

Before an Independent Hearings Panel

The Proposed Waikato District Plan (Stage 1)

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

IN THE MATTER OF hearing submissions and further submissions on the Proposed
Waikato District Plan (Stage 1):

Topic 25 – Zone Extents

**REBUTTAL EVIDENCE OF BRYAN KING
ON BEHALF OF HAVELOCK VILLAGE LIMITED**

LIGHTING

3 May 2021

BUDDLE FINDLAY

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1. SUMMARY OF REBUTTAL EVIDENCE

- 1.1 My name is Bryan King. I am a qualified lighting engineer and Managing Director of Strategic Lighting Partners Ltd.
- 1.2 I understand the potential for complaints resulting from obtrusive lighting effects emitted from the Gateway Business Park has been raised in evidence in opposition to the Havelock Village Ltd (“HVL”) proposal to rezone land at 5 Yashili Drive and 88 Bluff Road to a predominantly Residential Zone.
- 1.3 I was commissioned to undertake an on-site evaluation at 88 Bluff Road of obtrusive light emitting from the Gateway Business Park. This was to quantify the actual effect associated with lighting from the Park onto HVL site's to provide an informed and quantitative analysis of the potential for such issues to arise. The line-of-sight analysis and scientific site light measurements I have undertaken on HVL's site show that the line-of-sight residential dwelling light exposure zone relative to the Gateway Business Park is actually only a very small part of the HVL site.
- 1.4 **Annexure 1** includes SLP's technical report “Obtrusive Light Measurement Report” dated 23 April 2021. This report records my site evaluation of the light measurement undertaken on the site to evaluate the potential for lighting effects on future residential receivers on the HVL site. The conclusion of this report is:

The HVL site light measurements have been taken at exposure locations within the HVL residential zone area beyond the 45 dB noise contour line...

All measured site light values (vertical plane illuminance) are well within the required limits of the Operative District Plan for residential receivers, and thus compliance with District Plan sections 29B.5.3 and 29C.6.3 is clear and unequivocal.

- 1.5 My analysis and measurements demonstrate that the Gateway Business Park operators are in compliance with Waikato District Council allowable limits as they relate to HVL's proposed residential lots.
- 1.6 Based on current operational light sources from the Gateway Business Park, the resultant HVL exposure zone is very small and the light levels for residential receivers in that zone are less than one tenth of the allowable limit.

2. INTRODUCTION

- 2.1 This rebuttal statement relates to evidence in opposition filed by:

(a) Laurie Cook dated 17 March 2021 prepared for Hynds Pipe Systems

- 2.2 My name is Bryan King. I am Managing Director of Strategic Lighting Partners Ltd, independent consultants in design, technology, economics, environmental and standards for road lighting and public lighting. I have 38 years' experience as a director and CEO of lighting companies and consultancies.
- 2.3 My qualifications are Master of Business Administration (MBA) - University of Auckland, Diploma in Industrial Engineering (DipBIA) - University of Auckland and New Zealand Certificate of Engineering (NZCE) – AUT Auckland.
- 2.4 I am a professional member of the Illuminating Engineering Society of Australia and NZ (MIESANZ), the Illuminating Engineering Society of North America (MIESNA) and Carbon and Energy Professionals NZ (CEP-NZ).
- 2.5 I participate in the activities of the following lighting organisations:
- (a) Lighting Council New Zealand (LCNZ) – Technical, standards and regulation advisor
 - (b) Global Lighting Association (GLA) - Board member
 - (c) United Nations-Office for Outer Space Affairs (UN-OOSA) Vienna - GLA Representative for Light Pollution
 - (d) International Standards Organisation (ISO) Geneva – Lighting – NZ Representative
 - (e) International Electrotechnical Commission (IEC) Geneva – NZ Head of Delegation, Chair Environmental Advisory Group
 - (f) International Lighting Commission (CIE) Vienna - NZ National Committee member
 - (g) NZ Transport Agency (NZTA) - Road Lighting LED Working Group member
 - (h) Standards Australia Technical Committees – Road and Public Lighting, Lamps and Luminaires, Electromagnetic Compatibility
- 2.6 I have presented twenty-eight conference and seminar papers and authored or co-authored eleven Australia/NZ Publications on the topics of lighting technology, energy, carbon, obtrusive light, environment, asset management and procurement. An example is the “Street Lighting and Smart Controls (SLSC) Roadmap”, for the Department of Industry, Science, Energy, and Resources. Australian Federal Government, Canberra.

- 2.7 I have co-managed the professional content of four large international road and public lighting conferences over the last seven years which has brought me into close contact with international thought leaders and current with latest trends.
- 2.8 As a lighting management consultant I have completed many projects advising on a range of lighting aspects for the NZ Government, Australian State and Federal Government and many Local Councils in Australia and New Zealand.

3. CODE OF CONDUCT

- 3.1 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. I have complied with the Code of Conduct in preparing this statement of evidence and confirm that I will do so in presenting my evidence to the Commissioners. Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

4. SCOPE OF EVIDENCE AND METHODOLOGY FOR ASSESSMENT

- 4.1 This rebuttal statement relates to evidence in opposition filed by Laurie Cook dated 17 March 2021 prepared for Hynds Pipe Systems.
- 4.2 I have visited HVL's site as well as the Pokeno Gateway Business Park. I also undertook night time surveys of obtrusive light at various locations on HVL's site on 8 April 2021. Significant in-depth analysis has been undertaken, and is reported separately.
- 4.3 **Annexure 1** includes the technical report "Obtrusive Light Measurement Report" dated 3 May 2021 I prepared prior to this rebuttal evidence. This report records my site evaluation of the light measurement undertaken on the site to evaluate the potential for lighting effects.
- 4.4 The methodology I undertook to identify the relevant exposed parts of HVL's sites to potential light effects from the Gateway Business Park and subsequent site survey measurements are outlined in sections 3, 4 and 5 of that report respectively.

