

IN THE MATTER of the Resource Management Act 1991
(**RMA**)

AND

IN THE MATTER of an application by New Zealand
Fruitgrowers' Charitable Trust to the
Wellington City Council for a resource
consent to reinstate a sign on the building
located at 2 Jervois Quay, Wellington (**the
Application**)

**EVIDENCE OF RUSS KERN
ON BEHALF OF NEW ZEALAND FRUITGROWERS' CHARITABLE TRUST
(LIGHTING ENGINEER)**

22 November 2022

1. QUALIFICATIONS AND EXPERIENCE

- 1.1** My full name is Russ Charles Kern. I am a lighting engineer based in Auckland.
- 1.2** I am currently employed as Director at Kern Consultants Limited and have held that position since August 2003, when I founded the company.
- 1.3** I hold the following academic and professional qualifications:
- (a) NZ Certificate in Engineering (Electrical) from AUT (43/1982)
 - (b) Engineering Associates Registration Certificate EARB 4320 (1986)
 - (c) Certificate in Illumination Engineering from Auckland Institute of Technology (1996)
- 1.4** My previous work includes 11 years' experience assessing environmental effects from digital signs and completing verification testing after installation. I specialise in lighting design and assessment including outdoor lighting for commercial, industrial, and residential projects.

1.5 I have been a member of the Illuminating Engineering Society of Australia and New Zealand Limited (MIES 455) since 1993 and I am currently serving on the New Zealand Lighting Society Chapter Management Membership Committee.

1.6 Examples of my experience relevant to this project are:

(a) I have prepared lighting assessments for numerous resource consent applications for developments which include signs and in particular digital LED sign lighting in various regions throughout New Zealand including Whangarei, Auckland, Tauranga, Hamilton, Napier, Gisborne, New Plymouth, Stratford, Masterton, Porirua, Lower Hutt, Wellington, Blenheim, Timaru, Rangiora, Greymouth, Christchurch and Dunedin dating back to the first New Zealand digital sign application in 2011.

(b) I have experience testing luminance at over 65 digital signs throughout New Zealand and preparing assessment of environmental effects for over 100 digital signs.

1.7 Although not necessary in respect of council hearings, I confirm I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this report and I agree to comply with it while giving oral evidence before the Hearing Commissioners. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

2. INVOLVEMENT IN THE PROJECT

2.1 I have been working with the New Zealand Fruitgrowers' Charitable Trust (**NZFCT**) to provide advice in relation to the proposed reinstatement of the sign on the Huddart Parker building located on Lot 11 DP 11204 in the Post Office Square Heritage area. In particular, I am advising NZFCT in relation to the proposed luminance of the sign.

2.2 In preparing my evidence I have reviewed the consent application, all of the submissions received on the application and the section 42A report prepared on behalf of the Wellington City Council (**Council**).

3. SCOPE OF EVIDENCE

3.1 I have been asked to provide evidence in relation to the erection and operation of the proposed sign on the Huddart Parker building by application Reference SR No. 513399.

3.2 I have not visited the Site at the time of preparing my evidence; however, I have visited the general area on previous occasions while testing luminance on nearby billboards. I intend to arrive in Wellington the night before the hearing to assess typical luminance on digital billboards in the central area.

3.3 I have been provided with the proposed site plan and elevation drawing along with the assessment of effects on the environment report and appendices prepared by Urban Perspectives Ltd dated 22 April 2022.

3.4 My evidence covers lighting related matters including:

- (a) Technical requirements relating to the proposed sign.
- (b) A summary of the glare effects of the proposed sign;
- (c) Comments on the Council Report;
- (d) Comments on submissions; and
- (e) Conclusions.

4. SUMMARY OF EVIDENCE

4.1 The proposal is for a 13m x 4m sign in landscape format fixed to an existing support structure on the roof of Huddart Parker Building at 2 Jervois Quay (1 Post Office Square), Wellington, to replace a previous sign of similar proportions.

4.2 The sign will face southbound traffic on Customhouse Quay and Jervois Quay. It will also be visible from neighbouring buildings including some rooms in the Hotel InterContinental.

- 4.3** The proposed sign will use LED digital technology instead of the neon tube technology that was used in the previous sign on the building.
- 4.4** The sign will have an automated brightness control system to vary luminance as ambient light conditions change during day and night operation. The lighting controls will provide a dimming effect to ensure luminance and glare are controlled to an acceptable value for motorists, pedestrians, cyclists, nearby building occupants and nearby workers at all times of the day and night including transition periods between day and night.
- 4.5** Spill light will be very low if measured from adjacent buildings.
- 4.6** Luminance (brightness) will be low at night and kept to acceptable limits during the day depending on ambient light conditions.

