

5 July 2019

Pauline

[fyi-request-10469-063b6205@requests.fyi.org.nz](mailto:fyi-request-10469-063b6205@requests.fyi.org.nz)

Dear Pauline

**Local Government Official Information and Meetings Act 1987 (LGOIMA) request for the feedback on the LED trial in South Dunedin**

I am writing in response to your request made on 6 June 2019 asking for the feedback on the LED trial in South Dunedin.

Please find attached the feedback provided from the LED trial in South Dunedin. Pursuant to Section 7(2)(a) you are advised that certain information has been withheld to protect the privacy of natural persons.

As we have declined to provide some information you are advised that you have the right to seek a review by the Office of the Ombudsman 0800 802 602 or [info@ombudsman.parliament.nz](mailto:info@ombudsman.parliament.nz)

Yours faithfully



Rebecca Murray  
Governance Support Officer

LED South Dunedin Trial feedback/questions
My concern is the brightness of the new lights. The new ones that are by the Botanic Gardens are to my mind unnecessarily bright. I also support the push for Dunedin to become a Night Sky city. Safety of pedestrians i do not think would be compromised by less bright lights. I also note that Hamilton has adopted 3,000 K rather than 4,000 K on its arterial routes to protect its bat populations, whereas Dunedin is allowing the NZTA to install 4,000 K LED on our arterial routes and highways. Why does Dunedin need brighter lights?
The LED lights in South Dunedin are way too bright! It is bad for health and aesthetics. Please go for the lower powered option mentioned in the ODT. The bright ones will ruin the feel of the city.
Would like to see the lower rated 2400K lights as the 3000K lights emit too much light which invades private property and isn't good for our health.
I have looked into the three streets in south Dunedin and the led lights in Fawcett Street were by the best quality lights.
Please don't use the led lights. I find them very blinding. And they are really bad for our eyes.
Low-energy-consumption lighting is clearly the way of the future - I commend the DCC for being proactive towards this. I felt that the LEDs in the trial street were too blue, i.e. too higher K rating. Blue light is a rather aggressive light that is not particularly relaxing (not unlike the intense orange colour used by mitre 10 mega). Many people will be able to relate to this when trying to get to sleep after watching a tablet screen. I think that a slightly warmer LED could be used with minimal loss to safety for pedestrians or drivers.
<p><a href="https://www.ama-assn.org/ama-adopts-guidance-reduce-harm-high-intensity-street-lighting">https://www.ama-assn.org/ama-adopts-guidance-reduce-harm-high-intensity-street-lighting</a>, ama-assn.org</p> <p>AMA Adopts Guidance to Reduce Harm from High Intensity Street Lights</p> <p>3-4 minutes</p> <p>CHICAGO - Strong arguments exist for overhauling the lighting systems on U.S. roadways with light emitting diodes (LED), but conversions to improper LED technology can have adverse consequences. In response, physicians at the Annual Meeting of the American Medical Association (AMA) today adopted guidance for communities on selecting among LED lighting options to minimize potential harmful human and environmental effects.</p> <p>Converting conventional street light to energy efficient LED lighting leads to cost and energy savings, and a lower reliance on fossil-based fuels. Approximately 10 percent of existing U.S. street lighting has been converted to solid state LED technology, with efforts underway to accelerate this conversion.</p> <p>"Despite the energy efficiency benefits, some LED lights are harmful when used as street lighting," AMA Board Member Maya A. Babu, M.D., M.B.A. "The new AMA guidance encourages proper attention to optimal design and engineering features when converting to LED lighting that minimize detrimental health and environmental effects."</p> <p>High-intensity LED lighting designs emit a large amount of blue light that appears white to the naked eye and create worse nighttime glare than conventional lighting. Discomfort and disability from intense, blue-rich LED lighting can decrease visual acuity and safety, resulting in concerns and creating a road hazard.</p>

In addition to its impact on drivers, blue-rich LED streetlights operate at a wavelength that most adversely suppresses melatonin during night. It is estimated that white LED lamps have five times greater impact on circadian sleep rhythms than conventional street lamps. Recent large surveys found that brighter residential nighttime lighting is associated with reduced sleep times, dissatisfaction with sleep quality, excessive sleepiness, impaired daytime functioning and obesity.

The detrimental effects of high-intensity LED lighting are not limited to humans. Excessive outdoor lighting disrupts many species that need a dark environment. For instance, poorly designed LED lighting disorients some bird, insect, turtle and fish species, and U.S. national parks have adopted optimal lighting designs and practices that minimize the effects of light pollution on the environment.

