



# Dunedin City Council draft 9-Year Plan 2025-2034 Consultation document

## Submission from the Dunedin Dark Skies Group

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## Objectives

The Dunedin Dark Skies Group (DDSG) is seeking redress concerning light pollution impacting:

1. health and safety
2. cultural identity
3. wildlife
4. nighttime environment
5. stargazing
6. astronomical observations and research

## Introduction

Substantial and sustained increases in artificial light at night (widely known as ALAN) in Ōtepoti Dunedin has caused excessive and unnecessary light pollution. This has dramatically increased sky glow i.e. it has artificially brightened the night sky, and which is nowadays, obscuring the stars and the Milky Way to the extent that it is impeding astronomical observations. The author who is an experienced amateur astronomer has observed this phenomenon from many vantage points including the Beverly-Begg Astronomical Observatory in Robin Hood Park situated within the Town Belt.

Light pollution is primarily caused by the unregulated growth of light emitting diode (LED) lighting technologies, particularly by the private sector i.e. by businesses, commerce and industry. This was determined by instrument-based surveys of night sky quality. It has been steadily growing since LEDs became cheaper and hence widespread in outdoor lighting.

## Factors impeding the sustainable growth of Ōtepoti Dunedin

The author has recently become aware of the draft 9-year plan consultation document. It is self-evident that it is woefully inadequate in myriad respects. Systemic substantial failings have led to shocking and abhorrent outcomes for the health, safety and wellbeing of citizens in areas

such as public safety and in mental health, such as the appalling and distressing situation for impoverished and disenfranchised people reduced to begging, many of whom may well be physically and mentally unwell, and no, you may not banish them from the streets. Help them instead, because it is the measure of the mana of a city that it cherishes all its citizens.

There have also been and continue to be, substantial failings to *redress* (incidentally it's not *address*) extremely poor outcomes for our precious taonga: native wildlife e.g. yellow-eyed penguins, reptiles e.g. jewelled geckos and invertebrates e.g. ancient Peripatus the velvet worm. The situation in Ōtepoti Dunedin with nocturnal invertebrates including insects like lepidoptera i.e. moths is appalling. Light, sound, water and air pollution is extremely detrimental to them. Frankly, it's also extremely detrimental to people, especially to children.

A deeply held concern of some people, including the author, is the *uglification* of Dunedin, with excessive use of traffic calming and directing measures such as innumerable and sometimes preposterous roundabouts, reflective poles embedded in roads, and with orange road cones strewn like confetti everywhere. There are also hazardous concrete road projections and un-signposted raised-up pedestrian crossings and road humps, potentially damaging vehicles. All of which, has made Ōtepoti Dunedin unpleasant and hazardous to negotiate. Furthermore, it has rendered this city exceedingly ugly, a veritable eyesore marring its cultural heritage. This is having conscious and subconscious deleterious impacts on citizens physical, mental and spiritual wellbeing.

The author so deeply concerned about so many pressing matters that he desires audiences with council and staff tasked with these responsibilities. Not a mere five minutes at hearings, proper meeting(s) with representatives of the DDSG and other interested parties such as the Dunedin Astronomical Society (D.A.S.), the Royal Astronomical Society of New Zealand (R.A.S.N.Z.) and the Royal Society of New Zealand (R.S.N.Z.) but especially with health professionals.

This submission is primarily confined to representing the interests of the DDSG, namely mitigating the impacts of light pollution, since it has been largely ignored by the DCC, despite its "*upgrading*" its orange-yellow 2,200 kelvin high pressure sodium (HPS) streetlights to warm-white 3,000 kelvin LED streetlights.

