carried out under an approved sustainable forest management plan or permit that has been approved by the Secretary of Forestry under Part IIIA of the Forests Act 1949 (as amended by the Forests Act Amendment Act 1993).

21.1.7 Wetland Restoration and Enhancement

- (a) Any planting of indigenous wetland species and removal of exotic species (including weed and pest removal) within a wetland.

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21.1.8 Reserves

- (a) The use and development of any Council or crown owned land for reserve purposes, recreational activities and facilities.
- (b) The use and development of any land managed in accordance with an Approved Reserve Management Plan.

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21.1.9 Significant Waterbodies

- (a) Earthworks within 25 metres of any Significant Waterbody listed in [Appendix 1.9](#) for the following purposes:
- (i) The maintenance of drains, fences, man-made dams, access tracks and roads;
- (ii) Approaches to culverts.

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21.1.10 Activities on the Surface of Freshwater

- (a) Any activity, excluding motorised commercial recreation, on the surface of any freshwater body (including wetlands, rivers and lakes) which meets the following standard:
- (i) Structures shall be:
- (1) Less than 10 square metres in gross floor area; and
- (2) Located on or above the surface of water for less than two months within a twelve-month period.

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Note: Activities on, under or over freshwater may require resource consent from the Wellington Regional Council.

21.1.11 ~~Glare and Outdoor~~ Artificial Light

- (a) The emission of ~~outdoor artificial~~ light (including glare) meets the following standards:
- (i) A maximum artificial light level of 8 lux (lumens per square metre) measured at 1.5m above ground level at the site boundary.
- (ii) ~~Within the Dark Sky Management Area identified within Appendix 15, all outdoor lighting shall have a colour temperature of light emitted of 3000K Kelvin or lower.~~
- (iii) ~~Within the Dark Sky Management Area identified within Appendix 15, all outdoor lighting with a light output of 500 lamp~~

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lumens or greater shall be shielded or tilted so as to not emit any light at or above a horizontal plane measured at the light source.

Exception:

- (iv) Lighting controlled by motion-activated switches limiting the duration of illumination to less than five (5) minutes after activation are exempt from complying with standards (ii) and (iii) above.

(b) Outdoor Sports Lighting at Recreation Facilities

Within the Dark Sky Management Area identified within Appendix 15, the emission of light from outdoor sports lighting at Recreational Facilities which meets the following standards:

- (i) All outdoor sports lighting shall have a colour temperature of light emitted of 4000K Kelvin or lower.
- (ii) Outdoor sports lighting shall be designed to the illumination levels recommended in Australian Standard AS 2560 Guide to sports lighting, all parts. Maximum permitted illumination level is to be that recommended for "Level 3" competition standard. The lighting designs initial levels shall not exceed the recommended average service illuminance level by more than 50% and shall meet the recommended uniformity.
- (iii) Luminous intensity from any light source for any viewing angles at 1.5m height, at a distance of 45m beyond the field shall not exceed 1000 candela.
- (iv) Outdoor sports lighting shall not operate between 10pm and 7am.
- (v) All outdoor sports lighting shall provide the following controls:
 - (1) Automatic curfew controls to ensure the lighting is off between 10pm and 7am.
 - (2) Local control to turn lights on and off.
 - (3) If the lighting has a lighting level for competition, it shall also have a selectable lower lighting level for training.

DISCUSSION DRAFT

22 ASSESSMENT CRITERIA

22.1 Consents under District Wide Rules

These criteria are not exclusive, as other criteria may be considered when assessing a discretionary activity.

22.1.1 Subdivision

(a) General Assessment Criteria

Amenity

- (i) The extent to which the area's amenity values and character are protected and/or enhanced.
- (ii) The ability to avoid, remedy or mitigate reverse sensitivity effects where specific site characteristics and the nature of adjoining or nearby land uses are likely to generate the potential for complaints about adjoining land based primary production activities, or other lawfully established activities.

Natural Resources

- (iii) The extent to which existing landforms, significant trees, indigenous vegetation and habitats and waterbodies are protected and/or enhanced.
- (iv) Whether the subdivision would create adverse effects on groundwater quality.
- (v) The provision for esplanade reserves and/or strips.

Physical Resources

- (vi) Whether the subdivision is consistent with the requirements of New Zealand Standard 4404:2004 Land Development and Subdivision Engineering and other related standards.
- (vii) The provision of a potable water supply.
- (viii) The adequate and effective disposal of sewage and stormwater, or the ability of every lot to dispose of sewage and stormwater effectively without risk to public health and the environment.
- (ix) The cumulative impacts on infrastructure and its efficient use and development, including the capacity, safety and efficiency of the roading and rail network, and the ability of the area's utility services to function efficiently.
- (x) The adequate provision of access within every lot to meet modern vehicular standards.
- (xi) The provision of renewable energy and energy efficiency in the design and construction methods of the subdivision, and the consequential land use development.

22.1.17 Outdoor Artificial Light

- (i) The extent to which the light will adversely affect adjoining allotments.
- (ii) The impact of light direction on the safe and efficient operation of the road network.
- (iii) The extent to which the lighting(s) are is necessary for reasons of security, heritage, public amenity, or safety.
- (iv) The hours during which the lighting will operate.
- (v) Proposed methods to avoid, remedy or mitigate potential adverse effects including the height, orientation, angle, light colour temperature, and shielding of the light source.
- (vi) The extent to which the light will contribute to skyglow and adversely affect the quality of viewing of the night sky.
- (vii) For outdoor sports lighting, whether the lighting is consistent with the requirements of Australian Standard AS 2560 Guide to sports lighting.

22.1.18 Coastal Environment

- (i) The actual and potential effects of the location, type and density of subdivision and development on coastal amenity, landscape, open space, heritage values, ecological values, riparian management, foreshore management, and the natural character of the rural and coastal environment.
- (ii) Whether the subdivision/development introduces built structures to the coastal environment, and their effects on the open coastal vistas from public viewpoints, in particular where public roads are in close proximity to the coastal margin.
- (iii) The cumulative effects of subdivision and development on the coastal environment and the provision of infrastructure and services.
- (iv) The risks from natural hazards.
- (v) The extent to which public access is maintained and enhanced to the coast, including the provision of esplanade reserves.
- (vi) The extent to which the subdivision and development protects historic heritage, archaeological sites and waahi tapu sites.
- (vii) Whether the area is known for its importance as a food gathering or mahinga mataitai and/or mataitai area, and the development's effects on these areas.
- (viii) The extent to which a proposal on the landward side of MHWS will affect the coastal marine area.
- (ix) The extent to which the subdivision and development is consistent with the 'Caring for our Coast' Guidelines and any applicable Management/Structure Plan.

27 DEFINITIONS

Accessory building - means a detached structure, the use of which is ancillary and incidental to any lawful existing use on the site, and includes carports whether or not attached to the principal building.

Accessway - means, in relation to a rear site, all land that provides physical and legal access for one or more properties and which is held by an individual owner or in common, and it includes entities such as a driveway, right-of-way, private way and common access lot.

Assessment of Environmental Effects (AEE) - means an assessment of the environmental effects in accordance with the Fourth Schedule of the Resource Management Act 1991.

Bed – this is the definition applied in Section 2 of the Resource Management Act for a 'bed' in relation to any river for the purpose of the esplanade reserves.

Boarding kennels – kennels that are used to accommodate dogs for short-term accommodation purposes for the payment of a charge. The dogs do not permanently reside on the subject site.

Boundary Adjustment - means the subdivision of land comprised in two or more contiguous lots (notwithstanding any separation by any road, railway line or waterbody) involving the realignment and/or reconfiguration of boundaries where the number of existing certificates of title do not increase.

Building – means any structure, temporary or permanent, movable or immovable, and includes water tanks more than 1000 litres capacity, but excludes:

- Fences or walls of 2m or less in height above ground level or retaining walls of 2m or less in depth below ground level
- Masts and poles less than 2m in height above ground level
- Radio and television aerials (excluding dish antenna greater than 1.2m in diameter) less than 2m in height
- Uncovered decks not more than 1m above ground level
- Uncovered swimming pools no higher than 1m above ground level
- Up to 0.6m of overhanging eaves
- One building per allotment not exceeding 2m in height and 6m² in floor area provided the height to boundary performance standard is met
- Temporary structures associated with maintenance activities and construction works
- Structures intended primarily for erosion control or flood protection.

Building coverage – the percentage of the allotment covered by buildings.

Building Setback – the distance from the boundary within which no building can be erected, and any such area shall be left unoccupied and unobstructed by any structure from the ground level upwards.

- *Front boundary* – the boundary adjoining any road
- *Other boundary* – all other boundaries excluding the front boundary
- *Common wall boundary* – the boundary where two buildings join along an allotment boundary by way of a common wall.

Lamp lumens – the initial total amount of light produced by a light source just after it has stabilised but before depreciation (loss of operational efficiency) has started.

Landscaping – the visual improvement of an area through designed planting, paving, garden seating and other such enhancement.

Large lot – in terms of the Jellicoe Residential Character Area, this means a lot identified on the Jellicoe Residential Area Structure Plan as a “large lot”.

Loading space – a defined area of an allotment that has access to a road or service lane for the exclusive use of transferring goods from a vehicle to an activity or vice versa; excludes parking, landscaping or other similar required areas.

Lot – means an allotment defined in Section 218 of the Resource Management Act 1991.

- Front Lot – means a lot which directly abuts a street for the full length of one boundary;
- Rear Lot – means a lot situated to the rear of another site and which does not directly abut a street for any boundary except for the accessway.

Mahinga Maataitai – means the area from which food reserves from the sea are gathered.

Meteorological Structure – means a mast or pole structure and any support structures, on which anemometres and other meteorological devices or sensors are attached.

Minor Dwelling – means any building with at least one habitable room regardless of whether kitchen facilities are provided or not.

Motorised Outdoor Recreation Activity – means any activity involving a motor driven vehicle on land and/or water and includes motorbikes, off-roaders, all-terrain vehicles, jetboats and jetskis, in which the use of the vehicle is operated for profit or are organised activities with their own dedicated tracks and facilities.

Municipal Wastewater Treatment Plant - A municipal Wastewater Treatment Plant is a facility designed to treat municipal wastewater by reducing contaminants from wastewater and household sewage, both runoff (effluents) and domestic. It includes physical, chemical and biological processes for reducing contaminants. Its objective is to produce environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or re-use.

Network Utility – means any utility which is part a network and includes electrical lines, water, sewage and stormwater reticulation, streetlighting, telecommunication facilities, radiocommunications facilities, gas, roads, railway lines, airports, lighthouses, navigation aids and beacons, meteorological services and associated support structures.

Nighttime hours – Unless otherwise specified, 1 hour after sunset to 1 hour before sunrise.

Noise Emission Level - means a level of sound measured in accordance with NZS 6801: 1999 “Acoustics - Measurement of Sound” and assessed in accordance with NZS 6802: 1991 “Assessment of Environmental Sound” except as expressly provided for in this Plan. Where NZS 6802:1991 does not

- The operation of airborne aircraft including helicopters, except in relation to the use of aerodromes and landing areas.
- e) Where in noise rules in this Plan, the noise emission limit applies “at any point within any site other than the site from which the noise is generated” then neither shall the noise standard apply at or within the boundaries of any other site included in the parcel of land that incorporates the site from which the noise is generated, provided that:
- All sites in the parcel of land are held under the same ownership or under the same management; and
 - To be considered part of the parcel of land each site shall remain contiguous with at least one other site in the parcel that is under the same ownership.

Noise sensitive activities – means activities which involve habitation, or which require concentration of people and includes residential activities, residential units, residential institutions, visitor accommodation, papakainga, marae, wharenuī, places of assembly, hospitals, health care facilities and education facilities (other than airport staff and aviation training facilities).

Notable tree – means a tree that has been identified and assessed as a tree of significant value for botanical and/or for historic, cultural, spiritual, landmark or other community reasons, and is listed in the Schedule of Notable Trees in this Plan.

Notional Boundary - A line 20 metres from the wall of a habitable building used for residential purposes. If the site boundary is closer than 20 metres to the building at any point, the site boundary is to be treated as the notional boundary at that point.

Official Signs – means any sign for public safety erected in fulfilment of legislative responsibilities to provide advice, warnings or education for the purpose of people’s wellbeing and safety. These signs include, but are not limited to fire risk signs, health and safety obligations and hazardous substances.

Official Traffic Sign – means any sign erected or approved by a road controlling authority (as defined in Section 2(1) of the Land Transport Act 1998) for the purposes of regulating, warning, or informing road users (including pedestrians) of road conditions, locations, activities, traffic control, or other such information relative to the use of the road, including tourist and essential service facilities. This definition also includes other road controlling devices, such as traffic lights, railway crossing lights and barrier arms.

Outdoor Sports Lighting – Artificial lighting required only for the purposes of illumination of an area where outdoor recreation activities will occur at night.

Outstanding Landscape Area – an area considered significant due to outstanding natural landscape attributes, listed in the Schedule of Outstanding Landscape Areas and identified on the Planning Maps.

Oxidation Pond - A man-made (anthropogenic) body of water in which waste is consumed by bacteria, or a pond that contains partially treated wastewater which is then left to grow algae and bacteria which decompose the rest of the waste.

Papakainga housing – means use and development of multiple residential units and other buildings to enable whanau and extended family to live on any Maori land (as defined by Section 129 of the Te Ture Whenua Maori Act 1993).

Recreation Activity – Any activity where there is the passive or active pursuit of leisure, which can be competitive or non-competitive, casual or organised but does not include buildings and structures.

Recreation Facility – Any reserves, buildings or structures (temporary or permanent), required to enable active or passive recreation; and includes gymnasiums, grandstands, stadiums, clubrooms, viewing platforms, night lighting, and sealed courts.

Redevelopment – further development including extensions to existing structures, erection of new structures, development of more than one activity on an allotment, or new development to change the land use.

Relocated building – The movement of an existing used building to a new Certificate of Title.

Residential activities – The use of land and buildings by people for the purpose of living accommodation (up to 5 residents if subject to permanent on-site care or supervision) and includes associated accessory buildings (including elderly relative accommodation) but not long-term hospital or medical care facilities, or visitor accommodation (other than homestays), or serviced residential units.

Residential business – means an occupation, craft or profession undertaken within premises that are primarily used for residential purposes, but excludes any retailing of products not assembled or manufactured on the site.

Residential unit – a self-contained residential accommodation unit to be used exclusively by one household unit and includes residential units within multi-unit and retirement village developments.

Retail activity – the use of land or premises for the sale or hire of goods to the general public.

Retirement Villa – any residential unit development within the site of the Greytown Villas Character Area, with design features particularly suited to the needs of retirees, but does not include advanced residential health care facilities. A retirement villa may be a single or multi-unit.

Roading Hierarchy – the classification of roads according to the function, location and traffic carrying capacity (Refer to [Appendix 5](#) for classifications).

Sign – any text, graphics or lighting effect designed or intended to attract attention, whether placed on or attached to any land or building or incorporated in the design of any building which is visible from any public space. This includes any materials used on the sign, as well as any additional structure, support, frame or anchorage.

Significant Natural Area – an area considered significant due to ecological attributes, listed in the Schedule of Significant Natural Areas and identified on the Planning Maps.

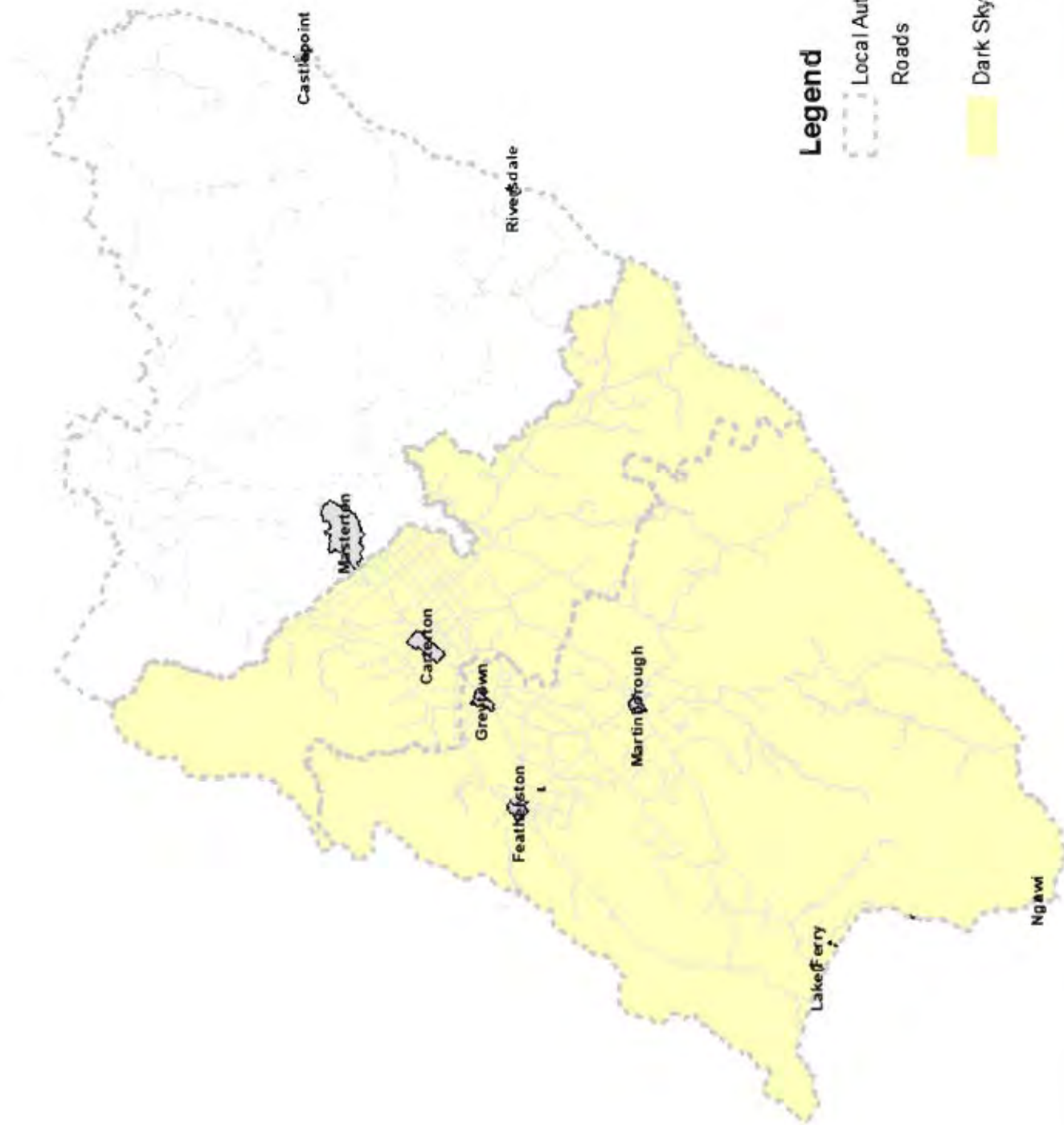
Site – means any area of land comprised wholly in one Certificate of Title, or the titles of an activity if it occurs over more than one title.

Sites of Historic Value – sites considered significant due to heritage attributes, listed in the Schedule of Historic Heritage Sites, and identified on the Planning Maps.




Skyglow – the lighting of the night sky caused by light directed near horizontally and into the sky either directly (from light sources that project light above the horizontal) or indirectly (reflected from a surface).

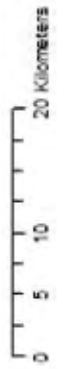
DISCUSSION DRAFT

Appendix B: Proposed Appendix 15: Dark Sky Management Area Map



Legend

-  Local Authority Boundaries
-  Roads
-  Dark Sky Management area



Dark Sky Management Area

Appendix C: Stephenson and Turner Lighting (S&T Lighting) Report

Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve



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South Wairarapa District Council

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Introduction

Context

South Wairarapa District Council (SWDC), along with Carterton and Masterton District Councils, is supporting an application by the Martinborough Dark Sky Society (MDSS) for the Wairarapa to be certified as an International Dark Sky Reserve by the International Dark Sky Association (IDA).

An international dark sky reserve is an area of public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for any one or more of the following: cultural, natural, educational, scientific or public purposes.

There are 12 Dark Sky Reserves across the world. There is currently only one dark sky reserve in New Zealand located within the Aoraki Mackenzie Valley. If the Wairarapa was to become a dark sky reserve, it would be the world's largest. There are also two dark sky Sanctuaries within New Zealand, being Stewart Island and Great Barrier Island.

Light pollution is the biggest threat to gaining certification, as light pollution hinders the ability for people to view the night sky. To qualify as a dark sky reserve, light pollution within the region must be controlled.

The IDA has guidelines that a reserve is required to meet before it can gain certification. This includes restrictions on new lighting, requiring light shielding, limits on light levels, light spectrum and lighting times. There is therefore a need to control lighting within the district to a level that can satisfy the IDA guidelines.

To control light pollution within the district the Councils are looking to prepare a plan change to amend the lighting provisions contained within the Wairarapa Combined District Plan (WCDP). Amended provisions would ensure that new lighting complies with IDA guidelines which would control light pollution and its adverse effects on the visibility, brightness and clarity of the night sky.

This review does not consider whether the current WCDP lighting provisions provide adequate protection of residential amenity. We understand such a review will form part of an upcoming review of the WCDP.

Stephenson & Turner as appropriately qualified lighting engineers have carried out an assessment of the current WCDP lighting provisions and the IDA International Dark Sky Reserve requirements and provide recommendations for revisions to the WCDP lighting provisions.

Scope of Review

The scope of our review:

1. A review of the WCDP to provide an assessment of the level of guidance and control provided for the protection of quality of views of night sky.
2. A review of the IDA requirements for an International Dark Sky Reserve.

3. A review of other documents that look to control light pollution to meet IDA requirements. (For example, the lighting provisions within the McKenzie District Plan and how they satisfy the IDA requirements for their Aoraki Mackenzie International Dark Sky Reserve).
4. Technical input as to the necessary standards and requirements within the WCDP to control lighting to meet IDA requirements for an International Dark Sky Reserve.
5. Technical input as to any specific activities (i.e. sports fields) that may require targeted district plan standards and requirements to meet IDA requirements for an International Dark Sky Reserve.
6. Technical input into developing WCDP Assessment Criteria for consideration by the Council when considering resource consent applications for lighting which does not meet the proposed new permitted activity standards and requirements.

Dark Sky Lighting Effects and Lighting Management Provisions

Effects of lighting on the Dark Sky - Skyglow

Skyglow or the brightening of the night sky is the primary effect that must be minimised to provide optimum night sky viewing. Brightening of the night sky has the effect of reducing the apparent brightness of stars and hence this reduces the quality of views of night sky.

Skyglow comprises two separate components as follows;

- a) Natural skyglow, that part of the skyglow that is attributable to radiation from celestial sources and luminescent processes in Earth's upper atmosphere.
- b) Artificial skyglow, that part of skyglow that is attributable to man-made sources of radiation (e.g. outdoor lighting), including light radiation that is emitted above the horizontal and light radiation that is reflected from the surface of the earth.

The IDA provides requirements for the management of artificial skyglow from artificial lighting in order to be a dark sky reserve.

IDA International Dark Sky Reserve Program Guidelines

With reference to the IDA's International Dark Sky Reserve Program Guidelines dated June 2018.

In order to be considered for Dark Sky Reserve Certification the area of land must be at least 700km² and consist of;

- A "core" area which meets minimum requirements for quality of sky and darkness.
- A "buffer" area which supports the core area's dark sky values and receives similar benefits.
- The "core" and the "buffer" collectively make up the dark sky reserve.

- The Aorangi Forest Park is the “core” of the dark sky reserve.
- The area outside of Aorangi Forest Park, all the way to the South Wairarapa, Carterton and Masterton district boundaries are the “buffer” of the dark sky reserve.

Additionally, the core must;

- Provide an opportunity for regular public nighttime access, with or without supervision.
- Must provide an exceptional dark sky resource, relative to the communities and towns that surround it.

A comprehensive Lighting Management Plan (LMP) is a minimum requirement for all dark sky reserves, the LMP must be adopted by at least 80% of population and 80% of designated area of protection (core and buffer). The regulations contained in the LMP must apply to all private and public landowners within the area of protection. Some exceptions may apply but are individually subject to IDA approval.

To meet this requirement within the Wairarapa District the Councils are looking to prepare a plan change to amend the lighting provisions contained within the Wairarapa Combined District Plan (WCDDP). Amended provisions would ensure that the minimum lighting management provisions required by IDA are included in the WCDDP

IDA International Dark Sky Reserve Minimum Lighting Management Provisions

The minimum lighting management provisions that the IDA requires/recommends are based on Five Principles for Responsible Outdoor Lighting and are based on simple ideas; limit light at night to where and when it is needed, don't overlight, and be sensitive to environmental concerns. These Five Principles are summarised in the following table.

LIGHT TO PROTECT THE NIGHT
Five Principles for Responsible Outdoor Lighting




USEFUL		<p>ALL LIGHT SHOULD HAVE A CLEAR PURPOSE</p> <p>Before installing or replacing a light, determine if light is needed. Consider how the use of light will impact the area, including wildlife and the environment. Consider using reflective paints or self-luminous markers for signs, curbs, and steps to reduce the need for permanently installed outdoor lighting.</p>
TARGETED		<p>LIGHT SHOULD BE DIRECTED ONLY TO WHERE NEEDED</p> <p>Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.</p>
LOW LIGHT LEVELS		<p>LIGHT SHOULD BE NO BRIGHTER THAN NECESSARY</p> <p>Use the lowest light level required. Be mindful of surface conditions as some surfaces may reflect more light into the night sky than intended.</p>
CONTROLLED		<p>LIGHT SHOULD BE USED ONLY WHEN IT IS USEFUL</p> <p>Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.</p>
COLOR		<p>USE WARMER COLOR LIGHTS WHERE POSSIBLE</p> <p>Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.</p>

The primary objective of the lighting management provisions recommended by IDA is to prevent the brightening of the night sky, which has the effect of reducing the apparent brightness of stars and quality of views of night sky.

The IDA expects them to guide the selection, placement, installation and operation of all new and replacement/retrofitted light in the Dark Sky Reserve. These lighting management provisions should be implemented as much as is practicable for both public and private installations.

The IDA preference is that the use of outdoor light at night should only be strictly, where it is needed, and in the appropriate amount for a specific task. The purpose of outdoor light that is allowed should be specifically to ensure public safety.

IDA Lighting Management Provisions within the Core

The IDA has very restrictive lighting management provisions for the “core”. As the core is fully within the Aorangi Forest Park it is expected that these provisions would be regulated by the Department of Corrections through their inclusion in their Aorangi Forest Park Management Plan and therefore these provisions do not require inclusion in the WCDP.

Within the core the installation of outdoor lighting is permitted only in instances where the administrating authority determines that a public safety hazard exists that can only be mitigated through the use of outdoor light at night. Otherwise the default policy should be not to light.

Shielding

All outdoor light fittings whose light source has an intensity of equal to or greater than 500 lumens shall be fully shielded. Light fittings who have an intensity of less than 500 lumens may be left unshielded for special purposes, such as historical preservation. The approved special uses must be stated in the LMP.

“Fully shielded” is defined such that that the light source is screened and, when mounted, its light directed in such a way that none is emitted at or above the horizontal plane passing through the lowest light-emitting portion of a light fitting. Light emitted just above horizontal (horizontal to 20° above horizontal) is a significantly higher contributor to skyglow than light emitted at higher angles.

Light fittings controlled by motion-activated switches which limit the duration of illumination to less than five (5) minutes after activation are exempt from this shielding provision

Tilted Light fittings

All outdoor light fittings whose light source has an intensity of equal to or greater than 500 lumens shall be mounted and tilted such that no light is directed at or above the horizontal plane passing through the lowest light-emitting portion of the light fitting. . Light emitted just above horizontal (horizontal to 20° above horizontal) is a significantly higher contributor to skyglow than light emitted at higher angles.

Light fittings controlled by motion-activated switches which limit the duration of illumination to less than five (5) minutes after activation are exempt from this shielding provision

Light Colour Temperature

Light is part of the electromagnetic spectrum. The human eye perceives visible light in the region of 280 nanometers (nm) to 780nm of the electromagnetic spectrum. Visible blue light extends from 424nm to 500nm.

Blue spectrum light is more strongly scattered by the night sky, increasing the levels of sky glow at night. Therefore, if the amount of blue light emitted by a light fitting is reduced its effect on skyglow is significantly reduced.

As a rough indicative measure, the lighting industry uses correlated colour temperature (CCT), measured in Kelvin (K) to describe the perceived colour of the light produced by a light source. A lower CCT generally, corresponds to a relatively lower proportion of blue light. For example a 3000K light source generally has 25% less blue light than a 4000K light source.

Outdoor light fittings shall be chosen to minimise the amount of blue light emitted into the nighttime environment.

In no case shall the outdoor light fittings have a light colour temperature exceeding 3000K.

Within the “core”, the light colour temperature is limited to 2700K maximum, with amber to warm-white preferred.

ILLUMINATED SIGNS

Internally illuminated signs are prohibited in the “core”.

In all other areas internally-illuminated signs, and signs illuminated by electronic means such as LEDs and similar lighting, shall be installed and operated according to the following requirements:

1. Use of such signs from one hour after local sunset to one hour before local sunrise is prohibited. Such signs will be equipped such that they are extinguished automatically at these times.
2. Displays must be single-color on a black background in design.
3. Luminance of such signs after sunset may not exceed 100 candelas per square metre.

LIGHTING LEVELS

Lighting within the “core” will be designed in consideration of the very low levels of ambient lighting. This means that less lighting is required than in a similar situation in a bright urban setting with high levels of ambient lighting.

While the relevant New Zealand Standards should be adhered to in designing any lighting scheme for the safety of users, special consideration and lighting techniques should be utilised to protect the night sky.

Within the “core” the following table gives the maximum lighting levels that will be used unless a demonstrated need for higher lighting levels exists.

Application	Lighting level (lux)
Building entry	0.3 lux
Trailheads	0.5 lux
Parking lot	10 lux (amber) / 1 lux (2700K)
Restroom entry	0.5 lux
Entrance station	10 lux (amber) / 1 lux (2700K)
Roadway	0 lux
Signage	0.5 lux
Flag	0 lux

Target levels not to be exceeded by more than 25%

For the “buffer zones” minimum lighting levels (lux) required for the nighttime activity should be used, with avoidance of unnecessary over-lighting.

CURFEW

In the “core” dusk-to-dawn lighting is not generally allowed. All outdoor lighting shall be extinguished between the hours of 10pm and one hour before sunrise, except in cases where visitor or staff presence or traffic dictates otherwise.