Recognizing the detrimental effects of poorly-designed, high-intensity LED lighting, the AMA encourages communities to minimize and control blue-rich environmental lighting by using the lowest emission of blue light possible to reduce glare. The AMA recommends an intensity threshold for optimal LED lighting that minimizes blue-rich light. The AMA also recommends all LED lighting should be properly shielded to minimize glare and detrimental human health and environmental effects, and consideration should be given to utilize the ability of LED lighting to be dimmed for off-peak time periods.

The guidance adopted today by grassroots physicians who comprise the AMA's policy-making body strengthens the AMA's policy stand against light pollution and public awareness of the adverse health and environmental effects of pervasive nighttime lighting.

Media Contact:

AMA Media and Editorial

Pressroom: (312) 239-4991

Email: [media@ama-assn.org](mailto:media@ama-assn.org)

My name is [REDACTED] and I'm extremely concerned with the new LED road lighting in South Dunedin. In fact, there are so many problems, the issues cannot be fully addressed here.

The vast majority of New Zealanders are unaware of the shortcomings and inherent risks of this lighting technology - and the LEDs in South Dunedin demonstrate unfit for purpose lighting is being installed without the necessary know how and expertise.

This matter is so serious, a group of concerned residents are scheduled to meet the Minister of Health, David Clark, to present an appeal for safer road lighting, supported by recent scientific papers, journals and literature, letters from various professional experts, medical/photographic records, and the 2018 report by the Royal Society of New Zealand.

It's urgent that Dunedin's retrofit be delayed.

Please read the attached pdf document which explains in more detail what these problems are.

Please find this PDF at the end of this document.

How big is the trial? How long before the trial is assessed?

Where can I find more information on the parameters of the trial?

I'm the chairman of the [REDACTED] and also one of the experts listed in the [REDACTED] pollution. In the Wairarapa we

minimised the potential impact on our citizens health by using 3000K streetlights but also minimising the brightness and number of streetlights. This was also done before the Royal Society report was released. Unless DCC is comfortable being exposed to the public liability of having installed blue rich, bright and high density white LED lighting post Royal Society report I would advise very careful planning. There are independent organisations which can help, please contact us if you need connecting. Dunedin has the chance to be an internationally respected city for managing light pollution impacts, please don't squander the opportunity.

I think the retrofit should be delayed until more investigation is carried out on what negative impact the new lighting may have on the health and safety of the general public. Keep in mind asbestos was considered ok. Smoking was considered ok etc etc. Best to have all the facts in place before the lights are installed!!

I live in Sunnyvale, California, USA. Our city installed 5000K streetlights. They are a catastrophe. They are far too bright and have too much glare. We can no longer sleep. The local observatory has been negatively impacted due to sky glow. The worst thing is that this light make us feel angry because we can't look at anything around us. The light overwhelms everything. I urge Dunedin to not make the same mistake. Please install only low intensity, soft lighting that is less than 2700K, shielded and diffused.

My name is [REDACTED] and I submitted a pdf file earlier today with my feedback. Can you please delete the file titled "LED South Dunedin Feedback Nov 2018" and use this amended document titled "LED South Dunedin Feedback - Nov 2018 FINAL. It has a small correction. Many thanks, [REDACTED]

My name is [REDACTED] and earlier today, I submitted a pdf file with my feedback.

I then sent another file with a small correction but forgot to remove the tracking when I saved it, so the editing window was still open, which mucked up the layout of the pdf.

I have corrected this now.

Can you please use this final amended document titled "LED Feedback Nov 2018" and delete the other two files.

My apologies at the mixup :)

Many thanks, [REDACTED]

For the trial, it is very hard to visually compare the lights at street level when the lights are in different streets. It would be more practical to have one street with sections that have all three different light types. Also would suggest having lights that can do the 3000 - 4000k during the early evening then lower to 2200 k alter evening, this would have health benefits, safety, night sky friendly bring in more tourists to stay longer. The china factories will make whatever we want so to design this to be economic, eco-friendly would make us world leaders and put Dunedin on the world map for doing something super awesome (in the same spirit as the harbour proposal)! There are countless studies, reports and examples there e.g [https://www.change.org/p/london-breed-stop-installing-led-street-lights-in-sf-neighborhoods-until-residents-weigh-in?fbclid=IwAR1Cy1q20clvanW2LnZtYGhdJQS\\_jM1OVxfRWt6YfkPhIMX5DqSqKye-md4](https://www.change.org/p/london-breed-stop-installing-led-street-lights-in-sf-neighborhoods-until-residents-weigh-in?fbclid=IwAR1Cy1q20clvanW2LnZtYGhdJQS_jM1OVxfRWt6YfkPhIMX5DqSqKye-md4)

I'd like some information about whether the fittings are fully cut-off or not. I read in the ODT article that the lighting encroaches more than the sodium-vapour lamps. I'm really worried about this at my place, I really dont want my house/garden lit up like it's a prison yard.