5. RESPONSE TO EVIDENCE OF MR LAURIE COOK FOR HYNDS PIPE SYSTEMS LTD

- 5.1 The following sections outline the key areas that I agree or disagree with the statements made by Mr Cook, and provide an explanation for each below.

- 5.2 Mr Cook discusses in Paragraph 4.9 the potential effects on sensitive observers of light from above Hynd's site.

".... at night the light emanating from Hynds operations will be conspicuous, and potentially obtrusive to sensitive observers, when viewed from land above the Hynd's sites..."

- 5.3 I disagree with this conclusion as it relates to the location of the future residential sites on HVL's site. The line-of-sight analysis and scientific site light measurements I have undertaken on HVL's site show that the line-of-sight residential dwelling light exposure zone relative to the Gateway Business Park is actually only a very small part of the HVL site (see the light analysis site plan and topographical Cross Section D drawing in Annexure 1). Furthermore, at the worst-case position in this exposure zone, the measured light levels are less than one tenth of the District Plan allowable limit.
- 5.4 Mr Cook's opinion regarding light being "potentially obtrusive to sensitive observers" is undeniable as a general proposition, but now that these surveys have been undertaken so is the fact that the potential levels on the HVL site are very substantially lower than the required compliance limits for residential receivers.
- 5.5 For this reason I am of the opinion there would be negligible lighting effects from the Gateway Business Park operational lighting on the proposed residential development in the HVL land.
- 5.6 Mr Cook discusses in paragraphs 5.1 and 5.3 the light exposure zones on HVL's proposed residential rezoning.

"The result of this rezoning proposal would be a substantial number of new dwellings that directly overlook Hynd's operations."

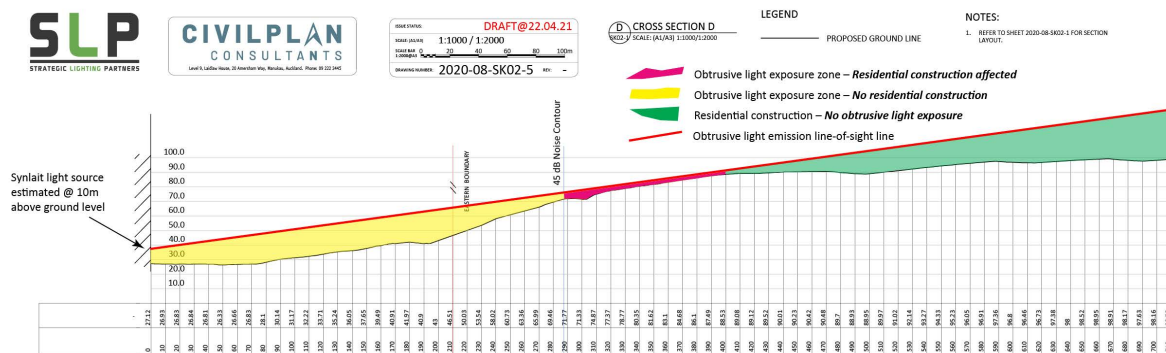
"in my opinion it would not be appropriate or good practice to locate new residential dwellings in such close proximity to, and overlooking a heavy industrial operation with lighting effects of this nature".

- 5.7 This opinion is not correct as it fails to recognise the subdivision topography and proposed dwelling locations – demonstrated by the cross sections included in Annexure 1. There is unlikely to be a "substantial number" of new dwellings proposed directly overlooking Hynd's operations because of the location of the 45 dB noise contour line illustrated in the Havelock Precinct Plan. The lighting line-of-sight analysis undertaken shows that the residential dwelling line-of-sight light visibility zone is a very small part of the HVL site (see the light analysis site plan and topographical Cross Section D drawing in Annexure 1). Even where there is a small area of line-of-sight light visibility on the proposed subdivision (see the light analysis site plan and topographical Cross