Adaptive Controls

To the greatest practical extent possible, all lighting should make appropriate use of adaptive controls to limit the duration, intensity, and/or extent of outdoor lighting. A total ON/OFF solution is preferred, but in specific cases light could remain ON at 10% of their nominal output.

The motion-activated switches shall limit the duration of illumination to less than five (5) minutes after activation.

Temporary Lighting

Allowable installations of outdoor lighting in the “core” for temporary purposes, shall be limited to the minimum number of nights required to complete the task that the lighting illuminates. Staff responsible for such installations will follow these guidelines to the greatest practical extent, and will endeavour to limit as much as possible off-site impacts of such lighting.

Light Painting

Within the “core” inappropriate, high-intensity light painting of landscapes, the use of floodlights or searchlights (other than for search and rescue), and similar uses of outdoor lighting is prohibited.

Sports Field Lighting

There is no existing sports field lighting within the “core”, the use of sports lighting within the “core” should be prohibited.

With reference to IDA – Criteria for Community-Friendly Outdoor Sports Lighting v1.0, the following is a summary of the IDA requirements for outdoor sports lighting within a Dark Sky Reserve.

1. Target illuminance for on field illuminance are to be appropriate for the application per IESNA RP-6-15 Sports and Recreation Area Lighting and only Class III and IV are permitted

FACILITY	CLASS			
	I	II	III	IV
Professional	X			
College	X	X		
Semi-Professional	X	X		
Sports Clubs	X	X	X	
Amateur Leagues		X	X	X
High School		X	X	X
Training Facilities			X	X
Elementary School				X
Recreational Event				X
Social Event				X

Class I: Facilities with spectator capacity over 5,000
Class II: Facilities with spectator capacity under 5,000
Class III: Facilities with some provision for spectators
Class IV: Facilities with limited or no provision for spectators

In New Zealand it is standard practice when designing outdoor sports lighting to refer to the Australian Standard AS 2560 Guide to Sports Lighting series of standards which are equivalent to IESNA RP-6-15, within AS 2560 “Level 2” typically referred to as “Training Standard Lighting” and “Level 3” typically referred to as “Competition Standard Lighting” are the predominant required illumination levels. To limit over-lighting, the design may vary by no more than 10% above the average target illuminance level.

2. All light fittings must be designed such as to not emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modelled may be in this zone.
3. Spill light not to exceed the permitted activity standard at the boundary.
4. Glare, luminous intensity from any light fitting for any viewing angles at 1.5m height, at a distance of 45m beyond the field shall not exceed 1000 candela.
5. Provide lighting controls for the following;
 - a. Automatic shut-off at locally established curfew time, not to be later than 11pm.
 - b. On site manual and/or remote control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to ensure only active sports fields are lighted.
 - c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field. For example Level 2 and Level 3 standards of lighting.
 - d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced.
6. The light fitting Colour Temperature (CCT) may not exceed 5700K. Lighting technologies have developed such that it is now possible to illuminate sports fields with 4000K light fittings, which is an improvement over 5700K, with 3000K preferred.

7. The installed field lighting is not to be used for illuminating other area tasks. For example, if parking area lighting is desired. They shall be illuminated by separate light fittings and systems not associated with the sports field illumination needs.

Existing WCDP lighting provisions

We carried out an analysis of the effectiveness and appropriateness of current WCDP lighting provisions in the protection of quality of views of night sky.

Wairarapa Combined District Plan (WCDP)

The Wairarapa Combined District Plan (WCDP) applies across the three District Councils of the Wairarapa, namely Masterton, Carterton and South Wairarapa.

Lighting within each district is currently controlled by the provisions within the WCDP. The plan manages lighting through provisions within the 'general rules' of the plan. These provisions apply to all outdoor lighting, regardless of activity / location across the districts.

The provisions relevant to the control of lighting within the districts and our associated review comments are outlined in the table on the following page.

From this review it is our opinion that the current WCDP lighting provisions are inadequate to provide the protection of quality of views of night sky required by IDA for a dark sky reserve.

Review of WCDP lighting provisions

Chapter	Provision	Detail	Review Comments
Chapter 5 – Residential Zone	5.3.3 Explanation	5 th paragraph, 3 rd sentence - <i>The effects of vehicle access, movement and manoeuvrability, noise emissions, artificial light levels and signage may also need to be controlled to address potential effects on safety and amenity.</i>	Includes requirement for artificial light levels to be controlled to address potential effects on safety and amenity. No specific requirement to protect effects on quality views of the night sky.
Chapter 6 – Commercial Zone	6.5.4 Standards for Controlled Activities (a) Carterton Character Area	(10) <i>Under verandah lighting must be provided and shall be sympathetic in scale and design to traditional or heritage qualities.</i> (12) <i>No sign shall be illuminated by any means other than directional lighting.</i>	No specific requirement to protect effects on quality views of the night sky.
Chapter 19: General Amenity Values	19.3.2 GAV1 Policies	(e) <i>Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, and to protect the clarity and brightness of the night sky. Implemented through Method 19.3.4(a), 19.3.4(b) 19.3.4(c) and 19.3.4(g).</i>	We recommend this policy is revised to include a policy reference to the Dark Sky Reserve and implementation method extended to entirety of new lighting provisions 19.3.4: (e) <i>Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads.</i> (f) <u><i>Within the Dark Sky Lighting Management Area, manage the light colour temperature, shielding and hours of operation of outdoor artificial lighting to mitigate skyglow to protect the clarity and brightness of the night sky.</i></u> <i>Implemented through Method 19.3.4.</i>
	19.3.3 Explanation	4 th paragraph – <i>Residential amenity is particularly sensitive to noise, artificial light and other site-specific adverse effects. These effects can seriously impact upon the health</i>	No specific requirement to protect effects on quality views of the night sky.

		<p><i>and create considerable animosity between neighbours. The policies and methods have been established to protect residents from such adverse effects.</i></p> <p><i>7th paragraph – Artificial lighting, particularly in residential areas, can adversely affect the ability to sleep. The two main causes are the general loss of night sky from the cumulative effects of urban lighting, and the nuisance caused by single sources that emit high levels of glare. Again such effects can be mitigated through compliance with standards on light emission levels across property boundaries.</i></p>	<p>7th paragraph – This sentence is a bit mixed up, we recommend the wording is revised.</p> <p><i>Artificial lighting standards, are directed at two main adverse effects: first, residential amenity and the ability to sleep and second, the general loss of night sky from the cumulative effects of outdoor lighting. Again such effects can be mitigated through compliance with standards on light emission levels across property boundaries.</i></p>
	19.3.4 Methods	<p><i>(a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa.</i></p> <p><i>(b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards.</i></p> <p><i>(c) Conditions on resource consent to control adverse effects of activities.</i></p> <p><i>(g) Liaison with Road Controlling Authorities to promote the use of shields and other devices on streetlights to direct light downwards.</i></p>	<p>(a), add protection of the night sky: <i>(a) Performance standards for permitted activities to maintain general amenity values and quality of views of night sky throughout the Wairarapa.</i></p> <p>(b), note that a resource consent is required for any departure from lighting performance standards.</p> <p>(c), is appropriate.</p> <p>(g), inclusion of this clause implies that the lighting standards apply to streetlights. Therefore, the impact of lighting provisions on road lighting needs to be considered.</p>
Chapter 21- General Rules	21.1.11 Glare and Artificial Light - Permitted Activity	<p><i>(a) The emission of light (including glare) meets the following standard:</i></p> <p><i>(i) A maximum artificial light level of 8 lux (lumens per square metre)</i></p>	<p>No specific rules to protect effects on quality views of the night sky.</p> <p>Provisions required to minimise skyglow to protect the brightness and clarity of the night sky.</p>

		<i>measured at 1.5m above ground level at the site boundary.</i>	
Chapter 22 – Assessment Criteria	22.1.17 Artificial Light	<p><i>(i) The extent to which the light will adversely affect adjoining allotments.</i></p> <p><i>(ii) The impact of light direction on the safe and efficient operation of the road network.</i></p> <p><i>(iii) The extent to which the light(s) are necessary for reasons of security, public amenity, or safety.</i></p> <p><i>(iv) The hours during which the lighting will operate.</i></p> <p><i>(v) Proposed methods to avoid, remedy or mitigate potential adverse effects including the height, orientation, angle, and shielding of the light source.</i></p>	<p>There are no assessment criteria for considering the effects of artificial light on the quality of views of night sky. Therefore, we recommend the addition of the following criteria:</p> <p><u><i>(vi) The extent to which the light will adversely affect skyglow and the quality of views of night sky.</i></u></p>

Reference Documents

In carrying out this review and providing lighting provision recommendations we have referred to lighting standards, Operative District Plans, lighting management plans and IDA annual reports for other Dark Sky Reserves and Sanctuaries. The following provides an outline of standards or provisions that are relevant to meeting the IDA minimum requirements for Lighting Management Provisions for an International Dark Sky Reserve.

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

There is a combined Australian/New Zealand standard AS/NZS 4282:2019 released in 2019 and therefore can be considered to very relevant to today's regulatory requirements and lighting technologies which include LED lighting.

The "Preface" to this standard states that *the objective of this standard is to provide a common basis for assessment of the likely effects of developments that involve the provision of outdoor lighting.*

The "Foreword" to this standard states that *The requirements and recommendations of this Standard are based on surveys of interested parties i.e. local government, electricity utilities and the lighting industry; on studies of people's reaction to obtrusive light; on the extent of spill light from lighting installations; and on precedents for the control of regulatory control of obtrusive light.*

Several aspects of potential obtrusiveness are considered, viz, 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 protecting dark environments..

Relevant guidance from this standard includes;

- a) Because skyglow is caused both by reflected and direct light from the installations, restricting design illuminances to the minimum necessary for the application will provide additional mitigation.
- b) High correlated colour temperature light sources should be avoided as light at the blue end of the spectrum increases light scatter.
- c) The standard provides recommended limits for skyglow based on the calculation of Upward Light Ratio lighting technical parameters that can be applied to control obtrusive effects of skyglow.

Mackenzie District Plan

There is currently only one dark sky reserve in New Zealand located within the Mackenzie Valley, Aoraki. This reserve is located within the boundaries of the Mackenzie District and to achieve its IDA Dark Sky Reserve Certification the lighting provisions within the Mackenzie District Plan (MDP) were updated with the current operable MDP being March 2015.

Relevant guidance from the MDP is accessed in the following table;

MDP Section	MDP Part	MDP Content	Comment and recommendations
Section 12 – Signs, outdoor lighting and aerial distractions	Relevant Objectives and Policies	1. The need for controls on signs and outdoor lighting in the District is important to ensure that the potential effects of these do not adversely affect the amenity of the District.	We agree the need for controls on signs and outdoor lighting.
		2. The type, nature and location of lighting can adversely affect people’s ability to view the night sky. This issue is of great significance due to the existence of the University of Canterbury Mt John Observatory.	We agree with this statement and recommend that reference is made to the significance due to the existence of the International Dark Sky Reserve Certification.
		3. Avoidance of unnecessary light pollution in the Mackenzie Basin.	We agree, an objective of the WCDP plan change is avoidance of unnecessary light pollution in the Combined Wairarapa District.
		4. Preservation of the ability to view the night sky.	We agree, an objective of the WCDP plan change is preservation of the ability to view the night sky.
	13 Outdoor Lighting	<p>Provides outdoor lighting rules, relevant comment includes;</p> <p>5. Rule 13.a provides Permitted Activity Standards applicable to the area shown on the Outdoor Lighting Restriction map (an area around the Mt John Observatory, covers approximately 50% of the Mackenzie District).</p>	<p>These Permitted Activity Standards only apply to a “Outdoor lighting restriction” area which covers approximately 50% of the Mackenzie District. In the WCDP plan change it is proposed to include the districts of to South Wairarapa and Carterton in a ‘Dark Sky Management Area’, to reflect the area of the proposed Wairarapa Dark Sky Reserve.</p>
		<p>6. Rule 13.a.i, <i>Shielding: All outdoor 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.</i></p>	<p>We agree, similar rule should be included in the WCDP.</p>

		<p>7. Rule 13.a.ii, <i>Filtration: All outdoor lights shall have a filter to filter out the blue or ultraviolet light, provided the light source would have more than 15% of the total emergent energy flux in the spectral region below 440nm. The filters used must transmit less than 10% of the light at any wavelength less than 440nm. This therefore includes, but is not limited to, fluorescent, mercury vapour and metal halide lamps.</i></p>	<p>We believe this provision is too technical for most and with new lighting predominantly LED the use of light colour temperature limit of 3000K and below is far simpler as the light colour temperature is printed on the box of LED products. Recommend light colour temperature lighting provision is included in WCDP.</p>
		<p>8. Rule 13.a.iii, <i>No person shall illuminate or display the following outdoor lighting between 11.00pm and sunrise in the designated area:</i></p> <ul style="list-style-type: none"> a. <i>Searchlights.</i> b. <i>Illumination of public recreation facility.</i> c. <i>Outside illumination for aesthetic purposes of any building by floodlight.</i> d. <i>Any outdoor illumination in which light is produced by high-pressure sodium, metal halide, mercury vapour lighting or fluorescent lighting, unless these lamps were installed prior to 1 January 1979 in the Business or Residential Zones in Lake Tekapo or 1 March 1986 in all other zones.</i> 	<p>The objective of this rule is to ensure unnecessary lighting and lighting that uses light sources that have higher skyglow impact are not used between 11.00pm and sunrise. We agree with curfews on unnecessary lighting and recommend curfews on unnecessary lighting are included in the WCDP. The use of “sunrise” in the curfew definition will require automatic controls via astronomical time clocks which are available at a higher cost than traditional time clocks. Use of “6.00am” in lieu of “sunrise” will allow simple time clock control to be used. Rule 13.a.iii.d, is a retrospective rule requiring existing installations to be altered to comply, we do not recommend the inclusion of any lighting provisions in the WCDP that have retrospective impact on existing installations.</p>
		<p>9. Rule 13.b, applies to all other lighting in the Mackenzie District and states <i>all outdoor lighting shall be a permitted activity provided all fixed exterior lighting is directed away from adjacent properties and roads.</i></p>	<p>It is our opinion that this rule provides little actual protection of the dark sky.</p>

Section 18 Outdoor Lighting	Provides outdoor lighting assessment matters to be considered when reviewing Resource Consent applications, relevant comment includes;	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.a, The type and use of outdoor lighting proposed.</i>	
	<i>Rule 18.b, Type of illumination, focused on consideration of emissions at short wavelengths (consideration of blue light content).</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.c, The total power of lamps.</i>	We believe this would be better defined as light fitting total lumen outputs and maximum luminous intensities. Similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.d, Proposed location with respect to distance from the observatory.</i>	For WCDP the distance to the Aorangi Forest Park which is the “core” of the Dark Sky Reserve is important. Similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.e, Duration, time and frequency of proposed lighting.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.f, Whether it is proposed to shield lights to prevent light shining directly above the horizontal.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.g, Whether is proposed to filter out blue and ultraviolet light.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	<i>Rule 18.h, The effect of the proposal on research activity carried out at Mt John Observatory.</i>	For WCDP WCD Assessment Criteria for Discretionary Activities consideration on the effect on the dark sky should be considered.

In summary the MDP includes many lighting provisions that we recommend are included in the WCDP plan change.

IDA Aoraki Mackenzie International Dark Sky Reserve Annual Report

An IDA requirement for IDA International Dark Sky Reserve certification, is for the reserves management to provide an annual report to the IDA, this report can be considered to be a “report card” for the reserve, it provides commentary on their dark sky activities, achievements, quality of night sky views achieved and how regulatory controls are working. The following are some relevant guidance;

1. They propose to launch a scheme to certify commercial enterprises inside the reserve which can demonstrate having dark sky friendly exterior lighting.
2. The most important development is the agreement between New Zealand Transport Agency (NZTA) and the Mackenzie District Council that the 85% NZTA subsidy for new LED streetlights can be used for low colour temperature (2200K) LED lights.
3. Aoraki Mackenzie International Dark Sky Reserve Website:
www.darkskyreserve.org.nz/
4. No new territory was added to the reserve this year. Discussions are occurring to investigate an expansion to the Reserve to include the whole of the Mackenzie District.
5. Updating the Mackenzie District Plan and its lighting ordinance to cover LEDs is further delayed as the Plan undergoes legal and procedural challenges in other areas of the District Plan.
6. The MDC have recently employed a compliance officer to enforce rules including light spill, glare and colour.

Recommendations for new lighting provisions

To ensure that the quality of views of night sky are not adversely affected by artificial lighting and to meet the IDA’s regulatory requirements for lighting management provisions we recommend that the current lighting provisions within the WCDP are amended.

Street lighting

Many lighting standards and Operative District Plans exclude the effects of street lights from their rules and standards.

This is generally because street lighting would not meet the lighting standard limits but is deemed as necessary for all-night safety and security for the public at large.

Further consideration is required on this matter, including discussions with Council roading experts and NZTA before proposing any lighting standards that may impact on the ability to provide appropriate street lighting.

Lighting provisions

Review of Lighting Management Provisions

In the following tables we have listed artificial lighting applications/installations that we expect to exist or be required within the South Wairarapa, Carterton and Masterton Districts and considered the IDA lighting management provision requirements.

In considering the IDA lighting management provisions we considered:

- How it would be enforced (WCDP, DOC, NZTA, voluntary)
- Can it be readily complied with and compliance verified?
- Impact on safety
- Impact on people's amenity, namely their ability to carry out activities outdoors after dark
- Effects on spill light and glare
- Impact on businesses (cost, property security, presence)
- Availability of suitable light fittings and any associated increased cost
- Will it result in a significant number of resource consent applications because the lighting provision cannot be readily meet?

Review of IDA Lighting Management Provisions – Dark Sky Reserve Buffer

Lighting Applications	Lighting Effect	IDA Lighting Control Provision Considered	Comment and recommendations
General Outdoor Lighting Standards	Colour Temperature (CCT)	All outdoor light fittings whose light output is equal to or greater than 500 lumens, its light colour temperature shall be 3000K and below, with 2200K (amber) preferred.	Compliant light fittings are readily available. IDA requirement. Include this provision in WCDP.
	Shielding	All outdoor light fittings whose light output is equal to or greater than 500 lumens, when installed shall not emit any light at or above the horizontal.	Compliant light fittings are readily available, but a number of commonly used light fitting types will not comply. IDA requirement. Include this provision in WCDP.
	Light level	Lighting levels should be the minimum levels required for the task.	A subjective provision, difficult to control. IDA requirement. Provision in WCDP assessment criteria for consideration for discretionary activity.
Illuminated signs and	Light level	Between sunset and sunrise (nighttime) sign luminance must not exceed 100 candela per square metre.	This maximum level of 100 cd/m ² is low with AS/NZS 4282, Table 3.5 recommended a limit of 250 cd/m for a sign within a suburban area. IDA requirement. Include this provision in WCDP but allow up to 250 cd/m ² assessment criteria for discretionary activity.
	Operation time	Shall not operate between 11pm and 6am, except, where the illuminated sign is used to signal that a business on the site is open for business, the operating time can be extended to match the business operating time.	It is our opinion that this will have little impact on advertising as there would be few people around during curfew. IDA requirement. Include this provision in WCDP.
Outdoor sports lighting	Colour temperature	Limit colour temperature of light emitted from light fittings to 5400K and below, with 3000K preferred.	Floodlights currently used for outdoor sports lighting typically have a colour temperature of 5400K to 5700K. The latest LED floodlights are available in 4000K. IDA requirement. Include this provision in WCDP but reduce from 5400K to 4000K.

	Illuminance level	<p>Outdoor sports lighting shall be designed to the illumination levels recommended in Australian Standard AS 2560 Guide to sports lighting, all parts.</p> <p>Maximum permitted illumination level to be that recommended for “Level 3” competition standard.</p> <p>The lighting designs initial levels shall not exceed the recommended average service level by more than 50%.</p>	<p>Note that initial lighting levels can be expected to be 10-30% higher than the design level as the design will allow for depreciation or light output reduction over the life of the installation. IDA requirement. Include this provision in WCDP.</p>
	Glare	<p>Luminous intensity from any light fitting for any viewing angles at 1.5m height, at 45m beyond the field shall not exceed 1000 candela.</p>	<p>From our sports lighting design experience, we believe this limit can be readily meet with the appropriate light fitting selection and lighting design. IDA requirement. Include this provision in WCDP.</p>
	Operation time	<p>Shall not operate between 10pm and 7am</p>	<p>We would not expect this provision to impact on the use of the lighting as this sporting activity should not occur outside these hours unless it is sufficiently away from dwellings from a noise disturbance perspective. IDA requirement. Include this provision in WCDP.</p>
	Controls	<p>Shall be provided with the following lighting controls;</p> <ul style="list-style-type: none"> a) Automatic curfew controls to ensure the lights are off between 10pm and 7am. b) Local control to turn lights on and off. c) If the lighting has a lighting level for competition, it shall also have a lower lighting level for training. 	<p>IDA requirement. Include this provision in WCDP.</p>

	Lighting no field areas	The installed field lighting is not to be used for illuminating other area tasks. For example, if parking area lighting is desired. They shall be illuminated by separate light fittings and systems not associated with the sports field illumination needs	IDA requirement. Include this provision in WCDP.
	Pole height	To mitigate the effects of sports field lighting it is important to use poles of an appropriate height so that floodlights do not require the floodlights to be tilted to an extent that they are projection light above the horizontal.	Include provision in WCDP that allows an 18m pole height for lighting of sports fields.
Street lighting	Light level	Design in accordance with AS/NZS 1158 Design in accordance with M30 Lighting levels recommended in the above, not to be exceeded by more than 25%	Provision meets IDA requirement for not over-lighting streets. We expect this provision can be met for new installations. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?
	Shielding	Light fitting when installed shall not emit any light above the horizontal	IDA requirement. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?
	Colour temperature	Limit colour temperature of light emitted from light fittings to 3000K and below	IDA requirement. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?

Review of IDA Lighting Management Provisions – Dark Sky Reserve Core

The IDA requires additional more restrictive lighting management provisions for the “core”. As the core is fully within the Aorangi Forest Park it is expected that these provisions would be regulated by the Department of Conservation through a memorandum of understanding within the Council and the Martinborough Dark Sky Society, these provisions do not require inclusion in the WCDP.

The following review only identifies lighting management provisions that are additional to those for the “buffer”.

Lighting Applications	Lighting Effect	IDA Lighting Control Provision Considered	Comment and recommendations
Lighting within Dark Sky Reserve “Core”	Colour Temperature	Limit colour temperature of light emitted from light fittings to 2700K and below, with amber preferred. 3000K maximum for all portable lights	Similar to buffer provision but 2700K rather than 3000K. Include this provision in DOC LMP for Aorangi Forest Park
	Shielding	Light fittings when installed shall not emit any light at or above the horizontal.	Same as buffer provision. Include this provision in DOC LMP for Aorangi Forest Park
	Lighting Levels	Recommended target average lighting levels: Building entry 0.5 lux Trailheads 0.3 lux Parking lot 10 lux (amber) / 1 lux (2700K) Restroom entry 0.5 lux Entrance station 10 lux (amber) / 1 lux (2700K) Roadway 0 lux Signage 0.5 lux Flag 0 lux Target levels not to be exceeded by more than 25%	More specific requirements than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Adaptive controls	All outdoor light fittings whose light output is equal to or greater than 500 lumens shall have motion activated switches. Maximum activation time (5) minutes.	More specific requirements than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Curfew	All outdoor lighting shall be extinguished between the hours of 10 PM and one hour before sunrise.	More stringent requirement than buffer provisions, it applies to all lighting and curfew is 1 hour earlier. Include this provision in DOC LMP for Aorangi Forest Park
	Temporary lighting	Temporary lighting permitted for the duration of the task and limited to the area of the task	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park

	Visitor lighting	<p>The use of visitor outdoor light fittings whose light output is equal to or greater than 500 lumens is prohibited.</p> <p>The use of UV and blue lights (e.g. anti-mosquito lamp) is prohibited.</p> <p>The strobing of torches is prohibited.</p> <p>Vehicles lights are permitted only while driving.</p>	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Light Painting	The use of floodlights and searchlights (other than for search and rescue) is prohibited.	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Illuminated sign	Internally illuminated and LED signs are prohibited.	More stringent requirement than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park

Assessment Criteria

Scope

To provide guidance on the appropriate assessment criteria to be considered when the lighting proposed in a resource consent application does not meet the proposed amended lighting provision permitted activity standards, we recommend the addition of the following assessment criteria;

1. The type and use of outdoor lighting proposal.
2. Proposed location with respect to distance to the Aorangi Forest Park which is the “core” of the Dark Sky Reserve.
3. Duration, time and frequency of use of the proposed lighting.
4. Will the artificial lighting provide a positive/beneficial visual appearance or highlight? For example; highlighting a buildings heritage.
5. What are the light colour temperatures of the light emitted from all light fittings? 3000K and below have a reduced effect on the dark sky.
6. If the light colour temperature from light fittings exceeds 3000K, then;
 - a. the light fitting must not emit more than 25% of its total spectral power at wavelengths greater than 550 nanometers, or
 - b. is there justification of why a 3000K or lower light colour temperature cannot be used.
7. The lumen output (lumens) and maximum luminous intensity (candela) and its angle relative to the horizontal when installed.
8. The extent to which light will be directed upward into the sky both directly and in-directly through reflection off surfaces.
9. Are the illumination levels the minimum required/recommended for the task? Are the illumination levels significant?
10. To what extent will it contribute additional sky glow? Will it put the Dark Sky Reserve Certification at risk?
11. Is there any opportunity to offset any new increase in effects by reducing the effects of existing lighting.

Impact of Proposed Lighting Management Provisions

Impact on Safety

These lighting provisions are not expected to impact on public or road user safety, outdoor lighting is still permitted, it is the way this lighting is provided that changes. It is expected that

less lighting will be continuously operating at night with motion detection being more widely implemented. Through the elimination of light fitting glare and over lighting you can provide safer visual conditions.

Roads will still be lit but will use more appropriate luminaires and lighting levels. In the past there were some studies that concluded a level of better driver visibility under 4000K lights than 3000K lights, but a recent NZ study¹ but this is often outweighed by the better environmental conditions offered by 3000K lights. Globally 3000K is being adopted by the majority, with 4000K being retained for highways.

Impact on People's Amenity

These lighting provisions are not expected to impact on a person's ability to carry out activities outdoors after dark, they will just need to have the appropriate light fittings and installation design.

Impact on Sports

These lighting provisions introduce lighting design criteria that will require good lighting design and light fittings. The height of lighting poles may need to increase depending on the distances that lighting is required to be projected. Appropriate light fittings are not expected to be of any significant additional cost. Better lighting conditions for the users can be expected through better uniformity and confining the light to where it is needed.

The lighting controls required are common sense controls that should be provided for all outdoor sports lighting anyway.

Impact on Businesses

These lighting provisions can mean that you can no longer simply light a yard or building perimeter by installing a couple of large bright floodlights to throw light in many directions and skyward. Lighting design and light fitting selection will require more consideration and possibly additional installation costs to do the job properly.

The 11pm – 6am curfew on illuminated signage will prevent the lighting of signs through the middle of the night, but with lower people movements at these times we expect that the reduction in marketing exposure would be very minor. Note that when a retail business is open during curfew lighting of its signs is permitted.

Availability of Suitable Light Fittings

These lighting provisions put a restriction on the types of light fittings and the way they can be installed when the light fittings have a light output of 500 lumens or more. Light fittings of less than 500 lumens output and light fittings on motion detection controls (with a maximum activation time of 5 minutes) are exempt from these lighting fitting restrictions.

Light fittings with a 3000K light colour temperature are readily available in the lighting market and should not be at a premium cost over higher light colour temperature light fittings. It is a

¹ LED Streetlighting: Environment & Safety Impacts, Frith, Jackett & Chisnall

situation where the local light fitting suppliers will need to change what they stock to comply with the new provisions.

Similarly, for the requirement for light fittings that do not project light above the horizontal the local light fitting suppliers will need to change what they stock to comply with the new provisions. This restriction in light projection above the horizontal may result in installations that require an increase in the number of lights to light the same task area, but they may well be less powerful and have a lower total electricity consumption.

The definition of the requirements for light fittings has been kept to simplified to be readily understood, lighting suppliers could assist selections by ensuring that all stocked light fittings have there output (in lumens) and light colour temperature (in K) clearly shown. They could also identify appropriate light fittings as “Dark Sky Compliant”.

Resource Consents

These lighting provisions should result in better considered outdoor lighting installations but they do result in an increased level of restriction on what can be done and therefore there may be a resulting increase in Resource Consent applications and compliance monitoring where these permitted activity standards cannot be meet.

Positive Effects

In addition to the improvement in the quality of views of the night sky these lighting management provisions can be expected to also provide a reduction in spill light and glare from new outdoor lighting installations which will have a positive effect on residential amenity.

Appendix D: International Dark Sky Association - 2018 International Dark Sky Reserve Guidelines

Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve



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Introduction

Context

South Wairarapa District Council (SWDC), along with Carterton and Masterton District Councils, is supporting an application by the Martinborough Dark Sky Society (MDSS) for the Wairarapa to be certified as an International Dark Sky Reserve by the International Dark Sky Association (IDA).

An international dark sky reserve is an area of public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for any one or more of the following: cultural, natural, educational, scientific or public purposes.

There are 12 Dark Sky Reserves across the world. There is currently only one dark sky reserve in New Zealand located within the Aoraki Mackenzie Valley. If the Wairarapa was to become a dark sky reserve, it would be the world's largest. There are also two dark sky Sanctuaries within New Zealand, being Stewart Island and Great Barrier Island.

Light pollution is the biggest threat to gaining certification, as light pollution hinders the ability for people to view the night sky. To qualify as a dark sky reserve, light pollution within the region must be controlled.

The IDA has guidelines that a reserve is required to meet before it can gain certification. This includes restrictions on new lighting, requiring light shielding, limits on light levels, light spectrum and lighting times. There is therefore a need to control lighting within the district to a level that can satisfy the IDA guidelines.

To control light pollution within the district the Councils are looking to prepare a plan change to amend the lighting provisions contained within the Wairarapa Combined District Plan (WCDP). Amended provisions would ensure that new lighting complies with IDA guidelines which would control light pollution and its adverse effects on the visibility, brightness and clarity of the night sky.

This review does not consider whether the current WCDP lighting provisions provide adequate protection of residential amenity. We understand such a review will form part of an upcoming review of the WCDP.

Stephenson & Turner as appropriately qualified lighting engineers have carried out an assessment of the current WCDP lighting provisions and the IDA International Dark Sky Reserve requirements and provide recommendations for revisions to the WCDP lighting provisions.

Scope of Review

The scope of our review:

1. A review of the WCDP to provide an assessment of the level of guidance and control provided for the protection of quality of views of night sky.
2. A review of the IDA requirements for an International Dark Sky Reserve.