5. TECHNICAL REQUIREMENTS OF THE PROPOSED SIGN

- 5.1** A digital sign incorporates an essential device known as an ambient light sensor to automatically control luminance (brightness) depending on ambient light. This device can be calibrated, and settings adjusted during commissioning to ensure consented luminance limits are not exceeded.
- 5.2** Digital signs are manufactured so the luminance can be as high as 7,000cd/m² (nits). If daytime sign luminance is not controlled, it can flare causing unwanted glare and will not be suitable to look at. Under certain daylight conditions, 7,000cd/m² would be too high such as on dull overcast days or during twilight where ambient light is changing from night to day or day to night and at night.
- 5.3** Under certain daylight conditions, a high luminance value could be acceptable such as when direct sunlight is falling on the sign. Direct sunlight can “wash out” the LEDs, making the creative image difficult to read if the maximum luminance is set too low.
- 5.4** Experience from testing more than 65 digital signs has shown that a luminance of 5,000 cd/m² is appropriate to counter the effects of direct sunlight while ensuring the images do not appear glary.

- 5.5** From the work I have undertaken in Wellington, I am aware that the Council generally sets a consent condition with a limit of 5,500cd/m² during the day. This is appropriate because, for a digital sign to be clear, readable, and visible during the day, the upper luminance limit (or brightness) of a digital display needs to be at least 5,000 cd/m². A lower luminance limit such as 3,000 cd/m² would simply not enable the sign to be readable in direct sunlight during the day. The proposed Huddart Parker sign would face approximately north and will be subject to direct sunlight.
- 5.6** Digital sign manufacturers incorporate a small eyebrow on each individual LED set in a dark background to help counter direct sunlight effects. The LED eyebrows and dark background ensure an acceptable luminance can be set while providing a readable image during the day.
- 5.7** Painted surfaces, neon signs and traditional skin type signs in comparison to digital signs can have a luminance in excess of 10,000cd/m² under bright sunlight conditions or 800cd/m² when floodlit and cannot be controlled. These observations are based on tests at many digital billboard locations.
- 5.8** Digital sign luminance at night is also affected by ambient light. In my experience, a night time luminance of 400cd/m² has generally been imposed as maximum night time luminance value by the Council. While a 400cd/m² limit may be included as a consent condition, actual luminance is often commissioned at a luminance value less than that to better suit the environment. My opinion is that a night time luminance setting of 175cd/m² would be appropriate for the roof top location and would ensure that the sign is not too bright against the night sky when viewed from street level and nearby buildings. Experience from night tests has shown that a maximum luminance setting of 175cd/m² at night is acceptable from the perspective of a building occupant, cyclist or motorist.
- 5.9** Digital signs are designed to project an image using low powered LEDs. They are not designed to project light, and this helps to keep spill light to a minimum.
- 5.10** I have conducted spill light tests on several digital signs with a consented night time limit of 250cd/m² and verify that spill light reduces to a value below 1 lux at a distance of 28m directly in front of a typical digital sign and less when measured from a profile view to the side, above or below the screen. The Hotel

InterContinental is approximately 55m away and offers a profile view of the proposed sign, therefore spill light will be negligible.

- 5.11** Previous signs on the roof of the Huddart Parker building were illuminated by neon tube technology that formed letters that were permeable. The support structure is still on the roof and the proposal is to mount the digital sign modules on a backing panel to form a 13m x 4m sign in landscape profile using the existing structure as the basis of support.
- 5.12** The previous neon sign has been removed for some time, however from experience, the luminance from a neon sign is significantly higher than a digital sign at night. Depending on the neon colour, luminance could be as high as 2,000cd/m².
- 5.13** Digital signs have the ability to display multiple creative images in a programmed sequence. The proposal is to change creative artwork every eight seconds, with a dissolve transition of 0.5 seconds. This will not appear as a flash or moving image and will not be an instant change that can be distracting. The 0.5 second transition has been established after many years of digital display operation as an acceptable soft transition between creative images.

6. GLARE EFFECTS

- 6.1** AS / NZS 4282:2019 Control of the obtrusive effects of outdoor lighting is a lighting standard that provides guidance relating to glare from illuminated surfaces. The foreword to this standard acknowledges that the determination of when spill light becomes obtrusive to others is difficult since both physiological and psychological effects are involved. The purpose of the standard is to provide a means of providing passive recipients of spill light and glare relief from it being excessively obtrusive as applicable to the large majority of recipients.
- 6.2** The Standard identified in Paragraph 6.1 does not attempt to eliminate all obtrusive lighting effects, instead it provides limits for relevant light technical parameters that will be acceptable to most recipients. Just because a recipient can see an illuminated surface does not mean it is obtrusive.
- 6.3** I have completed tests from inside a motel room located approximately 10m away from a 3.2m x 6m digital sign oriented in portrait that was correctly set up to limit

glare, particularly at night when obtrusive effects can be more prominent. The conclusion was that recipients in the lounge and in upstairs motel rooms that had a direct view of the sign, would not observe any obtrusive effects from the digital sign that limited luminance to 5,000cd/m² during the day and 175cd/m² at night as outlined in Paragraphs 5.5 and 5.8 above.