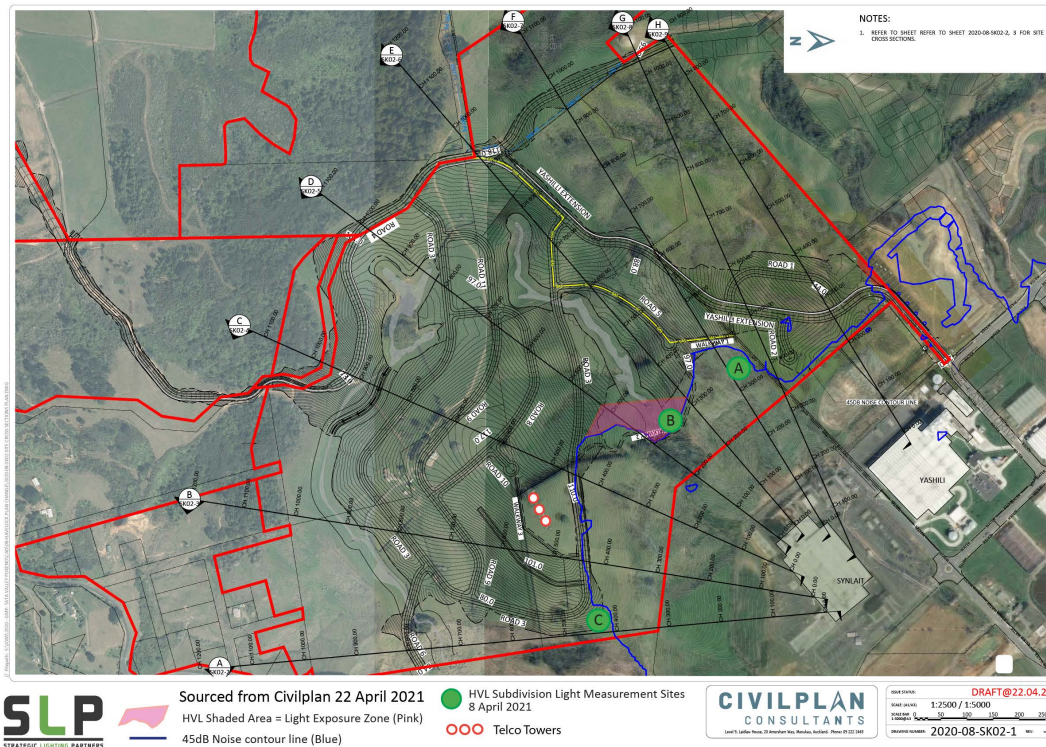
Section D drawing in Annexure 1), for this very small area the measured light levels are less than one tenth of District Plan allowable limit for residential receivers.

5.8 The undulating topography of the HVL site provides light shielding as well as separation from the industrial sites. The following graphics depict the HVL lighting analysis undertaken, which uses line-of-sight analysis, followed by quantitative site light measurements.

5.9 Below is the topographical Cross Section D drawing showing line-of-sight and exposure zones. This is the worst case of the eight cross sections analysed, and closely corresponds to measurement location B.



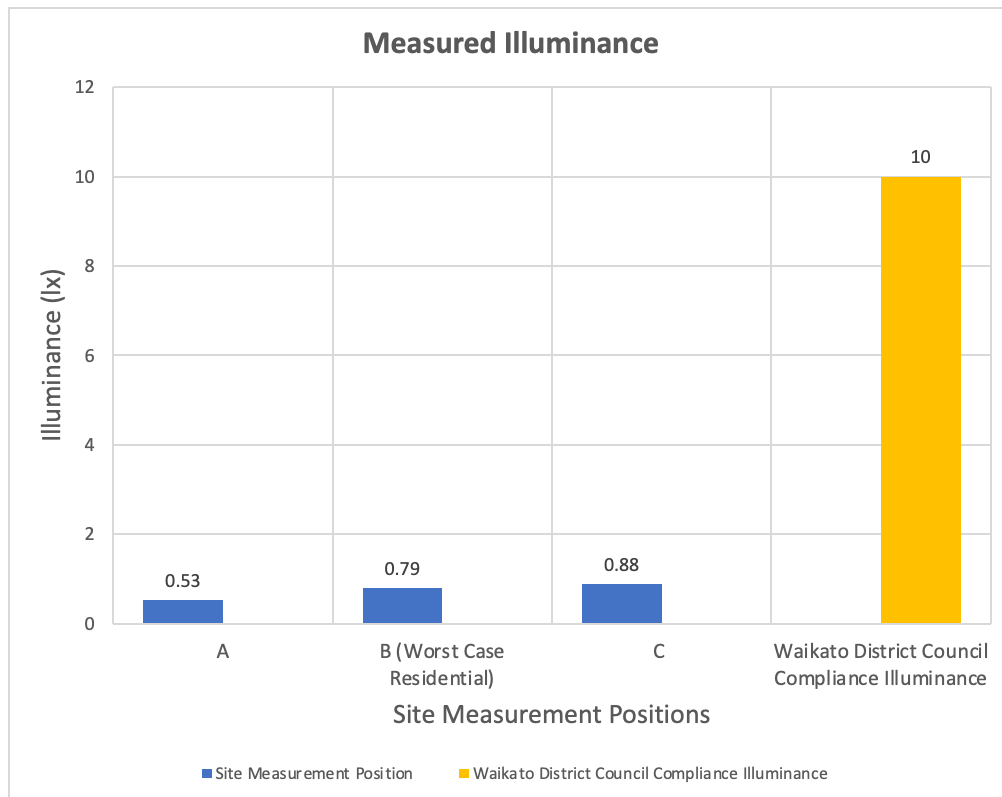
5.10 Below is the HVL light analysis plan view of site, 45dB noise contour line, light exposure zone and measurement sites. This is the compilation of the eight cross sections analysed. This shows the topographical cross sections A-H (radially extending from the Gateway Business Park industrial sites), and the three light measurement points A, B, C.



5.11 Below is a tabular summary of the HVL site scientific light measurements. This compares the measured vertical plane illuminance readings with the WDC compliance limit of 10 lx.

Site Measurement Position	GPS Position degrees	Height Above Sea Level (m)	Measurement Plane	Measured Illuminance (lx)	Compliance Illuminance (lx)
A	37.25558S, 175.0169E	91	Vertical	0.53	
B (Worst Case Residential)	37.2560S, 175.0179E	80	Vertical	0.79	
C	37.2572S, 175.0223E	85	Vertical	0.88	
Waikato District Council Compliance Illuminance					10

5.12 Below is a graphical summary of the HVL subdivision scientific light measurements. This compares the measured vertical plane illuminance readings with the WDC compliance limit of 10 lx.