3. A review of other documents that look to control light pollution to meet IDA requirements. (For example, the lighting provisions within the McKenzie District Plan and how they satisfy the IDA requirements for their Aoraki Mackenzie International Dark Sky Reserve).
4. Technical input as to the necessary standards and requirements within the WCDP to control lighting to meet IDA requirements for an International Dark Sky Reserve.
5. Technical input as to any specific activities (i.e. sports fields) that may require targeted district plan standards and requirements to meet IDA requirements for an International Dark Sky Reserve.
6. Technical input into developing WCDP Assessment Criteria for consideration by the Council when considering resource consent applications for lighting which does not meet the proposed new permitted activity standards and requirements.

Dark Sky Lighting Effects and Lighting Management Provisions

Effects of lighting on the Dark Sky - Skyglow

Skyglow or the brightening of the night sky is the primary effect that must be minimised to provide optimum night sky viewing. Brightening of the night sky has the effect of reducing the apparent brightness of stars and hence this reduces the quality of views of night sky.

Skyglow comprises two separate components as follows;

- a) Natural skyglow, that part of the skyglow that is attributable to radiation from celestial sources and luminescent processes in Earth's upper atmosphere.
- b) Artificial skyglow, that part of skyglow that is attributable to man-made sources of radiation (e.g. outdoor lighting), including light radiation that is emitted above the horizontal and light radiation that is reflected from the surface of the earth.

The IDA provides requirements for the management of artificial skyglow from artificial lighting in order to be a dark sky reserve.

IDA International Dark Sky Reserve Program Guidelines

With reference to the IDA's International Dark Sky Reserve Program Guidelines dated June 2018.

In order to be considered for Dark Sky Reserve Certification the area of land must be at least 700km² and consist of;

- A "core" area which meets minimum requirements for quality of sky and darkness.
- A "buffer" area which supports the core area's dark sky values and receives similar benefits.
- The "core" and the "buffer" collectively make up the dark sky reserve.

- The Aorangi Forest Park is the “core” of the dark sky reserve.
- The area outside of Aorangi Forest Park, all the way to the South Wairarapa, Carterton and Masterton district boundaries are the “buffer” of the dark sky reserve.

Additionally, the core must;

- Provide an opportunity for regular public nighttime access, with or without supervision.
- Must provide an exceptional dark sky resource, relative to the communities and towns that surround it.

A comprehensive Lighting Management Plan (LMP) is a minimum requirement for all dark sky reserves, the LMP must be adopted by at least 80% of population and 80% of designated area of protection (core and buffer). The regulations contained in the LMP must apply to all private and public landowners within the area of protection. Some exceptions may apply but are individually subject to IDA approval.

To meet this requirement within the Wairarapa District the Councils are looking to prepare a plan change to amend the lighting provisions contained within the Wairarapa Combined District Plan (WCDDP). Amended provisions would ensure that the minimum lighting management provisions required by IDA are included in the WCDDP

IDA International Dark Sky Reserve Minimum Lighting Management Provisions

The minimum lighting management provisions that the IDA requires/recommends are based on Five Principles for Responsible Outdoor Lighting and are based on simple ideas; limit light at night to where and when it is needed, don't overlight, and be sensitive to environmental concerns. These Five Principles are summarised in the following table.

LIGHT TO PROTECT THE NIGHT
Five Principles for Responsible Outdoor Lighting





USEFUL		<p>ALL LIGHT SHOULD HAVE A CLEAR PURPOSE</p> <p>Before installing or replacing a light, determine if light is needed. Consider how the use of light will impact the area, including wildlife and the environment. Consider using reflective paints or self-luminous markers for signs, curbs, and steps to reduce the need for permanently installed outdoor lighting.</p>
TARGETED		<p>LIGHT SHOULD BE DIRECTED ONLY TO WHERE NEEDED</p> <p>Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.</p>
LOW LIGHT LEVELS		<p>LIGHT SHOULD BE NO BRIGHTER THAN NECESSARY</p> <p>Use the lowest light level required. Be mindful of surface conditions as some surfaces may reflect more light into the night sky than intended.</p>
CONTROLLED		<p>LIGHT SHOULD BE USED ONLY WHEN IT IS USEFUL</p> <p>Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.</p>
COLOR		<p>USE WARMER COLOR LIGHTS WHERE POSSIBLE</p> <p>Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.</p>

The primary objective of the lighting management provisions recommended by IDA is to prevent the brightening of the night sky, which has the effect of reducing the apparent brightness of stars and quality of views of night sky.

The IDA expects them to guide the selection, placement, installation and operation of all new and replacement/retrofitted light in the Dark Sky Reserve. These lighting management provisions should be implemented as much as is practicable for both public and private installations.

The IDA preference is that the use of outdoor light at night should only be strictly, where it is needed, and in the appropriate amount for a specific task. The purpose of outdoor light that is allowed should be specifically to ensure public safety.

IDA Lighting Management Provisions within the Core

The IDA has very restrictive lighting management provisions for the “core”. As the core is fully within the Aorangi Forest Park it is expected that these provisions would be regulated by the Department of Corrections through their inclusion in their Aorangi Forest Park Management Plan and therefore these provisions do not require inclusion in the WCDP.

Within the core the installation of outdoor lighting is permitted only in instances where the administrating authority determines that a public safety hazard exists that can only be mitigated through the use of outdoor light at night. Otherwise the default policy should be not to light.

Shielding

All outdoor light fittings whose light source has an intensity of equal to or greater than 500 lumens shall be fully shielded. Light fittings who have an intensity of less than 500 lumens may be left unshielded for special purposes, such as historical preservation. The approved special uses must be stated in the LMP.

“Fully shielded” is defined such that that the light source is screened and, when mounted, its light directed in such a way that none is emitted at or above the horizontal plane passing through the lowest light-emitting portion of a light fitting. Light emitted just above horizontal (horizontal to 20° above horizontal) is a significantly higher contributor to skyglow than light emitted at higher angles.

Light fittings controlled by motion-activated switches which limit the duration of illumination to less than five (5) minutes after activation are exempt from this shielding provision

Tilted Light fittings

All outdoor light fittings whose light source has an intensity of equal to or greater than 500 lumens shall be mounted and tilted such that no light is directed at or above the horizontal plane passing through the lowest light-emitting portion of the light fitting. . Light emitted just above horizontal (horizontal to 20° above horizontal) is a significantly higher contributor to skyglow than light emitted at higher angles.

Light fittings controlled by motion-activated switches which limit the duration of illumination to less than five (5) minutes after activation are exempt from this shielding provision

Light Colour Temperature

Light is part of the electromagnetic spectrum. The human eye perceives visible light in the region of 280 nanometers (nm) to 780nm of the electromagnetic spectrum. Visible blue light extends from 424nm to 500nm.

Blue spectrum light is more strongly scattered by the night sky, increasing the levels of sky glow at night. Therefore, if the amount of blue light emitted by a light fitting is reduced its effect on skyglow is significantly reduced.

As a rough indicative measure, the lighting industry uses correlated colour temperature (CCT), measured in Kelvin (K) to describe the perceived colour of the light produced by a light source. A lower CCT generally, corresponds to a relatively lower proportion of blue light. For example a 3000K light source generally has 25% less blue light than a 4000K light source.

Outdoor light fittings shall be chosen to minimise the amount of blue light emitted into the nighttime environment.

In no case shall the outdoor light fittings have a light colour temperature exceeding 3000K.

Within the “core”, the light colour temperature is limited to 2700K maximum, with amber to warm-white preferred.

ILLUMINATED SIGNS

Internally illuminated signs are prohibited in the “core”.

In all other areas internally-illuminated signs, and signs illuminated by electronic means such as LEDs and similar lighting, shall be installed and operated according to the following requirements:

1. Use of such signs from one hour after local sunset to one hour before local sunrise is prohibited. Such signs will be equipped such that they are extinguished automatically at these times.
2. Displays must be single-color on a black background in design.
3. Luminance of such signs after sunset may not exceed 100 candelas per square metre.

LIGHTING LEVELS

Lighting within the “core” will be designed in consideration of the very low levels of ambient lighting. This means that less lighting is required than in a similar situation in a bright urban setting with high levels of ambient lighting.

While the relevant New Zealand Standards should be adhered to in designing any lighting scheme for the safety of users, special consideration and lighting techniques should be utilised to protect the night sky.

Within the “core” the following table gives the maximum lighting levels that will be used unless a demonstrated need for higher lighting levels exists.

Application	Lighting level (lux)
Building entry	0.3 lux
Trailheads	0.5 lux
Parking lot	10 lux (amber) / 1 lux (2700K)
Restroom entry	0.5 lux
Entrance station	10 lux (amber) / 1 lux (2700K)
Roadway	0 lux
Signage	0.5 lux
Flag	0 lux

Target levels not to be exceeded by more than 25%

For the “buffer zones” minimum lighting levels (lux) required for the nighttime activity should be used, with avoidance of unnecessary over-lighting.

CURFEW

In the “core” dusk-to-dawn lighting is not generally allowed. All outdoor lighting shall be extinguished between the hours of 10pm and one hour before sunrise, except in cases where visitor or staff presence or traffic dictates otherwise.

Adaptive Controls

To the greatest practical extent possible, all lighting should make appropriate use of adaptive controls to limit the duration, intensity, and/or extent of outdoor lighting. A total ON/OFF solution is preferred, but in specific cases light could remain ON at 10% of their nominal output.

The motion-activated switches shall limit the duration of illumination to less than five (5) minutes after activation.

Temporary Lighting

Allowable installations of outdoor lighting in the “core” for temporary purposes, shall be limited to the minimum number of nights required to complete the task that the lighting illuminates. Staff responsible for such installations will follow these guidelines to the greatest practical extent, and will endeavour to limit as much as possible off-site impacts of such lighting.

Light Painting

Within the “core” inappropriate, high-intensity light painting of landscapes, the use of floodlights or searchlights (other than for search and rescue), and similar uses of outdoor lighting is prohibited.

Sports Field Lighting

There is no existing sports field lighting within the “core”, the use of sports lighting within the “core” should be prohibited.

With reference to IDA – Criteria for Community-Friendly Outdoor Sports Lighting v1.0, the following is a summary of the IDA requirements for outdoor sports lighting within a Dark Sky Reserve.

1. Target illuminance for on field illuminance are to be appropriate for the application per IESNA RP-6-15 Sports and Recreation Area Lighting and only Class III and IV are permitted

FACILITY	CLASS			
	I	II	III	IV
Professional	X			
College	X	X		
Semi-Professional	X	X		
Sports Clubs	X	X	X	
Amateur Leagues		X	X	X
High School		X	X	X
Training Facilities			X	X
Elementary School				X
Recreational Event				X
Social Event				X

Class I: Facilities with spectator capacity over 5,000
Class II: Facilities with spectator capacity under 5,000
Class III: Facilities with some provision for spectators
Class IV: Facilities with limited or no provision for spectators

In New Zealand it is standard practice when designing outdoor sports lighting to refer to the Australian Standard AS 2560 Guide to Sports Lighting series of standards which are equivalent to IESNA RP-6-15, within AS 2560 “Level 2” typically referred to as “Training Standard Lighting” and “Level 3” typically referred to as “Competition Standard Lighting” are the predominant required illumination levels. To limit over-lighting, the design may vary by no more than 10% above the average target illuminance level.

2. All light fittings must be designed such as to not emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modelled may be in this zone.
3. Spill light not to exceed the permitted activity standard at the boundary.
4. Glare, luminous intensity from any light fitting for any viewing angles at 1.5m height, at a distance of 45m beyond the field shall not exceed 1000 candela.
5. Provide lighting controls for the following;
 - a. Automatic shut-off at locally established curfew time, not to be later than 11pm.
 - b. On site manual and/or remote control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to ensure only active sports fields are lighted.
 - c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field. For example Level 2 and Level 3 standards of lighting.
 - d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced.
6. The light fitting Colour Temperature (CCT) may not exceed 5700K. Lighting technologies have developed such that it is now possible to illuminate sports fields with 4000K light fittings, which is an improvement over 5700K, with 3000K preferred.

7. The installed field lighting is not to be used for illuminating other area tasks. For example, if parking area lighting is desired. They shall be illuminated by separate light fittings and systems not associated with the sports field illumination needs.

Existing WCDP lighting provisions

We carried out an analysis of the effectiveness and appropriateness of current WCDP lighting provisions in the protection of quality of views of night sky.

Wairarapa Combined District Plan (WCDP)

The Wairarapa Combined District Plan (WCDP) applies across the three District Councils of the Wairarapa, namely Masterton, Carterton and South Wairarapa.

Lighting within each district is currently controlled by the provisions within the WCDP. The plan manages lighting through provisions within the 'general rules' of the plan. These provisions apply to all outdoor lighting, regardless of activity / location across the districts.

The provisions relevant to the control of lighting within the districts and our associated review comments are outlined in the table on the following page.

From this review it is our opinion that the current WCDP lighting provisions are inadequate to provide the protection of quality of views of night sky required by IDA for a dark sky reserve.

Review of WCDP lighting provisions

Chapter	Provision	Detail	Review Comments
Chapter 5 – Residential Zone	5.3.3 Explanation	5 th paragraph, 3 rd sentence - <i>The effects of vehicle access, movement and manoeuvrability, noise emissions, artificial light levels and signage may also need to be controlled to address potential effects on safety and amenity.</i>	Includes requirement for artificial light levels to be controlled to address potential effects on safety and amenity. No specific requirement to protect effects on quality views of the night sky.
Chapter 6 – Commercial Zone	6.5.4 Standards for Controlled Activities (a) Carterton Character Area	(10) <i>Under verandah lighting must be provided and shall be sympathetic in scale and design to traditional or heritage qualities.</i> (12) <i>No sign shall be illuminated by any means other than directional lighting.</i>	No specific requirement to protect effects on quality views of the night sky.
Chapter 19: General Amenity Values	19.3.2 GAV1 Policies	(e) <i>Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, and to protect the clarity and brightness of the night sky. Implemented through Method 19.3.4(a), 19.3.4(b) 19.3.4(c) and 19.3.4(g).</i>	We recommend this policy is revised to include a policy reference to the Dark Sky Reserve and implementation method extended to entirety of new lighting provisions 19.3.4: (e) <i>Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads.</i> (f) <u><i>Within the Dark Sky Lighting Management Area, manage the light colour temperature, shielding and hours of operation of outdoor artificial lighting to mitigate skyglow to protect the clarity and brightness of the night sky.</i></u> <i>Implemented through Method 19.3.4.</i>
	19.3.3 Explanation	4 th paragraph – <i>Residential amenity is particularly sensitive to noise, artificial light and other site-specific adverse effects. These effects can seriously impact upon the health</i>	No specific requirement to protect effects on quality views of the night sky.

		<p><i>and create considerable animosity between neighbours. The policies and methods have been established to protect residents from such adverse effects.</i></p> <p><i>7th paragraph – Artificial lighting, particularly in residential areas, can adversely affect the ability to sleep. The two main causes are the general loss of night sky from the cumulative effects of urban lighting, and the nuisance caused by single sources that emit high levels of glare. Again such effects can be mitigated through compliance with standards on light emission levels across property boundaries.</i></p>	<p>7th paragraph – This sentence is a bit mixed up, we recommend the wording is revised.</p> <p><i>Artificial lighting standards, are directed at two main adverse effects: first, residential amenity and the ability to sleep and second, the general loss of night sky from the cumulative effects of outdoor lighting. Again such effects can be mitigated through compliance with standards on light emission levels across property boundaries.</i></p>
	19.3.4 Methods	<p><i>(a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa.</i></p> <p><i>(b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards.</i></p> <p><i>(c) Conditions on resource consent to control adverse effects of activities.</i></p> <p><i>(g) Liaison with Road Controlling Authorities to promote the use of shields and other devices on streetlights to direct light downwards.</i></p>	<p>(a), add protection of the night sky: <i>(a) Performance standards for permitted activities to maintain general amenity values and quality of views of night sky throughout the Wairarapa.</i></p> <p>(b), note that a resource consent is required for any departure from lighting performance standards.</p> <p>(c), is appropriate.</p> <p>(g), inclusion of this clause implies that the lighting standards apply to streetlights. Therefore, the impact of lighting provisions on road lighting needs to be considered.</p>
Chapter 21- General Rules	21.1.11 Glare and Artificial Light - Permitted Activity	<p><i>(a) The emission of light (including glare) meets the following standard:</i></p> <p><i>(i) A maximum artificial light level of 8 lux (lumens per square metre)</i></p>	<p>No specific rules to protect effects on quality views of the night sky.</p> <p>Provisions required to minimise skyglow to protect the brightness and clarity of the night sky.</p>

		<i>measured at 1.5m above ground level at the site boundary.</i>	
Chapter 22 – Assessment Criteria	22.1.17 Artificial Light	<p><i>(i) The extent to which the light will adversely affect adjoining allotments.</i></p> <p><i>(ii) The impact of light direction on the safe and efficient operation of the road network.</i></p> <p><i>(iii) The extent to which the light(s) are necessary for reasons of security, public amenity, or safety.</i></p> <p><i>(iv) The hours during which the lighting will operate.</i></p> <p><i>(v) Proposed methods to avoid, remedy or mitigate potential adverse effects including the height, orientation, angle, and shielding of the light source.</i></p>	<p>There are no assessment criteria for considering the effects of artificial light on the quality of views of night sky. Therefore, we recommend the addition of the following criteria:</p> <p><u><i>(vi) The extent to which the light will adversely affect skyglow and the quality of views of night sky.</i></u></p>

Reference Documents

In carrying out this review and providing lighting provision recommendations we have referred to lighting standards, Operative District Plans, lighting management plans and IDA annual reports for other Dark Sky Reserves and Sanctuaries. The following provides an outline of standards or provisions that are relevant to meeting the IDA minimum requirements for Lighting Management Provisions for an International Dark Sky Reserve.

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

There is a combined Australian/New Zealand standard AS/NZS 4282:2019 released in 2019 and therefore can be considered to very relevant to today's regulatory requirements and lighting technologies which include LED lighting.

The "Preface" to this standard states that *the objective of this standard is to provide a common basis for assessment of the likely effects of developments that involve the provision of outdoor lighting.*

The "Foreword" to this standard states that *The requirements and recommendations of this Standard are based on surveys of interested parties i.e. local government, electricity utilities and the lighting industry; on studies of people's reaction to obtrusive light; on the extent of spill light from lighting installations; and on precedents for the control of regulatory control of obtrusive light.*

Several aspects of potential obtrusiveness are considered, viz, 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 protecting dark environments..

Relevant guidance from this standard includes;

- a) Because skyglow is caused both by reflected and direct light from the installations, restricting design illuminances to the minimum necessary for the application will provide additional mitigation.
- b) High correlated colour temperature light sources should be avoided as light at the blue end of the spectrum increases light scatter.
- c) The standard provides recommended limits for skyglow based on the calculation of Upward Light Ratio lighting technical parameters that can be applied to control obtrusive effects of skyglow.

Mackenzie District Plan

There is currently only one dark sky reserve in New Zealand located within the Mackenzie Valley, Aoraki. This reserve is located within the boundaries of the Mackenzie District and to achieve its IDA Dark Sky Reserve Certification the lighting provisions within the Mackenzie District Plan (MDP) were updated with the current operable MDP being March 2015.

Relevant guidance from the MDP is accessed in the following table;

MDP Section	MDP Part	MDP Content	Comment and recommendations
Section 12 – Signs, outdoor lighting and aerial distractions	Relevant Objectives and Policies	1. The need for controls on signs and outdoor lighting in the District is important to ensure that the potential effects of these do not adversely affect the amenity of the District.	We agree the need for controls on signs and outdoor lighting.
		2. The type, nature and location of lighting can adversely affect people’s ability to view the night sky. This issue is of great significance due to the existence of the University of Canterbury Mt John Observatory.	We agree with this statement and recommend that reference is made to the significance due to the existence of the International Dark Sky Reserve Certification.
		3. Avoidance of unnecessary light pollution in the Mackenzie Basin.	We agree, an objective of the WCDP plan change is avoidance of unnecessary light pollution in the Combined Wairarapa District.
		4. Preservation of the ability to view the night sky.	We agree, an objective of the WCDP plan change is preservation of the ability to view the night sky.
	13 Outdoor Lighting	Provides outdoor lighting rules, relevant comment includes; 5. Rule 13.a provides Permitted Activity Standards applicable to the area shown on the Outdoor Lighting Restriction map (an area around the Mt John Observatory, covers approximately 50% of the Mackenzie District).	These Permitted Activity Standards only apply to a “Outdoor lighting restriction” area which covers approximately 50% of the Mackenzie District. In the WCDP plan change it is proposed to include the districts of to South Wairarapa and Carterton in a ‘Dark Sky Management Area’, to reflect the area of the proposed Wairarapa Dark Sky Reserve.
		6. Rule 13.a.i, <i>Shielding: All outdoor 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.</i>	We agree, similar rule should be included in the WCDP.

		<p>7. Rule 13.a.ii, <i>Filtration: All outdoor lights shall have a filter to filter out the blue or ultraviolet light, provided the light source would have more than 15% of the total emergent energy flux in the spectral region below 440nm. The filters used must transmit less than 10% of the light at any wavelength less than 440nm. This therefore includes, but is not limited to, fluorescent, mercury vapour and metal halide lamps.</i></p>	<p>We believe this provision is too technical for most and with new lighting predominantly LED the use of light colour temperature limit of 3000K and below is far simpler as the light colour temperature is printed on the box of LED products. Recommend light colour temperature lighting provision is included in WCDP.</p>
		<p>8. Rule 13.a.iii, <i>No person shall illuminate or display the following outdoor lighting between 11.00pm and sunrise in the designated area:</i></p> <ul style="list-style-type: none"> a. <i>Searchlights.</i> b. <i>Illumination of public recreation facility.</i> c. <i>Outside illumination for aesthetic purposes of any building by floodlight.</i> d. <i>Any outdoor illumination in which light is produced by high-pressure sodium, metal halide, mercury vapour lighting or fluorescent lighting, unless these lamps were installed prior to 1 January 1979 in the Business or Residential Zones in Lake Tekapo or 1 March 1986 in all other zones.</i> 	<p>The objective of this rule is to ensure unnecessary lighting and lighting that uses light sources that have higher skyglow impact are not used between 11.00pm and sunrise. We agree with curfews on unnecessary lighting and recommend curfews on unnecessary lighting are included in the WCDP. The use of “sunrise” in the curfew definition will require automatic controls via astronomical time clocks which are available at a higher cost than traditional time clocks. Use of “6.00am” in lieu of “sunrise” will allow simple time clock control to be used. Rule 13.a.iii.d, is a retrospective rule requiring existing installations to be altered to comply, we do not recommend the inclusion of any lighting provisions in the WCDP that have retrospective impact on existing installations.</p>
		<p>9. Rule 13.b, applies to all other lighting in the Mackenzie District and states <i>all outdoor lighting shall be a permitted activity provided all fixed exterior lighting is directed away from adjacent properties and roads.</i></p>	<p>It is our opinion that this rule provides little actual protection of the dark sky.</p>

Section 18 Outdoor Lighting	Provides outdoor lighting assessment matters to be considered when reviewing Resource Consent applications, relevant comment includes;	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.a, <i>The type and use of outdoor lighting proposed.</i>	
	Rule 18.b, <i>Type of illumination</i> , focused on consideration of emissions at short wavelengths (consideration of blue light content).	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.c, <i>The total power of lamps.</i>	We believe this would be better defined as light fitting total lumen outputs and maximum luminous intensities. Similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.d, <i>Proposed location with respect to distance from the observatory.</i>	For WCDP the distance to the Aorangi Forest Park which is the “core” of the Dark Sky Reserve is important. Similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.e, <i>Duration, time and frequency of proposed lighting.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.f, <i>Whether it is proposed to shield lights to prevent light shining directly above the horizontal.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.g, <i>Whether is proposed to filter out blue and ultraviolet light.</i>	We agree, similar criteria should be included in the WCDP Assessment Criteria for Discretionary Activities.
	Rule 18.h, <i>The effect of the proposal on research activity carried out at Mt John Observatory.</i>	For WCDP WCD Assessment Criteria for Discretionary Activities consideration on the effect on the dark sky should be considered.

In summary the MDP includes many lighting provisions that we recommend are included in the WCDP plan change.

IDA Aoraki Mackenzie International Dark Sky Reserve Annual Report

An IDA requirement for IDA International Dark Sky Reserve certification, is for the reserves management to provide an annual report to the IDA, this report can be considered to be a “report card” for the reserve, it provides commentary on their dark sky activities, achievements, quality of night sky views achieved and how regulatory controls are working. The following are some relevant guidance;

1. They propose to launch a scheme to certify commercial enterprises inside the reserve which can demonstrate having dark sky friendly exterior lighting.
2. The most important development is the agreement between New Zealand Transport Agency (NZTA) and the Mackenzie District Council that the 85% NZTA subsidy for new LED streetlights can be used for low colour temperature (2200K) LED lights.
3. Aoraki Mackenzie International Dark Sky Reserve Website:
www.darkskyreserve.org.nz/
4. No new territory was added to the reserve this year. Discussions are occurring to investigate an expansion to the Reserve to include the whole of the Mackenzie District.
5. Updating the Mackenzie District Plan and its lighting ordinance to cover LEDs is further delayed as the Plan undergoes legal and procedural challenges in other areas of the District Plan.
6. The MDC have recently employed a compliance officer to enforce rules including light spill, glare and colour.

Recommendations for new lighting provisions

To ensure that the quality of views of night sky are not adversely affected by artificial lighting and to meet the IDA’s regulatory requirements for lighting management provisions we recommend that the current lighting provisions within the WCDP are amended.

Street lighting

Many lighting standards and Operative District Plans exclude the effects of street lights from their rules and standards.

This is generally because street lighting would not meet the lighting standard limits but is deemed as necessary for all-night safety and security for the public at large.

Further consideration is required on this matter, including discussions with Council roading experts and NZTA before proposing any lighting standards that may impact on the ability to provide appropriate street lighting.

Lighting provisions

Review of Lighting Management Provisions

In the following tables we have listed artificial lighting applications/installations that we expect to exist or be required within the South Wairarapa, Carterton and Masterton Districts and considered the IDA lighting management provision requirements.

In considering the IDA lighting management provisions we considered:

- How it would be enforced (WCDP, DOC, NZTA, voluntary)
- Can it be readily complied with and compliance verified?
- Impact on safety
- Impact on people's amenity, namely their ability to carry out activities outdoors after dark
- Effects on spill light and glare
- Impact on businesses (cost, property security, presence)
- Availability of suitable light fittings and any associated increased cost
- Will it result in a significant number of resource consent applications because the lighting provision cannot be readily meet?

Review of IDA Lighting Management Provisions – Dark Sky Reserve Buffer

Lighting Applications	Lighting Effect	IDA Lighting Control Provision Considered	Comment and recommendations
General Outdoor Lighting Standards	Colour Temperature (CCT)	All outdoor light fittings whose light output is equal to or greater than 500 lumens, its light colour temperature shall be 3000K and below, with 2200K (amber) preferred.	Compliant light fittings are readily available. IDA requirement. Include this provision in WCDP.
	Shielding	All outdoor light fittings whose light output is equal to or greater than 500 lumens, when installed shall not emit any light at or above the horizontal.	Compliant light fittings are readily available, but a number of commonly used light fitting types will not comply. IDA requirement. Include this provision in WCDP.
	Light level	Lighting levels should be the minimum levels required for the task.	A subjective provision, difficult to control. IDA requirement. Provision in WCDP assessment criteria for consideration for discretionary activity.
Illuminated signs and	Light level	Between sunset and sunrise (nighttime) sign luminance must not exceed 100 candela per square metre.	This maximum level of 100 cd/m ² is low with AS/NZS 4282, Table 3.5 recommended a limit of 250 cd/m for a sign within a suburban area. IDA requirement. Include this provision in WCDP but allow up to 250 cd/m ² assessment criteria for discretionary activity.
	Operation time	Shall not operate between 11pm and 6am, except, where the illuminated sign is used to signal that a business on the site is open for business, the operating time can be extended to match the business operating time.	It is our opinion that this will have little impact on advertising as there would be few people around during curfew. IDA requirement. Include this provision in WCDP.
Outdoor sports lighting	Colour temperature	Limit colour temperature of light emitted from light fittings to 5400K and below, with 3000K preferred.	Floodlights currently used for outdoor sports lighting typically have a colour temperature of 5400K to 5700K. The latest LED floodlights are available in 4000K. IDA requirement. Include this provision in WCDP but reduce from 5400K to 4000K.

	Illuminance level	<p>Outdoor sports lighting shall be designed to the illumination levels recommended in Australian Standard AS 2560 Guide to sports lighting, all parts.</p> <p>Maximum permitted illumination level to be that recommended for “Level 3” competition standard.</p> <p>The lighting designs initial levels shall not exceed the recommended average service level by more than 50%.</p>	<p>Note that initial lighting levels can be expected to be 10-30% higher than the design level as the design will allow for depreciation or light output reduction over the life of the installation. IDA requirement. Include this provision in WCDP.</p>
	Glare	<p>Luminous intensity from any light fitting for any viewing angles at 1.5m height, at 45m beyond the field shall not exceed 1000 candela.</p>	<p>From our sports lighting design experience, we believe this limit can be readily meet with the appropriate light fitting selection and lighting design. IDA requirement. Include this provision in WCDP.</p>
	Operation time	<p>Shall not operate between 10pm and 7am</p>	<p>We would not expect this provision to impact on the use of the lighting as this sporting activity should not occur outside these hours unless it is sufficiently away from dwellings from a noise disturbance perspective. IDA requirement. Include this provision in WCDP.</p>
	Controls	<p>Shall be provided with the following lighting controls;</p> <ul style="list-style-type: none"> a) Automatic curfew controls to ensure the lights are off between 10pm and 7am. b) Local control to turn lights on and off. c) If the lighting has a lighting level for competition, it shall also have a lower lighting level for training. 	<p>IDA requirement. Include this provision in WCDP.</p>

	Lighting no field areas	The installed field lighting is not to be used for illuminating other area tasks. For example, if parking area lighting is desired. They shall be illuminated by separate light fittings and systems not associated with the sports field illumination needs	IDA requirement. Include this provision in WCDP.
	Pole height	To mitigate the effects of sports field lighting it is important to use poles of an appropriate height so that floodlights do not require the floodlights to be tilted to an extent that they are projection light above the horizontal.	Include provision in WCDP that allows an 18m pole height for lighting of sports fields.
Street lighting	Light level	Design in accordance with AS/NZS 1158 Design in accordance with M30 Lighting levels recommended in the above, not to be exceeded by more than 25%	Provision meets IDA requirement for not over-lighting streets. We expect this provision can be met for new installations. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?
	Shielding	Light fitting when installed shall not emit any light above the horizontal	IDA requirement. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?
	Colour temperature	Limit colour temperature of light emitted from light fittings to 3000K and below	IDA requirement. Discuss with NZTA and Council Roading Sections if provision should be included in WCDP?