6.4 Operators of digital signs have become more competent at correctly setting up digital signs to ensure night time luminance is kept to a minimum. This is particularly important for large signs that have a dark surrounding background such as the night sky. It is acknowledged that a person standing at a window in a nearby building would “see” the sign, but it would not appear glary if the above lighting and control recommendations are incorporated.

6.5 Signs can be illuminated at night in various ways such as being internally lit using a light box, floodlit skins or digitally illuminated. The latter provides the best solution to limit glare and spill light due to its automated luminance controls.

6.6 There are examples of glare from illuminated signs in Wellington, for example, the Robert Walters internally lit sign on top of the Harbour Tower building appears glary however I have not measured it to confirm the actual luminance value.

6.7 I have also measured luminance from several digital signs in Wellington at various times of the day and night that have been consented with a maximum daytime luminance of 5,500cd/m² and night time limit of 400cd/m² with images changing with a 0.5 second transition. For example:

(a) 22 Willeston Street – 61.5cd/m² at night and 3,510cd/m² daytime maximum.

(b) 149-151 Cuba Street – 140cd/m² at night and 2,710cd/m² daytime maximum.

(c) 241 Thorndon Quay – 71.2cd/m² at night and 3,660cd/m² daytime maximum.

6.8 I have also measured the night time luminance of the Waterloo Quay over bridge in July 2022 (i.e. the pedestrian bridge over Waterloo Quay accessing Sky Stadium)

which measured 257cd/m². The proposed Huddart Parker sign will have a luminance reading significantly less than this value.

6.9 It is important to understand the consented luminance limit is a maximum value and the measured luminance, while potentially reading lower than the maximum limit in complete darkness, will read higher at dusk and dawn and there needs to be a buffer to ensure the night time luminance is not exceeded.

6.10 A digital sign mounted on the roof of the Huddart Parker Building operating at night that is programmed and commissioned to run at minimum luminance settings in conjunction with an automated ambient light sensor for daytime operation will not appear glary. The night time appearance would be no brighter than the lighting operating in the Huddart Parker building office floors when viewed from the Hotel Intercontinental.

7. COMMENTS ON COUNCIL REPORT

7.1 I have read the Council Report dated 15 November 2022 and agree with the lighting conclusion in Paragraph 83 stating that the effects of lighting on the InterContinental Hotel will be less than minor and are acceptable.

7.2 I also agree with Paragraph 78 stating that the Central Area in Wellington has a number of existing light sources that add to the vibrancy and commercial character of the Central Area. Billboards are just one aspect of that vibrancy.

7.3 The report writer also understands the technology used in digital billboards can be dimmed and I can add that the dimming effect is automated and responds to ambient light during the day and at night to ensure luminance is reduced to lessen adverse effects.

7.4 The Heritage Assessment included in Appendix 5 Paragraph 52 states that even though luminance will be automatically managed in response to ambient lighting conditions, the billboard will still be significantly brighter than a non-illuminated board. I assume this is referring to daylight conditions and not during darkness. Based on this assumption, I disagree with the statement noting that luminance measured on the light coloured walls of the Huddart Parker building, or any other

light coloured surface will potentially be in excess of 10,000cd/m² from direct sunlight as described in Paragraph 5.7 above.

- 7.5** Paragraph 64 in the Heritage Assessment also states that an illuminated sign will be the dominant visual feature even when luminance is decreased during dull conditions, or at night. I disagree with this statement noting correctly commissioned automated controls on a digital sign reduce luminance on overcast days so the sign will appear similar to nearby surfaces. At night, office lighting visible through windows of buildings will appear similar to an illuminated sign as acknowledged in Paragraph 80 in the Council Officers Report and nearby backlit and floodlit signs will appear brighter.
- 7.6** Proposed Condition 15 in Appendix 6 of the Council Officer's Report requires a daytime luminance limit of 5,000cd/m² and a night time limit of 250cd/m². A 5,000cd/m² daytime limit and a night time limit of 175cd/m² is appropriate for the Huddart Parker roof top location.

8. COMMENTS ON SUBMISSIONS

- 8.1** There were 11 submissions received in support of the proposal and 3 in opposition. The following comments relate to lighting matters presented by submitters.