6. CONCLUSION

Based on current operational light sources from the Gateway Business Park, the resultant HVL exposure zone is very small and the light levels for residential receivers in that zone are less than one tenth of the allowable limit.

Bryan King

3 May 2021

Havelock Village Ltd - Obtrusive Light Measurement Report

3 May 2021



1 Introduction

This report provides the analysis and findings of site light measurements undertaken on Thursday 8th April 2021 between 7.00pm and 9.00pm at the site at 88 Bluff Road, Pokeno (HVL site).

Scientific light measurements were taken to provide a better understanding of obtrusive light spill from the Pokeno Gateway Business Park and its effect on the HVL Site.

2 Executive Summary

With cross sections of the likely post-development terrain provided by Civilplan, SLP has calculated that the visual impact of the Industrial lighting emitted by Hynds, Synlait and Yashili is restricted to a relatively small area beyond the 45dB noise contour illustrated on the Havelock Precinct Plan as shown in Figure 1. SLP understands that any future residential sites will be located beyond this contour line on 88 Bluff Road. Scientific measurements were taken at 3 different site locations (A, B, C in Figure 1) which clearly indicate that spill light (illuminance) levels are less than 1 lux and therefore are well below the required Waikato District Council Operative District Plan compliance limit of 10 lux. Consequently, SLP does not consider there will be obtrusive lighting effects from the Pokeno Gateway Business Park on the proposed location of future residential sites at HVL's Site.

3 Light Measurement Criteria

3.1 Site Light Measurement points

The site light measurements capture spill light levels from the industrial sites, at the most relevant line-of-sight light exposure zones on the HVL site. The HVL site plan light exposure zone diagram (see Section 4) identifies the area (shown in pink) where the greatest potential for obtrusive light effects from the Gateway Business Park are located on the HVL site. This plan view is the consolidation of the eight line-of-sight light exposure assessments made by SLP that have been compiled from the eight cross-

sectional topographical drawings provided by Civilplan Consultants Ltd. These use the Civilplan versions provided on 22 April 2021, which include the 45dB noise contour line.

3.2 Site light measurement process, equipment and expertise

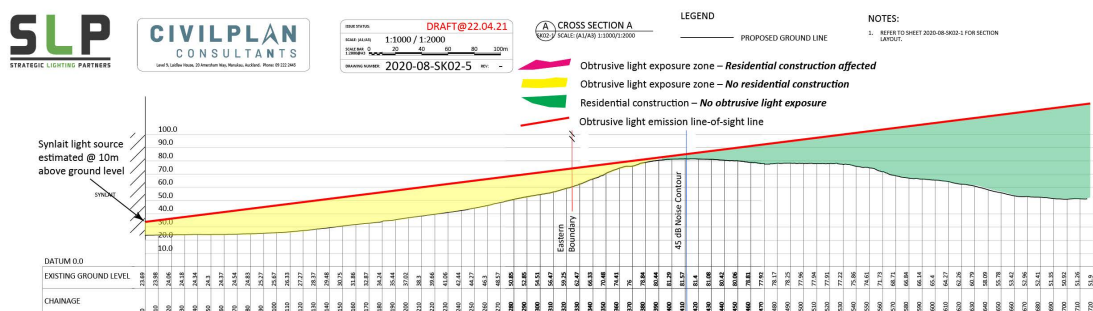
The measurements have been carried out in accordance with relevant New Zealand standard *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting*. SLP engaged 3D Lighting Design Ltd as a light measurement subcontractor in order to access specific expertise with calibrated measurement instruments, which is essential when absolute measurements are required to formulate evidence-grade conclusions. Detailed measurement process information using a scientific grade Yokogawa 510.02 illuminance meter and a TopCon BM-9A20D luminance meter is available if supportive technical detail is required.

3.3 Cross Sectional Topographical Drawings

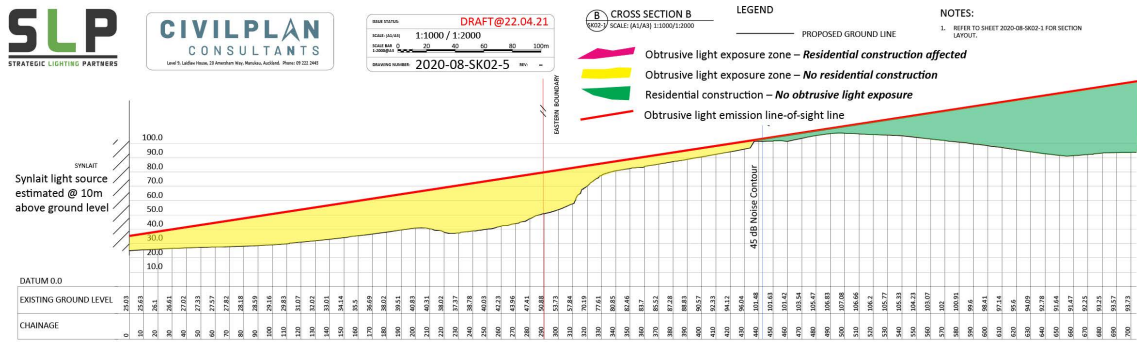
On 22 April Civilplan Consultants Ltd provided eight cross-sectional drawings (cross-sections A-H) which have been overlaid with SLP line-of-sight light direction line assessments. These drawings are used to determine the obtrusive light exposure zones on each cross section, the location and dimensions of which are consolidated to compile the HVL site plan light exposure zone diagram (see Section 4).

