

**BEFORE DUNEDIN CITY COUNCIL
LUC-2017-319**

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application for resource consent by BP Oil New Zealand Limited for redevelopment at BP Mosgiel, 70 – 76 Gordon Road, Mosgiel, Dunedin

**STATEMENT OF EVIDENCE OF PAUL GILBEY ON BEHALF OF BP OIL NEW
ZEALAND LIMITED**

LIGHTING

Dated: 30 November 2017



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INTRODUCTION

Qualifications and experience

1. My full name is Paul Gilbey. I am a Director at Lawrence Jones Partners Limited. Lawrence Jones Partners Limited is a Building Services Engineering Consultancy, established in 1960. My role is Director and Electrical Engineer. I have been in this role since 2004.
2. I have worked in the field of electrical building services engineering for more than 40 years. I have worked on many other similar projects including BP Greenlane, BP Mt Maunganui, BP Ormiston, BP Tirau and BP Richmond. I hold the qualification of BEng (Hons) and am a Chartered Member of Engineering New Zealand (CMEngNZ). I am a full member of the Institution of Engineering and Technology (MIET) and International Professional Engineer (IntPE).
3. I was commissioned by BP Oil New Zealand Limited (**BP Oil**) to undertake a study of the proposed external lighting and to assess the impacts of the canopy lighting on the adjacent residential properties on the western side of the site, and to report on the proposed design. This is covered in the Lighting Assessment Report dated 6 July 2017. My commission has since been expanded to consider the light spill effects across the whole site.
4. In preparing my evidence, I have reviewed:
 - (a) AEE: Application to Dunedin City Council for redevelopment at BP Mosgiel, 70 – 76 Gordon Road, Mosgiel, Dunedin. June 2017;
 - (b) the Council's section 95B report, dated 20 September 2017;
 - (c) all submissions received on land use application to the Council;
 - (d) the Council's section 42A Officer's Report and Appendices; and
 - (e) evidence prepared by **Mr John Chandler** (BP Oil), **Ms Fiona Small** (Planning), **Mr Peter Runcie** (Noise) and **Mr Chris Rossiter** (Traffic).

Code of Conduct

5. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. Other than when I state that I am relying on the advice of another person, this evidence is entirely within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

6. In this brief of evidence, I will discuss:
- (a) description of site (in relation to the lighting etc);
 - (b) performance standards requirements (Part 21.5.4 Glare and Lighting of the District Plan);
 - (c) key findings and conclusions from the Exterior Lighting Proposal dated 6 July 2017; and
 - (d) the submissions of Gwendoline Bamberg, Judith and Eric Kirby and Victor and Gertruda McDonald.

EXECUTIVE SUMMARY

7. My evidence:
- (a) identifies the current lighting levels in the immediate vicinity of the site with and without the existing BP site lights operating;
 - (b) provides calculated illumination levels at the surrounding properties;
 - (c) discusses the effects of vehicle headlight sweep and provides light mitigation measures; and
 - (d) provides responses to the submissions received regarding lighting.

THE SITE AND ITS SURROUNDING CONTEXT

8. The site is generally flat. Gordon Road is lit on the western side (fuel station side) by street lighting poles fitted with high pressure sodium lamps. A light pole is located in front of the existing BP canopy. A second pole is located at approximately 35m to the north and a further pole is located at approximately 25m to the south.
9. The current lighting levels are as follows:
 - (a) With the existing BP canopy lights and signage illuminated, lighting levels of between 3 and 14 lux were recorded on the eastern side of Gordon Road, between numbers 67 and 75.
 - (b) With the existing BP canopy lights and signage turned off, and the street lights being the only source of illumination, lighting levels of between 3 and 12 lux were recorded. The higher levels corresponded with the location of the street lights on the opposite side of the road. From the above, the main contributor to the lighting levels on the eastern side of Gordon Road are the existing street lights and not from the current BP service station.
 - (c) Site measurements of the existing BP pylon sign recorded illumination levels of 10 lux at 3m from the sign, dropping to below 3 lux at 5m from the sign. Due to the presence of other light sources (canopy lights, street lights) it is not possible to isolate the actual contribution from the sign. However, I consider that the contribution would be minimal.
10. The proposed lighting levels are in keeping with modern service station designs. BP Greenlane, BP Pakuranga and BP Fendalton are examples of similar sites having the same lighting system in a residential area. The 8 lux isoline noted on the lighting plan 3491ERC1 revision A is contained within the site boundary.