Please do not ruin the urban streetscape with LED lighting. It's harsher on the eyes, bad for wildlife and will make our beautiful southern skies -- with their occasional urban auroras! -- harder to enjoy.Â

These 3000K lights pose a health and safety risk, they are a hazard, not only to me but too many others in this community.

The light is too bright to drive safely under at night and if you have had a traumatic brain injury like me they are just too much to handle, I will become a prisoner in my own home with my curtains drawn from when they are turned on at night. Heaven forbid if my block out curtains can't hold the light spill.

There is an opportunity for the DCC to really consider the well-being of the individuals, the wider community and the environment and to get it right, be like Tekapo, Fairlee and Twizel and get a dispensation from NZTA to use 2200K amber lights. This would also tie in with Keep NZ Beautiful and retaining Dunedin glorious night skies.

I do not understand why this has to be done in such haste, at the very least please slow down and update on the scientific data such as the Royal Society.

Is your community's wellness not a priority?

Are all the current bulbs going to blow all at once and need replacement? Is the NZTA subsidy worth it at the end of the day?

Is my right to live a well life worth nothing to you?

You have the power to eliminate this extreme hazard - please use it.

Dunedin's LED road lights may be unstable. 3,000 K and 4,000 K LED road lights may exhibit chromaticity shift; LEDs degrade over time and their colour changes, long before the life expectancy of luminaires. This is worrying the lighting industry. The DCC should stop the planned retrofit of LED road lights in 2019 and investigate the chromaticity problem, as well as other serious problems and major health and safety flaws with LED technologies. It would be costly if the LEDs are unstable and don't remain white. The NZTA have granted the DCC until July 2021 to implement LED upgrade. Don't rush into an unreliable evolving technology, retain high pressure sodium, and shield it inexpensively with a metal strip as per those in Ross Street, Roslyn by the Beverly Begg Observatory.

I am not in favour of replacing our amber lighting with LED street lights. there is some research out there about the negative effects of LED lighting mainly health wise. I am more than happy with our current amber lighting.

#### Led Lighting Trial

I am in favour of finding energy efficient and environmentally non-polluting alternatives to reduce the impact humans have on the earth and decrease our contribution to climate change. If there are good alternatives to our current street lighting, which achieve this, then we should invest in such changes.

However in my observations of the trial area of the suggested new lights, I have major concerns:

â€ In comparison to the sodium lighting the light produced by the new LEDS is cold, white and

bright.

â€¢ It is not diffuse lighting, which spreads evenly over the ground and therefore leaves bright pools of light between quite dark patches. It means those living right next to the lamp poles have extremely bright light intruding not only onto their properties, but directly into their houses, especially the ones in South Dunedin, which are often very close to the footpath and close to each other. I am concerned that I will have a lamp in very close proximity to my bedroom in a house I am currently building.

â€¢ The light/dark contrast also produces a slight strobe effect as you are driving along and also at one point the very bright LEDs are shining directly into the driverâ€™s eyes. This does not make for safe driving.

â€¢ I also understand there is accumulating research that indicates there may be health issues with prolonged exposure to blue light and its interference with the production of melatonin and hence our circadian rhythms.

â€¢ More importantly I find the overall aesthetic of the trial lighting harsh and unappealing. I would not want these light installed throughout the city.

To be clear, I do not want to see these lights installed across Dunedin at all. I would like to see further investigation into better downward, softer and more diffuse lighting to enhance our dark sky status and save energy and therefore costs. The current suggestion is not the way to go.

Please note, I will include a duplicate submission as an attachment, as it looks like all the formatting has been lost on this form so it will be more difficult to read.

The drive by DCC to certify Dunedin as an International Dark Sky City is a total folly and a waste of money, but worst of all - it will destroy stunning night views of tens of thousands of residents in at least 26 suburbs.

While the move to LED lighting is a good move by council, the shading that will destroy our night views of the city has not been thought about.