Review of IDA Lighting Management Provisions – Dark Sky Reserve Core

The IDA requires additional more restrictive lighting management provisions for the “core”. As the core is fully within the Aorangi Forest Park it is expected that these provisions would be regulated by the Department of Conservation through a memorandum of understanding within the Council and the Martinborough Dark Sky Society, these provisions do not require inclusion in the WCDP.

The following review only identifies lighting management provisions that are additional to those for the “buffer”.

Lighting Applications	Lighting Effect	IDA Lighting Control Provision Considered	Comment and recommendations
Lighting within Dark Sky Reserve “Core”	Colour Temperature	Limit colour temperature of light emitted from light fittings to 2700K and below, with amber preferred. 3000K maximum for all portable lights	Similar to buffer provision but 2700K rather than 3000K. Include this provision in DOC LMP for Aorangi Forest Park
	Shielding	Light fittings when installed shall not emit any light at or above the horizontal.	Same as buffer provision. Include this provision in DOC LMP for Aorangi Forest Park
	Lighting Levels	Recommended target average lighting levels: Building entry 0.5 lux Trailheads 0.3 lux Parking lot 10 lux (amber) / 1 lux (2700K) Restroom entry 0.5 lux Entrance station 10 lux (amber) / 1 lux (2700K) Roadway 0 lux Signage 0.5 lux Flag 0 lux Target levels not to be exceeded by more than 25%	More specific requirements than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Adaptive controls	All outdoor light fittings whose light output is equal to or greater than 500 lumens shall have motion activated switches. Maximum activation time (5) minutes.	More specific requirements than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Curfew	All outdoor lighting shall be extinguished between the hours of 10 PM and one hour before sunrise.	More stringent requirement than buffer provisions, it applies to all lighting and curfew is 1 hour earlier. Include this provision in DOC LMP for Aorangi Forest Park
	Temporary lighting	Temporary lighting permitted for the duration of the task and limited to the area of the task	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park

	Visitor lighting	<p>The use of visitor outdoor light fittings whose light output is equal to or greater than 500 lumens is prohibited.</p> <p>The use of UV and blue lights (e.g. anti-mosquito lamp) is prohibited.</p> <p>The strobing of torches is prohibited.</p> <p>Vehicles lights are permitted only while driving.</p>	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Light Painting	The use of floodlights and searchlights (other than for search and rescue) is prohibited.	Not included in buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park
	Illuminated sign	Internally illuminated and LED signs are prohibited.	More stringent requirement than buffer provisions. Include this provision in DOC LMP for Aorangi Forest Park

Assessment Criteria

Scope

To provide guidance on the appropriate assessment criteria to be considered when the lighting proposed in a resource consent application does not meet the proposed amended lighting provision permitted activity standards, we recommend the addition of the following assessment criteria;

1. The type and use of outdoor lighting proposal.
2. Proposed location with respect to distance to the Aorangi Forest Park which is the “core” of the Dark Sky Reserve.
3. Duration, time and frequency of use of the proposed lighting.
4. Will the artificial lighting provide a positive/beneficial visual appearance or highlight? For example; highlighting a buildings heritage.
5. What are the light colour temperatures of the light emitted from all light fittings? 3000K and below have a reduced effect on the dark sky.
6. If the light colour temperature from light fittings exceeds 3000K, then;
 - a. the light fitting must not emit more than 25% of its total spectral power at wavelengths greater than 550 nanometers, or
 - b. is there justification of why a 3000K or lower light colour temperature cannot be used.
7. The lumen output (lumens) and maximum luminous intensity (candela) and its angle relative to the horizontal when installed.
8. The extent to which light will be directed upward into the sky both directly and in-directly through reflection off surfaces.
9. Are the illumination levels the minimum required/recommended for the task? Are the illumination levels significant?
10. To what extent will it contribute additional sky glow? Will it put the Dark Sky Reserve Certification at risk?
11. Is there any opportunity to offset any new increase in effects by reducing the effects of existing lighting.

Impact of Proposed Lighting Management Provisions

Impact on Safety

These lighting provisions are not expected to impact on public or road user safety, outdoor lighting is still permitted, it is the way this lighting is provided that changes. It is expected that

less lighting will be continuously operating at night with motion detection being more widely implemented. Through the elimination of light fitting glare and over lighting you can provide safer visual conditions.

Roads will still be lit but will use more appropriate luminaires and lighting levels. In the past there were some studies that concluded a level of better driver visibility under 4000K lights than 3000K lights, but a recent NZ study¹ but this is often outweighed by the better environmental conditions offered by 3000K lights. Globally 3000K is being adopted by the majority, with 4000K being retained for highways.

Impact on People's Amenity

These lighting provisions are not expected to impact on a person's ability to carry out activities outdoors after dark, they will just need to have the appropriate light fittings and installation design.

Impact on Sports

These lighting provisions introduce lighting design criteria that will require good lighting design and light fittings. The height of lighting poles may need to increase depending on the distances that lighting is required to be projected. Appropriate light fittings are not expected to be of any significant additional cost. Better lighting conditions for the users can be expected through better uniformity and confining the light to where it is needed.

The lighting controls required are common sense controls that should be provided for all outdoor sports lighting anyway.

Impact on Businesses

These lighting provisions can mean that you can no longer simply light a yard or building perimeter by installing a couple of large bright floodlights to throw light in many directions and skyward. Lighting design and light fitting selection will require more consideration and possibly additional installation costs to do the job properly.

The 11pm – 6am curfew on illuminated signage will prevent the lighting of signs through the middle of the night, but with lower people movements at these times we expect that the reduction in marketing exposure would be very minor. Note that when a retail business is open during curfew lighting of its signs is permitted.

Availability of Suitable Light Fittings

These lighting provisions put a restriction on the types of light fittings and the way they can be installed when the light fittings have a light output of 500 lumens or more. Light fittings of less than 500 lumens output and light fittings on motion detection controls (with a maximum activation time of 5 minutes) are exempt from these lighting fitting restrictions.

Light fittings with a 3000K light colour temperature are readily available in the lighting market and should not be at a premium cost over higher light colour temperature light fittings. It is a

¹ LED Streetlighting: Environment & Safety Impacts, Frith, Jackett & Chisnall

situation where the local light fitting suppliers will need to change what they stock to comply with the new provisions.

Similarly, for the requirement for light fittings that do not project light above the horizontal the local light fitting suppliers will need to change what they stock to comply with the new provisions. This restriction in light projection above the horizontal may result in installations that require an increase in the number of lights to light the same task area, but they may well be less powerful and have a lower total electricity consumption.

The definition of the requirements for light fittings has been kept to simplified to be readily understood, lighting suppliers could assist selections by ensuring that all stocked light fittings have there output (in lumens) and light colour temperature (in K) clearly shown. They could also identify appropriate light fittings as “Dark Sky Compliant”.

Resource Consents

These lighting provisions should result in better considered outdoor lighting installations but they do result in an increased level of restriction on what can be done and therefore there may be a resulting increase in Resource Consent applications and compliance monitoring where these permitted activity standards cannot be meet.

Positive Effects

In addition to the improvement in the quality of views of the night sky these lighting management provisions can be expected to also provide a reduction in spill light and glare from new outdoor lighting installations which will have a positive effect on residential amenity.

Appendix E: Objectives and Policies of WCDP

Zone	Relevant issues
Rural Zone	3. <i>Recognising that primary production activities generate external effects that are generally an accepted part of the rural environment while ensuring that such effects do not have excessive or cumulative adverse effects on the environment, particularly on amenity values and natural processes and systems.</i>
	10. <i>Providing opportunities for the economic benefits of the tourism values of the Wairarapa's rural environment to be realised in a manner that avoids the adverse effects of development on such values.</i>
Residential Zone	1. <i>Higher density residential development, and inappropriate building design, scale, bulk and site layout may conflict with the local residential character and amenity values, particularly in areas with historic heritage values and/or a strong cohesive sense of character.</i>
Industrial Zone	5. <i>Where not appropriately managed, the nature and scale of industrial activities may adversely affect adjoining areas and the environment. For example, potential adverse effects from contaminated discharges of stormwater can degrade waterbodies, while other effects such as odour, noise, lighting, waste, heavy traffic, services and the like, may degrade amenity values.</i>
Tangata Whenua	1. <i>Appropriate ways need to be adopted to take account of Tangata Whenua values and to involve Tangata Whenua in resource management decision-making.</i>
	2. <i>Resources of cultural and spiritual significance to Tangata Whenua can be lost or compromised if development occurs without considering the value or importance of the site.</i>
Coastal Environment	1. <i>Changes in land use, and poorly designed and located development and subdivision and associated works can compromise the natural character and special qualities of the Wairarapa Coast.</i>
Subdivision, Land Development and Urban Growth	2. <i>Subdivision and development can adversely affect the landscape, character amenity and natural values of the environment, if the scale, intensity and design of such development are not addressed. Infrastructure servicing subdivision and development can have positive and adverse effects on the environment.</i>

General Amenity Values	3. Glare from, for example, outdoor lighting and reflective surfaces, can annoy people and distract motorists.
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Zone	Relevant Objectives	Relevant policies	Relevant methods
Rural Zone (Section 4)	Objective Rur1: To maintain and enhance the amenity values of the Rural Zone, including natural character, as appropriate to the predominant land use and consequential environmental quality of different rural character areas within the Wairarapa.	<p>Policy Rur1 (a): Identify areas within the Rural Zone where the predominant land use is primary production, which needs to operate and develop effectively – Rural (Primary Production) Zone.</p> <p>Policy Rur1 (b): Identify areas within the Rural Zone where the predominant land use is conservation management, and which are primarily managed by public agencies – Rural (Conservation) Zone</p> <p>Policy Rur1 (d): Maintain and enhance the amenity values, including natural character, of the differing Rural character areas through appropriate controls over subdivision and the bulk, location and nature of activities and buildings, to ensure activities and buildings are consistent with the rural character, including an appropriate scale, density and level of environmental effects.</p>	4.3.10(e): Assessment of environmental effects through the resource consent process for activities that do not comply with the environmental standards.

Residential Zone (Section 5)	Objective Res1: To maintain and enhance the character and amenity values of Wairarapa's residential areas, having due regard to the particular characteristics of each neighbourhood, and the need to provide for a diversity of residential lifestyles and non-residential services and activities.	Policy Res1(a): Manage the Wairarapa's residential area under a single overall framework to provide for a wide range of lifestyles in a manner that is consistent with maintaining and enhancing an acceptable level of residential character and amenity values.	5.3.4(a): Specifically identify permitted land uses within the Residential Zone, supported by such environmental standards as necessary to protect the character, amenity values and function of the Zone.
		Policy Res1(b): To provide residents with an acceptable level of certainty through environmental controls imposed on development and land use in the Residential Zone.	5.3.4(b): The resource consent process to assess potential adverse environmental effects of activities that are not permitted, either because of non-compliance with environmental standards or because of the nature of the non-residential land uses.
			5.3.4(c): Use of conditions on resource consents to control the effects of activities to acceptable levels.
			5.3.4(f): Education, guidance and information about environmental standards and sustainable residential design.

Commercial Zone (section 6)	Objective Com1: To maintain and enhance the character and amenity values of the Commercial Zone in a manner that enables its commercial functions to provide for the wellbeing of the Wairarapa while mitigating adverse effects on the natural and physical environment.	Policy Com1(a): Maintain and enhance the function, character and amenity of the Commercial Zone by controlling the bulk, location and nature of activities and buildings to achieve appropriate levels of scale, density and environmental effects.	6.3.19(a): Development standards for permitted activities to protect the character, amenity, and function of the Commercial Zone.
			6.3.19(f): Assessment of environmental effects through the resource consent process for activities that do not comply with development standards.
		Policy Com1(b): Encourage a wide range of appropriate activities within the Commercial Zone while ensuring any adverse effects are avoided, remedied or mitigated.	6.3.19(h): Conditions on resource consents, including consent notices and covenants on Certificates of Title, to control the effects of activities.
			6.3.19(i): Education and information about the environmental standards, values, and amenity associated with the Commercial Zone.

			6.3.19(j): Working with business interests and their advisers in obtaining appropriate building design and layout in accordance with the relevant objectives and policies of the Commercial Zone.
Industrial Zone (Section 7)	Objective Ind1: To provide for a wide range of activities within the Industrial Zone that can function efficiently within acceptable levels of environmental quality and amenity.	Policy Ind1(a): Provide adequate serviced land resources for the existing and future industrial development needs of the Wairarapa.	7.3.13(e): Use of a Design Guide for managing development within the Wairarapa Industrial Area.
		Policy Ind1(b): Enable a wide range of activities, including activities with adverse effects that may not otherwise be appropriate in other zones.	7.3.13(h): Assessment of environmental effects through the resource consent process for activities that do not comply with the performance standards.
		Policy Ind1(e): Control industrial activities, including primary processing industries, which may have significant external environmental effects.	7.1.13(i): Conditions on resource consents, including consent notices on Certificates of Title, to control the effects of activities.

		<p><i>Policy Ind1(g): Manage the visual effects of industrial activities on major arterial roads and within close proximity to Residential or Rural Zones.</i></p>	
	<p><i>Objective Ind3: To provide for the efficient use and development of the Opaki Industrial Area in a manner that maintains and enhances the special amenity values of the vicinity, including those of the residences that overlook the area.</i></p>	<p><i>Policy Ind3(d): Maintain the qualities of the area by restricting all industrial activities with the potential to create significant adverse effects.</i></p>	
	<p><i>Objective Ind4: To provide for the efficient use and development of the Waingawa Industrial Area in a manner that protects the area's environmental qualities while recognising its context within the rural environment and its high profile location, as well as the potential infrastructural and</i></p>	<p><i>Policy Ind4(e): Maintain the amenity values and character of the surrounding area by ensuring industrial development recognises and appropriately addresses its rural context and neighbours through an appropriate form, location and pattern of built development, landscaping and planting.</i></p>	

	access requirement of industry in this location.		
Tangata Whenua (Section 8)	Objective TW1: To recognise and provide for the cultural values and relationship of Tangata Whenua in managing the natural and physical resources and the effects of activities, while taking into account the principles of the Treaty of Waitangi.	Policy TW1(a): Recognise Tangata Whenua values and provide for Tangata Whenua to maintain and enhance their traditional relationship with the natural environment.	8.3.4 (a): Establish agreed processes with Tangata Whenua to investigate how significant sites and issues can be identified and addressed in an appropriate way without divulging sensitive information.
		Policy TW1(b): Have particular regard to the exercise of kaitiakitanga by Tangata Whenua in the management of activities and resources.	8.3.4(b): Identification of culturally significant sites to Tangata Whenua (as appropriate) through a reference system of the sites.
		Policy TW1(c): Protect waahi tapu, sites of cultural importance and other taonga.	8.3.4(c): Rules in the Plan protecting waahi tapu and taonga sites identified by Tangata Whenua.
			8.3.4(d): Establish agreed processes with Rangitaane o Wairarapa and Ngati Kahungunu ki Wairarapa for consultation on resource consents where appropriate.
			8.3.4(e): Assessment of environmental effects on sites of significance to Tangata Whenua,

			<p>where an activity is subject to resource consent.</p> <p>8.3.4(f): Conditions on resource consents including covenants on Certificates of Title and consent notices to control the effects of activities.</p> <p>8.3.4.(i): Council encouragement of information and education on the importance of sites of significance to Tangata Whenua and the mechanisms available to protect these sites.</p> <p>8.3.4.(m): Promote greater involvement of Iwi in resource management.</p> <p>8.3.4.(n) Policies and rules within the Regional Policy Statement and Regional Plans that offer further protection to sites of significance.</p>
Landscape (Section 9)	Objective Lan1: To identify and protect the Wairarapa's outstanding landscapes and natural features from the adverse effects of inappropriate subdivision, use and development.	Policy Lan1(a): Comprehensively and consistently identify and assess the outstanding landscapes and natural features within the Wairarapa.	9.3.4.(b): Rules in the Plan for activities within outstanding landscapes, and natural features to establish minimum thresholds of potential adverse change.
		Policy Lan1(b): Manage the effects of activities with the potential to adversely affect the attributes and values of outstanding landscapes and natural features.	9.3.4.(c): Through the resource consent process, assessment of environmental effects where an activity exceeds the minimum thresholds within a defined outstanding landscape and natural feature.

	<p><i>Policy Lan1 (c): Protect the particular attributes and values of outstanding landscapes and natural features from inappropriate development, with any adverse effects on those attributes and values being avoided, remedied or mitigated.</i></p>		<p><i>9.4.3.(d): Conditions on resource consents, including consent notices and covenants on Certificates of Title to control the adverse effects of activities on landscape values.</i></p>
	<p><i>Policy Lan1 (d): Encourage new development to be located and designed in a way that protects the attributes and values of the Wairarapa's outstanding landscapes and natural features.</i></p>		<p><i>9.4.3.(e): Information and education on the value of the Wairarapa's outstanding landscapes and natural features, and on the ways to avoid or mitigate any adverse effects on those values when planning an activity or development.</i></p>
	<p><i>Policy Lan1 (e): Increase public awareness of landscape values and their importance, and encourage the community and landowners to support protection of the Wairarapa's outstanding landscapes and natural features.</i></p>		<p><i>4.3.(f): Identification of Outstanding Landscapes and Natural Features using the following criteria:</i></p> <ul style="list-style-type: none"> • <i>Natural science factors;</i> • <i>Aesthetic values;</i> • <i>Transient values;</i> • <i>Expressiveness/legibility;</i> • <i>Historical associations;</i> • <i>Value to Tangata Whenua;</i>

			<ul style="list-style-type: none"> • Whether the values are shared and recognised.
		<i>Policy Lan1 (f): Provide support and incentives as appropriate to landowners in the protection of outstanding landscapes and natural features.</i>	<i>9.4.3(g): Monitoring the Wairarapa's outstanding landscapes and natural features to identify where noticeable landscape, visual and amenity change is occurring, and review the District Plan if necessary.</i>
Indigenous Biodiversity (Section 11)	<i>Objective Bio1: To maintain and enhance the biological diversity of indigenous species and habitats within the Wairarapa.</i>	<i>Policy Bio1 (a): Coordinate with other agencies and organisations in identifying risks, requirements, opportunities and effective methods for protecting and enhancing Wairarapa's biodiversity.</i>	<i>11.3.7(a): In conjunction with other key organisations, initiation of a Wairarapa Biodiversity Strategy by 2008 to establish goals and a programme of action for identifying and managing natural habitats, methods for enhancing biodiversity, and for prioritising actions for protecting significant natural areas.</i>
			<i>11.3.7(b): Environmental standards to limit the potential adverse effects of activities on indigenous vegetation wetlands and habitats with actual or potential value for biodiversity.</i>
		<i>Policy Bio1 (b): Collaborate with other agencies and organisations in undertaking joint initiatives and in supporting landowners' initiatives in the protection and enhancement of biodiversity.</i>	<i>11.3.7(d): Through the resource consent process, assessment of environmental effects where an activity may adversely affect an area of significant indigenous</i>

			<p>vegetation and/or significant indigenous habitat.</p>
			<p>11.3.7(e): Conditions on resource consents, including consent notices and covenants on Certificates of Title, to avoid, remedy or mitigate the adverse effects of activities.</p>
		<p><i>Policy Bio1(e): Support and encourage the protection of natural habitats on private land, including restoring and protecting linkages and ecological corridors.</i></p>	<p>11.3.7(f): Information and education on the value of the Wairarapa's biodiversity and its significant natural areas, including the need to consider these values when planning an activity or development.</p>
			<p>11.3.7(h): Incentives and information as appropriate to encourage landowners to protect natural habitats, such as rates relief, support with fencing and pest control, funding sources, and assistance with applications for protective covenants.</p>
		<p><i>Policy Bio1(f): Increase public awareness of the natural values within the Wairarapa, and encourage community support for the protection and conservation of the Wairarapa's biodiversity.</i></p>	<p>11.3.7(i): Provision to create conservation lots to form separate tenure of natural areas.</p>
			<p>11.3.7(m): Cooperation with landowners, organisations, groups and interested parties involved in conservation management.</p>
			<p>11.3.7(n): Support for local conservation care groups and programmes.</p>

<p>Coastal Environment (Section 13)</p>	<p>Objective CE1: To protect the natural character of the coastal environment by ensuring use, subdivision and development maintains the comparatively undeveloped nature of the Wairarapa Coast.</p>	<p>Policy CE1(b): Manage the design, location and scale of subdivision and development in the identified coastal environment to ensure the special qualities and natural character of the coast are retained and adverse effects are avoided, remedied or mitigated, with priority given to avoiding effects.</p> <p>Policy CE1(d): Ensure that adverse cumulative effects of subdivision, land use and development on the special qualities and natural character of the Wairarapa coast are avoided, remedied or mitigated.</p>	<p>13.3.10(b) Apply a regulatory framework that promotes innovative approach to subdivision and development, including standards for permitted activities to provide for development that is consistent with the natural character of the coastal environment, and with the character and amenity values of coastal settlements.</p>
<p>Subdivision, Land Development and Urban Growth (Section 18)</p>	<p>Objective SLD1: To ensure subdivision and land development maintains and enhances the character, amenity, natural and visual qualities of the Wairarapa, and protects the efficient and effective operation of land uses and physical resources.</p>	<p>Policy SLD1(a): Manage subdivision and land development in a manner that is appropriate for the character and qualities of the environmental zone in which it is located, while recognising that such change may alter the character and qualities.</p>	<p>18.3.16(b): The application of minimum subdivision standards as appropriate to each environmental zone or to each management area within a zone.</p>
		<p>Policy SLD1(b): Provide subdivision where it is compatible with the physical characteristics of the site, provided any adverse environmental effects are avoided, remedied or mitigated.</p>	<p>18.3.16(e): Assessment of environmental effects through the resource consent process for subdivision proposals or for land use activities not complying with development standards.</p>
		<p>Policy SLD1(i): Protect the quality, character and values of the Wairarapa's rural environment from the cumulative effects of intensification by limiting subdivision below the rural minimum area standards to situations where there are</p>	<p>18.3.16(f): Resource consent conditions to avoid remedy or mitigate the potential adverse effects of consequent land use.</p>

		<p><i>special circumstances that would not create a precedent.</i></p>	
		<p><i>Policy SLD1 (j): In the Rural Coastal Environment Management Area, allotments, particularly where new buildings and structures are likely to be constructed, shall:</i></p> <ul style="list-style-type: none"> <i>i. Avoid or mitigate any adverse effects on landscape, natural and amenity values from any buildings, structures and accessways;</i> <i>ii. Not degrade the natural character of the coastal environment through an inappropriate density, scale and location;</i> 	
	<p><i>Objective SLD5: To sustainably manage and develop the reserve and open space network to cater for current and future community needs and to protect and enhance</i></p>	<p><i>Policy SLD5(a): Require a reserve contribution from new residential and visitor accommodation development, including rural subdivision creating vacant lots that have the ability to be developed for residential purposes, that is proportionate to the demand for passive and active community recreational requirements arising from the development, including the need to protect the Wairarapa's key environmental assets such as its coastal margins and natural features.</i></p>	



	<p>significant environmental assets.</p>	<p><i>Policy SLD5(b): Ensure land acquired as a reserve contribution is located and designed to complement the recreational and open space needs and amenity of the District.</i></p>	
<p>General Amenity Values (Section 19)</p>	<p>19.3.1 Objective GAV1: To maintain and enhance those general amenity values which make the Wairarapa a pleasant place in which to live and work, or visit.</p>	<p>19.3.2 Policy Gav(e): Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, and to protect the clarity and brightness of the night sky.</p>	<p>19.3.4 Methods:</p> <p>(a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa.</p> <p>(b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards.</p> <p>(c) Conditions on resource consent to control adverse effects of activities.</p> <p>Anticipated Environmental Outcome</p> <p>(a) The maintenance of amenity values appropriate to the surrounding environment.</p>




			<i>(b) Minimised conflict over amenity between established uses and temporary activities.</i>
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Appendix F: Lighting available at lighting retailers



Appendix F: Lighting available at lighting retailers




Lights available in New Zealand that comply with Dark Sky Reserve proposed plan change standard 21.1.11(a)(ii, iii and iv)

RETAILER	LIGHT	LUMENS	COLOUR TEMPERATURE (KELVIN)	MOTION DETECTOR + TIMER	SHIELD OR TILT	PRICE	READILY AVAILABLE
Mitre10	 <p>Orbit Lighting LED Spotlight W: 230mm, H: 54mm Black</p>	600	3000 K	no	Shield and tilt	\$69.98	In stock at multiple outlets
Lighting Plus Masterton	 <p>Varde 6w AC LED Exterior Spotlight - Black</p>	380	3000 K	no	both	\$45-60	In stock at multiple outlets

RETAILER	LIGHT	LUMENS	COLOUR TEMPERATURE (KELVIN)	MOTION DETECTOR + TIMER	SHIELD OR TILT	PRICE	READILY AVAILABLE
Lighting Plus Masterton	 <p>Ojo LED Exterior Wall Light - Graphite</p>	45	3000 K	no	Shield, down light	\$48.30-69	In stock at multiple outlets
Lightplan	 <p>CREO.90 Recessed low glare LED downlight with 50° beam angle</p>	850	3000 K	no	Shield, down light	\$85	Available
Lightplan	 <p>Eva IP65 Exterior rated surface mounted low-glare 9W LED</p>	1050	3000 K	no	Shield, down light	\$249	Available

RETAILER	LIGHT	LUMENS	COLOUR TEMPERATURE (KELVIN)	MOTION DETECTOR + TIMER	SHIELD OR TILT	PRICE	READILY AVAILABLE
	downlight with 38° beam angle.						
Lightplan	 <p>Myra Security Light Adjustable exterior wall mounted twin spotlight with integrated security sensor</p>	560	3000 K	yes	Tilt, spotlight	\$279	Available
Lightplan	 <p>Senter Integrated, in-direct LED exterior bollard made with high quality die-cast</p>	805	3000 K	no	Shield	\$259	Available

RETAILER	LIGHT	LUMENS	COLOUR TEMPERATURE (KELVIN)	MOTION DETECTOR + TIMER	SHIELD OR TILT	PRICE	READILY AVAILABLE
	aluminium components. When lit, the light bounces off the two angled sides and creates a glow of light all around the base of the fitting.						
Lightplan	 <p>Zado Pole Light Integrated 5W LED garden spike light with 355° tilt.</p>	550	3000 K	no	Tilt spotlight	\$199	Available
Lightplan	 <p>Solar CCT Black Surface mounted LED ceiling button with 120° beam angle, available in 2 sizes</p>	1360 - 2040	3000 K	no	Downlight, ceiling	\$65-99	Available

RETAILER	LIGHT	LUMENS	COLOUR TEMPERATURE (KELVIN)	MOTION DETECTOR + TIMER	SHIELD OR TILT	PRICE	READILY AVAILABLE
Lightplan	 <p>Lunar R Exterior recessed in-ground uplight complete with plastic niche for concrete</p>	480	3000 K	no	Uplight	\$99.00 (not including lamp or landscape transformer. One transformer would typically run several fittings.)	Available
Mitre10	 <p>Orbit Lighting Security Light LED Twin 6 Watt Black</p>	320	5000 K	yes	both	\$74.98	In stock at multiple outlets
Mitre10	 <p>Vectral Solar Twin Security Light 60mm Black</p>	400	?	yes	both	\$64	Low stock

Appendix G: Summary of Australian Standard *AS 2560 Guide to Sports Lighting*

Appendix G: Summary of Australian Standard *AS 2560 Guide to Sports Lighting*

From AS 2560.2.1:2003 recommended average maintained illuminance levels for Tennis (Extract from Table 1)

Level of Play	Horizontal Illuminance (lux)	Uniformity U1 Min/Avg
Training, Recreation	250	0.6
Club Competition	350	0.6

From AS 2560.2.3:2007 recommended average maintained illuminance levels for Football (all codes i.e. football, rugby league and rugby union), (Extract from Table 1)

Level of Play	Horizontal Illuminance (lux)	Uniformity U1 Min/Avg	Uniformity U2 Min/Max
Level 1 - Ball & Physical Training	50	0.3	N/A
Level 2 - Match Practice	100	0.5	0.3
Level 3 - Competition	200	0.6	0.4

From AS 2560.2.4:1986 recommended average maintained illuminance levels for Outdoor Netball and Basketball, (Extract from Table 1)

Level of Play	Horizontal Illuminance (lux)	Uniformity U1 Min/Avg
Recreation & Training	100	0.5
Competition	200	0.66

From AS 2560.2.7:1994 recommended average maintained illuminance levels for Hockey, (Extract from Table 1)

Level of Play	Horizontal Illuminance (lux)	Uniformity U1 Min/Avg
Physical Training	30	0.25
Ball Training, Junior and Minor Club Competition	250	0.6
Major Club, National and International Competition	500	0.7

Appendix H: Wairarapa Dark Sky Reserve – Issues and Options Report



PERCEPTION PLANNING
your connection with the environment

Wairarapa Dark Sky Reserve

ISSUES AND OPTIONS REPORT

Prepared for South Wairarapa District Council

15 January 2020



Summary and Recommendations

- South Wairarapa District Council, along with Carterton and Masterton District Councils, is supporting an application by the Martinborough Dark Sky Society (MDSS) for the Wairarapa to be certified as an International Dark Sky Reserve by the International Dark Sky Association (IDA).
- An international dark sky reserve is an area of public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for any one or more of the following: cultural, natural, educational, scientific or public purposes.
- There are 12 Dark Sky Reserves across the world. There is currently only one dark sky reserve in New Zealand located within the Mackenzie Valley, Aoraki. If the Wairarapa was to become a dark sky reserve, it would be the world's largest. There are also two dark sky Sanctuaries within New Zealand, being Stewart Island and Great Barrier Island¹.
- A Dark Sky Reserve certification has the potential to bring a number of positive benefits to the Wairarapa region including tourism (in particular winter tourism), cultural, environmental and educational benefits.
- Light pollution is the biggest threat to gaining certification, as light pollution hinders the ability for people to view the night sky. To qualify as a dark sky reserve, light pollution within the region must be controlled.
- The IDA has guidelines that a reserve must meet before it can gain certification. This includes restrictions on new lighting, requiring light shielding, limits on light levels/temperature and lighting times. There is therefore a need to control lighting within the district to a level that can satisfy the IDA guidelines.
- There are a number of options for the Wairarapa Councils to control light pollution within the District and these are outlined and assessed within Section 5 of this report.
- It is recommended that the Wairarapa Council's prepare a plan change to the Wairarapa Combined District Plan (WCDP) to amend the lighting controls contained within the plan. Amended provisions would ensure that new lighting

¹ A sanctuary differs from a Dark Sky Reserve in that it is typically situated in a very remote location with few (if any) nearby threats to the quality of its dark night skies.

complies with IDA guidelines within the dark sky reserve area, to reduced light pollution and adverse effects on the visibility, brightness and clarity of the night sky.