Note that the noise contour line position has been provided by Styles Group acoustics consultants and overlaid on the Civilplan Consultants Ltd (plan view) site image. The SLP obtrusive light assessment only considers obtrusive light issues that lie beyond the noise contour line (i.e. away from the industrial sites) as we understand that HVL do not intend that residential dwellings will be constructed inside of the noise contour line boundary.

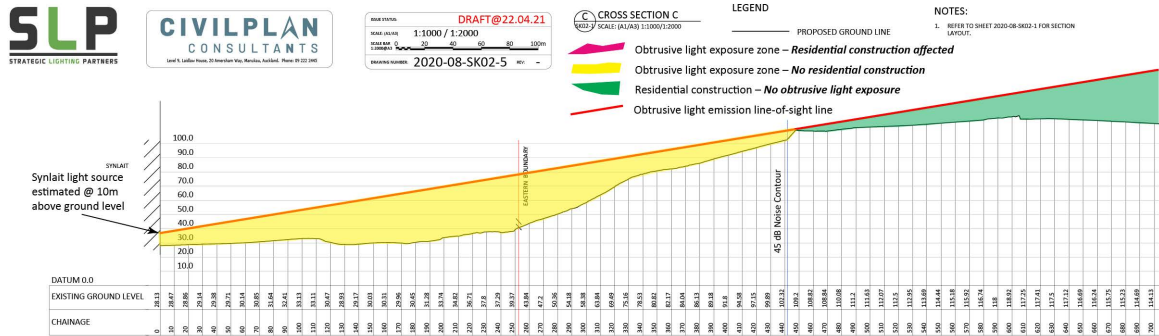
Topographical cross-section diagram A



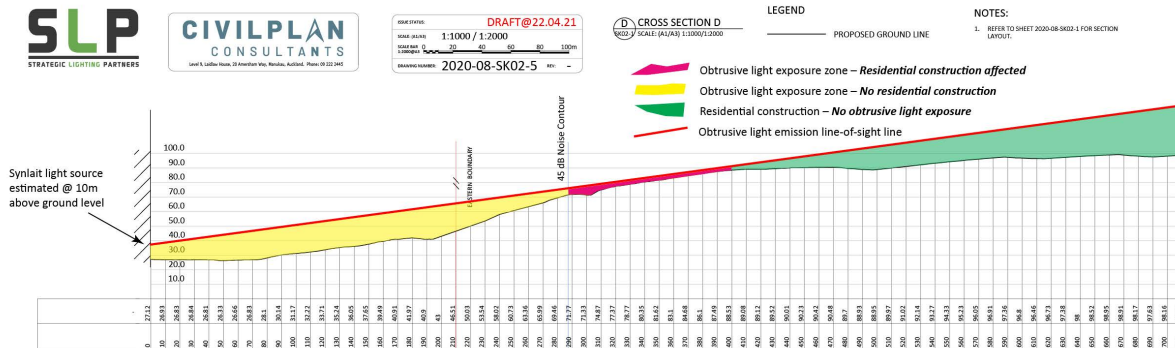
Topographical cross-section diagram B



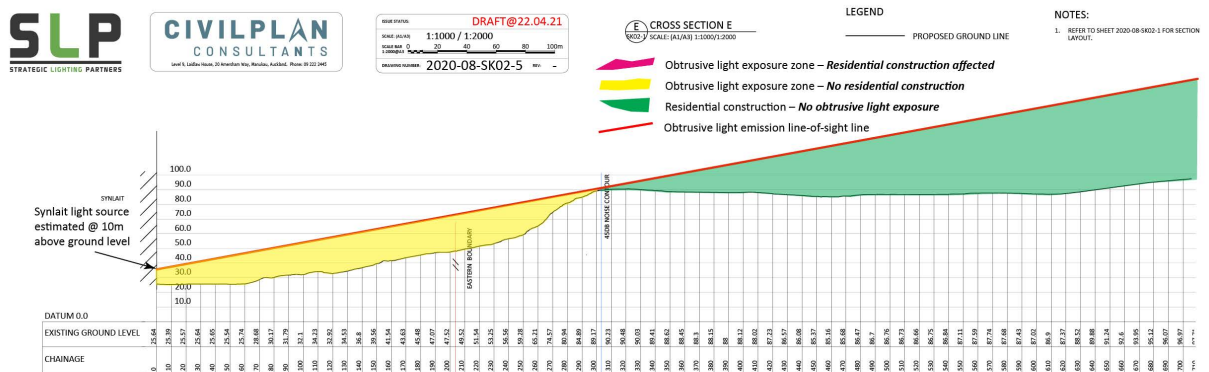
Topographical cross-section diagram C



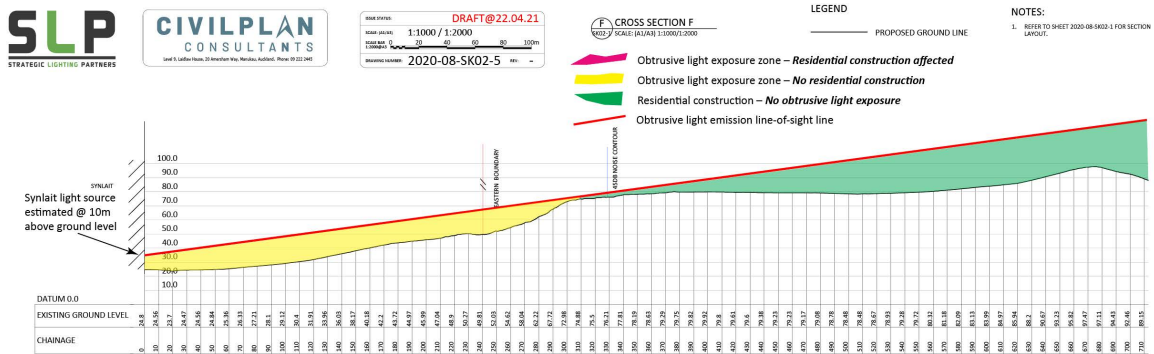
Topographical cross-section diagram D



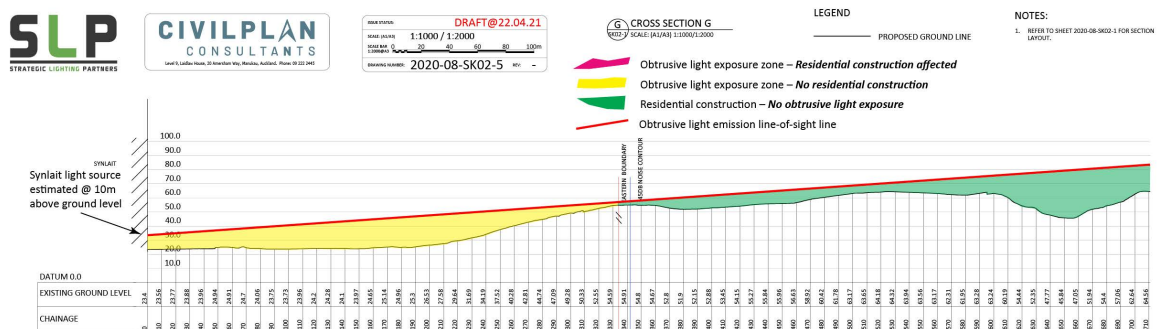
Topographical cross-section diagram E



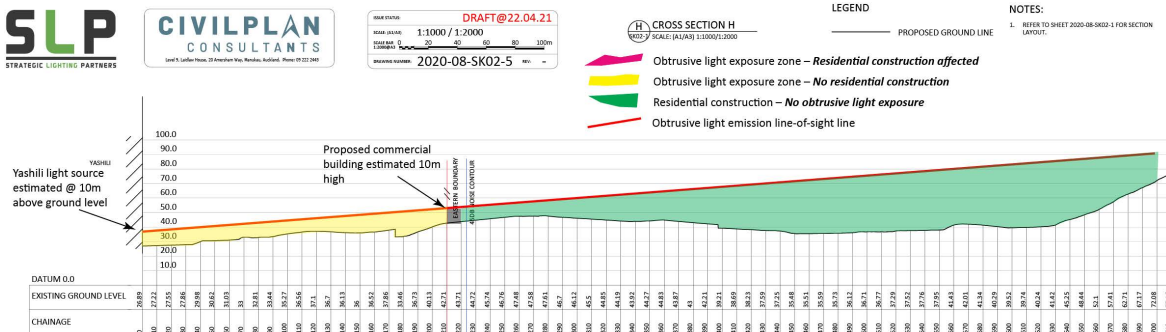
Topographical cross-section diagram F



Topographical cross-section diagram G



Topographical cross-section diagram H



4 Site Diagram Plan View – Light Measurement points

HVL site plan light exposure zone diagram

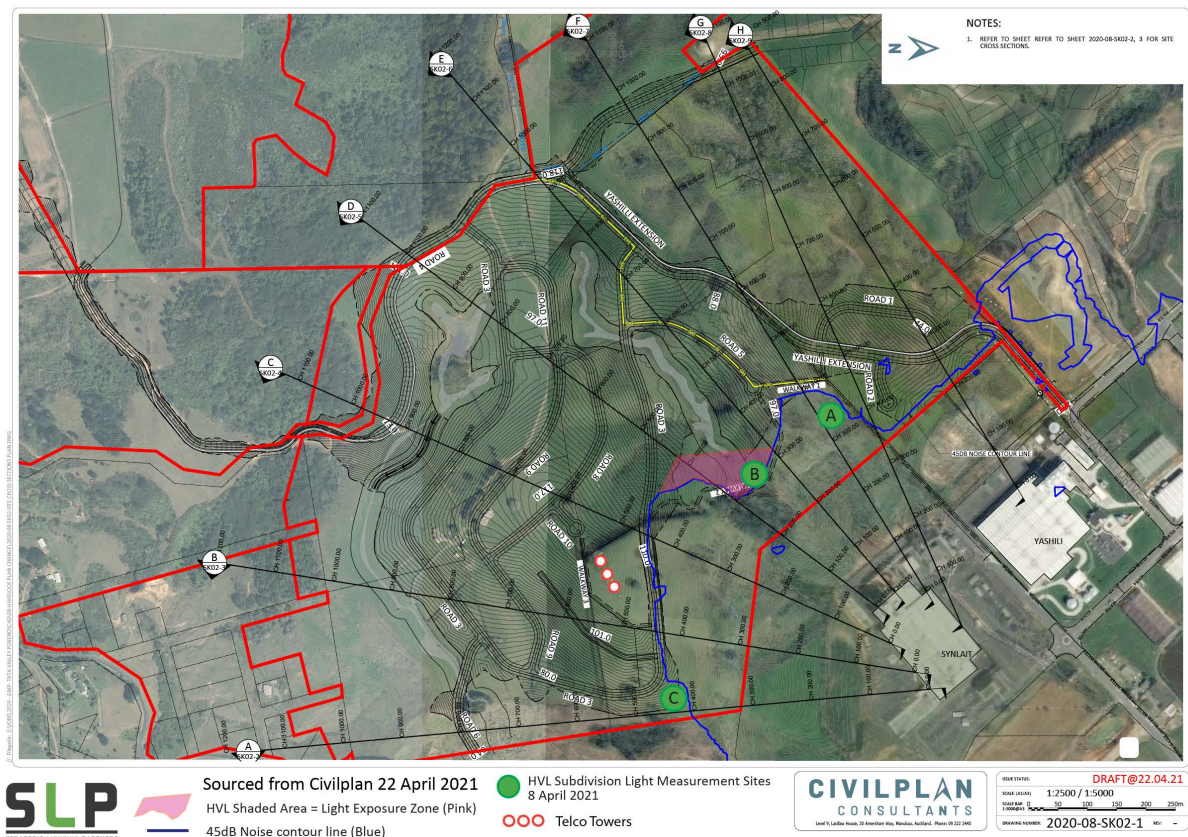


Figure 1 Plan view of HVL site, 45dB noise contour line, light exposure zone and measurement sites

Measurement points: A, B, C indicate HVL site light measurement positions

The pink-coloured area indicates the area of the HVL Site beyond the noise contour line that is exposed to line-of-sight light emissions from the industrial sites. This area has been determined from the consolidated cross section information discussed in Section 3.

The HVL site light measurement position “B” falls within the pink zone and thus the scientific measurements taken at this point can be reasonably expected to represent the worst-case point for potential obtrusive light impact on the HVL site.

The compliance of the light emission level in this area with the Operative Waikato District Plan is covered in Section 8 below.

5 Site Light Measurement Process