InterContinental Hotel

- 8.2** The submission from the InterContinental Hotel opposes the application and refers to garish direct LED light entering directly into the upper floors of neighbouring premium guestrooms, the premium club lounge and presidential suite. There is also reference to excessive light from the proposed sign.
- 8.3** Further concerns raised include flashing and glare from the proposed sign. It should be noted that digital signs have the ability for luminance (brightness) to be programmed and controlled to low limits to prevent glare and the bright appearance that may be referenced in the submission. The proposed sign is not neon, and instead uses low power LEDs that are easily controllable. The existing Wellington nightscape includes street lighting, signage, traffic lights, vehicle lights, office lighting, illuminated flag poles etc., that all add to the vibrancy of a modern city.

- 8.4** There may be some digital signs in the Wellington area that do appear bright, however these particular locations may not be controlled correctly, or the settings have not been commissioned to an acceptable limit and could be rectified.
- 8.5** Daytime luminance of the proposed sign will be controlled to automatically adjust luminance based on ambient light so that sign LEDs will dim on overcast / dull days and appear no brighter than necessary to be read while being below maximum luminance limits when subject to direct sunlight.
- 8.6** The proposed sign will have a soft dissolve transition of 0.5 seconds that will not translate as a flash.

Boffa Miskell

- 8.7** The submission by Boffa Miskell opposes the application referring to District Plan objectives and policies and Wellington City Council's Design Guide for Signs regarding lighting and potential colours.
- 8.8** The Central Area Urban Design Guide for Signs notes the intention of the design guide is to provide guidelines to promote general design principles that can be applied in different ways appropriate to each proposal and site. It does not stipulate signs of particular type, size or appearance. However, Objective 9 sets the purpose namely to ensure illuminated signs are appropriate for their context and do not compromise the amenity of nearby residential areas, prominent public spaces or areas of special character or heritage value by ensuring illumination levels are set so they do not cause glare or obtrusively impact on the neighbouring environment.
- 8.9** The application AEE outlines the proposal to include an automatic control system to manage the digital screen in response to changes in ambient light with the resulting control limiting potential glare. It is my opinion that the ambient light sensor is critical to ensure the luminance is managed correctly and will meet the objectives of the design guide regarding lighting particularly for the neighbouring Hotel and Post Office Square Heritage area.

Stout Street Chambers

- 8.10** The submission by Stout Street Chambers opposes the application and refers to the Council's Design Guide for Signs. The submission does not specifically refer to

lighting issues however it does refer to objectives and guidelines in the Central Area District Plan and Heritage Rule 21D.3.

- 8.11** My understanding is that the relevant matters for consideration are those specified in rule 21D.3.1 to 21D.3.1.4. I consider the proposed sign meets the illumination objectives outlined in 21D.3.1.3 and 21D.3.1.11 relating to compliance with the Design Guide for Signs as commented on in Paragraph 8.8 above.

Submissions in support

- 8.12** The submission by David Stevens supports the application and recommends that time and temperature be displayed on a portion of the sign to replicate previous sign installations on the Huddart Parker building. The same sentiment is echoed by other submitters supporting the application. Technology is available for this to be incorporated into the proposed sign as a separate segment and would require the operator to set up the display and programme accordingly. An example of a digital sign that incorporates a time and temperature segment is located at 132 Symonds Street, Auckland.

9. CONCLUSION

- 9.1** Based on my experience with similar digital signs located in central city areas and the proposed use of an ambient light sensor to control luminance to acceptable low limits, I consider the lighting effects will be less than minor with no appreciable glare for motorists, cyclists or occupants of nearby buildings and commercial premises, and the luminance will be controlled to acceptable values in keeping with ambient light conditions.
- 9.2** Spill light will not affect nearby building occupants due to the automated luminance controls and distance between the nearest neighbouring building windows and proposed sign. It is acknowledged the sign would be visible from some Hotel Intercontinental rooms; however, the luminance will be controlled to acceptable values in keeping with ambient light conditions and accepted obtrusive light standards to limit glare.

- 9.3** It is my view that potential lighting effects such as colour shifts on internal wall surfaces may be discernible in day-to-day activities but will be too small to adversely affect other persons during the day and night.
- 9.4** The definition of “less than minor” in this assessment is based on “adverse effects that are discernible day to day effects but are too small to adversely affect other persons”.
- 9.5** I recommend a daytime luminance limit of 5,000cd/m² during the day and 175cd/m² limit at night with a transition time of 0.5 seconds noting the night time luminance recommendation is less than that outlined in the draft conditions.

Russ Charles Kern

Dated this 22nd day of November 2022