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1 Purpose

South Wairarapa District Council, along with Carterton and Masterton District Councils, are supporting an application by the Martinborough Dark Sky Society for the area of South Wairarapa and Carterton to be certified as an International Dark Sky Reserve.

Light pollution is the biggest threat to gaining certification, as light pollution hinders the ability for people to view the night sky. To qualify as an international dark sky reserve light pollution within the region must be controlled.

The purpose of this report is to provide;

- Background information on international dark sky reserves and the proposed Wairarapa Dark Sky reserve;
- Identify the resource management issues faced by the Councils associated with obtaining dark sky reserve certification; and
- Examine the options to address those issues available to the District Councils.

2 Background

2.1 What is a Dark Sky Reserve?

2.1.1 International Dark Sky Reserves

An international dark sky reserve is an area of public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for cultural, natural, educational, scientific or public purposes².

The International Dark Sky Association (IDA) set up the International Dark Sky Places (IDSP) Program in 2001 to encourage communities, parks and protected areas around the world to preserve and protect dark sites through responsible lighting polices and public education.

There are 12 Dark Sky Reserves across the world with three in the southern hemisphere. There is currently only one dark sky reserve in New Zealand located within the Mackenzie Valley, Aoraki.

Dark Sky Reserves are not selected by the IDA but are nominated by a group and individuals from the community.

In order to be considered for dark sky reserve the area of land must be at least 700km² and consist of;

- a “core” area which meets minimum requirements for quality of sky and darkness;
- and

² <https://www.darksky.org>

- a “buffer” area which supports the core area’s dark sky values and receives similar benefits³.
- The ‘core’ and the ‘buffer’ collectively make up the ‘reserve.

Requirements for the quality of sky and darkness within the reserve include;

- Ability to see the milky way with the naked eye
- No artificial light sources within the vicinity that create significant glare

Light pollution is the biggest threat to the ability to view the night sky. Due to light pollution, the night sky over many of our urban environments can be brighter than a natural, starlit sky. This skyglow hides the stars from our sight and prevents us from experiencing a natural night, even in areas at a distance from urban development⁴.

The IDA provides a set of guidelines⁵ that must be achieved before dark sky reserve accreditation is gained. These guidelines include requirements for;

- A Lighting Management Plan (LMP) to ensure that a sufficient number of communities within the reserve area comply with the minimum lighting standards contained within the Lighting Management Plan Guidelines’. The Lighting Management Plan Guidelines outline minimum light shielding, light levels and timing, and guidance for illuminated signs.
- A program, either through education, economic incentives, permitting or regulation, to encourage all new outdoor lighting fixtures to conform to the relevant regulation or guidelines for night sky friendly lighting.
- Acknowledgement of the protected area by government or regulatory agencies. For example, the Councils demonstrating that dark skies are an important scientific, natural, cultural, and/or scenic resource value as shown by the inclusion of appropriate language in official documents for long term planning .

Councils therefore have a role in assisting the Dark Sky Society to achieve certification.

2.1.2 Wairarapa Dark Sky Reserve

The low light pollution levels in Wairarapa make it one of the best, easily accessible places in the world to view the night sky. This quality has been recognised by the Martinborough Dark Sky Society which has applied to the IDA for a large portion of Wairarapa to be formally recognised as an International Dark Sky Reserve.

³ <https://www.darksky.org/our-work/conservation/idsp/become-a-dark-sky-place/>

⁴ <https://www.darksky.org/light-pollution/measuring-light-pollution/>

⁵ International Dark Sky Reserve Program Guidelines June 2018 <https://www.darksky.org>

The International Dark Sky Reserve status would enable the Wairarapa to be actively marketed to domestic and international visitors looking to experience the night sky. The District Councils have recognised the large potential benefits associated with the dark sky reserve, and these are further identified within this report below.

The 'core' of the reserve is the Aorangi Forest Park and its surrounds.



Figure 1 - Proposed International Dark Sky Reserve - Source: Jarvis McDonald Group

A review of the current provisions of the Wairarapa Combined District Plan (WCDP) reveals that control lighting emissions within the district are not currently sufficiently specific to address the light emissions that impact on the view of the night sky, and do not meet the IDA guidelines. In particular, the provisions in the Plan do not control light shielding, light colour temperature, or identify areas within the Wairarapa where specific light emission controls are needed, or the times of day when light emissions require control.

The priority, in terms of the International Dark Sky Reserve accreditation process, is to ensure that light emissions/pollution from new lighting within the district can be controlled.

2.2 Benefits

Dark Sky Reserve certification has the potential to bring a number of positive benefits to the Wairarapa Region. These benefits are touched on below.

2.2.1 Tourism

Dark Sky Reserve certification has the ability to substantially boost tourism in the Wairarapa region and develop tourism over the quieter winter months.

Wairarapa is a well-established summer tourist destination, sought for wineries and cuisine. Tourist spending in Wairarapa during the 18/19 Summer averaged at 23 million, meanwhile average spending for 2019 winter averaged at 12 million. These statistics are almost identical to Aoraki before they became an internationally recognised Dark Sky Reserve. Once Aoraki became an accredited and established dark sky reserve winter tourism spending increased 41.8% (2010 vs 2019).⁶

Additionally, certification would protect the two existing dark sky tourism companies in Wairarapa (starfield and under the stars), as well as allowing other dark sky tourism companies establish themselves. The activity (stargazing) must take place at night which means that those visiting the area also need accommodation and are likely to partake in other tourist activities during the day-time, boosting tourist activity undertaken in the district.

2.2.2 Education

A dark sky reserve in Wairarapa will provide rare opportunity to educate tourists and locals of all ages about astronomy. For something that is above us every night so much of the population know so little about it. Currently 80% of the world cannot see the stars and live below light polluted skies⁷, a number that is only increasing as development and populations increase. Wairarapa has a unique opportunity to safeguard the night sky and educate people about historic uses for stars.

Local universities will be able to utilise the proposed dark sky reserve to support astrological related courses. Furthermore, local schools would be able to educate students about stargazing and the solar system.

2.2.3 Cultural benefits

Māori ancestors highly valued the night sky and possessed such great astronomical knowledge of their surrounding environment. Tātai Arorangi or astronomy was interwoven throughout Māori way of life and tohunga kōkorangi or master astronomers would observe the movements and positions of the stars, planets, comets and meteors and passed this knowledge through oral traditions like waiata, whakataukī, karakia and more.

The knowledge of the night sky was localised, the stars and planets were indicators of seasonal change, spawning migrational species and other environmental factors. The night sky highlights some important Māori values that have been detrimental to their livelihood and here are some key concepts (not limited) to Māori that signified the importance of the night sky; kaitiakitanga or guardianship, kōtahitanga or unity, whanaungatanga or sense of family connection, mātauranga and māramatanga or knowledge and insight, and many more.

⁶ <https://www.mbie.govt.nz/immigration-and-tourism/tourism-research-and-data/tourism-data-releases/monthly-regional-tourism-estimates/latest-update/monthly-tourism-spend-grouped-by-rto-and-product-category/>

⁷ Falchi, F., *et al* (2016) The new world atlas of artificial night sky brightness, *Science Advances* **2** (6)

The ability to view the night sky is integral to Māori in;

- Whakatere waka - Navigation
- Matariki - Pleiades
- Māramataka - Māori Lunar calendar
- Death

The night sky has been integral to the livelihood of Māori for hundreds of years, highlighting the great spiritual connection Māori have with the environment and without visible sky's this will challenge their livelihood.

2.2.4 Environment

The effects of light pollution on the environment has become increasingly researched and discussed over the past 10 years. As cities grow larger and brighter, night skies begin to become less visible. 56% of the country is unable to view the milky way. This figure is expected to significantly increase over the next 5-10 years based on the current rates of development across the country. Wairarapa has a rare opportunity to prevent further light pollution that is concurrent with population growth and development.

Plants and animals depend on Earth's daily cycle of light and dark rhythm to govern life-sustaining behaviours such as reproduction, nourishment, sleep and protection from predators. Scientific evidence suggests that artificial light at night has negative and deadly effects on many creatures including amphibians, birds, mammals, insects and plants⁸.

3 Statutory Framework

3.1 RMA

The purpose of the RMA is to promote the sustainable management of natural and physical resources. The principles of the Act are set out in sections 6, 7 and 8 as matters of national importance, other matters and the Treaty of Waitangi respectively. Differing levels of weight are given to these sections.

Section 6 identifies the following as matters of national importance. These matters must be recognised and provided for and include;

- (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

⁸ <https://www.darksky.org/light-pollution/wildlife/>

- (e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga

Section 7 requires that the particular regard must be given to;

- (a) Kaitiakitanga;
- (aa) the ethic of stewardship;
- (b) The efficient use of natural and physical resources;
- (c) The maintenance and enhancement of amenity values;
- (d) Intrinsic values of ecosystems;
- (e) Maintenance and enhancement of the quality of the environment;

Section 8 requires that the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) are taken into account.

3.2 NZCPS

The New Zealand Coastal Policy Statement (NZCPS) outlines how the purpose of the Act will be achieved in respect of the coastal environment.

Objective 2 of the NZCPS seeks to preserve that natural character of the coastal environment through recognising the characteristics and qualities that contribute to natural character. Objective 3 requires recognition for the role of tangata whenua as kaitiaki and provide for tangata whenua in involvement in the management of the coastal environment.

Policy 13 – Preservation of natural character – seeks to preserve the natural character of the coastal environment and to protect it from inappropriate use and development. Of particular relevance is that Policy 13(2)(e) recognises that natural character is not the same as natural features and landscape or amenity values and may include matters such as the natural darkness of the night sky.

3.3 Wellington Regional Policy Statement

The Wellington Regional Policy Statement (RPS) provides an overview of the resource management issues for the Wellington Region and policies and methods for the management of these issues.

The RPS contains objectives and policy to preserve and protect habitats and features, including natural character of the coastal environment (Objective 3, Policy 35). The RPS also contains objectives and policies that recognise the need for Council's to work with local iwi authorities for the benefit of the region.

3.4 Wairarapa Combined District Plan

The Wairarapa Combined District Plan (WCDP) applies across the three District Councils of the Wairarapa, namely Masterton, Carterton and South Wairarapa.

Lighting within each district is currently controlled by the provisions within the WCDP. The plan manages lighting through provisions within the 'general rules' of the Plan. These provisions apply to all outdoor lighting, regardless of activity / location across the districts.

The provisions relevant to the control of lighting within the districts are outlined below;

Chapter	Provision	Detail
Chapter 19: General Amenity Values	19.3.2 GAV1 Policies	(e) Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, and to protect the clarity and brightness of the night sky. Implemented through Method 19.3.4(a), 19.3.4(b) 19.3.4(c) and 19.3.4(g).
	19.3.4 Methods	(a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa. (b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards. (c) Conditions on resource consent to control adverse effects of activities. (g) Liaison with Road Controlling Authorities to promote the use of shields and other devices on streetlights to direct light downwards.
Chapter 21- General Rules	21.1.11 Glare and Artificial Light - Permitted Activity	(a) The emission of light (including glare) meets the following standard: (i) A maximum artificial light level of 8 lux (lumens per square metre) measured at 1.5m above ground level at the site boundary.
Chapter 22 - Assessment Criteria	22.1.17 Artificial Light	(i) The extent to which the light will adversely affect adjoining allotments. (ii) The impact of light direction on the safe and efficient operation of the road network. (iii) The extent to which the light(s) are necessary for reasons of security, public amenity, or safety.

		<p>(iv) The hours during which the lighting will operate.</p> <p>(v) Proposed methods to avoid, remedy or mitigate potential adverse effects including the height, orientation, angle, and shielding of the light source.</p>
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3.5 South Wairarapa District Council Annual Plan 2019/20

The South Wairarapa District Council Annual Plan for the 2019/20 year identifies in 'Projects/Issues' a plan change in partnership with the Martinborough Dark Sky Society to amend outdoor lighting permitted standards/rules within the District Plan to facilitate the development of a proposed Dark Sky Reserve within the Wairarapa⁹.

3.6 Carterton District Council Annual Plan 2019/20

The Carterton District Council Annual Plan supports the implementation of the Wairarapa Economic Development Strategy providing funding to contribute to projects.

3.7 Wairarapa Economic Development Strategy and Action Plan

The Wairarapa Economic Development Strategy and Action Plan identifies the 'Martinborough Dark Sky experience' as one of the four best 'multi-season, multi day regular returns' tourism opportunities in the district. The report identifies the opportunity for the Dark sky astronomy experience as an extension to Wellington tourism offer.

3.8 Draft South Wairarapa spatial plan

The purpose of the South Wairarapa Spatial Plan is to prepare the region for ongoing growth and to create a 'blueprint' for what the district will look like in time to come.

Within the South Wairarapa Spatial Plan Discussion Document¹⁰ - Shaping Move 1 recognises that the areas dark sky is internationally recognised and has the potential to become a large dark sky reserve. Proposed objectives seek to ensure the district's special qualities and character is 'nutured'¹¹ and guiding growth to achieve a tourism hub. The discussion document recognises the need to protect the dark sky reserve initiative from being compromised through inappropriate development.

⁹ South Wairarapa District Council Annual Plan for the 2019/20 year pg 14

¹⁰ South Wairarapa Spatial Plan – Our Future Focus 2050 – Discussion Document – How do you want South Wairarapa to look into the future.

The tourism hub is proposed to be a key role of the Wairarapa and includes wine, best food, dark sky reserve, gliding, bush, heritage, cultural initiatives, lake, wild coastline, trails with integrated education and employment.¹¹

One of the seven proposed special character projects for the region involves having the largest dark sky reserve in the world. While, one of the nine better connection projects is to promote joint educational initiative, including cultural astronomy/dark sky centre.¹¹

4 Consultation

This project is at its very initial stages, and as such there has been no consultation undertaken by the Council to the local community or interested stakeholder groups. The Council has however been open to its support of the Dark Sky Society's intention to gain International Dark Sky Reserve accreditation.

Discussion with the Martinborough Dark Sky Society have revealed that some initial discussions have been held with the Māori Standing Committee, Local Business Associations and Local Community Groups, however no formal consultation, or consultation plan has been established as yet.

It is recommended that consultation is started with the following groups as soon as possible.

- Local iwi;
- Māori Standing Committee;
- Department of Conservation (DOC);
- Minister for the Environment;
- Local Communities;
- Federated Farmers;
- Local Business Associations;
- Destination Wairarapa;
- Pukaha to Palliser
- Any other groups/individuals that may have a particular interest identified by the Dark Sky Society.

¹¹ South Wairarapa Spatial Plan Discussion Document. Retrieved from <http://www.swdc.govt.nz/sites/default/files/SouthWairarapaSpatialPlanDiscussionDocument.pdf>

It is recommended that consultation is undertaken by the Council in combination with the Dark Sky Society on a non-formal basis initially to get a feel for any concerns or queries that stakeholders may have. Any formal consultation (i.e by way of a Plan change process) can then be undertaken when required.

5 Issue and Outcomes

5.1 Issue

The information provided within this report above outlines the importance of the night sky within the Wairarapa and the benefits that would arise from the establishment of an international dark sky reserve.

There is also a clear direction from both higher order planning documents and from local strategic development documents to recognise that maintaining and enhancing the ability to view the night sky is important from both a resource management and regional economic development perspective. The night sky is identified within the NZCPS¹², and within the Councils' strategic documents and the District Plan as an important feature for the district that requires controls on activities to manage effects.

As outlined above one of the key criteria for achieving dark sky reserve status is that local authority needs to manage activities and any new outdoor lighting associated with those activities that has the potential cause light pollution that would undermine the dark sky qualities of the area.

The primary issue for the Wairarapa Councils to address is;

People need outdoor lighting to use buildings and spaces, however some lighting can cause adverse effects on the visibility, brightness and clarity of the night sky.

This issue recognises that outdoor lighting is important for way finding, identification of places, for public safety, and is essential to people's ability to use buildings and spaces.

This issue also identifies that lighting both individually and cumulatively can have an adverse effect on the ability to view the night sky.

5.2 Outcomes

To resolve the issue identified above the Wairarapa Councils need to be able to ensure that buildings and outdoor areas can be illuminated to provide legible, safe and functional facilities and spaces but in ways that minimise light pollution to levels that maintain the darkness of the night sky.

To address this issue the Councils needs to identify;

¹² Policy 13 – Preservation of Natural Character. Policy 13(2)(e) recognises the 'the natural darkness of the night sky' as a value of natural character.

- Light sources – the activities that cause lighting emissions; and
- Lighting type and characteristics – the types of lighting and characteristics (ie colour and temperature) of lighting that cause light pollution.

The Councils then need to consider the options for the management of these factors to avoid, mitigate and remedy light pollution within the District. Section 5 of this report ‘Options’ will identify the options available to the Councils to control lighting.

6 Options

6.1 Option 1 – Status Quo

This ‘do nothing/ maintain ‘status quo’ option would mean that lighting continues to be managed through the existing provisions in the WCDP.

Pros
No Plan change required.
No additional financial cost for implementation or compliance
Plan users (the general public, businesses, consultants and Council officers) are familiar with the Plan and how it works
Cons
Lighting control within the WCDP is primarily focused on the effects of lighting on the roading network and adjoining allotments rather than the night sky ¹³ .
The Plan has limited focus on managing lighting to protect the ability to view the night sky. The Plan limits lux levels of lighting. This is inefficient to manage light spill and light temperature that are the primary factors of light pollution. The provisions of the WCDP are currently unfit to resolve the issue.
Dark sky reserve accreditation would not be achieved for the District as it cannot confirm that the requirements to achieve accreditation can be met.

6.2 Option 2 – Bylaw

To control lighting within the district the Councils could develop a Bylaw/s under the Local Government Act 2002.

Under section 145 and s146 of the Local Government Act 2002, Councils can make bylaws for a number of purposes. These includes protecting the public from nuisance, for public

¹³ South Wairarapa Combined District Plan – 22.1.17 Artificial Light

health and safety reasons, offensive behaviour, and the management of infrastructure, reserves and recreational grounds.

Bylaws can be used as an alternative to setting rules in a district plan.

Pros
Bylaws have more limited rights of appeal and therefore provide greater certainty.
Bylaws would generally take less time than an RMA Plan change to develop and become operative.
Permit and penalty processes made under bylaws can be simpler than resource consent processes.
Cons
Given limited appeal rights there is less involvement in development of the provisions from the general public.
Bylaws are designed to control nuisance, being ‘ <i>a person, animal, thing, or circumstance causing unreasonable interference with the peace, comfort, or convenience of another person</i> ¹⁴ . Therefore the focus of a Bylaw must be on protection of public from nuisance. The issue that needs to be addressed in this case is managing lighting to avoid effects on the night sky, as opposed to effects on people’s comfort.
Outdoor lighting fixed to or associated with permanent buildings or activities, and are permanent (used regularly) and as such are not short-term and temporary activities which are more appropriately controlled by a bylaw.

6.3 Option 3 – Amendment to District Plan provisions - Plan Change

Lighting within the district is currently controlled by the provisions contained within the WCDP. This option would involve retaining the management of lighting within the WCDP but refining the provisions to better respond with the identified issue.

Amendments to the WDCP would need to be undertaken by way of a plan change by the Councils in accordance with the procedure set down within Schedule 1 of the RMA.

Pros

¹⁴ Auckland Council Property Maintenance and Nuisance Bylaw 2015

Lighting in the district is already managed by the WCDP. This is where the public expect to find the provisions that control lighting. Controlling lighting through provisions within the District Plan is common practise within New Zealand.
The RMA Schedule 1 process provides for public involvement in the development of the provisions by way of submissions and further submission. Submitters also have the opportunity to appeal a decision.
The Plan change can specifically address the identified issue. The scope of the plan change is therefore very isolated.
Provisions of the plan can be specifically proposed to address light pollutions and its effects on the ability to view the night sky. This approach is consistent with the other areas in New Zealand with a Dark Sky reserve, being the McKenzie District.
Plan amendments to better provide for associated Dark Sky Reserve activities (activities within the rural environment that are likely to be associated with dark sky tourism) can occur at a later stage and might be most efficiently considered as part of the broader District Plan Review process currently underway.
Cons
The plan change process can be costly and time consuming.

6.3.1 Option 3A - Plan change - Provisions applying to the whole of the Wairarapa

Option 3A involves the amendment of the WCDP lighting provisions that apply over the whole of the Wairarapa District regardless of location or zone.

This is consistent within the current approach taken within the operative WCDP. The current WCDP provisions contained within the 'General Rules' and objectives, polices and assessment criteria for artificial lighting are not location focused.

6.3.2 Option 3B - Plan change - Provisions apply only to certain areas

Option 3B involves amending the lighting provisions of the WCDP, but applying those provision only to certain areas, namely the dark sky reserve area. This would involve identifying a particular area/s where the lighting provisions are applied to resolve the identified issue.

Option 3A - Provision apply across the whole District	Option 3B - Provisions applying to certain areas
Plan users (the general public, businesses, consultants and Council officers) are familiar with the plan and how it works.	Applying provisions to certain areas would be a new approach to the control of lighting within the WCDP, but is possible through the use of planning and mapping mechanisms such as overlays. This approach is targeted to apply provisions

	only where additional lighting control is required.
The provisions of the Plan apply equally across the district and to all activities, reducing light pollution across the district as a whole.	The provision would be specific to area where it is identified that light pollution needs to be more tightly controlled, namely the identified dark sky reserve area over the South Wairarapa and Carterton.
Does not require identification and mapping of a 'overlay area' where lighting provisions would apply.	Would require identification and mapping of areas where provisions apply.
If a dark sky reserve accreditation is obtained for the South Wairarapa and Carterton, provisions that apply across the district may help to support the expansion of the 'dark sky reserve' in the future.	If amended lighting provisions are required to assist in the expansion of the dark sky reserve area within the future, a further plan change would be required.
The costs of implementation of the provisions (ie more expensive lighting) would be passed into all plan users, even those outside the intended dark sky reserve area of South Wairarapa and Carterton.	The costs of implementation of the provisions (ie more expensive lighting) are only passed on to those that are located within identified areas.

6.4 Option 4 - Non-Regulatory methods

Option 4 involves the use of non- regulatory methods to control lighting within the district. This could involve the use of methods such as;

- Education
- Lighting Design Guides provided by the Council or the Dark Sky Society

Pros
Financial costs for implementation are likely to be lower than the Councils using Bylaws or a Plan Change.
Educating people the story of the 'night sky' may make them more invested in the outcomes.
Can be used in conjunction with other 'options' outlined above.
Cons
Relies on the 'good will' of individuals for implementation.

There is no ability to 'take action' against those who do not comply.

7 Preferred Option

The tables in Section 6 above identify the pro's and con's of each option available to the Councils, to assist in assessing the options available and selecting a preferred option.

Section 5 of the report identifies the resource management issue that is required to be resolved by the Councils. Option 1 -Status Quo, will not resolve the identified issue and as such should be ruled out.

Option 2 - Bylaw provides a legitimate way of controlling lighting within the district, however one that is primarily designed to manage nuisance, not effects on the environment. In addition, this option would be a new approach to managing lighting within the district which may take some time for the community to get used to and understand. For these reasons, it is not recommended that Option 2 is pursued.

On the basis of the analysis above it is recommend that the Councils proceed with **Option 3** - Plan Change, in combination with **Option 4** - Non-regulatory methods.

The outcome of this recommendation would be an amendment to the provisions of the WCDP to respond to the resource management issue raised within Section 5 of this report. Changes to the WCDP would ensure that lighting for any new activities within the District is controlled, so that lighting will not contribute to light pollution or have adverse effects on the visibility, brightness or clarity of the night sky.

The nature and the area of application (ie Option 3A or Option 3B) of these provisions would be developed and assessed as part of the Plan change process.

For existing activities, non-regulatory methods such as education, undertaken by the Councils and the Dark Sky Society, would assists in highlighting to the public on the benefits of lighting that would comply with the WCDP provisions. It would be the intention of this process that the community would 'get on board' to voluntarily change lighting to reduce light pollution.

Disclaimer

We used a lot of different sources of information to write this report. Where we could we tried to make sure that third party information was accurate, but we couldn't audit all those external reports, websites, people or organisations. If the information we used turns out to be wrong, we can't accept any responsibility or liability if that affects our report or its conclusions. We might (but aren't required to) update our report if we find any additional information that was available when we wrote the report that affects its conclusions.

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Prepared by:

Debbie Donaldson, LLB BSc

SENIOR PLANNER, PERCEPTION PLANNING LIMITED

Version	Date	Author	Reviewer	Comments
1	15/01/20	Debbie Donaldson	Phillip Percy	DRAFT for Council
2	31/01/20	Debbie Donaldson		FINAL to Council
3				
4				

Appendix I: Schedule 1 Clause 3 Consultation Responses



Department of
Conservation
Te Papa Atawhai

20-H-00161

20 July 2020

South Wairarapa District Council
C/- Debbie Donaldson
Perception Planning Limited

Debbie@perceptionplanning.co.nz

Dear Debbie

Consultation on the Wairarapa International Dark Sky Reserve draft plan change to the Wairarapa Combined District Plan

Thank you for your letter to the Minister of Conservation received by email dated 23 June seeking to consult with the Minister regarding a draft change to the Wairarapa Combined District Plan. Your letter has been referred to the Department for reply on behalf of the Minister.

The Minister and the Department are generally supportive of the proposed Wairarapa Dark Sky Reserve centred around Aorangi Forest Park in South Wairarapa. We see that implementing more stringent limits on outdoor lighting as set out in the draft plan change as complimentary to, and necessary to support the dark sky reserve accreditation being sought.

I note that the natural darkness of the night sky is a matter that may contribute to natural character of the coastal environment under Policy 13 of the New Zealand Coastal Policy Statement 2010. I consider the proposed permitted lighting standards within the proposed Dark Sky Management Area will be sufficient to provide for preservation of natural character of the coastal environment, and that there is also sufficient policy direction in the district plan currently to ensure development activities requiring resource consent have regard to protecting natural character of the coastal environment. The proposed standards will also ensure that lighting effects adjacent to public conservation lands are limited and maintain the inherent conservation values they possess.

Overall, I am supportive of the approach taken in the draft plan change, and I thank you for this opportunity to provide comments at this stage of your process.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Natasha Hayward'.

Natasha Hayward
Director Planning Permissions and Land

Department of Conservation *Te Papa Atawhai*
Hamilton Office, Private Bag 3072, Hamilton 3240

Our reference: 2020-0810

26th June 2020

South Wairarapa District Council
C/- Perception Planning
Debbie Donaldson

Email: debbie@perceptionplanning.co.nz

Dear Debbie

Initial Waka Kotahi response to a proposed district plan change providing for the introduction of a Wairarapa International Dark Sky Reserve

The New Zealand Transport Agency, Waka Kotahi, takes this opportunity to respond to your letter of 26th June 2020 in which you seek feedback on a proposed district plan change to the Wairarapa Combined District Plan that seeks to introduce provisions to secure a dark sky reserve area within the Wairarapa that will support an International Dark Sky Association (IDA) accreditation. State Highways 2 and 53 are located within the proposed Dark Sky Management Areas in proposed Appendix 13, but not within the core area of dark sky protection.

Waka Kotahi is generally supportive of the dark sky initiative and will work cooperatively with all parties to support the resource management outcomes for the proposed dark sky reserve. The matters of interest to Waka Kotahi are lighting of state highways, lighting required for road maintenance, road upgrades and emergency works; lighting for road signals; and lighting for accident/incidents/hazards. It is with these matters in mind we have reviewed the draft s32 Evaluation Report and considered how Waka Kotahi's activities are provided for in the Wairarapa Combined District Plan.

Mainly our activities fall within designations so are exempt from complying with usual District Plan rules. As rules in these circumstances do not provide a level of certainty for dark sky outcomes, Waka Kotahi has agreed to a Memorandum of Understanding (MoU) in which we can outline how state highway lighting, whilst meeting requirements of AS/NZS 1158 light design standards, can be changed to achieve as far as practical the limits of light output and sky glow as proposed in the plan change document. This will mean changing existing light infrastructure and equipment within the state highways to ensure the colour temperature does not exceed 3000K. Lumens outputs are significantly about 500-lumens and may exceed this limit however this cannot be changed under light design standards; and all road lighting is required to be tilted down (0°) with upward waste light levels less than 1% so no change to shielding or tilting would be required to achieve the sky glow outcomes sought. In order to effect light equipment change and improve colour temperature, our Systems Management team will need to secure funding through the National Land Transport Plan and program light replacement maintenance works for sections on both State Highway 2 and State Highway 53. Parameters around these activities can be signalled in the MoU.

Occasionally District Plan provisions apply to road infrastructure activities when maintenance, upgrade or emergency works step outside the state highway designated area. For these circumstances we have reviewed, with your assistance, existing District Plan provisions that apply and have reviewed the proposed plan change rules that would apply.

We understand that the proposed provisions for **Outdoor Artificial Light**, revised section 21.1.11, would not apply to roads including state highways however there is no proposed definition for 'outdoor artificial light' so we seek clarification on our interpretation.

When maintenance, upgrade or emergency works occur on or beside a state highway, it is our understanding these activities would fall within the ambit of a **temporary activity** as defined by chapter 27 of the District Plan:

***“Temporary Activity** – means an activity in any zone that is of a non-repetitive, transient nature and includes entertainment, cultural and sporting events.’*

Section 21.1.16 of the District Plan provides rules for temporary activities. There are no proposed changes to the temporary activity rules of the District Plan to support dark sky outcomes. Existing provisions that may apply to maintenance, upgrade or emergency works for state highways are in rule 21.1.16(e) temporary storage of goods or materials limited to 6months duration; 21.1.16(g) temporary signs restrictions and exemptions; 21.1.16(a) relating to temporary building and construction activities limiting works to 12 months in duration. Hence any lighting outside of a designation associated with temporary road maintenance/construction/upgrade/emergency works activities could be expected to occur for up to 12 months without a resource consent if the activity stepped outside the state highway designation.

In terms of lighting that would be used in these temporary circumstances, we can advise it would not meet the lumens or temperature output limits provided for in the proposed plan change under proposed rule 21.1.11 for Outdoor Artificial Light. Of reasonable importance however is there are no state highways within the core of the dark sky reserve area, thus we understand that Waka Kotahi's activities would not challenge the International Dark Sky Association Guidelines for Dark Sky Reserves.