The obtrusive light requirements in the Waikato Operative District Plan are less comprehensive than those used by surrounding councils and by other NZ councils and include only quantitative limits for spill light measured by illuminance, in lux (abbreviated to lx).

A difference between WDC and other council compliance requirements is that WDC omits to specify the limits for vertical and horizontal illuminance (as identified in the AS/NZS Standard). In undertaking this assessment, HVL site light measurements consist

of illuminance measurements (lx) on the HVL site, with vertical and horizontal plane spill light from the industrial sites. These are used for compliance evaluation purposes.

6 HVL Site Light Measurement Results

The following are the results of outdoor night site light measurements, taken on Thursday 8 April 2021.

HVL Site Light Measurements

Table 1 Illuminance Measurements (lux) – Spill Light from general sites

Measurement Position	Measurement Plane	Illuminance (lx)	GPS Position degrees	Height m ASL
A – HVL site near Yashili				
	Vertical	0.53	37.25558S, 175.0169E	91
	Horizontal	0.06	37.25558S, 175.0169E	91
B – HVL site near Synlait				
	Vertical	0.79	37.2560S, 175.0179E	80
	Horizontal	0.05	37.2560S, 175.0179E	80
C – HVL site near Hynds				
Facing Synlait site	Vertical	0.88	37.2572S, 175.0223E	85
	Horizontal	0.07	37.2572S, 175.0223E	85
Facing Hynds site	Vertical	0.64	37.2572S, 175.0223E	85
	Horizontal	0.07	37.2572S, 175.0223E	85

The worst-case obtrusive light location and light value are marked by red circle

7 Requirements of the Waikato Operative District Plan

The following is an excerpt from the Waikato Operative District Plan regarding spill light and glare. We understand these requirements are replicated in the relevant resource consents for Hynds and Synlait. Source: Mark Tollemache.

Heavy Industry Zone (Same applies for Industry Zone 29C.6.3)

29B.5.3 LIGHT SPILL AND GLARE

All exterior lighting must be designed, located and at all times directed, screened, adjusted and maintained to ensure that the direct luminance from the lighting shall not exceed:

1. 10 lux (lumens per square metre) at or within the boundary of all affected residential sites between the hours of 10:00pm and 7:00am;
2. 20 lux at or within the boundary of all affected residential sites at all other times when lighting is required.

For exterior lighting near to any residential zone, and in any other case where the applicant, or the Council is unsure as to the ability of the lighting to comply with these [performance standards](#), the applicant shall provide the Council with a report from a Professional Illumination Engineer confirming that the lighting installation has

been designed, installed and aimed in a manner that will ensure compliance with this RULE. In the case of a new installation design, information must be provided at the time of applying for a [building](#) consent.

Explanation

While sunlight is perceived in a positive way, other artificial sources of light because of quantitative, directional or spectral features can cause annoyance, discomfort, distraction, loss of sleep, loss of amenity or a reduction in the ability to see.

The rules reflect the need to control these adverse effects of light spill and glare within residential environments.

The limiting quantitative requirement applicable to the HVL site is an illuminance limit of 10 lux at or within the boundary of all affected residential sites (i.e. in this case, the location of proposed HVL residential dwellings beyond the 45 dB noise contour line). The Operative District Plan does not state whether this illuminance limit applies to the vertical plane or horizontal plane, nor does it state any requirement for compliance with the applicable NZ technical standard *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting*. Note that District Plan sections 29B.5.3 and 29C.6.3 are titled as “LIGHT SPILL AND GLARE”, however the WDC quantitative requirements only include criteria for light spill (illuminance) but not glare (luminance).