11. The proposed horizontal lighting levels reduce significantly beyond the 8 lux isoline and are at 1.0 lux at the centreline of Gordon Road. This level is equivalent to full moon on a clear night.

PERFORMANCE STANDARD REQUIREMENTS

12. The Dunedin City District Plan has the following spill lighting and glare requirements:

21.5.4 Performance Standard: Glare and Lighting (Amended by Plan Change 8, 30/3/09)

- (i) *except in any Industrial 1 or Port Zone, no activity shall result in greater than:*
- (a) *16 lux of light onto any other site in a Residential Zone, measured inside that site.*
 - (b) *8 lux of light onto any other site used for residential purposes during night-time hours, measured at the windows of any such residentially occupied building.*

This rule does not apply to headlights of motor vehicles.

13. The lighting design prepared for the proposed BP Connect Service Station is the standard design where the service station is located in a residential setting. In these situations, the design brief is always to achieve adequate lighting for service station operations, whilst complying with all regulatory requirements with respect to light spill in a residential area.
14. This is particularly important in residential areas as the applicable Council planning requirements have strict limitations on spill light onto adjoining properties.
15. The computer modelling software package (Dialux) used to identify isolux contours on the site is a recognised industry standard program. The modelling is used to identify the predicted lighting levels throughout the site. This model was used in the lighting assessment report 6 July 2017.
16. The model shows that the lighting levels from the proposed canopy will comply with requirements of the District Plan. An isolux contour is a line

joining points of equal illuminance in lux. This is used to determine distributed lighting levels.

LIGHT SPILL ON ADJOINING PROPERTIES

- 17.** The plan submitted as part of the resource consent application shows a maximum value of 7.9 lux on the vertical plane of the adjacent property at 39 Irvine Street. However this value occurs at approximately 2.8m above ground level. As this is a single storey building, this would be above window height. The maximum spill light on the windows of the property is less than 7.9 lux due to it being at a lower height and is calculated at 6.7 lux. Please refer to lighting plan 3491ERC2 revision A.
- 18.** This light spill is achieved by controlling a number of lights. Three lights in the outer row on the western boundary are to be dimmed to 30% output and one light turned off. In the second row from the western boundary, one light will be dimmed to 30% output. This will be achieved by automatic controls built into the lighting control system. These will not be accessible to the site operator to override or adjust. The adjusted lighting levels will occur during night time hours.
- 19.** I have also considered spill light onto other adjoining properties at 68, 69A and 69B Gordon Road and confirm the following:

 - (a) a maximum value of 3 lux occurs on a vertical calculation surface adjacent to 68 Gordon Road; and
 - (b) a maximum value of 1.5 lux occurs on a vertical calculation surface on the residential boundary adjacent to 71 Gordon Road. The lighting levels of 1.5 lux to 3 lux fall within the range classified as “twilight under a clear sky”.
- 20.** I am satisfied that the proposed external lighting at the BP Connect Service Station will fully comply with the Performance Standards of the Dunedin City District Plan.

21. In addition, light spill to those properties on the western side of the site will be further attenuated by the proposed acoustic fence.