## Draft 9-year plan

The draft 9-year plan omits policies and strategies for mitigating the impacts of light pollution caused by artificial light at night which is adversely impacting:

1. health and wellbeing of citizens
2. pedestrian safety at night
3. driver safety at night
4. marine, freshwater and terrestrial wildlife
5. stargazing, astrotourism and astronomy
6. cultural identity
7. sustainable business management
8. sustainable business growth

## Climate change

Your draft 9-year plan consultation document provides only a cursory mention of achieving nett-zero carbon emissions by 2030. This objective is founded on the unproven assumption that forests are always nett carbon absorbers, when up-to-date research suggests that due to

climate change with year-on-year increasing ambient temperatures, forests can instead become nett carbon emitters.

It is incumbent upon you to develop, and institute remedial measures by redressing excessive and unnecessary use of energy within city boundaries. A glaring illustration of unnecessary energy wastage is the unrestrained, inconsiderate, and harmful use of outdoor lighting.

## Detrimental Impacts of Artificial Light at Night (ALAN)

Renowned International and Aotearoa New Zealand based researchers have demonstrated that ALAN is likely or is highly likely to be detrimental to:

1. the health and wellbeing of people
2. wildlife
3. ecosystems

The DCC has consistently abrogated its responsibilities and duty to

1. acknowledge
2. redress

major health and environmental concerns raised by innumerable leading scientists and health professionals concerning light pollution, ably described by internationally renowned experts including those who are domiciled in Aotearoa New Zealand:

1. Dr Ellen Cieraad, professor emeritus of Ecology, Environmental Science, and Sustainability.
2. Dr Bridgette Farnworth, PhD in Behavioural Ecology & Conservation Biology, Te Pūkenga Nelson Marlborough Institute of Technology.
3. Dr Margaret Stanley, professor of Biology, University of Auckland. Margaret is an ecologist with expertise in biodiversity, biosecurity, conservation, invasive species, and urban ecology.
4. Dr Michelle Greenwood, an ecologist, NIWA Canterbury.
5. Dr Phillipa Gander, professor emeritus of Chronobiology, Massey University. Phillipa was the former director of the Sleep/Wake Research Centre.
6. Susan Mander, senior lecturer (PhD candidate), specialist in illumination engineering, Massey University. Susan is also a widely experienced lighting designer.
7. Dr John Hearnshaw, professor, emeritus of Astronomy and Physics, University of Canterbury. John was a former director of Mt John Observatory, Tekapō.
8. Kyra Xavia, Aotearoa New Zealand's Dark Sky International representative. Kyra is an expert in light pollution and Dark Sky implementation.
9. Steve Butler Dark Sky representative of the Royal Astronomical Society of New Zealand (R.A.S.N.Z.).
10. Associate professor Dr Alexander Tups, Department of Physiology, University of Otago whose research specialities include circadian rhythms and light-mediated melatonin hormone suppression.

## Wildlife

The DCC has demonstrated an appalling lack of understanding and insight towards crepuscular and nocturnal wildlife, especially for invertebrates like insects and larger nocturnal fauna, which plants need, and which are crucial for the survival of healthy ecosystems. This is self-evident from the large increases in ALAN since 2016 when streetlights were changed from orange-yellow HPS to white 3,000 kelvin LED. Please note, it is not the DDSG's responsibility to prove this is the case; in the author's informed opinion that this is an indubitable fact.

It is beholden of the DCC to be always vigilant, and especially to protect and enhance the reputation and mana of Ōtepoti Dunedin as the Wildlife Capital of Aotearoa New Zealand by redressing a highly noxious, insidious and creeping poison that constitutes ALAN and the culturally offensive, health and safety issue that results, light pollution.

Wildlife capital status is sorely lacking a rigorous scientific foundation, and there is no independent validation. Upon whose authority is Ōtepoti Dunedin's status of being internationally recognised as being the Wildlife Capital of Aotearoa New Zealand predicated? Which august internationally respected organization accredited Ōtepoti Dunedin with this accolade? The author has found no such evidence. This has led him to conclude it is solely a marketing ploy to bring in tourism revenue. DCC and ORC please, put your money where your mouth is and walk the talk.