The plan to shade the new street lights should be stopped immediately for the following reasons â€”

1. Looking at the black hole in the city lights that is the street light trial, moving to the new shades will obliterate Dunedinâ€™s famous night views from at least 26 suburbs - The Cove, Waverley, Vauxhall, Shiel Hill, Andersons Bay, St Clair Park, Kew, Corstorphine, Calton Hill, Lookout Point, Balaclava, Mary Hill, Mornington, Belknowes, Roslyn, Maori Hill, Dalmore, Liberton, Pine Hill, Waikari, Helensburg, Halfway Bush, Brockville, Opoho, and Ravensbourne.
2. For years the council has repeatedly used multiple pictures of Dunedinâ€™s amazing nightscape to promote the city. And rightly so. No city anywhere in New Zealand or Australia has anything like our hill views of the city and harbour, except for perhaps a couple of multimillion dollar Wellington suburbs.
3. The council obviously see our night views as a major asset to the city, yet they plan to destroy that major asset. A large amount of our city promotion showing this great asset will have to be pulled, other any future promotion of our stunning night views, will be false advertising.
4. Residents have spent millions of dollars on decks, window alterations, and house remodelling, to take in our amazing night views â€” this will be wasted money.

5. Home buyers have spent tens of thousands of dollars as a premium for homes and sections that have great night views over the city. For people who work during the day, they see their night view much more than their day view. All this additional value that has been paid for a great night view will be destroyed. Have residents been informed of this, and will the DCC compensate for millions upon millions of house value they are destroying?

6. To pass International Dark Sky certification minimum requirement 1 (F), businesses are required to completely extinguish ALL lit signs by one hour after sunset, until one hour before sunrise. In winter, this means most businesses will have to turn their signs off while they are still open. Even in summer all the bars, restaurants, takeaways and petrol stations will have to turn off all their lit signs.

7. Similarly, to pass International Dark Sky certification, thousands of businesses will have to spend millions to upgrade all the lighting over areas such as supermarket car parks, car sales yards, business yards and car parks, and all security lighting.

8. If businesses have not been told of this, consulted on it, and that their views taken into consideration, then this is a clear and obvious breach of several parts of the Local Government Act.

9. If householders have not been told of loss of night views that they have paid significant sums of money for, and potential losses of their part of their home value, been consulted about it, and had their views taken into consideration, then this is also a clear breach by council of the Local Government Act.

10. The folly of the Dark Sky Certification, is that even if the council spent millions on the dark sky initiative, star gazing from the city would still be nowhere near as good at driving 5 minutes outside of the city.

11. In fact, if you took 1000 locations in the South Island, except for Christchurch, Dunedin would be the very worst of 1000 locations try to make turn into a dark sky place.

12. The moon causes significant light pollution that hinders star gazing. The moon is out at some time of the night on 27 out of every 28 days.

13. With our coastal climate, on the one or two days a month when there is no moon, it is likely there is cloud cover, or moisture in the air.

14. The very reason we light pollution from the city, is all because we have so much moisture in the air from our coastal location. In other words, if there is light pollution, that means there are plenty of moisture particles in the air, so star gazing is not at an optimum anyway.

15. The best dark sky places are a/ far inland 2/ have a dry or even desert air 3/ are at high altitude. Dunedin has none of these attributes.

16. The ONLY Dark Sky Certified communities anywhere on the globe, that are near the coast, are ALL tiny villages, and ALL of those are on remote islands.

17. No city anywhere near the size of Dunedin (even with all the best attributes of dry inland and high altitude) has ever been awarded Dark Sky status.

18. Virtually all towns with 10,000 or more with Dark Sky certification, are dry climate and desert towns, at high altitude (i.e 7000ft)

19. Our stunning historic heritage will be invisible at night as a minimum requirement for Dark Sky certification will be to turn off floodlighting on our historic buildings, statues, monuments, bridges etc

20. A minimum requirement to pass Dark Sky certification is that there is broad community support. I have talked to dozens of people, and not one wants to lose their night views of the city lights to get Dark Sky certification " not a single one - including many of us who like stargazing and astrophotography.

21. The consultation on the new street lights is appallingly inadequate. The council is asking residents about the colour of the lights, but has totally failed in any way to inform the residents of 26 suburbs (or anyone) that they are planning to obliterate Dunedin's night time views.

22. The council is getting a reputation as of progressing with projects that narrowly focus on improving just one aspect of the city, while being ignoring any negative consequences, and ending up as an expensive fiasco. The South Dunedin cycleway has example after example of this, and even expensive redesigns have had ripped up for a second time and re-redesigned. Even now there are highly dangerous aspects of South Dunedin pedestrian redesigns. I recently saw a small boy nearly killed, because the extended curb supposed to make it safer for pedestrians, mean that long trucks cannot get around the corner without the back wheels crossing the footpath EXACTLY where pedestrians are supposed to stand. Hundreds of tyre marks on the footpath shows this happens all the time. Similarly the Highcliff Rd safety barrier is safer for cars, but is considered a "cheese cutter" for motorcyclists, and is a death trap for pedestrians and cyclists. Projects MUST be progressed with an open mind to negative consequences. Time after time projects end in an expensive fiasco and an embarrassment to competence of the council, as they are pushed through with a narrow focus on a single goal, with an arrogant dismissal of any negative consequences.