SUBMISSIONS

Submission of Gwendoline Bambery

22. Ms Bambery noted her concerns with the proposed increased level of luminescence cast into the surrounding residential properties during the hours of darkness due to forecourt lighting and signage illumination.
23. In paragraph 19 of my evidence, I have advised that a maximum value of 1.5 lux is calculated on a vertical surface on the residential boundary of 69A Gordon Road. This level will reduce further at the property boundary.
24. I note that the canopy lights utilise the latest technology LED lamps and incorporate specifically designed optics with a cut-off distribution limiting the spill light outside of the canopy and onto adjacent properties. The lights are a slim low profile design and specifically designed for this type of application. Modern LED lamps are able to control the distribution and spread of light through their optical design and special optics which was not possible with older technology metal halide lamps.
25. The forecourt will be lit by LED floodlights mounted on a 5m high pole located at the tyre inflator and a 3.5m pole at the caravan dump station. The lights are designed to be installed flat (zero tilt) and are a non-directional type, i.e. they are not aimed outwards but aimed downwards to minimise any spill light outside of the site.
26. Only the information sections on the pylon sign will be lit by LED lamps located within it. The sign will incorporate a price indicator comprising low brightness green LEDs to form price figures. The LEDs will not be flashing or be of a high brightness to cause discomfort glare. Please refer to the photo below (**Figure 1**) for a typical night time pylon sign installation. In my experience signs which are similar to the proposed sign should not cause

any adverse effects from glare or indirect illuminance on adjacent residential properties.

27. The site will be arranged for vehicles to enter the station at the road crossing closest to the carwash and exit at the road crossing closest to the shop. The effect of headlights on the properties opposite the carwash entry should therefore be minor.
28. To mitigate the effects of vehicle headlights when exiting the carwash on the properties on the opposite side of Gordon Road, there will be planting and/or screening along the eastern kerb line to form a visual barrier.
29. The Land Transport Rules (Vehicle Lighting 2004), restrict the height of a headlight to a maximum of 1.2m from the ground. The headlight(s) must emit light that is visible from a distance of 100m and have a dip angle between 1 and 2 percent. No information on the effects of glare are included in this rule. Due to the presence of screening which will be maintained at a height of 1.2m, the lighting effect from vehicle headlights on Ms Bambury's property will be minimal.

Submission of Judith and Eric Kirby

30. Judith and Eric Kirby have noted concerns about the proposed signage. The pylon sign height will be maintained at the present height of 7.5m and will be approximately 100mm wider, due to its curved shape. The sign will be lit by LED lamps located within it.
31. As noted previously, only the information sections on the proposed sign will incorporate a price indicator comprising low brightness green LEDs to form price figures. The LEDs will not be flashing or be of a high brightness to cause discomfort glare. In my experience signs which are similar to the proposed sign should not cause any adverse effects from glare or indirect illuminance on adjacent residential properties.
32. The sign will not directly face the window of 68 Gordon Road. However to mitigate any visual effects of the sign, and to minimise the view, trees

could be planted along the southern boundary. Please refer to **Figure 1** for a typical night time image showing the illuminated pylon signs. As can be seen, only the information sections of the sign are illuminated.

Submission of Victor and Gertruda McDonald

33. Victor and Gertruda McDonald note their concerns about the light on neighbouring properties. Specifically, they are concerned that the light will be adjusted by the operator.
34. In paragraph 17 of my evidence, I have advised that the maximum illumination on the neighbouring property at 39 Irvine street will be 7.9 lux at roof height.
35. In paragraph 19 of my evidence, I have advised that a maximum calculated value of 1.5 lux occurs on the residential boundary adjacent to 71 Gordon Road. This will be further reduced at the property itself which is set back from this boundary position
36. The canopy lights utilise the latest technology LED lamps and incorporate specifically designed optics with a cut-off distribution limiting the spill light outside of the canopy and onto adjacent properties. The lights are a slim low profile design specifically designed for this type of application.
37. The canopy lights will be automatically controlled by switching and dimming to reduce the light output on the western side of the site, during night-time hours. This feature will be built in to the automatic lighting control system. The automatic controls will be set within the control system and will not be adjustable by the Operator. The lights will be dimmed to meet the time set at “night time hours” by the District Plan. The remaining canopy lights do not need to be controlled in this manner to achieve compliance with the Dunedin City District Plan Performance Standard.
38. The lights will be visible, as with any lighting source, however as noted in paragraph 24 of my evidence the lights are designed to control the

distribution and spread of light. Please refer **Figure 2** showing the sharp cut-off of illumination beyond the canopy.