Irrespective of this we believe it is best to include, within the MoU documentation, the potential temporary lighting situations that could not meet lumen output or colour temperature limits, so it is clear to all parties. I summarise this below for your benefit:

1. Traffic signals (permanent and temporary) - it is very likely that traffic signal aspects will exceed the 500-lumen limit. As these are required devices for safe operation of the network an appropriate exemption will be required in the MOU. It is anticipated that District Plan provisions will not apply to traffic signals.
2. Rotating beacons such as are used by emergency services (police, fire ambulance), and utility and road worker crews - generally between 1200 to 7200 lumens so will exceed the 500-lumen limit. As the safe operation of road maintenance work and emergency vehicles is critical to the network and community, these devices will need to be exempted in the MOU.
3. The strobe lights on the rear panel of TTM trucks – these are between 24,000 and 100,000 Lumens (very bright flash) so will require an exemption in the MOU. It is anticipated that District Plan provisions will not apply to such use of strobe lights which always occur on a temporary basis.
4. Worksite light - required for safe night-time maintenance or construction activity. The lighting used will exceed the 500-lumen limit and may also use light sources cooler than the 3000K warm white Dark Skies preference. Therefore, such activities will require an exemption in the MOU.

It is anticipated that the District Plan provisions will not apply to any of the above examples because they relate to temporary activities for road works or will be located within an existing designation.

Please keep us notified of the plan change process, any changes to the proposed District Plan provisions and any clarifications on the above you are able to make.

Waka Kotahi may make a submission to the plan change generally based on the above considerations.

Yours sincerely



Kathryn St Amand / Principal Planner (Consultant)

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CC: **Mark Owen** / Manager, System Management Wellington

Julian Chisnall / Team Leader – Road Safety (National)



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Section 32 Evaluation

WAIRARAPA INTERNATIONAL DARK SKY RESERVE – OUTDOOR ARTIFICIAL
LIGHTING PROPOSED PLAN CHANGE

Prepared for South Wairarapa District Council, Carterton District Council and
Masterton District Council

24th August 2020



Source: Christytoms Photography

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DISCUSSION DRAFT

1 Introduction

This report has been prepared by Perception Planning Ltd on behalf of South Wairarapa District Council, Carterton District Council and Masterton District Council.

The report provides a summary of the evaluation undertaken in accordance with Section 32 of the Resource Management Act 1991 in relation to this proposed plan change to the operative Wairarapa Combined District Plan. This report should be read in conjunction with the proposed amendments to the District Plan, which are included in Appendix A of this report.

1.1 List of Abbreviations

The following abbreviations have been used in this report:

South Wairarapa District Council, Carterton District Council and Masterton District Council – The Councils

PPC or Plan Change	-	Proposed plan change
RMA or the Act	-	Resource Management Act 1991
WCDP or the Plan	-	Wairarapa Combined District Plan
IDA	-	International Dark Sky Association
MDSS	-	Martinborough Dark Sky Society

2 The Purpose of the Wairarapa Dark Sky Reserve Plan Change

South Wairarapa District Council, along with Carterton and Masterton District Councils, are supporting an application by the Martinborough Dark Sky Society (MDSS) for the Wairarapa to be certified as an International Dark Sky Reserve by the International Dark Sky Association (IDA).

Dark Sky Reserve certification has the potential to bring a number of positive benefits to the Wairarapa region including tourism (in particular winter tourism), cultural, environmental and educational benefits.

Light pollution is the biggest threat to gaining certification. To qualify as a dark sky reserve, light pollution within the region must be managed.

The key criteria for achieving dark sky reserve status is that local authorities need to manage activities and any new outdoor lighting associated with those activities, that has the potential to cause light pollution that would undermine the dark sky qualities of the area.

This Plan change offers the opportunity to undertake a focused review of the WCDP lighting provisions and ensure that they:

- Enable international dark sky reserve certification to be obtained.
- Ensure that light pollution that effects the brightness and clarity of the night sky within the districts is minimised.

A review of the operative WCDP reveals that the provisions that control light emissions within the district are not sufficiently specific to address light pollution that adversely effects the brightness and clarity of the night sky. The operative provisions also fail to meet the IDA requirements for dark sky reserve accreditation.

The priority, in terms of the international dark sky reserve certification process, is to ensure that light emissions/pollution from new development within the proposed dark sky reserve area can be controlled.

The purpose of the proposed plan change is therefore to review the Plan's issues, objectives, policies, rules, methods and assessment criteria to:

1. Manage new lighting within the districts to minimise adverse effects from light pollution to protect the brightness and clarity of the night sky.
2. Manage new lighting to ensure that the requirements for obtaining international dark sky reserve status can be met.
3. Clearly signal to the community that the clarity and brightness of the night sky are important features of the Wairarapa and should be protected.
4. Allow for outdoor artificial lighting when the type and characteristics of lighting used will not have adverse effects on the brightness and clarity of the night sky.
5. Ensure that Plan provisions are sufficiently clear and direct, to assist decision-makers assessing and determining applications for lighting.
6. Ensure provisions clearly articulate Council's expectations in relation to lighting.

The proposed changes will:

- Provide more specificity in terms of standards for the installation of lighting.
- Ensure that lighting that meets the prescribed standards is provided for 'as of right'.
- Ensure that lighting that does not comply with the standards requires an assessment of effects, including effects on the on the brightness and clarity of the night sky.
- Provide clear objectives, polices and assessment criteria for assessment when lighting does not meet the permitted activity standards and would require resource consent.

As outlined in section 3.3 of this report, it is the intention of the MDSS to apply for an international dark sky reserve over the South Wairarapa and Carterton districts. For this reason, it is intended that the provisions proposed as part of this plan change will only apply to the South Wairarapa and Carterton districts. This area is to be identified within the Plan as the 'Dark Sky Management Area'.

The provisions proposed by this plan change will only apply to new lighting that is erected within the proposed Dark Sky Management Area¹ once this plan change becomes operative.

¹ It is proposed to identify the area where the provisions of the Plan change will apply as the 'Dark Sky Management Area'. This area reflects the area of the proposed Wairarapa International Dark Sky reserve. At this time the reserve is not officially accredited by the IDA, it therefore is not appropriate to call the area the

These provisions will not apply retrospectively to existing and established lighting. If lighting is replaced however the new provisions proposed in this plan change will apply.

This plan change has not reviewed the effectiveness and efficiency of the current WCDP lighting provisions to provide adequate protection of residential amenity. The scope is limited to ensuring that international dark sky reserve certification can be gained, and minimising light pollution to protect the brightness and clarity of the night sky. A review of the operative WCDP, including the lighting provisions that relate to effects on amenity, will be undertaken as part of the full plan review that is scheduled to be undertaken within the next three years.

This plan change has been prepared with input from suitably qualified lighting engineers from Stephenson and Turner Lighting (S&T Lighting), Wellington. S&T Lighting have prepared an expert report to accompany this plan change attached as Appendix C.

3 What is a Dark Sky Reserve?

3.1 International Dark Sky Reserves

An international dark sky reserve is an area of public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for cultural, natural, educational, scientific or public purposes².

The IDA set up the International Dark Sky Places Program in 2001 to encourage communities, parks and protected areas around the world to preserve and protect dark sites through responsible lighting polices and public education.

There are 12 Dark Sky Reserves across the world with three in the southern hemisphere. There is currently only one dark sky reserve in New Zealand, located within the Mackenzie Valley, Aoraki. There are also two dark sky Sanctuaries within New Zealand, being Stewart Island and Great Barrier Island³. If the Wairarapa was to become a dark sky reserve, it would be the world's largest.

Dark sky reserves are not selected by the IDA but are nominated by a group and/or individuals from the community.

In order to be considered for a dark sky reserve the area of land must be at least 700km² and consist of:

- a “core” area which meets minimum requirements for quality of sky and darkness; and
- a “buffer” area which supports the core area’s dark sky values and receives similar benefits⁴.

Wairarapa International Dark Sky reserve within the Plan change, until formal accreditation has been achieved.

² <https://www.darksky.org>

³ A sanctuary differs from a Dark Sky Reserve in that it is typically situated in a very remote location with few (if any) nearby threats to the quality of its dark night skies.

⁴ <https://www.darksky.org/our-work/conservation/idsp/become-a-dark-sky-place/>

- The 'core' and the 'buffer collectively make up the 'reserve'.⁵

Requirements for the quality of sky and darkness within the reserve include:

- ability to see the Milky Way galaxy with the naked eye
- no artificial light sources within the vicinity that create significant glare⁶.

3.2 Dark Sky Reserve Accreditation

The goals of dark sky certification areas include⁷:

- To identify and honour public or private lands and their surrounding communities for exceptional commitment to and success in implementing the ideals of dark sky preservation;
- To promote eco and astro-tourism;
- To promote protection of nocturnal habitats, public enjoyment of the night sky and its heritage, and/or areas ideal for professional and/or amateur astronomy;
- To encourage land administrators, surrounding communities and private interests to identify dark skies as a valuable resource in need of proactive protection;
- To provide international recognition for such sites;
- To encourage other locations to become environmental leaders on dark sky issues by communicating the importance of dark skies and by providing an example of what is possible with proper stewardship.

The IDA provides a set of guidelines⁸ (attached as Appendix D) that must be achieved before dark sky reserve certification is gained. These guidelines include requirements for:

- A Lighting Management Plan (LMP) to ensure that a sufficient number (80% of the population and 80% of the designated area of protection (core and buffer)) of communities within the reserve area comply with the minimum lighting standards contained within the Lighting Management Plan Guidelines. The Lighting Management Plan Guidelines outline minimum light shielding, light levels and timing, and guidance for illuminated signs. The regulations contained in the LMP must apply to all private and public landowners within the area of protection. Some exceptions may apply but are individually subject to IDA approval.

⁵ IDA – International Dark Sky Reserve Program Guidelines – June 2018 pg 3

⁶ DSA – International Dark Sky Reserve Program Guidelines – June 2018 pg 8

⁷ DSA – International Dark Sky Reserve Program Guidelines – June 2018 pg 3

⁸ International Dark Sky Reserve Program Guidelines June 2018 <https://www.darksky.org>

- A program, either through education, economic incentives, permitting or regulation, to encourage all new outdoor lighting fixtures to conform to the relevant regulation or guidelines for night sky friendly lighting.
- Acknowledgement of the protected area by government or regulatory agencies. For example, the Councils demonstrating that dark skies are an important scientific, natural, cultural, and/or scenic resource, as shown by the inclusion of appropriate language in official documents for long term planning.

The minimum lighting management provisions that the IDA requires/recommends are based on 'Five Principles for Responsible Outdoor Lighting'. These five principles are summarised in the following table.

LIGHT TO PROTECT THE NIGHT Five Principles for Responsible Outdoor Lighting		
USEFUL		ALL LIGHT SHOULD HAVE A CLEAR PURPOSE Before installing or replacing a light, determine if light is needed. Consider how the use of light will impact the area, including wildlife and the environment. Consider using reflective paints or self-luminous markers for signs, curbs, and steps to reduce the need for permanently installed outdoor lighting.
TARGETED		LIGHT SHOULD BE DIRECTED ONLY TO WHERE NEEDED Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.
LOW LIGHT LEVELS		LIGHT SHOULD BE NO BRIGHTER THAN NECESSARY Use the lowest light level required. Be mindful of surface conditions as some surfaces may reflect more light into the night sky than intended.
CONTROLLED		LIGHT SHOULD BE USED ONLY WHEN IT IS USEFUL Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.
COLOR		USE WARMER COLOR LIGHTS WHERE POSSIBLE Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.

Figure 1- International Dark Sky Association - Five principles for responsible outdoor lighting.

The above IDA principles seek to guide the selection, placement, installation and operation of all new and replacement/retrofitted lights in any dark sky reserve. The IDA preference is that outdoor light at night should only be used strictly where it is needed and in the appropriate amount for a specific task. The purpose of outdoor light should be specifically to ensure public safety.

The Councils therefore have an important role in assisting the MDSS to achieve dark sky reserve certification for the Wairarapa.

3.3 Wairarapa Dark Sky Reserve

The low light pollution levels in Wairarapa make it one of the best, easily accessible places in the world to view the night sky. This quality has been recognised by the MDSS, which has applied to the IDA for a large portion of Wairarapa, (the South Wairarapa and Carterton Districts) to be formally recognised as an international dark sky reserve.

The International Dark Sky Reserve status would enable the Wairarapa to be actively marketed to domestic and international visitors looking to experience the night sky. The District Councils have recognised the significant potential benefits associated with the dark sky reserve, and these are further identified in section 4.

The ‘core’ of the proposed Dark Sky Reserve is the Aorangi Forest Park and its surrounds.

It is the intention of the MDSS to obtain certification for the ‘core’, with a ‘buffer area’ comprising of the South Wairarapa District and the Carterton Districts initially. It is the intention that the area of the dark sky reserve will be expanded to include the Masterton District at a later time.



Figure 2 – Proposed International Dark Sky Reserve – Source: Jarvis McDonald Group

The ‘core’ of the proposed Wairarapa Dark Sky Reserve is located within the Aorangi Forest Park, which is managed by the Department of Conservation (DOC). The IDA guidelines have additional, more restrictive requirements that must be achieved for lighting within the ‘core’ area. It is the intention of the Council and MDSS to enter into a memorandum of understanding (MOU) with DOC to ensure that the requirements of the IDA guidelines for the ‘core’ can be managed through the MOU process, as opposed to requiring specific provisions within the WCDP which only apply to the Aorangi Forest Park area.

4 Benefits to the Wairarapa of being a Dark Sky Reserve

4.1 Economic Growth and Tourism

International dark sky reserve certification has the ability to substantially boost tourism in the Wairarapa region, in particular during the quieter winter months.

Wairarapa is a well-established summer tourist destination for wineries and cuisine. Tourist spending in Wairarapa during the 2018/19 summer averaged at 23 million dollars, while spending for the 2019 winter was 12 million. These statistics are almost identical to Aoraki before it became an internationally recognised dark sky reserve. Once Aoraki became an accredited and established dark sky reserve, winter tourism spending increased 41.8% (2010 vs 2019).⁹

Additionally, certification would benefit the existing dark sky tourism companies in Wairarapa (Starfield and Under the Stars), as well as providing an opportunity for other companies to establish. Stargazing must take place at night which means that visitors also need accommodation and are likely to undertake other tourist activities during the day-time.

In 2019 the MDSS commissioned Jarvis McDonald Group (JMG) to undertake an Economic Study to identify and assess the potential economic opportunities arising from a Dark Sky Reserve in the Wairarapa¹⁰.

Based on conservative assumptions, the JMG report found that the Wairarapa could expect:

- Up to 280,000 more guest nights over the 10 years following dark sky reserve certification
- An additional \$190 million tourist dollars spent over that period
- Over 115 extra jobs in direct tourism employment after 10 years.¹¹

The JMG report was prepared prior to the recent 2020 Covid-19 pandemic. At this time, it is not possible to accurately estimate the impact that the pandemic may have on international tourism to New Zealand and the Wairarapa in the coming years, or how it will influence the anticipated economic and employment benefits of dark sky reserve certification identified in the report.

4.2 Cultural

Māori ancestors highly valued the night sky and possessed great astronomical knowledge of their surrounding environment. Tātai Arorangi or astronomy was interwoven throughout Māori way of life and tohunga kōkorangi or master astronomers would observe the movements and

⁹ <https://www.mbie.govt.nz/immigration-and-tourism/tourism-research-and-data/tourism-data-releases/monthly-regional-tourism-estimates/latest-update/monthly-tourism-spend-grouped-by-rto-and-product-category/>

¹⁰ Jarvis McDonald Group - Wairarapa Dark Sky Reserve International Certification - Economic Study, 31 January 2020

¹¹ Jarvis McDonald Group - Wairarapa Dark Sky Reserve International Certification - Economic Study, 31 January 2020

positions of the stars, planets, comets and meteors. They passed this knowledge through oral traditions like waiata, whakataukī, karakia and more.

The knowledge of the night sky was localised, the stars and planets were indicators of seasonal change, spawning of migrational species and other environmental factors.

The ability to view the night sky is integral to Māori in:

- Whakaterere waka (navigation)
- Matariki (pleiades)
- Māramataka (Māori Lunar calendar)
- Death

The night sky has been integral to the livelihood of Māori for hundreds of years, highlighting the great spiritual connection Māori have with the environment. Lack of visibility of the night sky adversely affects the relationship of Maori with their taonga.

4.3 Environmental

The effects of light pollution on the environment has become a topic of increasing research and discussion over the past 10 years. As cities grow larger and brighter, night skies begin to become less visible. 56% of the New Zealand is unable to view the Milky way. This figure is expected to significantly increase over the next 5-10 years based on current rates of development. Wairarapa has a rare opportunity to prevent further light pollution that is concurrent with population growth and development.

Plants and animals depend on Earth's daily cycle of light and dark rhythm to govern life-sustaining behaviours such as reproduction, nourishment, sleep and protection from predators. Scientific evidence suggests that artificial light at night has negative and deadly effects on many creatures including amphibians, birds, mammals, insects and plants¹².

4.4 Social

4.4.1 Education

A dark sky reserve in Wairarapa will provide a rare opportunity to educate tourists and locals of all ages about astronomy. Currently 80% of the world cannot see the stars and live below light polluted skies¹³, a number that is increasing as development and populations increase. The dark sky reserve is an opportunity to safeguard the night sky and educate people about historic uses for stars.

Local universities and schools will be able to utilise the proposed dark sky reserve to support astrological related courses and the science curriculum.

¹² <https://www.darksky.org/light-pollution/wildlife/>

¹³ Falchi, F., *et al* (2016) The new world atlas of artificial night sky brightness, *Science Advances* **2** (6)

4.4.2 Health

Darkness at night-time is essential to human health. Humans adhere to a sleep-wake pattern governed by the day-night cycle and artificial light at night can disrupt that cycle. Our bodies produce the hormone melatonin in response to circadian rhythm, which helps to keep us healthy. Melatonin has antioxidant properties, induces sleep, boosts the immune system, lowers cholesterol, and helps the functioning of the thyroid, pancreas, ovaries, testes and adrenal glands. Night-time exposure to artificial light, in particular blue light suppresses melatonin production¹⁴. Blue light is the main contributor, and therefore a move to warmer light (3000K and lower) reduces the blue light and the magnitude of effect on our bodies. For those who are aware and concerned about night time blue light exposure, the positive effect of the plan change provisions is more important than the dark sky

Ensuring that light pollution is minimised and that the sky is as dark as possible, will be positive for human health.

5 Light Pollution

Outdoor artificial lighting assists in way finding, identification/advertisement of specific locations, and a feeling of safety in non-daylight hours. Our increasing demand for light, however, can result in light pollution, which not only obscures the ability to view the night sky but can have consequences for our health and well-being, cause nuisance or annoyance and adversely effect ecological systems.

Much outdoor lighting used at night is inefficient, overly bright, poorly targeted, improperly shielded, and, in many cases unnecessary. This light, and the electricity used to create it, is being wasted by spilling it into the sky, rather than focusing it on to the actual objects and areas that people want illuminated¹⁵.

Light pollution is made up of a number of components. These are:

- light spill
- glare
- skyglow.

5.1 Light Spill and Glare

Spill light is light that flows beyond the property boundaries (Figure 3). Glare is light that hinders or bothers the human eye (refer to Figure 4).

¹⁴ <https://www.darksky.org/light-pollution/human-health/>

¹⁵ <https://www.darksky.org/light-pollution/>



Illuminance on vertical plane.

Figure 3 - Illustration of Light Spill - Source: Stephenson Turner



Intensity towards the observer: this concerns the luminous intensity emitted by the luminaire in the direction of the observer.

Figure 4 - Illustration of Glare - Source: Stephenson Turner

Light spill and glare primarily cause effects on amenity, where light is either too bright, or goes into areas that do not need to be lit. Glare and light spill can create a nuisance for receivers of the unwanted light.

Light spill and glare have little effect on the ability to view the night sky. For this reason, the provisions of the WCDP that manage light spill and glare and the effects of this light on amenity have not been reviewed as part of this plan change. Those provisions will be reviewed when the Council undertakes its full Plan review. It is noted however that methods to manage skyglow (discussed below) will also provide a level of mitigation of light spill and glare effects on amenity.

5.2 Skyglow

Skyglow or the brightening of the night sky is the primary effect that must be minimised to provide optimum night sky viewing. Due to skyglow, the night sky over many of our urban environments can be brighter than a natural, starlit sky. This skyglow hides the stars from our sight and prevents us from experiencing a natural night, even in areas at a distance from urban development¹⁶.

Skyglow comprises two separate components:

- a) Natural skyglow, that part of the skyglow that is attributable to radiation from celestial sources and luminescent processes in Earth's upper atmosphere.

¹⁶ <https://www.darksky.org/light-pollution/measuring-light-pollution/>

- b) Artificial skyglow, that part of skyglow that is attributable to man-made sources of radiation (e.g. outdoor lighting), including light radiation that is emitted above the horizontal plane and light radiation that is reflected from the surface of the earth.¹⁷

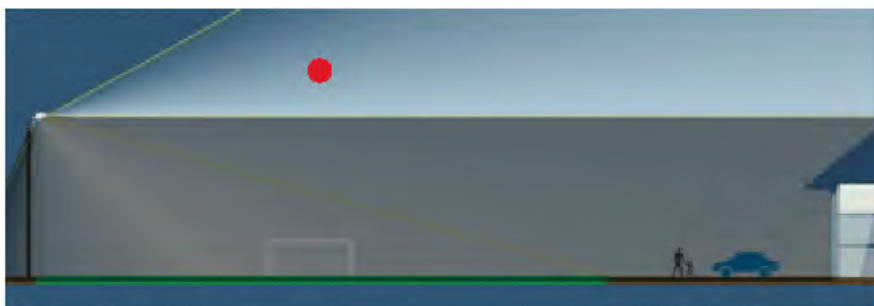


Figure 6 - Illustration of Skyglow Source: Stephenson Turner

Because skyglow is caused both by reflected and direct light from installations, restricting illuminances to the minimum necessary will provide mitigation.

Lighting needs to be managed to minimise skyglow and reduce light pollution. The IDA sets requirements for the management of artificial skyglow from lighting for dark sky reserves.

6 Statutory and Policy Context

This section of the report provides an overview of the statutory and policy context relevant to this plan change.

6.1 Resource Management Act

6.1.1 The Purpose of the RMA

The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5(2) of the Act states:

“In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while:

- a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.”*

¹⁷ S&T lighting – Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 6

6.1.2 Sections 6, 7 and 8

Section 6 of the RMA identifies matters of national importance that are required to be recognised and provided for in achieving the purpose of the Act. Section 6 of the Act requires the preservation of the natural character of the coastal environment. In addition, s6 requires the Council to recognise and provide for relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga. The brightness and clarity of the night sky is an important taonga for Māori.

Section 7 of the Act specifies other matters that are required to be recognised and provided for in achieving the purpose of the Act. Of particular relevance to this plan change is:

- 7(a) kaitiakitanga
- 7(b) the ethic of stewardship
- 7(c) the maintenance and enhancement of amenity values
- 7(d) the intrinsic values of ecosystems
- 7(f) the maintenance and enhancement of the quality of the environment.

Section 8 of the Act requires that the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) are taken into account when achieving the purpose of the Act and have been considered as part of this plan change.

6.1.3 Section 32 of the RMA

Under section 32 of the RMA, any proposed district plan change must be accompanied by a report that assesses:

- The extent to which each objective is the most appropriate way to achieve the purpose of the RMA; and
- Whether the proposed policies and methods are the most appropriate way in which to achieve the objectives in terms of their efficiency and effectiveness.

The s32 evaluation must take the following considerations into account:

- Identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for:
 - economic growth that are anticipated to be provided or reduced; and
 - employment that are anticipated to be provided or reduced; and
- If practicable, quantify the benefits and costs referred to above; and
- Assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

Clause 4A of s32 requires that the evaluation report must summarise all advice concerning the proposal received from iwi authorities and the response to that advice, including any provisions of the proposal that are intended to give effect to the advice. This is discussed in more detail in Section 9 of this report.

6.1.4 Functions of District Councils

The Council has statutory functions under section 31 of the RMA. These include 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.

Section 31(1)(b) requires the Council to control any actual or potential effects of the use, development or protection of land.

6.1.5 The Purpose of District Plans

Section 72 of the RMA states that the purpose of a district plan is to assist territorial authorities to carry out their functions in order to achieve the purpose of the Act.

6.1.6 Preparation of District Plans

Section 73 states that there must be at all times one district plan for each district prepared by the Council in a manner set out in the First Schedule of the Act.

6.1.7 Matters to be Considered by Territorial Authorities

The matters to be considered by the Council when preparing or changing the Plan are set out in section 74 of the Act. This requires the Council to act in accordance with its functions under section 31, the provisions of Part 2, and its duty under section 32. Section 74(2) also sets out a number of other matters Council shall have regard to including plans and strategies prepared under other acts.

6.1.8 Contents of District Plans

Under section 75(3) a District Plan must give effect to:

- (a) any national policy statement; and*
- (b) any New Zealand coastal policy statement; and*
- (ba) a national planning standard; and*
- (c) any regional policy statement.*

Under s75(4) a district plan must not be inconsistent with:

- (a) a water conservation order; or*
- (b) a regional plan for any matter specified in section 30(1).*

6.2 National Policy Context

6.2.1 National Policy Statements

The RMA requires that the District Plan give effect to any National Policy Statement (“NPS”). An NPS is a document prepared under the RMA to provide objectives and policies on matters of national importance. Of relevance to this plan change is the New Zealand Coastal Policy Statement 2010 (NZCPS)

Part of the proposed dark sky reserve is located within the coastal environment, and as such the provisions of the NZCPS need to be considered in this plan change. The NZCPS outlines how the purpose of the Act will be achieved in respect of the coastal environment.

Objective 2 of the NZCPS seeks to preserve the natural character of the coastal environment through recognising the characteristics and qualities that contribute to natural character. Objective 3 requires recognition for the role of tangata whenua as kaitiaki and provision for tangata whenua involvement in the management of the coastal environment.

Policy 13 – Preservation of natural character, seeks to preserve the natural character of the coastal environment and to protect it from inappropriate use and development. Of particular relevance is Policy 13(2)(e) that recognises that natural character is not the same as natural features and landscape or amenity values; and may include matters such as the natural darkness of the night sky.

6.2.2 National Environmental Standards

The RMA requires that the District Plan give effect to any National Environmental Standards (NES). A NES provides technical standards, methods or requirements for matters of national importance.

It is considered that there are no NES that are relevant to this plan change, and as such no further analysis is required as part of this report.

6.2.3 National Planning Standards

The National Planning Standards were introduced to the RMA as part of the 2017 amendments. The purpose of the National Planning Standards is to improve consistency in plan and policy statement structure, format and content¹⁸.

The National Planning Standards contain a prescribed structure for district plans. Relevant to this plan change is that the National Planning Standards direct that a chapter for 'Light' is provided within the 'General District-Wide Matters' section of the standards.

Timeframes have been specified for councils to implement the National Planning Standards (s75(3)(c)). Different timeframes apply to different planning standards and different local authorities. City/district councils, like the Wairarapa Council's generally have five years to adopt the planning standards, with seven years for the definitions standard. If a council undertakes a full plan review within these timeframes the new plan must meet the planning standards when it is notified for submissions.

The proposed Wairarapa dark sky plan change is not a full plan review. It makes modest amendments to a discrete and limited number of provisions to provide specific lighting controls, specific to achieving dark sky reserve accreditation.

It is also important to note that the operative WCDP is due to be fully reviewed and this is anticipated to occur within the next 2-3 years. For this reason, it is considered appropriate that the format for district plans prescribed by the national planning standards is applied to the WCDP at the time of the full plan review.

6.2.4 Wellington Regional Policy Statement

The Wellington Regional Policy Statement (RPS) provides an overview of the resource management issues for the Wellington Region and polices and methods for the management of these issues.

The RPS contains objectives and policy to preserve and protect habitats and features, including the natural character of the coastal environment (Objective 3, Policy 35). The RPS

¹⁸ <https://www.mfe.govt.nz/rma/national-direction/national-planning-standards/about-national-planning-standards>

also contains objectives and policies that recognise the need for Council's to work with local iwi authorities for the benefit of the region.

6.2.5 Local Strategic Context

6.2.5.1 South Wairarapa District Council Annual Plan 2019/20

The South Wairarapa District Council Annual Plan for the 2019/20 year identifies in 'Projects/Issues' a plan change in partnership with the MDSS to amend outdoor lighting permitted standards/rules within the District Plan to facilitate the development of a proposed Dark Sky Reserve within the Wairarapa¹⁹.

6.2.5.2 Carterton District Council Annual Plan 2019/20

The Carterton District Council Annual Plan supports the implementation of the Wairarapa Economic Development Strategy (see below) and providing funding to contribute to projects.

6.2.5.3 Wairarapa Economic Development Strategy and Action Plan

The Wairarapa Economic Development Strategy and Action Plan identifies the 'Martinborough Dark Sky experience' as one of the four best 'multi-season, multi day regular returns' tourism opportunities in the district. The report identifies the opportunity for the dark sky astronomy experience as an extension to Wellington tourism offer.

6.2.5.4 Draft South Wairarapa spatial plan

The purpose of the South Wairarapa Spatial Plan is to prepare the region for ongoing growth and to create a 'blueprint' for what the district will look like in the future.

At this time, only a 'discussion document' has been released for comments, and as such the document carries no statutory status. The discussion document however is helpful to provide an indication of the Councils intentions and matters for consideration in developing a spatial plan over the coming years.

Within the South Wairarapa Spatial Plan Discussion Document,²⁰ Shaping Move 1 recognises that the areas dark sky is internationally recognised and has the potential to become a large dark sky reserve. Proposed objectives seek to ensure the district's special qualities and character are 'nurtured'¹¹ and to guide growth to achieve a tourism hub. The discussion document recognises the need to protect the dark sky reserve initiative from being compromised through inappropriate development.

The tourism hub is proposed to be a key focus and includes wine, best food, dark sky reserve, gliding, bush, heritage, cultural initiatives, lake, wild coastline, trails with integrated education and employment.²¹

¹⁹ South Wairarapa District Council Annual Plan for the 2019/20 year pg 14

²⁰ South Wairarapa Spatial Plan - Our Future Focus 2050 - Discussion Document - How do you want South Wairarapa to look into the future.