23. Therefore, with a growing reputation of wasting millions by rushing in headlong into projects without properly looking at the consequences, it is time for the council to have a good look at the major negative consequences of the Dark Skies initiative. Without that, the Dark Skies project is almost guaranteed to be another failed debacle

24. BEFORE the council starts spending millions on installing new lights, the community and businesses MUST be informed and consulted about the many ramifications of the councils plan that are hugely negative for residents, home owners, voters, businesses and the city in general. At the very, minimum the council is required to do that by law.

The ongoing controversy surrounding LED Blue White lighting should be enough to halt installation of the current form of LED's proposed by both the DCC and NZTA. The DCC has had meetings enough surely, with informed and knowledgeable experts to think more than twice about installing anything other than the amber 2200K LEDs.

So much money has been invested in creating a lovely city, a creative hub, "the world's greatest little city", and research and consultation on uplifting the over all well-being of a city's residents. And tourists won't like it either. Please pause - and take more time with this decision. So much good has been done in raising the city's profile positively, and in development, that it would be the greatest shame of all to wreck that integrity with LED lighting that has a negative impact on the health of citizens, the look - mood - and feel of a city, and the potential for Dunedin to be recognised as a Dark Sky City.

If The NZTA has already approved amber 2200 K LEDs for the towns of Tekapo, Mt Cook,

Fairlie and Twizel, then why can't Dunedin have the same?

Thank you for your considerations.

Some comments:

- I am pleased that the new LED lights are not much visible from the surrounding hills. Based on international research this is best for viewing the night sky, and for creatures that rely on dark.

- I think they give good visibility on the ground, however the lights used in the trial were extremely bright, and light up all houses in the streets, rather than just the ground beneath them. This seems like overkill.

- I think the 3000 kelvin "warm white" bulbs lights are too bright for most residential areas. Current scientific research warns that such tones are not good for human circadian rhythms, and that yellow tones are better for health and well-being.

- I think the bulbs used in the trial (I don't know if there was a difference, but the ones in Fawcett St seemed painfully bright) would be suitable for main traffic routes and around shops and food premises that are open throughout the night, but I think they are too "white" for predominantly residential areas, and areas on the outskirts of the city.

- One other thing I'd like the council to keep in mind, is that while the LED bulbs reduce sky glare, they are very bright from directly beneath. This is useful for some purposes, but please remember that many of Dunedin's residents live on hills, and live directly underneath streetlights (rather than on flat sections with some distance from the street). I live on a steep section in Andersons Bay, and have two streetlights on the street above, about 8 metres above our house, that shine directly down into our bedroom windows. Living in an old house, it has proven difficult to keep the light out, even with triple layer blackout curtains. At present, at least the light has a warmer orange tone. I am dreading that light being bright and "warm white", as I have struggled with sleeping since arriving in Dunedin 6 months ago, and am used to living in a dark neighbourhood in Christchurch.

To summarise, I understand that the current streetlights are outdated and will need to be replaced. In my own home we have recently upgraded all our bulbs to LED, however we have chosen coloured Hue bulbs, and find that in the evenings 2200 and 2400 K light is the best, while anything brighter feels harsh and unnatural. I know that streetlights need to light the roads for driver visibility, but it is important to consider the impact on the humans living nearby - and on the creatures that rely on darkness for things like migration, mating, etc. I wonder if you could consider a compromise - choose 3000K bulbs on main routes and busy intersections, and near businesses that are open at night, and in suburbs, semi-rural areas, and near ecological spots like Jubilee park and the botanic gardens, choose warmer light such as 2400K. They will still be much brighter than the current bulbs, better technology, and more future-proofing for the council's lighting network, but will be much better for the health of the residents and animals that inhabit Dunedin.

The 3000 K LEDs planned for our city emit too much disruptive blue-rich light, excess luminance and glare. We need much safer lighting. This blue-rich lighting is now being questioned in Europe & the United States. At the very least, I urge council to take more time with this very important decision, 2700k lights will be available in April 2019, well before the NZTA subsidy runs out

I have seen the trial LED lights in South Dunedin and find them blindingly bright compared to the old sodium lights. Please don't install them throughout Dunedin. Or consider installing amber-hued LED lighting and provide better shielding. Even though the trial lights are directed

downwards, they still seem inadequately shielded and appear to be throwing off unwanted spill to the sides and above.