To gain accreditation as an international dark sky sanctuary, reserve, park, or community, applicants must meet strict criteria set by Dark Sky International. Ōtepoti Dunedin has the potential to become so internationally recognised with Dark Sky status, but it can only be achieved with perseverance, diligence, dedication and crucially by enlightened councils. Is this you, his worship the mayor, councillors, and staff of the Dunedin City Council?

Frankly, everyone knows that the answer inevitably is no. You misguidedly believe that this will cost enormous sums of money. True, it would eventually and over time cost significant sums but not nearly as much as you may have been led to believe and yet this wonderful transformation can be effectively and inexpensively achieved by winning hearts and minds. All that the author needs are audiences which possess eyes that see, ears that listen, and hearts imbued with empathy.

Yet, you are seemingly willing to squander an incredible unique opportunity to become an International Dark Sky city aka a "*Night Sky City*," second in the world after Flagstaff, Arizona. The concept of a "*Night Sky City*" was first raised and promoted by you. A *bona fide* International Dark Sky city engenders a veritable mountain of international prestige, bequeathed mana, but most importantly it would greatly enhance the protection of our critically endangered, unique wildlife for future generations of citizens to enjoy.

## Mitigating light pollution in Ōtepoti Dunedin

It is unacceptable that any entity, person or vehicles has an inalienable right to inflict people, wildlife and the environment with ALAN.

### Recommendations:

1. Reconvene the Dark Sky Advisory Panel. [I would like to nominate businessman and amateur astronomer, Mr Mirko Harnisch as the chair, should he be willing to accept it.]
2. Define and task a new environmental rôle for protecting the night-time environment to a well-qualified, diligent and empathetic councillor.

3. Similarly, define and task a new environmental rôle protecting the night-time environment to a well-qualified senior member of staff.
4. Consult with international and local experts in their respective fields.
5. Develop environmental policies that will sustainably manage the night-time environment. These policies and procedures have already been instigated elsewhere in New Zealand.
6. Redraft and completely rewrite your light-spill rule 9.3.5.
  - a. Seek legal advice from an environmental solicitor, i.e. Dunedin MP, Rachel Brooking to ensure that this rule is explicit, easy to understand, unambiguous and is completely legally watertight. It cannot be disregarded or neglected.
  - b. An immediate change to light spill rule 9.3.5 is to specify the maximum permitted correlated colour temperature (CCT) to all types of lamps used in outdoor lighting, which is principally but not exclusively LED. This should be limited to a maximum CCT of 3,000 kelvin.
  - c. Specify the maximum permitted luminous flux in lumens per square metre.
  - d. Specify the maximum permitted light spill beyond the perimeter of businesses, enterprises, yards and dwellings.
  - e. Specify the type and extent of shielding. All outdoor lighting should be fully shielded with downward-pointing luminaires with zero light spill at and above horizontal.
  - f. Specify the time(s) which outdoor lighting is allowed to be turned on and then must be turned off.
  - g. Specify the implementation and use of lighting sensors that will turn lighting on and off.
  - h. Specify the deployment of security cameras that may be used to control security lighting.
  - i. Restrict the maximum permitted correlated colour temperature (CCT) to warmer and much more environmentally sustainable amber 2,200 kelvin LEDs in the vicinity of wildlife living in the Town Belt, the Otago peninsula, but also in West harbour, home to the Orokonui Ecosanctuary which has endangered wildlife.
  - j. Rigorously police and strictly enforce this new and improved light spill rule.
  - k. Obtain professional advice from the reconvened Dark Sky Advisory Panel, and/or the DDSG.
  - l. Obtain professional advice from and employ lighting professionals who have expertise in environmentally sustainable lighting. This responsibility should not be delegated to roading engineers, who may have little or no experience of environmental lighting.
  - m. Institute substantial monetary and other significant penalties on any business, industry, entities or person(s) for failure to comply.