²¹ South Wairarapa Spatial Plan Discussion Document. Retrieved from <http://www.swdc.govt.nz/sites/default/files/SouthWairarapaSpatialPlanDiscussionDocument.pdf>

One of the seven proposed ‘special character’ projects for the region involves having the largest dark sky reserve in the world. One of the nine ‘better connection’ projects is to promote joint educational initiatives, including cultural astronomy/dark sky centre.¹

7 The Current District Plan Framework

7.1 Structure of the District Plan

The Wairarapa Combined District Plan (WCDP) applies across the three District Councils of the Wairarapa, namely Masterton, Carterton and South Wairarapa.

Lighting within all districts is controlled by the provisions within the WCDP. The Plan primarily manages lighting through the use of:

- Issues, objectives and policies within Chapter 19 General Amenity Values;
- Rules within Chapter 21 – District Wide Land Use Rules; and
- Assessment Criteria within Chapter 22 – Assessment Criteria.

These provisions apply to all outdoor lighting, regardless of location or the activity the lighting is associated with.

7.2 Operative provisions

The provisions in the operative WCDP that are particularly relevant to the proposed plan change are outlined in the table below.

Other objectives and policies that are relevant but do not specifically relate to the control of lighting are summarised in Appendix D of this report.

Chapter	Provision	Detail
Chapter 19: General Amenity Values	19.3.1 Objective GAV1 – General Amenity Values	To maintain and enhance those general amenity values which make the Wairarapa a pleasant place in which to live and work, or visit.
	19.3.2 GAV1 Policies	(e) Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, and to protect the clarity and brightness of the night sky. Implemented through Method 19.3.4(a), 19.3.4(b) 19.3.4(c) and 19.3.4(g).
	19.3.4 Methods	(a) Performance standards for permitted activities to maintain general amenity values throughout the Wairarapa. (b) Assessment of environmental effects through the resource consent process for activities that do not comply with performance standards.

		(c) Conditions on resource consent to control adverse effects of activities. (g) Liaison with Road Controlling Authorities to promote the use of shields and other devices on streetlights to direct light downwards.
Chapter 21: District Wide Land Use Rules	21.1.11 Glare and Artificial Light - Permitted Activity	(a) The emission of light (including glare) meets the following standard: (i) A maximum artificial light level of 8 lux (lumens per square metre) measured at 1.5m above ground level at the site boundary.
Chapter 22: Assessment Criteria	22.1.17 Artificial Light	(i) The extent to which the light will adversely affect adjoining allotments. (ii) The impact of light direction on the safe and efficient operation of the road network. (iii) The extent to which the light(s) are necessary for reasons of security, public amenity, or safety. (iv) The hours during which the lighting will operate. (v) Proposed methods to avoid, remedy or mitigate potential adverse effects including the height, orientation, angle, and shielding of the light source.

Within each zone, an activity is a permitted activity if it complies with the permitted activity rules of that zone and the permitted activity rules contained within the District Wide Land Use Rules - Chapter 21.

Where proposed outdoor lighting would fail to meet the development standards for 'Glare and Artificial Light' in Rule 21.1.11, the activity will require resource consent as a **Restricted Discretionary Activity**, with discretion restricted to:

- *Avoiding, remedying or mitigating of any effects deriving from the non-compliance within the particular standards(s) that is not met.*

Restricted Discretionary activities will be assessed against the relevant assessment criteria set out in Section 22 of the Plan²².

²² Rural Zone Rule 4.5.5(e), Residetail Zone 5.5.4(a), Commercial Zone Rule 6.5.5(b) and Industrail Zone Rule 7.5.7(a)

Any resource consent required for lighting is assessed against the 'Assessment Criteria' in Chapter 22.1.17 which are specific to artificial light.

8 Summary of Proposed Plan Change Changes

A marked up version of the detailed changes proposed by this plan change are attached to this report at Appendix A. This section of the report provides a summary of the proposed changes.

An analysis of the proposed provisions in accordance with s32 of the RMA is included in Sections 10 and 11 of this report.

8.1 Proposed Definitions

This plan change introduces the following definitions:

<u>Lamp lumens</u>	<u>the initial total amount of light produced by a light source just after it has stabilised but before depreciation (loss of operational efficiency) has started.</u>
<u>Outdoor Sports Lighting</u>	<u>Artificial lighting required only for the purposes of illumination of an area where outdoor recreation activities will occur at night.</u>
<u>Skyglow</u>	<u>the lighting of the night sky caused by light directed near horizontally and into the sky either directly (from light sources that project light above the horizontal) or indirectly (reflected from a surface).</u>

8.2 Proposed Issues

The operative WCDP contains one issue relevant to lighting which states:

Section 19 - General Amenity Values

- 3. Glare from, for example, outdoor lighting and reflective surfaces, can annoy people and distract motorists.*

This existing issue highlights the importance of managing glare from outdoor lighting, but the issue relates only to effects on amenity and traffic safety. The issues contained within the operative WCDP fail to recognise the effects that some outdoor lighting can have on the brightness and clarity of the night sky.

This plan change therefore proposes a new issue is inserted to Section 19 - General Amenity Values, to read:

- 4. Light emitted from outdoor lighting within the identified Dark Sky Management Area can cause adverse effects on the brightness and clarity of the night sky.*

To resolve this issue the Wairarapa Councils need to ensure that within the Dark Sky Management Area buildings and outdoor areas can be illuminated to provide legible, safe and functional facilities and spaces but in ways that minimise light pollution to levels that protect the darkness of the night sky.

The proposed issue meets the good practice guidance for resource management issues²³ as it:

- Identifies the environmental opportunity for improvement;
- Can be addressed by the Council under its functions and responsibilities as set out in the RMA;
- Is specific to the areas of the districts (the Dark Sky Management Area, which is South Wairarapa and Carterton districts) where additional controls are required;
- Is succinct; and
- Sets out what is being affected, how and where.

As outlined in the Introduction to Section 19 of the WCDP, 'amenity values' refers to *'those environmental characteristics of an area that contribute to the pleasantness and attractiveness of that area as a place to live work or visit'*.

This report outlines the importance of the darkness of the night sky within the Wairarapa and the benefits that would arise from the establishment of an international dark sky reserve. The darkness of the night sky is an environment factor that contributes to the amenity of the Wairarapa.

There is also a clear direction from both higher order planning documents and from local strategic development documents that maintaining and enhancing the darkness of the night sky is important from a resource management and regional economic development perspective. The night sky is identified within the NZCPS²⁴, and within the Councils' strategic documents and the District Plan as an important feature for the district. Controls are therefore required in order to manage effects of activities on that feature.

8.3 Proposed Objectives

There are no changes proposed to the operative objectives of the WCDP. It is considered that the existing objectives provide an appropriate framework for managing this issue.

8.4 Proposed Policies

The proposed plan change will amend one policy within the operative Plan, and add a new policy that specifically manages lighting to protect the brightness and clarity of the night sky.

Section 19 – General Amenity Values 19.3.2 GAV1 Policies will be amended to read:

- (e) *Manage the intensity, location and direction of artificial lighting to avoid light spill and glare onto adjoining sites and roads, ~~and to protect the clarity and brightness of the night sky.~~*

²³ www.qualityplanning.co.nz

²⁴ Policy 13 – Preservation of Natural Character. Policy 13(2)(e) recognises the 'the natural darkness of the night sky' as a value of natural character.

(f) Within the Dark Sky Lighting Management Area, manage the light colour temperature, shielding and hours of operation of outdoor artificial lighting to mitigate skyglow, to protect the clarity and brightness of the night sky.

The proposed changes ensure that the effects of lighting on amenity are distinguished from the effects of lighting on the night sky. The proposed policies also highlight the importance of the night sky as an amenity value within the Dark Sky Management Area.

8.4.1 Proposed methods and anticipated environmental results

This plan change proposes one amendment to Chapter 19 .3.4 – Methods to Implement General Amenity Values, to read:

(g) Liaison with Road Controlling Authorities to promote the use of streetlighting with a colour temperature of 3000K (Kelvin) or lower, shields and other devices on streetlights to direct light downwards.

The purpose of this amendment is to reflect the agreement between the Wairarapa Councils and NZTA to provide streetlighting within the Wairarapa that meets a 3000K (Kelvin) limit²⁵.

This plan change also proposes one amendment to Chapter 19.4 – Anticipated Environmental Outcomes to include a new outcome, namely:

(c) Preservation of the brightness and clarity of the night sky within the Dark Sky Management Area.

The outcome is reflective of the outcome sought by the inclusion of Policy 19.3.2(f) within the Plan.

8.5 Proposed Rules and Assessment Criteria

8.5.1 Proposed Rules

8.5.1.1 Outdoor Artificial light

The plan change proposes new performance standards for outdoor artificial lighting within Section 21 – District Wide Land Use Rules, in particular Rule 21.1.11 – Glare and Artificial Light. The introduction of new performance standards is required to ensure the management of the aspects of lighting that can cause skyglow and result in adverse effects on the brightness and clarity of the night sky.

The proposed plan change introduces the following performance standards within Rule 21.1.11, to apply within the Dark Sky Management Area. The performance standards manage:

- The light colour temperature of lights;
- Shielding and tilting of lights; and
- Provide an exemption to the light colour temperature and shielding and tilting performance standards, where lighting is controlled by motion sensors with limited duration.

The plan change also seeks to rename the title of Chapter 21.1.11 from Glare and Artificial Light to Outdoor Artificial Light. This is to assist interpretation of the Plan for plan users, ensuring

²⁵ Per comms with South Wairarapa District Council

that Plan users are aware the provisions only apply to outdoor artificial lighting, and that these provisions seek to manage more aspects of lighting than just the control of glare.

The marked up version of the proposed amendments to Rule 21.1.11 - Outdoor Artificial Light is contained within Appendix A. A full s32 analysis of the proposed provisions is contained within Section 11 of this report.

8.5.1.2 Outdoor Sports Lighting

The proposed plan change also proposes new permitted activity performance standards to Section 21.1.11 – Outdoor Artificial Light of the Plan, to manage outdoor sports lighting at recreational facilities within the Dark Sky Management Area. The performance standards propose to manage:

- The light colour temperature of lights;
- The design of lighting in accordance with Australian Standard *AS 2560 Guide to sports lighting*;
- The luminous intensity from light fittings;
- Hours of operation of outdoor sports lighting; and
- Provide controls for outdoor sports lighting, including automatic curfew controls, local control and training/competition lighting.

The purpose of the amendments to the rules of Chapter 21.1.11 is to ensure that outdoor sports lighting, normally a large contributor to skyglow, is managed to reduce effects on the brightness and clarity of the night sky within the Dark Sky Management Area.

The marked up version of the proposed amendments to Rule 21.1.11 - Outdoor Artificial Light is contained within Appendix A. A full s32 analysis of the proposed provisions is contained within Section 11 of this report.

The plan change also seeks to include new permitted activity performance standards within the Rural, Commercial and Industrial zones to provide a maximum building height of 18m for outdoor sports lighting poles at recreational facilities within the Dark Sky Management Area.

The marked up version of the proposed amendments to Chapter 4 - Rural zone Rule 5.5.2(a), Chapter 6 - Commercial zone, Rule 6.5.2(a) and Chapter 7 - Industrial zone, Rule 7.5.2(a) - are contained within Appendix A. A full s32 analysis of the proposed provisions is contained within Section 11 of this report.

Assessment Criteria

The plan change proposes amendments to the assessment criteria contained within Chapter 22.1.17 – Artificial Light and Chapter 22.2.10 – Signs. The marked up version of the proposed amendments to Chapter 22 – Assessment Criteria is contained within Appendix A.

The proposed amendments seek to ensure that when lighting or illuminated signs fail to comply with the performance standards for lighting contained within the District Wide Land Use Rules, or rules within the relevant environmental zone, an assessment as part of a resource consent application will include an assessment of:

- The extent to which the lighting or illuminated sign will contribute to skyglow
- The proposed lighting methods used to avoid, remedy or mitigate effects, including light colour temperature of the light source; and

- In regards to outdoor sports lighting, the extent to which the lighting is consistent with the Australian Standard *AS 2560 Guide to sports lighting*.

Planning Maps

It is proposed that the amended performance standards will only apply to the South Wairarapa and Carterton Districts and as such a 'Dark Sky Management Area' has been identified that extends over the South Wairarapa and Carterton Districts.

The Dark Sky Management Area' will identified in the 'Dark Sky Management Area' Map included in the Plan as Appendix 15 and attached to this report as Appendix B. A full s32 analysis of the proposed provisions is contained within Section 11 of this report.

9 Consultation

9.1 Legislative Requirements

Clause 3 of the First Schedule of the RMA specifies the people who must be consulted in the preparation of a plan, including plan changes. The provisions relevant to this plan change are:

3. Consultation

(1) During the preparation of a proposed policy statement or plan, the local authority concerned shall consult—

(a) the Minister for the Environment; and

(b) those other Ministers of the Crown who may be affected by the policy statement or plan; and

(c) local authorities who may be so affected; and

(d) the tangata whenua of the area who may be so affected, through iwi authorities; and

(e) any customary marine title group in the area.

(2) A local authority may consult anyone else during the preparation of a proposed policy statement or plan.

(3) Without limiting subclauses (1) and (2), a regional council which is preparing a regional coastal plan shall consult—

(a) the Minister of Conservation generally as to the content of the plan, and with particular respect to those activities to be described as restricted coastal activities in the proposed plan; and

(b) the Minister of Transport in relation to matters to do with navigation and the Minister's functions under Parts 18 to 27 of the Maritime Transport Act 1994; and

(c) the Minister of Fisheries in relation to fisheries management, and the management of aquaculture activities.

(4) In consulting persons for the purposes of subclause (2), a local authority must undertake the consultation in accordance with section 82 of the Local Government Act 2002.

4B Further pre-notification requirements concerning iwi authorities

Before notifying a proposed policy statement or plan, a local authority must—

(a) provide a copy of the relevant draft proposed policy statement or plan to the iwi authorities consulted under clause 3(1)(d); and

(b) have particular regard to any advice received on a draft proposed policy statement or plan from those iwi authorities.

(2) When a local authority provides a copy of the relevant draft proposed policy statement or plan in accordance with subclause (1), it must allow adequate time and opportunity for the iwi authorities to consider the draft and provide advice on it.

9.2 Statutory Consultation

Clause 3 of Schedule 1 of the RMA requires local authorities to consult with a number of parties during the preparation of a proposed plan. The following organisations and authorities have been consulted²⁶ on this plan change:

Consultee	
Neighbouring District Councils	Masterton District Council
	Tararua District Council
Iwi	Rangitāne o Wairarapa
	Ngāti Kahungunu
Government Ministries	Minister for the Environment
	Minister of Conservation

9.3 Consultation on the Wairarapa Dark Sky Reserve

9.3.1 Neighbouring Councils

Masterton District Council has advised that they will not be making a formal response at this time.

²⁶ Consultation was undertaken in June 2020. A copy of an earlier version of this s32 report and draft District Plan provisions were provided to each consultee.

Tararua District Council have advised by email that they consider that the proposed Plan change will only have minor effect, if any on the Tararua District. In principle Tararua District Council support the proposed plan change where public safety is not affected (minor or less than minor) and the plan change supports scientific, environmental, aesthetic or economic outcomes.

9.3.2 Iwi

No written response has been received from Rangitāne o Wairarapa or Ngāti Kahungunu.

Information regarding the plan change was also sent to Hurunui-O-Rangi Marae and Kohunui Marae. No written response has been received from Hurunui-O-Rangi Marae.

Kohunui Marae advised by email, that they had an opportunity to discuss the proposed plan change, and that they did not feel that there was anything in particular about the proposed plan change that affected them as hapū of southern Wairarapa.

Kohunui Marae did however express that their interest focused on where any Dark Sky projects may be situated, in case they are on Māori land, and if information shared impinges on their local hapū intellectual property rights.

In response to concerns about where Dark Sky activities will occur, it is anticipated that that as a result of the Dark Sky Reserve accreditation, there could be a demand for new activities within the Wairarapa associated with the Dark Sky Reserve status, ie sky gazing businesses, accommodation and tourism activities. Any new activity of this nature, located within the Rural zone, would trigger the need for a resource consent from the Council. As part of the resource consenting process engagement with iwi (which should include local marae and hapū) is required to be undertaken. This will allow iwi to consider the potential location and effects of any proposed activities. The Council and applicants should be encouraged to actively engage with iwi early in this process.

In terms of effects on iwi/local hapū intellectual property rights, this is much more difficult to manage, and falls outside the Councils functions under the RMA and outside the scope of this plan change. That said however, this is a very important matter for Council, the MDSS and others parties involved in activities associated within the Dark Sky reserve, to be acutely aware of, and recognise the scale and importance of mātauranga māori associated within the Dark Sky, and activity engage with iwi, hapū and whanau in the area, in considering of what information is shared, how and by whom.

9.3.3 South Wairarapa District Council Maori Standing Committee

Debbie Donaldson presented at the Māori Standing Committee Meeting in the 4th August. The presentation was undertaken in the Public Participation section of the meeting, and as such only a limited time was available for questions from members. The presentation outlined the plan change and the progress to date and next steps.

The MSC requested that Ms Donaldson present at the next meeting in September to provide information on what engagement has been done with Māori and the impacts of their proposal on any future Māori economic plans at this meeting. The MSC next meeting is the 15th September, which will allow comments to be considered prior to public notification of the Plan change.

As outlined above information regarding the proposed plan change has been sent to Rangitāne o Wairarapa or Ngāti Kahungunu, Hurunui-O-Rangi Marae and Kohunui Marae.

In responding to the MSC's question regarding impacts on future Māori economic plans, it is considered there will be very limited impact. The only financial implications to iwi, is the cost associated with erecting or replacing lighting on land in order to comply with the proposed new rules within the District Plan, which is considered minimal (and is discussed further in Section 13 of this report).

The proposed plan change will assist Dark Sky Reserve accreditation being obtained in the Wairarapa. There is real opportunity that the International Dark Sky Reserve status could provide local development/economic opportunities for iwi within the Wairarapa, given the anticipated benefits this will bring the Wairarapa in terms of tourism and associated economic development.

9.3.4 Government Ministries

9.3.4.1 Department of Conservation

A written response was received from the Department of Conservation on the 20th July 2020 (attached in Appendix I). The letter expressed that the Minister of Conservation and the Department of Conservation were overall supportive of the proposed Wairarapa Dark Sky Reserve centred around Aorangi Forest Park in South Wairarapa.

DOC noted in the letter that they '*consider the proposed permitted lighting standards within the proposed Dark Sky Management Area will be sufficient to provide for preservation of natural character of the coastal environment, and that there is also sufficient policy direction in the district plan currently to ensure development activities requiring resource consent have regard to protecting natural character of the coastal environment. The proposed standards will also ensure that lighting effects adjacent to public conservation lands are limited and maintain the inherent conservation values they possess*'.

9.3.4.2 Minister for the Environment

Acknowledgement of receipt of the details of the proposed Plan change was received from the Minister for the Environment, however no formal response on the plan change has been received as yet.

9.3.4.3 New Zealand Transport Agency (NZTA)

Meetings were held with NZTA on the 3rd and 23rd July 2020. A formal letter of response was received from NZTA on the 31st July 2020 (attached in Appendix I). NZTA indicated general support of the dark sky initiative and stated they will work cooperatively with all parties to support the resource management outcomes for the proposed dark sky reserve.

It is the intention of NZTA to enter into a memorandum of understanding (MOU) with the three Wairarapa District Councils to outline how NZTA state highway lighting can be changed to achieve as far as practical the limits of light output and sky glow as proposed in the plan change document.

9.4 Other Engagement and Consultation

9.4.1 International Dark Sky Association (IDA)

The draft plan change was provided to the IDA for an opportunity to review and provide comments. An email response was received from the IDA in July 2020. The IDA were in general very supportive of the proposed provisions and s32 report. The IDA suggested minor amendments to the provisions to better reflect the IDA guidelines. This has been reviewed

and subsequent amendments have been made that are reflected in provisions proposed in this Plan change.

9.4.2 Engagement by the Wairarapa Dark Sky Society

On the 21st July 2020 the Martinborough Dark Sky Society hosted a Dark Sky information evening at Stonehenge in Carterton. This event was attended by local Mayors (Masterton, Carterton and South Wairarapa), District and Regional Councillors, Members of the Maori Standing Committee, local MP candidates, and local business representatives. At the event Debbie Donaldson from Perception Planning spoke about the details of the proposed plan change and the process that would be followed. The response was positive with questions primarily focused on the process and lighting for sports facilities.

The Martinborough Dark Sky Society also hosted an event on the 30th July 2020 in Martinborough called 'Sleep and Health' looking at the impact of light on sleep and health. An overview of the proposed plan change and process was provided to attendees at this events.

9.4.3 Engagement with local community / businesses / stakeholders

There are events planned with both the Martinborough Business Association and Go Carterton within the months of August and September to discuss the details of the plan change and provide Unfortunately these meeting are yet to have taken place, given changes to meeting dates and agenda items as a result of the Covid-19 pandemic, however these will occur prior to public notification of the plan change.

10 Evaluation of the Proposed Plan Change

10.1 How appropriate are the objectives of the Plan to achieve the purpose of the RMA?

10.1.1 Summary Assessment of the Appropriateness of the Objectives

This plan change is an 'amending proposal' as it amends an existing Plan. In this situation, the RMA requires the proposed provisions of the plan change to be evaluated against both the objectives of the plan change (if there are any) and the relevant objectives in the existing Plan. This is so a plan change cannot be justified based solely on its own objectives, without being consistent with the broader plan objectives. The evaluation must assess whether the new provisions will help achieve the objectives already in the Plan and will not undermine them.

The purpose of the proposed Wairarapa dark sky reserve plan change is outlined within section 2 of this report.

The operative objectives within the WCDP that are relevant to this plan change are outlined within Appendix E. The objectives particularly relevant to this plan change are discussed below.

- The operative WCDP objectives of three of the four zones of the district (the rural, residential and commercial zones) require that amenity values of these zones are

maintained and enhanced²⁷. In the industrial zone the emphasis is on providing for industrial activity within acceptable amenity levels.²⁸

- Objective TW1, In Chapter 8 of the Plan – Tangata Whenua, requires the Council's to recognise and provide for the cultural values and relationships of tangata whenua in managing the natural and physical resources and effects of activities.
- Objective CE1 in Chapter 13 – Coastal Environment requires the protection of the natural character of the coastal environment by ensuring use, subdivision and development maintains the comparatively undeveloped nature of the Wairarapa Coast. (It is important to note that the NZCPS recognises that 'natural darkness of the night sky' is a feature of natural character).
- Objective SLD1, in Chapter 18 – Subdivision, Land Development and Urban Growth seeks to ensure subdivision and land development maintains and enhances the character, amenity, natural and visual qualities of the Wairarapa, and protects the efficient and effective operation of land uses and physical resources.
- Objective GAV1, in Chapter 19 – General Amenity Values, requires the Council to maintain and enhance those general amenity values which make the Wairarapa a pleasant place in which to live and work, or visit.

The ability to view the night sky and enjoy its brightness and clarity are a natural quality of the Wairarapa and a characteristic of the amenity value of the area. There is a focus within the operative objectives of the Plan on the maintenance and enhancement of amenity values and natural and visual qualities of the Wairarapa. Other objectives recognise and provide for cultural values within the Wairarapa.

The objectives of the proposed plan change are consistent with the objectives of the operative WCPD, and as such achieving the purpose of the Act.

For this reason, it is considered that the operative WCDP objectives achieve the objectives of the proposed plan change, and as such there is no need to add a new objective/s to the Plan or amend existing objectives through this process.

10.2 Options for achieving the Objectives

10.2.1 Summary of Options

The options to achieve the proposed objectives of the plan change that have been considered are outlined below:

Option 1: Status Quo (no change from the Operative Plan)

This option retains the existing provisions in the Plan to manage outdoor lighting within the Wairarapa.

Option 2: Bylaw

This option involves controlling lighting within the districts by the Council's developing a Bylaw/s under the Local Government Act 2002.

²⁷ Rur1, Res1, Com1.

²⁸ Ind1

Option 3: Plan Change to amend provisions of the WCDP applying across the Wairarapa

This option would retain the existing provisions which manage lighting within the WCDP but refine the provisions to better respond to the identified issue. This option would apply over the whole of the Wairarapa District, regardless of location or zone.

Option 4: Plan Change to amend provisions of the WCDP applying to an identified Wairarapa Dark Sky reserve area.

This option retains the provisions which manage lighting within the WCDP but refine the provisions to better respond to the identified issue. The provisions would be applied only to the area covered by the dark sky reserve.

Option 5: Non-regulatory methods

Option 4 involves the use of non-regulatory methods to control lighting within the district. This could involve the use of methods such as:

- education
- publishing Lighting Design Guides (which would be voluntary guidance, and not incorporated by reference into the Plan).

10.2.2 Recommended Option

It is considered that the best approach is a combination of Options 4 and 5.

Option 4 involves retaining the current statutory control of lighting using the District Plan, with a review of the District Plan objectives, policies and rules to reflect the identified resource management issue. Option 4 also limits the application of provisions to the area proposed to be included within the Wairarapa Dark Sky Reserve.

Option 5 supplements Option 4, in that the Council can use non-regulatory methods, for example education, and lighting design guidance to help highlight the importance of the dark sky reserve. Such guidance can provide additional detail about the need to manage lighting and how people can do this by installing specific types of lighting.

Overall, it is considered that a combination of Options 4 and 5 are the most efficient and effective way of achieving the objectives.

The 'Wairarapa Dark Sky Reserve - Issues and Options'²⁹ report provides an evaluation of the options considered to achieve the proposed objective. This report is attached at Appendix H.

²⁹ Wairarapa Dark Sky Reserve - Issues and Options Report, Prepared by Perception Planning, dated 15th January 2020

11 Summary Assessment of the Appropriateness of the Preferred Provisions to Achieve the Objectives

Section 32(1)(b) states that in addition to examining the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act, an evaluation report must:

examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—

(i) identifying other reasonably practicable options for achieving the objectives; and

(ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

(iii) summarising the reasons for deciding on the provisions [...]

(2) An assessment under subsection (1)(b)(ii) must—

(a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—

(i) economic growth that are anticipated to be provided or reduced; and

(ii) employment that are anticipated to be provided or reduced; and

(b) if practicable, quantify the benefits and costs referred to in paragraph (a); and

(c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

The costs and benefits of each option are identified in the analysis below, followed by an assessment which meets the requirements of s32(1)(b)ii) and a32(2)(a), a32(2)(a)(i) and (ii), and s32(2)(c) as set out above.

This evaluation report must contain a level of detail that “*corresponds to the scale and significance of the ... effects that are anticipated from the implementation of the proposal*” (s32(1)(c)). Scale refers to the size or magnitude of the effects, including how many people or species or other natural resources are affected, by how much, and over how wide an area. Guidance on this component of s32 evaluations states: “*where the impacts of a proposal are likely to be low, little detail will be required in the evaluation report*”.³⁰

³⁰ A Guide to Section 32 of the Resource Management Act 1991, p.21.

12 Policies

The plan change will amend Policy 19.3.2(e) and include a new Policy 19.3.2(f). These proposed changes are described in Section 8.4.

The inclusion of Policy 19.3.2(f) provides clear direction that the clarity and brightness of the dark sky is an amenity value that needs to be protected, and that the aspects of lighting that cause skyglow must be managed to achieve this.

The current provisions of the Plan identify the brightness and clarity of the night sky need to be protected³¹. However the operative policy fails to reference skyglow, which is the primary cause of adverse effects on the brightness and clarity of the night sky.

For this reason, it is considered that the operative policy is inefficient and ineffective to achieve the objectives of the Plan change. A new policy is proposed that provides a focus on the adverse effects of skyglow to the brightness and clarity of the night sky, and how skyglow is to be managed.

13 Rules, Methods and Planning Maps

The proposed plan change proposes a number of amendments to the rules and methods within the WDCP. These amendments are outlined in detail in Appendix 1 of this report

This section provides an assessment of the proposed changes, as required by s32 of the RMA.

13.1 Chapter 22 - District Wide Land Rules - Outdoor Artificial Lighting

Lighting that meets the development standards in the operative WCDP is a permitted activity. A permitted activity means that resource consent is not required for the activity if it complies with any requirements, conditions, standards and permissions specified for the permitted activity. It is therefore important that councils are confident that compliance with any requirements, conditions, and permissions will adequately manage the effects expected (including cumulative effects)³².

Outdoor artificial lighting is currently controlled by performance standards, that if complied with, mean that the installation of lighting is a permitted activity within all environmental zones.

Lighting is an activity that is usually ancillary to another activity (ie lighting up a building so you can enter it safely or lighting up a sports field so that you can play on the field). It is therefore considered onerous to require resource consent for the installation of all lighting. In addition, the effects of different lighting types and design are known and measurable, and for these reasons it is an activity that the Council can effectively manage using permitted activity standards.

³¹ Operative Policy 19.3.2 GAV 1 (e)

³² www.qualityplanning.org.nz

For these reasons, it is not proposed to change this general approach to managing artificial lighting through the use of permitted activity standards.

However, the specific performance standards for outdoor artificial lighting are proposed to change. As outlined in Section 8.5.1 of this report, it is proposed that three new performance standards are included within Chapter 21 – District Wide Land Use Rules, specifically in Chapter 21.1.11 – Outdoor Artificial Lighting. These performance standards will apply to sites located in the identified ‘Dark Sky Management Area’. This area reflects the proposed geographical boundaries of the dark sky reserve.

The proposed changes to the district wide land rules for artificial lighting have been primarily driven by the need to reflect the IDA lighting guidelines in order to gain accreditation, and to control skyglow, which will have adverse effects on the brightness and clarity of the night sky.

As outlined within Section 7.2 of this report, the operative WCDP has one performance standard to manage glare and artificial light, limiting light levels to 8 lux at the site boundary.

The technical report prepared by S&T Lighting³³ (attached as Appendix C) has identified that this standard does not control skyglow, which is the main cause of light pollution that effects the ability to view the night sky.

The IDA identifies requirements to manage skyglow which must be put in place to achieve dark sky reserve accreditation. The technical report prepared by S&T Lighting proposes to include standards that address those factors, including:

- Limits on the colour temperature of lighting (proposed standard 21.1.11(a)(ii)); and
- Shielding and titling of light fittings above 500 light lumens (proposed standard 21.1.11(a)(iii))

13.1.1 Light colour temperature

The lighting industry uses correlated colour temperature (CCT), measured in Kelvin (K) to describe the perceived colour of the light produced by a light source³⁴. The warmer light colours are on the lower end of the scale, with light colour temperatures in the 2700K to 3000K range. Pure white light is around 4000K, while cooler temperatures that simulate daylight are 5000K or higher.