Blue-hued LEDs would interfere with our lovely night skies, interfere with sleep-wake patterns, disrupt fauna and flora (birds, insects, plant photosynthesis), but they would also destroy the golden glow more appropriate for the ambience of our heritage city. As an example, I point to Rome, where last year yellow sodium streetlights were replaced with blue hued LEDs. Residents complained about the new "harsh" lighting, which made their city look like a "morgue". Do not do this to Dunedin. Do not let Auckland or Wellington determine what lighting in Dunedin should look like. We have a special city, unique to New Zealand, with fabulous night skies and an historic atmosphere, most evident in the city center. Imagine Harrop St., off the Octagon, illuminated with blindingly bright blue-hued LEDs; it would be awful.

City planners should also strongly consider dimming streetlights when there are no cars in the area, this will conserve energy and conserve night skies. This has been done elsewhere. (I can only attach one relevant .pdf file to this, so I will send another .pdf separately.)

Thank you.

I have already provided feedback, however I could not attach more than one file. The attached file describes Norway's road lighting that dims when no cars are around, which saves energy and cuts costs. Here's a link to the article:

<https://www.dailyscandinavian.com/energy-saving-road-lighting-norway/>

1. I am a resident of City Rise and and overlook the city, harbour and ocean from my home. I chose to live here because of the spectacular view. Now the night view is to change with the introduction of blue rich white LED road lighting. This will have a major visual impact on Central Dunedin as seen from the hills above the city and around the harbour where most of us live. No longer will we look down to a warm amber colour which suits the climate and our beautiful heritage buildings. It will look cold and uninviting. Others I have spoken with agree and add their concerns about the affects on human health, and wildlife. They are aware of new international research on LED's and ask for a pause to re-consider.

2. I have lived for many years in Tekapo NZ and the Sibylline National Park, Italy, where the night sky is a wonder to behold. Please note that last month Lonely Planet Travel Trends for 2019 placed 'Dark Skies' uppermost. To quote "Across the planet, travellers are now seeking out the world's last-remaining dark places where they can get a clear, unpolluted view of the stars". We must protect Dunedin from excessive light. I fear that unless expert advice is taken, we risk destroying an enormous economic opportunity for Dunedin to become the world's first ever Dark Sky City.

3. What we want are glare-free, warm white 2700 K LEDs as a maximum on main arterial routes, with glare-free, amber 2200 K for residential areas, parks and reserves. If it can be done for Tekapo it can be done for Dunedin.

PLEASE PAUSE and RECONSIDER



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<Screen Shot 2018-11-30 at 9.30.49 PM.png>

WARM TO COLD

Dear DCC,

I am quite concerned about the adverse health effects of the planned 3000K for residential streets (4000K for highways). I own a mixed use (commercial/residential) heritage building on George street that is flanked by streetlights. I am quite concerned that the new LED streetlights (at either 3000 or 4000K) will have too much blue light bathing my property. This concerns me greatly given evidence linking blue spectrum LEDs with sleep disruption and adverse health effects. I urge the DCC to consider adopting warmer LEDs that work with, rather than against, humans' natural sleep cycle. The city only has one chance to get this right. Further, it is unfortunate the DCC only trailed ONE bulb (3000K), not the ones that are better for health, and this was done in a low decile community (who might not advocate for the best outcome) rather than a range of communities.

I have checked the trial streets and noted the LEDs do not give as diffuse light as we have been accustomed to with sodium lamps. I would not like one of these LEDs directly outside my house.

I understand that LED technology is rapidly evolving, as is understanding of its potential health impacts. I would therefore prefer the DCC to delay implementation as long as possible to be sure these are truly the best lights for the purpose and for the wellbeing of residents.

I visited the street lighting trial in the Melbourne St area and was unable to complete the walk I had planned. Thankfully I was driven there, as afterwards I would not have been able to drive myself safely away from the lighting. The new lights are way beyond my comfort level, and indeed caused me to feel ill even with my sunglasses on, and a peaked cap. I definitely could not look upwards. I feel for those poor citizens living with unwanted light spill onto their properties. How on earth will they be ever able to look up at the night sky, or close off that harsh intense light when it comes time for sleep. I absolutely do not EVER want this choice of obscene lighting anywhere near my property, and feel very very sad that the DCC have foisted this decision on the ratepayers who live here. I respectfully ask that the DCC halt this roll-out, and consider the new science emerging all the time. The Royal Society of NZ has recently published a well researched and thorough paper on the problems of Blue White lighting, with many verifiable attachments. If other communities are allowing more community friendly LED's, that will do no harm to people, our wildlife or our beautiful night sky, why are the DCC stubbornly pushing this type of lighting upon us. Three or four years ago, the science and the supporting economics of the decision may have made sense. Not so now. Please do the decent thing, and review the decision. This roll-out in it's current planned form will hurt many citizens unnecessarily. My understanding of the role of Council is to ensure the health and wellbeing of it's citizens and not knowingly cause harm. Thank you.