- 39. The information only sections of the sign will be lit by LED lamps located within it. As the sign is manufactured from individual components, there is no photometric data available to use within the lighting program. However, in my experience, signs which are similar to the proposed sign should not cause any adverse effects from glare or indirect illuminance on adjacent residential properties.
- 40. The sign is predominantly dark green in colour with only the information sections of the sign lit by led lamps located within it. The top section of the sign where the BP Helios symbol is located will be white.

OFFICER'S REPORT AND CONSENT CONDITIONS

- 41. Paragraph 94 of the Officer's Report notes there are no specific controls for the pylon sign, which may have light spill onto the adjoining property at 68 Gordon Road. In paragraph 9(c) of my evidence I refer to site measurements of the existing pylon sign which show lighting levels below 3 lux at 5m from the sign. These levels are expected to be similar to those of the proposed sign and therefore the effects on the adjoining property at 68 Gordon Road will be less than minor.
- 42. In paragraph 96 the planner comments the light spill, although within the permitted 8 lux limit, is likely to have minor effects on the adjacent properties at 35 and 37A Irvine Street.
- 43. As stated in paragraph 18 of my evidence the outer row of canopy lights on the western side will be dimmed to 30% output and one light switched off, and on the next row one light will be switched off. The lights are specifically designed to minimize spill light outside of the canopy and it is considered the effects will be less than minor.

44. In paragraph 97 the planner comments on the potential adverse visual amenity effects of the pylon sign including effects of illumination in addition to the size and visual character of the sign.
45. As noted in paragraph 39 of my evidence, there is no photometric data available for the sign. However from the site measurements noted in paragraph 9(c) of my evidence the illumination levels from the sign will be less than minor. With regards to the size, I note in paragraph 30 of my evidence the proposed sign will be the same height and approximately 100mm wider than the existing sign. Please refer to the photograph at **Figure 1** for the visual character of the sign.
46. In paragraph 98 the concerns are noted about ensuring the lights required to be dimmed for compliance stay at a compliant level. As stated in paragraph 37 of my evidence, there will be no manual adjustment for the lighting control system to enable the dimmed lights to be increased by the site operator.
47. Please refer to the evidence provided by Ms Fiona Small regarding how the illumination of the proposed building, signage and car park will create amenity effects on the character of the neighbourhood, which responds to the concerns noted in paragraph 99 of the Officer's Report.
48. In paragraph 181, the planner notes that lighting relies on a judgement of matters. I disagree with this statement as the lighting levels for the development are based on calculated values and not on personal opinions, assumptions, interpretations and beliefs.
49. In paragraph 188, the planner notes the proposal is inconsistent with the policy (Public Health and Safety) in regards to light emissions. Policy 2.2.6.2 refers to "restrict the levels of noise and light spill from activities and development to safe levels depending on the nature of the receiving environment (zone)". I refer to my earlier evidence that the light spill from the proposed development is within the requirements of 21.5.4 Performance Standard: Glare and Lighting.

50. Condition 2 omits “*measured at the windows of any such residentially occupied building.*” This limits the point of measurement to the windows rather than to any point on the site.

CONCLUSION

51. The proposed lighting will be compliant and not discernible against background/ambient light levels from other sources. Lighting effects will therefore be minor.



Paul Gilbey

30 November 2017



Figure 1 – BP Connect Sign



Figure 2