8 Compliance with the Waikato Operative District Plan

HVL site light measurement are shown in Section 6. These show the illuminance measurements (lx) for spill light. The horizontal illuminance values are significantly lower than the vertical values, so only the vertical values are considered for compliance evaluation purposes.

HVL site light measurement results

Light emissions are from several sites surrounding the HVL land (ie Yashili, Synlait, Hynds and other general site sources).

The vertical illuminance values are:

- Position A – HVL site near Yashili: 0.53 lx
- Position B - HVL site near Synlait: 0.79 lx
- Position C - HVL site near Hynds (Facing Synlait): 0.88 lx (see note below)
- Position C - HVL site near Hynds (Facing Hynds): 0.64 lx

The worst-case point for obtrusive light line of sight exposure on the HVL site is at position “B” as this measurement position is in the obtrusive light line-of-sight exposure zone. This point has a vertical illuminance of 0.79 lx, thus the light exposure area behind this point will have lower vertical illuminance values.

Note that position “C” (near Hynds, facing Synlait) has vertical illuminance of 0.88 lx, but is not a worst-case situation in this context. This is because this measurement position is located on the crest of a topographical ridgeline and the area beyond point “C” is fully shielded from the light line-of-sight (See Section 3 - Topographical cross-section diagram A).

Site Measurement Position	GPS Position degrees	Height Above Sea Level (m)	Measurement Plane	Measured Illuminance (lx)	Compliance Illuminance (lx)
A	37.255585, 175.0169E	91	Vertical	0.53	
B (Worst Case Residential)	37.25605, 175.0179E	80	Vertical	0.79	
C	37.25725, 175.0223E	85	Vertical	0.88	
Waikato District Council Compliance Illuminance					10

Figure 2 Table of comparative site light measurements

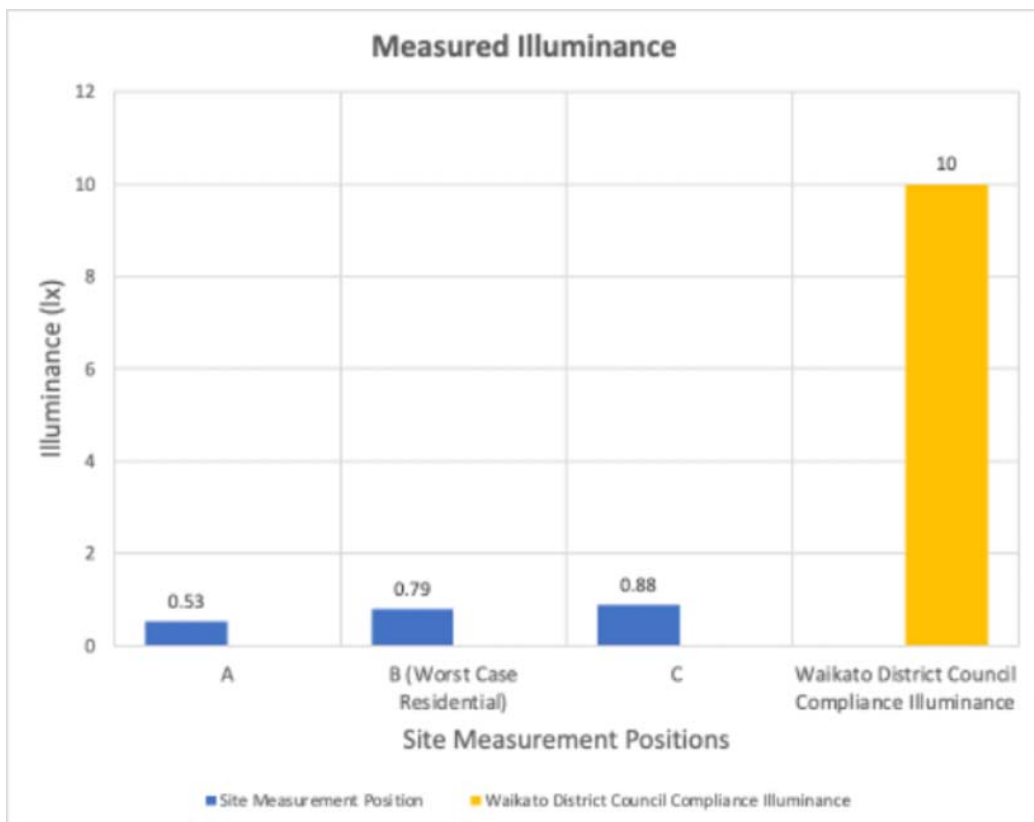


Figure 3 Bar chart of comparative site light measurements

All of these values are well under the Operative District Plan limit of 10 lx at or within the boundary of all affected residential sites, and thus for the industrial activities would readily comply with the requirements of Sections 29B.5.3 and 29C.6.3 of the District Plan.

9 Conclusions

The HVL site light measurements have been taken at exposure locations within the proposed HVL residential zone area on 88 Bluff Road beyond the 45 dB noise contour line. The site light measurement position “B” falls within the site plan light exposure zone and is the worst-case point for obtrusive light exposure on the HVL subdivision.

All measured site light values (vertical plane illuminance) are well within the required limits of the Operative District Plan for residential receivers, and thus compliance with District Plan Sections 29B.5.3 and 29C.6.3 is clear and unequivocal.

Bryan King and Godfrey Bridger

Directors - Strategic Lighting Partners Ltd



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