My wife and I were NOT impressed with the lights, it appears far too harsh and makes the area look like some sort of gulag. A lot of light was impinging on the houses nearby, despite the shielding and the lighting was uneven along the road. Please could you use a lower temperature LED to try and minimise this? (If you decide to roll out this where I live, I want to inform you that I DO NOT WANT this in the light just outside my house in Stirling ST). Thank you

It's an improvement, but not ideal, that the DCC have opted for 3,000 K over 4,000 K LEDs. The 3,000 K LED road lights on trial in South Dunedin are far too bright, very harsh on the eye and despite shielding, their light trespasses into dwellings, which may have a negative impact on people's health and well-being.

It's not acceptable to light up people's homes anymore. Road lighting must avoid trespass into private property, specially designed luminaires and shielding may be needed where dwellings

are close to the road.

There were light and dark zones on the LED illuminated streets, more so than the HPS. The illumination from HPS was more even and the lamps themselves less glary. If the HPS lamps were shielded they would be far superior to the LEDs.

Much better LEDs are available that diffuse the light evenly, and create less glare.

If Dunedin is to become an international night sky city then arterial routes and state highways under the aegis of the NZTA must deploy fully shielded (as per the IDA) 3,000 K LED and not 4,000 K as currently planned, Hamilton has set a precedent, as have towns in the Wairarapa's dark sky reserve with 3,000 K LED road lights on arterial routes.



New street lights okay, quite impressed, with what I saw. Quite dark down Melbourne Street at 5.25am this morning Sat Nov 10



28<sup>th</sup> November, 2018

My name is  and I'm extremely concerned with the new LED road lighting in South Dunedin. In fact, there are so many problems, the issues cannot be fully addressed here.

**The vast majority of New Zealanders are unaware of the shortcomings and inherent risks of this lighting technology - and the LEDs in South Dunedin demonstrate unfit for purpose lighting is being installed without the necessary know how and expertise.**

This matter is so serious, a group of concerned residents are scheduled to meet the Minister of Health, David Clark, to present an appeal for safer road lighting, supported by recent scientific papers, journals and literature, letters from various professional experts, medical/photographic records, and the 2018 report by the Royal Society of New Zealand.

**It's urgent that Dunedin's retrofit be delayed.**

LED lighting technology is still in its infancy. It has unique properties and poses many challenges that lighting engineers, designers and decisionmakers in New Zealand are still grappling with. Indeed, there's an alarming lack of expertise and understanding about how to mitigate the drawbacks and properly implement this form of lighting. There's also insufficient acknowledgement of the negative consequences they have upon safety, health and life quality. We simply don't know enough about the human visual system, chronobiology, and the technology itself, to confidently assume it's safe.

Adequate testing is required and this must be undertaken by independent researchers unaffiliated with the light industry, which has a vested interest in the results.

**We cannot replace high-pressured sodium (HPS) road lighting with LED luminaires on a one to one unit basis.** There are simply too many different variables involved that all need to be considered and calculated properly.

**The blue-rich white LEDs in South Dunedin, produce excess luminance** (too much light falls on the human eye) which results in dangerous disability glare. This can harm eye health, hinder vision, reduce safety and compromise security.

**Excess luminance is especially problematic for those with keratoconus**, a common form of astigmatism. This degenerative eye condition causes extreme photosensitivity and exacerbates the negative effects of glare, making driving under blue-rich white LEDs dangerous, stressful and painful. New Zealand has an unusually high incidence rate of this condition. **Blue-rich white LED road lighting is particularly unsuited for our population.**

**Many people cannot tolerate the glare of these LEDs and are unable to safely drive at night or walk home comfortably.** The blue light content of high-intensity LED road lighting luminaires creates worse nighttime glare in general, and can cause increased starburst visual disturbances, especially for drivers over 40 years-old (which accounts for most of the driving population). As a result, **these luminaires decrease visual acuity and safety, and pose a road hazard.** There's already been numerous letters published in the ODT newspaper in recent months, from distressed members of the public who have been personally impacted, their freedom restricted and their families affected. (People who suffer from migraines, autism, photosensitivity and certain mental conditions are also vulnerable to the blue-rich content, excess luminance, glare and flicker generated by LEDs.)

Human vision is complex and there is much more we need to know. What's obvious, is **the strong contrast produced by high-intensity LEDs prevents dark adaptation and hinders mesopic vision** needed when driving at night.