³³ S&T lighting – Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 13

³⁴ S&T lighting – Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 9



Figure 7 - Kelvin Temperature Chart Source: Blubs.com

Blue spectrum light is more strongly scattered by the night sky, increasing the levels of skyglow at night. If the amount of blue light emitted by a light fitting is reduced, its effect on skyglow is significantly reduced. For this reason, controlling the colour temperature of lighting is important to minimising skyglow and ultimately the effects on the brightness and clarity of the night sky.

The IDA guidelines for a dark sky reserve require that lighting must be chosen to minimise the amount of short wavelength light (blue light) emitted into the night-time environment. Lighting policy within any dark sky reserve area must restrict lighting so that the correlated light colour temperature (CCT) of light does not exceed 3000 Kelvin³⁵. The proposed performance standard is therefore a reflection of the measures required by the IDA guidelines.

As with lamp lumens, plan users should easily be able to ascertain the light colour temperature (Kelvin) of any proposed light fitting, by referring to the packaging or manufacturers details (if purchasing on line. A review of lighting available at lighting retailers indicates that a number of light fittings are readily available at under 3000 Kelvin, (3000K), with equivalent price points to other lighting available. This information is attached at Appendix F of this report.

13.1.2 Light lumens

Light lumens are a measure of light brightness. More lumens mean a brighter light; fewer lumens mean a dimmer light (lumens differ from watts, which is a measure the energy used, not the light output).

Outdoor lights which emit a low level of brightness (ie those under 500 lamp lumens) will have very limited contribution to skyglow and do not need to be controlled as stringently as outdoor lighting that is brighter. This is the reason why the proposed performance standard 21.1.11(a)(iii) requiring shielding/tilting is only triggered when a light emits a brightness over

³⁵ IDA - Internation Dark Sky Reserve Programe Guidelaines, June 2018 - Lighting Management Plan Requirement 4

500 lamp lumens. This approach is consistent within the IDA requirements for lighting within a dark sky reserve³⁶.

To improve interpretation of the Plan the plan change proposes to include a definition for light lumens as outlined in Section 8.1.

Plan users should easily be able to ascertain the lamp lumen output of any proposed lighting by referring to the packaging the lighting comes in, or to manufacturers details (if purchasing on-line), in order to comply with this standard. A review of lighting available at lighting retailers indicates a number of light fittings are readily available at under 500 lamp lumens, with equivalent price points to other lighting available. For example, the light lumen level is easily obtainable from the Mitre 10 website. This information is attached at Appendix F of this report.

13.1.3 Shielding or tilting of lights

Proposed standard 21.1.11(a)(iii) requires that any lighting above 500 lamp lumens is shielded or tilted to prevent light being directed above the horizontal level of the light fitting. Shielding or tilting of light fittings above 500 lamp lumens is a requirement of the lighting IDA guidelines for dark sky reserve accreditation³⁷.

Shielding or tilting is important to ensure that light is directed downwards, focusing on the area to be lit. Shielding or tilting ensures that a light source is screened and, when mounted, its light directed in such a way that none is emitted at or above the horizontal plane.

A light fitting that emits light that is less than 500 lamp lumens does not require shielding, as the light output is of a low level that will not cause adverse effects on skyglow. This low-brightness level lighting (under 500 lamp lumens) can face upwards, without shielding. This type of lighting is often used for garden lighting and decorative lighting, and plan users can continue to use this type of lighting without triggering the need for resource consent.

Light fittings that are shielded, or shields for light fittings are easily obtainable at lighting suppliers. It is not considered that this standard will be onerous on plan users, either in terms of ability to obtain appropriate lighting or in cost.

13.1.4 Exemption – Lighting controlled by motion activated sensors

The proposed plan change provides an exemption to proposed performance standards 21.1.11(a)(ii) and (iii) where the emission of outdoor artificial light is controlled by motion activated switches which limit the duration of illumination to less than 5 minutes.

This exemption is provided for within the IDA dark sky reserve guidelines³⁸, and provides an exemption to the requirement for light colour temperature and shield/tilt light where illumination is limited in duration. This will ensure that lighting that is primarily designed for security and access purposes, is not unduly limited.

³⁶ IDA – Internation Dark Sky Reserve Programe Guidelaines, June 2018 – Lighting Managment Plan Requirement 3 and 4

³⁷ IDA – Internation Dark Sky Reserve Programe Guidelaines, June 2018 - Lighting Managment Plan Requirement 5

³⁸ IDA – Internation Dark Sky Reserve Programe Guidelaines, June 2018 - Lighting Managment Plan Requirement 3

The effects to the brightness and clarity of the night sky as a result of this exemption are considered negligible.

13.1.5 Summary

The proposed plan change seeks to include three new performance standards and one exemption, for outdoor official lighting within Chapter 21 – District Wide Land Use rules. These standards will only apply to new lighting within the proposed ‘Dark Sky Management Area.’ The standards are reflective of the IDA requirements, which must be implemented in order to gain international dark sky reserve accreditation.

The current operative WCDP provisions do not manage skyglow, and as such the IDA requirements for a dark sky reserve are unable to be met. The only option to ensure that dark sky reserve certification can be obtained, is to amend the Plan to ensure that the provisions reflect the requirements of the IDA.

It is considered that the proposed performance standards are drafted in such a way that they can be interpreted by plan users, despite the inclusion of a level of ‘technical lighting’ terminology. In addition, lighting which complies with the requirements of the performance standards should be readily available to plan users, through common lighting manufactures and suppliers. To support this, it is the intention of the MDSS to work with local lighting retailers to ensure that lighting that is compliant with the proposed provisions is available at local stores, and that merchants are aware of the proposed provisions, to ensure they are able to inform customers. It may be possible for suitable light fittings to be identified as ‘dark sky’ compliant.

It is expected that there will be minimal additional cost to plan users associated with obtaining lighting that meets the proposed performance standards (depending on the light fitting chosen). The wider benefits of obtaining dark sky reserve certification and minimising light pollution to ensure the brightness and clarity of the night sky is protected, outweigh the minor inconvenience and monetary cost to plan users.

The proposed provisions are easy to monitor to ensure that compliance is achieved, and monitoring can be undertaken by the Councils compliance officers.

It is considered that the proposed performance standards for outdoor artificial lighting are both effective in achieving the objectives of the plan change and the objectives of the operative Plan and are the most efficient way of achieving these objectives.

13.2 Outdoor Sports lighting

13.2.1 Outdoor sports lighting performance standards

The proposed plan change seeks to include a new suite of performance standards within Chapter 21.1.11 – Outdoor Artificial Lighting, specifically to manage outdoor sports lighting at recreational facilities within the proposed Dark Sky Management Area.

Outdoor sports lighting is essential for ensuring that evening sports and recreation activities can occur, particularly in winter. Outdoor sports lighting however, primarily as a result of the large areas needed to be lit and the level of brightness required to undertake sporting activities safely, can be a major light pollution source and an appreciable contributor to skyglow.

For this reason, outdoor sports lighting is an activity that is considered to warrant the need for its own set of performance standards. It has been acknowledged that sports lighting would generally be unable to meet the light colour temperature performance standard (and possibly

other standards) proposed above for general. If only the general lighting provisions were proposed, any new sports lighting would be unlikely to comply with the performance standards and would require resource consent.

Concern has been raised by local councillors³⁹, that lighting provisions that are restrictive on outdoor sports lighting and which trigger resource consent would be onerous for sports clubs, which are usually community run organisations with limited resources.

As outlined within the report by S&T Lighting⁴⁰, outdoor sports lighting can be controlled by specific performance standards that ensure that skyglow is minimised, by requiring:

- Limits on the colour temperature of lighting (proposed standard 21.1.11(b)(i))
- Requiring lighting levels to be designed in accordance with the Australian Standards *AS 2560 Guide to sports lighting* (proposed standard 21.1.11(b)(ii))
- Restricting luminous intensity of lighting (proposed standard 21.1.11(b)(iii))
- Limiting hours of operation of outdoor sports lighting to between 7am and 10pm (proposed standard 21.1.11(b)(iv))
- Requiring controls on sports lighting, including automatic curfew controls, local control and competition and training levels. (proposed standard 21.1.11(b)(v))

These proposed performance standards are more restrictive (in some respects, but less in others) than the general lighting performance standards, but are tailored to the specific requirements of outdoor sports lighting.

These sporting provisions are IDA certification requirements, which look to ensure that good lighting design and controls are applied to sports lighting to mitigate unnecessary skyglow.

The proposed performance standards have been drafted to reflect the guidance of the IDA, namely 'Criteria for Community-Friendly Outdoor Sports Lighting'⁴¹. The exception to this is the inclusion of performance standard 21.1.11(b)(ii) that requires design of lighting in accordance within Australian Standards *AS 2560 Guide to sports lighting*. In New Zealand it is standard practice to refer to the Australian Standard *AS 2560 Guide to Sports Lighting* series of standards, which are equivalent to the Illuminating Engineering Society IESNA RP-6-15 Sports and Recreation Area Lighting standards referred to in the IDA guidelines⁴².

AS 2560 "Level 2" typically referred to as "Training Standard Lighting" and "Level 3" typically referred to as "Competition Standard Lighting" are the predominant required illumination levels. To limit over-lighting, the proposed performance standard 21.1.11(b)(ii) requires the design that may vary by no more than 10% above the average target illuminance level contained within the standard. Appendix G of this report provides extracts of the luminance levels contained within this standard that apply to different types of sporting facilities.

The Australian Standards *AS 2560 Guide to Sports Lighting* are standards available from www.techstreet.com for purchase. Due to copyright restrictions the standards are unable to be

³⁹ South Wairarapa District Council Meeting 5th February 2020.

⁴⁰ S&T lighting - Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 23-25

⁴¹ IDA- Criteria for Community Friendly Outdoor Sports Lighting, Version 1 March 2018

⁴² S&T lighting - Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 11-13

attached to this report as an Appendix. The Council will however purchase a copy of the standards, that will be available to be viewed at the time of notification of the proposed plan change.

It is anticipated that an applicant for new sports lighting within the proposed Dark Sky Management Area would be likely to engage the services of a lighting consultant or supplier with sports lighting design experience. That expert would be able to interpret and apply the proposed lighting standards to the requirements of the recreation facility. While these rules are more technical and therefore less straightforward to interpret, it is unlikely that the average plan user will need to understand how to apply these rules to their activity.

'Recreational Facility' is defined within Chapter 27 - Definitions of the Operative Plan⁴³. To assist Plan interpretation, it is proposed to include a new definition for 'outdoor sports lighting' (see Section 8.1 of this report). This will ensure that the application of these performance standards is clear and limited.

13.2.2 Outdoor Sport Lighting - Pole Height

The plan change proposes amendments to the permitted activity performance standards within the Rural, Industrial and Commercial zones that apply a 'maximum building height' within the Proposed Dark Sky Management Area.

The proposed amendments seek to provide for a maximum building height for 'Outdoor Sports Lighting Poles at Recreational Facilities' to 18 metres. The operative Plan currently has a 15m height restriction within these zones for buildings, other than dwellings⁴⁴.

The report of S&T Lighting has identified that an 18m light pole height is imperative for mitigating spill, glare and skyglow when lighting a full-size football field⁴⁵. Without an increase in the permitted activity height for lighting poles, sports lighting is usually designed with lower pole heights to avoid the need for a resource consent for the pole. Using shorter poles may avoid the need for resource consent but does not assist to manage the glare, light spill and skyglow effects that may result. With a higher pole height it is easier to direct light downward to target the required area. A shorter pole results in light being projected outwards (and upwards) to achieve lighting of the same area and this results in increased spill light, glare and skyglow. The effects of permitting poles with a taller height is therefore offset by the reduction in adverse light effects.

In assessing the appropriateness of an 18m pole height for outdoor sports lighting, it is appropriate to consider the permitted activity standards for similar type structures within these zones. Rule 21.1.24 - Network Utilities, provides the performance standards for network utilities within the districts. Rule 21.1.24(3)(a) allows for the construction of mast, poles and towers for network utilities and energy generating activities to a maximum height of 20m within the Rural,

⁴³ Recreational Facility is defined as "Any reserves, buildings or structures (temporary or permanent), required to enable active or passive recreation; and includes gymnasiums, grandstands, stadiums, clubrooms, viewing platforms, night lighting, and sealed courts."

⁴⁴ WCDP Chapter 4 - Rural zone Rule 5.5.2(a), Chapter 6 - Commercial zone, Rule 6.5.2(a) and Chapter 7 - Industrial zone, Rule 7.5.2(a)

⁴⁵ S&T lighting - Report on Wairarapa Combined District Plan Lighting Provisions for Wairarapa Dark Sky Reserve. 24 May 2020 Pg. 25

Commercial and Industrial Zones, 12m within the Residential Zone, and 10m in road, road reserve or service lane of any environmental zone as a permitted activity.

For this reason, it is considered that an increase in the permitted activity performance standard for buildings, limited to only outdoor lighting poles at recreational facilities, is appropriate within the Rural, Commercial and Industrial zones. It is not considered appropriate to extend this to the Residential zone, given that the maximum building height limit of 10m and utility height of 12m within this zone is considerably less than the 18m proposed. It is considered that if a new lighting pole is proposed within the Residential zone, then a resource consent, and assessment of the appropriateness of the pole height within the residential context, is appropriate.

At this time it is proposed that the provisions for outdoor sports lighting will only apply within the Dark Sky Management Area. This is because this area has been identified as an area where tighter controls on light pollution are required to protect the brightness and clarity of the night sky, of which sports lighting can be a significant contributor. The proposed provisions are in line within recommended guidance for sports lighting from the IDA. There is an opportunity for these provisions to be extended to include Masterton District under the WCDP full plan review, if considered appropriate at the time.

13.3 Illuminated signs

The IDA guidelines for dark sky reserves require that illuminated signs are regulated, including requirements for hours of operation, and limitations on the illuminated surface area of signs.⁴⁶

Consideration was given to including the IDA requirements for illuminated signs within the WCDP as performance standards. Signage is managed in the WCDP primarily as a permitted activity, where signage is able to meet the performance standards outlined within the various environmental zones.

Under the operative WCDP, illuminated signs are not a permitted activity within the Rural and Residential zones⁴⁷. Illuminated signs are also not a permitted activity within the commercial and industrial areas of Greytown, Featherston and Martinborough town centres, where these areas are located within the Historic Heritage Precincts, and the Carterton Character area⁴⁸.

Considering these restrictions and that the proposed Dark Sky Management Area encompasses the South Wairarapa and Carterton districts, there are only very small pockets of commercial and industrial areas in the South Wairarapa and Carterton where illuminated signs could be erected as a permitted activity. It is noted that the IDA requirements require the guidelines to apply to 80% of the area of the reserve and 80% of the population. It is noted that the area where illuminated signs would be a permitted activity, would be significantly less than 80% of both the population and the area of the proposed dark sky reserve area.

⁴⁶ IDA - International Dark Sky Reserve Programme Guidelines, June 2018 - Lighting Management Plan Requirement 3

⁴⁷ WCDP Rule 4.5.2(h)(i)(8) Rural Zone and WCDP Rule 5.5.2(h)(i)(6). Commercial Zone 6.5.4(a)(i)(12)

⁴⁸ WCDP Rule 21.1.1(b)(ii) - No sign is illuminated by any means other than directional lighting.

The use of illuminated signage and most importantly its contribution to skyglow within the South Wairarapa and Carterton districts has therefore not been highlighted as a significant resource management for the area at this time.

For these reasons, this plan change does not propose amendments to the rules controlling illuminated signs within the proposed Dark Sky Management Area. In all but limited cases resource consent would be required under the operative WCDP to erect an illuminated sign. It is considered that the provisions of the operative plan provide appropriate control of illuminated signs at this time. It is however recommended that the assessment criteria for signs (when being assessed as part of a resource consent application) are amended to include consideration, for illuminated signs, of the extent to which the illuminated sign will contribute to skyglow and adversely affect the quality of viewing the night sky.

It is noted that the WCDP is due to be fully reviewed in the coming three years. At this time a full review of the signage provisions within the plan will be undertaken. At this time, if a resource management issue is evidenced in relation to illuminated signage within the Dark Sky Management Area, the provisions can be reviewed and additional controls in line with the IDA requirements can be introduced if necessary. These provisions would also need to be reviewed if/when Masterton District Council is included within the proposed Dark Sky Reserve Area, as there are a number of illuminated signs within Masterton's commercial and industrial zones.

13.4 Street Lighting

Street lighting is a major light source within the District. Many lighting standards in operative District Plans in New Zealand specifically exclude the application of lighting rules within plans to street lighting. This is generally because street lighting may not meet the lighting standard limits in all instances, but is deemed as necessary for all-night safety and security for the public at large.

Within the South Wairarapa and Carterton districts all Council owned street lighting has been replaced with street lighting with a colour temperature of 3000 Kelvin and is shielded so that lighting is directed directly downwards and not above the horizontal line of the light fitting. In addition, the Councils are in the process of developing a memorandum of understanding with the New Zealand Transport Agency (NZTA) that will detail an agreement with NZTA to achieve 3000K LED lighting along NZTA controlled highways within the Wairarapa⁴⁹.

For this reason, it is not necessary to provide an exception to the lighting provisions within the Plan for street lighting. The plan change proposes to make the following amendments to Method (f) in Chapter 19.3.4 'Methods to implement General amenity values' to read:

- (f) *Liaison with Road Controlling Authorities to promote the use of streetlighting with a colour temperature of 3000 Kelvin or lower, shields and other devices on streetlights to direct light downwards.*

13.5 Planning Maps

The plan change will identify a 'Dark Sky Management Area' within Part D – Appendices Appendix 15 of the Plan. The proposed Dark Sky Management Area is the geographical area

⁴⁹ Per comms with South Wairarapa District Council

within which the proposed outdoor artificial lighting performance standards will apply and will form an overlay to the underlying Zones.

The Dark Sky Management Area comprises of the districts of South Wairarapa and Carterton, reflecting the area to be included within the proposed Wairarapa Dark Sky Reserve. The MDSS has indicated that there is a clear intention to include the Masterton District within the dark sky reserve area at a later date. There is still work to do in terms of assessing existing lighting within this district and undertaking a lighting inventory before this can happen. When sufficient information has been collected to support the extension of the dark sky reserve to the Masterton district, a plan change can be initiated to apply these lighting provisions across the entire plan area and remove the Dark Sky Management Area. Alternatively, this could be undertaken as part of the full WCDP review anticipated to occur within the next three years.

The proposed Appendix 15 to the WCDP is included at Appendix B of this report.

14 Costs and Benefits associated with the implementation of the Provisions

14.1 Costs

The most obvious cost of the implementation of the proposed provisions, is a potential increase associated with the cost of light installations which comply with the proposed permitted activity standards within the Dark Sky Management Area. In addition, the implementation of the provisions require plan users to investigate and install an alternative lighting design, for example a lighting design with more light fittings, but would result in a lower brightness of light spread. A review of information from light suppliers has shown that the proposed performance standards are unlikely to result in a significant increase in the cost of light fittings, however the range of options will be more limited, and a higher number of fittings may be required. Therefore there may be a small cost to those installing lights in terms of time, availability and cost of obtaining lights to meet the proposed performance standards.

The proposed provisions will also result in a cost to the Councils, in time and resources, to ensure that staff and plan users are aware, and able to interpret and apply the new provisions. There may also be an increase in monitoring cost to the Council. This cost is not anticipated to be onerous and is likely to be limited to a short period following the plan change becoming operative. There is also a financial cost to developers and the community, and other interested parties who wish to engage in the plan change process.

14.2 Benefits

It is beneficial to specifically separate within the policy framework of the plan, how and why the Plan seeks to control lighting to manage skyglow. While the measures put in place to manage skyglow will also contribute to an improved level of control on the effects of lighting on amenity there are existing provisions within the plan that highlight the need to manage lighting to protect amenity.

The benefits of the proposed amendments include specifically recognising the brightness and clarity of the night sky as an amenity value of the Wairarapa that needs to be protected. A separate policy with this focus also ensures that plan users are directed to consider the aspects of outdoor lighting that will be controlled to minimise skyglow, namely light colour temperature, shielding and hours of operation.

The primary benefit that will occur from the implementation of the provisions, is that new lighting will be managed to meet the requirements of the IDA and will assist in ensuring that an international dark sky reserve can be established and accredited within the South Wairarapa and Carterton Districts. Section 4 of this report, outlines in detail the economic, social, cultural and environmental benefits that an international dark sky reserve would bring, which are intrinsically linked, and dependent on the inclusion and implementation of these proposed provisions.

The provisions focus on reducing light output and only lighting areas that are necessary. There will be benefits to the environment through the minimisation of skyglow.

Those using lighting are also likely to experience benefits of reduced energy use and cost, as a result of only lighting areas as and when required.

An additional benefit of these proposed provisions is that safety will be maintained, by continuing to provide for lighting for safety purposes, but unnecessary light pollution will be minimised. The proposed provisions are not expected to have any adverse impact on public or road user safety. The elimination of glare and over-lighting will assist in providing safer visual conditions. It is expected that less lighting will be continuously operating at night, with motion detection being more widely implemented.

The proposed lighting provisions are not expected to impact on a person's ability to carry out activities outdoors after dark. A positive effect on residential amenity is anticipated, as a result of the improvement in the quality of views of the night sky, and a reduction in spill light and glare from new outdoor lighting installations.

15 Economic Growth and Employment Opportunities

The certification of an international dark sky reserve in the Wairarapa is anticipated to result in substantial economic growth and employment opportunities for the districts, through boosting the districts tourism offer, as outlined within Section 4 of this report. The proposed policy amendments will contribute to enabling the economic growth and employment opportunities associated with the dark sky reserve.

16 Risks associated with the Preferred Option

The provisions of the operative district plan are inadequate to implement the requirements of the IDA. Without these provisions, the Council's will have ineffective policy and planning

methods to managing lighting and there is a risk that dark sky reserve certification will not be achieved.

The Council has sufficient information to act. The proposed management area has been recognised by the MDSS as an appropriate location for an international dark sky reserve and the dark sky is widely recognised as an important amenity value for the district. In addition, the Council's strategic documents recognise the importance of the dark sky reserve accreditation. The implementation of the proposed provisions is intended to provide clear direction within the district plan that the dark sky is an important amenity feature of the district that requires protection and consideration when assessing development proposals. The costs associated with implementing the provisions as the preferred option, are outweighed by the benefits.

It is considered that there is little risk associated with the implementation of the preferred option.

17 Conclusion

This report provides a summary assessment of the plan change consistent with s32 of the RMA. The report describes the purpose of the plan change and summarises an evaluation of:

- The objectives of the plan change;
- The broad plan change options;
- The proposed amendments to the policy framework to introduce new policies; and
- The proposed methods and standards.

The report concludes that the plan change is the most appropriate way to achieve the purpose of the RMA.

Disclaimer

We used a lot of different sources of information to write this report. Where we could we tried to make sure that third party information was accurate, but we couldn't audit all those external reports, websites, people or organisations. If the information we used turns out to be wrong, we can't accept any responsibility or liability if that affects our report or its conclusions. We might (but aren't required to) update our report if we find any additional information that was available when we wrote the report that affects its conclusions.

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Appendix A: Marked up version of the WCDP

DISCUSSION DRAFT

Appendix B: Proposed Appendix 15: Dark Sky Management Area Map

DISCUSSION DRAFT

Appendix C: Stephenson and Turner Lighting (S&T Lighting) Report

DISCUSSION DRAFT

Appendix D: International Dark Sky Association - 2018 International Dark Sky Reserve Guidelines

DISCUSSION DRAFT

Appendix E: Objectives and Policies of WCDP

DISCUSSION DRAFT

Appendix F: Lighting available at lighting retailers

DISCUSSION DRAFT

Appendix G: Summary of Australian Standard *AS 2560 Guide to Sports Lighting*

DISCUSSION DRAFT

Appendix H: Wairarapa Dark Sky Reserve – Issues and Options Report

DISCUSSION DRAFT

Appendix I: Schedule 1 Clause 3 Consultation Responses

DISCUSSION DRAFT

DISCUSSION DRAFT

PERCEPTION PLANNING

Appendix 2 – Wairarapa International Dark Sky Summary of Information

The Wairarapa International Dark Sky Reserve – Outdoor Artificial Lighting Plan Change

The Martinborough Dark Sky Society are applying to the International Dark Sky Association for part of Wairarapa to be certified as an International Dark Sky Reserve. South Wairarapa, Carterton, and Masterton District Councils support this application for the variety of economic (tourism), environmental, social, and cultural benefits the certification would bring to the districts.

What is a dark sky reserve?

A dark sky reserve is public or private land where the quality of starry nights and the nocturnal environment are exceptional, and those qualities are specifically protected for cultural, natural, educational, scientific or public purposes (www.darksky.org).

There are only 12 dark sky reserves in the world, and only three are in the southern hemisphere. There is only one dark sky reserve in New Zealand, located in the Mackenzie Valley, Aoraki. There are two dark sky sanctuaries¹ in New Zealand - Stewart Island and Great Barrier Island.

If Wairarapa became a dark sky reserve, it would be the world's largest.

Managing light pollution better will help the dark sky reserve application

Light pollution is the biggest threat to getting International Dark Sky Reserve certification. To qualify as a dark sky reserve, light pollution in the region must be managed to certain levels. South Wairarapa and Carterton district councils want to support a successful dark sky reserve application, so they are proposing to change and add some rules in the Wairarapa Combined District Plan that relate to managing light pollution.

Skyglow or the brightening of the night sky is the worst thing for night sky viewing. Due to skyglow, the night sky over many of New Zealand's urban environments can be brighter than a natural, starlit sky. Skyglow hides the stars from our sight and prevents us from experiencing a natural night, even in areas far away from urban development².

What is the Wairarapa Combined District Plan?

A district plan is a public document that guides how we manage activities and environmental impacts (like outdoor lighting) in our districts. The Wairarapa Combined District Plan is the one shared by the South Wairarapa, Carterton, and Masterton districts.

¹ A sanctuary differs from a Dark Sky Reserve in that it is typically situated in a very remote location with few (if any) nearby threats to the quality of its dark night skies.

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

What is a plan change?

District plans are reviewed approximately every ten years, but councils can initiate smaller 'plan changes' between the major reviews to keep the plans current and relevant.

When a council proposes a plan change, they will publicly notify the changes they intend to make to the plan and invite the public to make submissions on them. The submissions will be considered at a hearing by a hearing panel. Afterward, the hearing panel will issue a decision on whether to go ahead with the plan change or not.

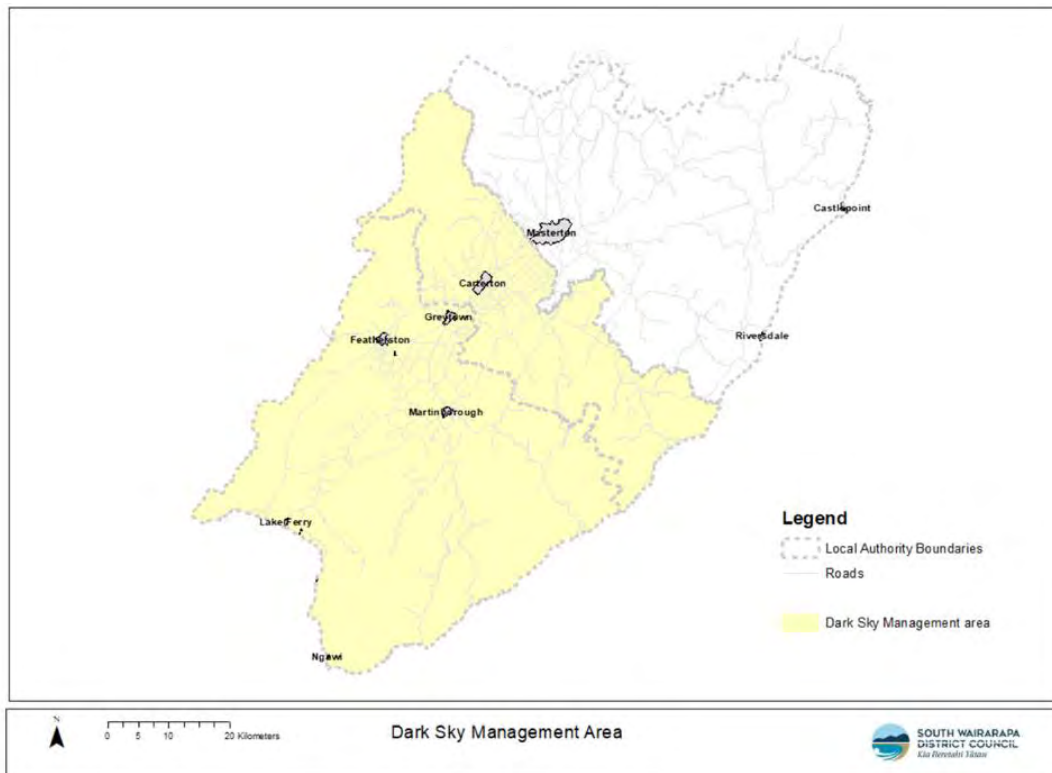
What changes are the South Wairarapa and Carterton District Councils proposing?

The Council would like to change some objectives, policies, and rules (collectively called 'provisions') in the Wairarapa Combined District Plan so light pollution can be controlled better. The plan currently does not specifically address light pollution that adversely affects the brightness and clarity of the night sky. The provisions also do not meet the International Dark Sky Association requirements for dark sky reserve accreditation.

Here are the main changes:

- A new rule that will require outdoor lighting to be tilted down or shielded so light goes out and down – not out and up.
- A new rule that will control the 'colour temperature' of lighting – making sure light temperatures are 3000 kelvins and under.
- An exemption to the above rules if outdoor lighting is on a five-minute (or less) sensor/timer.
- New rules for sports lighting at recreational facilities to address light pollution, and to make it easier (eg. no resource consents) for sports recreation facilities to install outdoor lighting.

The Martinborough Dark Sky Society wants the International Dark Sky Reserve area to be over the South Wairarapa and Carterton districts. Therefore, the proposed changes to the plan will only apply to the South Wairarapa and Carterton districts at this time (not to the Masterton District). The area will be clearly identified in the planning maps as the 'Dark Sky Management Area'.



These proposed new provisions will not apply to existing and established lighting. If lighting is replaced, then the new provisions would apply. However, we will encourage people to change their lighting to meet these new standards and reduce light pollution in the districts.

Have your say on the Wairarapa International Dark Sky Reserve – Outdoor Artificial Lighting Plan Change

A copy of the proposed changes to the plan and a 'Section 32 report' (which explains the reasoning behind each proposed change) is available at <https://www.swdc.govt.nz>

Anyone can make a submission on a plan change. To find out how to make a submission, please go to <https://www.swdc.govt.nz>

If you make a submission, you are entitled to participate in a hearing.

If you have questions about the proposed changes or about the plan change process, please email xxx or ring [xxx](tel:xxx).