- n. Apply this rule to public entities such as schools, sportsgrounds, the Forsyth Barr Stadium, hockey, cricket and rugby sport fields, and anything else which is brightly lit at night.
  - o. **Crucially.** Rigorously apply this new light spill rule to Port Otago, which emits ALAN in prodigious quantities. If Ports of Lyttleton can successfully achieve environmentally responsible lighting, then so can Port Otago. Acquire photographic images of responsible lighting of ports and airports. I can furnish some photos.
  - p. Collaborate with the ORC. If Port Otago doesn't lie within the DCC's jurisdiction, then it behoves you to ensure that the ORC implements an analogous light spill rule.
  - q. Apply this rule to Momona Airport.
  - r. Apply this rule to Delta.
  - s. Apply this rule to KiwiRail, and to the New Zealand Railways Corporation. If this lies outside your jurisdiction, then ensure that it is applied by the appropriate authorities.
  - t. Apply it to industrial and commercial zones within city limits.
  - u. Apply it to car sales yards and to all carparks.
  - v. Apply it to all petrol stations and associated fuel storage facilities.
7. Develop a sustainable business growth model or strategy, which fully respects and conserves the night-time environment.
  8. Collaborate with the Otago Regional Council regarding these matters. Do not shirk your responsibilities by asserting that this job belongs solely to the ORC.
  9. Develop objective measures of quantifying successful implementation, such as complete wildlife surveys (including all animal and plant kingdoms e.g. fungi, plants and invertebrates and life in soils) before and after implementation, with ongoing monitoring.
  10. Publicly and regularly report all issues raised in this submission regularly via the:
    - a. DCC website
    - b. Otago Daily Times
    - c. Social media
  11. Collaborate with the author, who will give his time and expertise freely.

The above specifications for an effective light spill rule and mitigation of light pollution are by no means exhaustive. It should be viewed as an illustration of what is required and expected of the DCC and the ORC to ensure that ALAN is subject to legally enforceable light spill rules, which will ensure that neither people, wildlife nor the land, sea, rivers, streams and the night sky is impinged upon by ALAN.



Key Objective for the 9-year plan 2025 – 2034.

**Drop at least one whole Bortle Class over the entire city, right out to its geographical boundaries, i.e. all 3,300 km<sup>2</sup>**

The Bortle Scale is a system that classifies the brightness of the night sky based on light pollution levels, affecting the visibility of celestial objects. It's a nine-level scale, ranging from Class 1 (the darkest, pristine skies) to Class 9 (the brightest, inner-city skies). Ōtepoti Dunedin, depending on location, may lie between Classes 3 to 6. The inner city is about Class 5 - 6, Port Otago is Class 8 – 9, the most heavily light polluted location, which lies in the vicinity of endangered wildlife, i.e. the Orokonui Ecosanctuary, West harbour and Taiaroa head.

Dropping an entire Bortle Class would make a dramatic improvement to the visibility of the stars and the Milky Way, and so it would be enormously beneficial to star gazers and astronomers. It would certainly enhance city assets, like Taiaroa Head, Orokonui Ecosanctuary and especially the historic Beverly-Begg astronomical observatory, which is developing and enhancing its facilities for the public.

## Conclusion

Life on Earth is facing gargantuan existential challenges of “*Titanic*” iceberg-sized proportions for wildlife, and for the entire human race to which the renowned biologist and conservationist Sir David Attenborough has attested. Young environmentalists like Greta Thunberg, our tamariki, mokopuna and whānau know it to be true. This knowledge makes the author exceedingly sad, desperately tired, but make no mistake, he is assiduously determined to succeed in creating an exquisitely beautiful *Night Sky City*.

His worship the mayor, Jules Radich of Ōtepoti Dunedin, I am frustrated by the lack of progress in implementing responsible outdoor night lighting in our city, especially under a council that claims to support environmental sustainability but fails to show it. The author represents dedicated amateurs and professionals who work within and without the DDSG, who give freely of their time, invaluable experience and expertise. Surely then, we can collaborate to work towards a bright future for Ōtepoti Dunedin. Esteemed mayor, councillors and staff, please make it your aspiration too!