Please watch the technical lecture by Wout van Bommel on Signify's website (formerly Philips Lighting) about mesopic vision, which explains why blue-rich white LEDs are particularly unsuited for illuminating our roads at night. <https://goo.gl/byqmt4>

**White LEDs 3000-4000 K also emit oxidising blue-rich light which is phototoxic to the human eye and is linked to retinal damage and cell death.**

The disruptive blue wavelengths of light from these LEDs can also harm health by preventing the production of the hormone melatonin which plays a vital role in the regulation of healthy neuro and endocrine function. Melatonin known for regulating circadian rhythms, is also a powerful antioxidant which provides protective anti-cancer and immune boosting effects. (See the recent 2018 report on Blue Light by the Royal Society of New Zealand.)

Due to their high directionality, these **LEDs do not illuminate evenly**, instead, there are noticeable bright and dark zones which compromises vision, safety and security. Rather than address the cause of the problem (non-uniform light distribution), lighting/roading engineers add more luminaires but this only results in over lighting, adding more disruptive blue-rich light to the environment, and increased light pollution.

The high directionality of these light sources also causes a worsening of **light trespass into private property, invading people's homes, reducing privacy, comfort, and preventing proper rest at night.** (Pulling the curtains at night is not the solution.)

**These LEDs are too harsh, glary and bright.** Comparable to "prison lights," and the clinical, flat, lifeless light of a morgue, they are completely unsuited for our city and the welcoming, warm atmosphere that befits Dunedin and its beautiful historic buildings.

The white light emitted by LEDs is not a sign of "progress", a necessity to save energy, nor despite erroneous claims by the lighting industry, is it safer or an improvement. In fact, just the opposite.

It's shortsighted, inappropriate and irresponsible to light up our nights as if they were day (the blue-rich light emitted from white LEDs trick the body into thinking it is daytime). And it's vital to preserve our urban nightscape with consideration, care and awareness of its biological, environmental and economic value.

**Instead of waiting for the technology to mature, and ensuring it's safety and suitability, we've embraced this new form of lighting without applying due diligence.** Energy savings, performance, and the lifespan of the technology have been grossly exaggerated - and lured by promises of reduced operational /maintenance costs, and substantial funding subsidies, decision-makers have been swept up by the LED juggernaut. As a consequence, we've ignored how to safely and effectively illuminate our surrounds – all to our detriment.

Cities around the world are now rejecting unfit for purpose blue-rich white 3000–4000 K LEDs, and favouring warm white 2700 K lamps with reduced blue content, with the more savvy and smart municipalities, insisting on amber 2200 K LEDs.

**LEDs have modules in a flat array, exposed to the human eye.** Due to their glare, blue-rich light and excessive luminance (which harms eye health, impairs vision, and compromises safety) LED modules need to be sufficiently recessed, hidden from direct view, shielded and/or have suitable optics that cover the modules and diffuse the intensity of the light they emit.

**Road lighting must have an appropriate and suitable spectral power distribution (SPD) and these LEDs do not provide this.**

**Only glare-free, warm white 2700 K LEDs should be installed as a maximum on main arterial routes, with glare-free, amber 2200 K for residential areas, parks and reserves.**

Although the night sky may appear darker under LED illumination, this optical illusion is caused by high-intensity light restricting the pupil and preventing dark adaptation. This makes it impossible to detect all but the brightest star in the sky. **It's a myth these LEDs are night sky-friendly.** While they do direct light downwards, and have less obvious upwards light spill compared to the unshielded, HPS road lighting they replace, unlike HPS lamps, their light has a peak in blue wavelengths of light which scatters readily, bouncing off the ground back into the atmosphere, increasing light pollution.

**Blue-rich white LED road lighting will further degrade our night sky.**

Surely, the large financial investment into a technology that will last decades should significantly improve the appearance of our city, enhance the life quality of all residents and be of overall benefit to our region?

Considering the shortcomings and risks of the technology have been explained in various submissions to the DCC with safer, practical options advised - installing these LEDs is inappropriate, irresponsible and negligent.

Why are we accepting inferior lighting based on a poor decision made in 2017, when the NZTA's subsidy deadline has been extended until June 2021?

With so much at stake this decision doesn't make sense, especially when glare-free, warm white 2700 K LED luminaires with reduced blue light content and improved optics will be available as soon as April 2019?

The NZTA has already approved amber 2200 K LEDs for the towns of Tekapo, Mt Cook, Fairlie and Twizel, and needs to immediately update their m30 list of approved luminaires so all municipalities can choose more appropriate lighting sources.

Please delay this rollout and do the right thing for your caring residents, concerned ratepayers and active stakeholders – as well as for future generations and our precious wildlife.

Dunedin deserves safer, fit for purpose road lighting, as does the rest of the country.

