

15th September 2022

Port of Tauranga Limited,
Private Bag 12504,
Tauranga Mail Centre.
Tauranga 3143

Attention: Rowan Johnstone

Email: [REDACTED]

re: - Port of Tauranga Expansion Project - Proposed Crane Lighting – Peer Review

Introduction

1. Documentation has been received from Evolve Lighting via Port of Tauranga Engineering for proposed future crane lighting to be installed in a Port of Tauranga Expansion Project at Sulphur Point.
2. The following documents have been received for review:
 - Evolve Lighting Port of Tauranga Crane Lighting – Spill Light Rev 0 dated 4th August 2022.
 - Evolve Lighting Port of Tauranga - New Crane Lighting dated 29th July 2022
 - Brown NZ Limited Port of Tauranga Expansion Application dated December 2021
3. Should the Port be successful in its current consent application to extend the Sulphur Point Wharf by 385m, the development would include the installation of new flood lighting fixed to three new cranes located at Port of Tauranga Sulphur Point wharf as well as new light towers on the existing reclamation. Spill lighting and crane specific lighting information prepared by Evolve Lighting was included in the information provided by Port of Tauranga for review.
4. The Environment Court has asked for advice on the following lighting question: -

(c) What is the lighting proposed for the cranes and what effects will such lighting have on neighbours, including Whareroa Marae.
5. I have extensive knowledge of external lighting effects having worked with the Environment Court and various Council's over many years to evaluate the effects of lighting on the environment. My experience in the lighting industry dates back for more than 40 years. I have various lighting qualifications including MIES status and am currently serving on the IESANZ membership qualifications committee.

Project Description – Port of Tauranga Expansion Project (External Lighting)

6. The Port plans to upgrade existing high pressure sodium crane lighting on eight of the nine existing cranes while the remaining recently installed crane has LED light fittings that will be retained. New LED floodlights would be installed on the three proposed future cranes. There are also some small, localised light fittings on the structure to illuminate crane walkways for pedestrian access to the crane's cab.
7. There is also mast mounted high pressure sodium floodlighting in the container storage areas adjacent to the wharf and port area that will be retained. Over time, the Port is working to replace these with new LED light fittings.
8. Crane mounted floodlights will only operate when the crane is in operation. Floodlighting is not turned on when the crane is parked and stowed. There are also three static red navigation lights that always operate when it is dark on each crane for safety reasons to identify the extremity of each crane. These navigation lights will also be installed on the three new cranes.
9. The nearest residential properties are located at Whareroa Marae approximately 675m away across the harbour. Residents will potentially be able to see the new cranes and effects from associated lighting.
10. I have not visited Port of Tauranga at night but have reviewed various photographs of existing lighting in the port area.

Lighting Design

11. The Evolve lighting design provides details of proposed crane lighting. All floodlights are downward facing to light the ships deck and hold as well as adjacent dock loading and set down area. New lighting is identified in their drawings with 18 floodlights located on the underside of each crane structure.
12. Proposed floodlights comprise two versions of the Falcon Pro-320-750 professional series high output LED area light. Refer to attached Falcon Pro data sheet. Both types are 320 Watt with symmetric beam, one type has a narrow 30-degree beam and the other is a wide 60-degree beam. The wide beam version flood lights will be located at the wharf end of the crane (7 floodlights) and the narrow beam floodlights will be located over the ship's hull so that light can penetrate the hold (11 floodlights).
13. Resource Consent is required as a Restricted Discretionary activity due to proposed height of the crane. The area of discretion is limited to the safe operation of the cranes to meet Tauranga City Airport requirements. However, for this review, the lighting design criteria used in determining adequacy of the proposed crane lighting has been assessed against Tauranga City Plan 4G.2.2 Commercial, Industrial and Open Spaces spill light in addition to AS/NZS 4282: 2019 spill light and glare requirements for the control of obtrusive effects of outdoor lighting.
14. All new crane flood lighting is directed downward at zero degrees tilt with the lens parallel to the wharf surface. High mast wharf lighting will have a tilt of up to 5 degrees maximum to ensure glare is adequately controlled.
15. Compliance is achieved with Tauranga City Plan lighting standards of 10 lux maximum spill light limit at a marae boundary as well as AS/NZS 4282 control of obtrusive effects of outdoor lighting guidelines where the maximum luminous intensity is 2,500cd.

16. Lighting calculation documentation has also assessed roadway threshold increment for motorists travelling past the port on State Highway 2. The maximum permitted threshold increment for motorists is 15% with an adaption luminance of 10. Calculated threshold luminance on State Highway 2 is 0.0% and complies.
17. Proposed crane lighting may operate beyond normal external lighting curfew hours and the assessment includes calculation results that show compliance with these reduced lighting values after curfew at 10.00pm each night.
18. Proposed lighting for the three new cranes will be similar to the existing nine cranes. The difference will be LED technology used in the modern floodlight is more controlled compared to the older high pressure sodium floodlights.
19. There is potential for an increase in glare and sky glow from the new floodlights that could be seen directly by residents and motorists, however this can be mitigated with careful location and orientation of proposed flood lighting. The attached design has ensured the new floodlights are directed directly downward to minimise obtrusive effects and to mitigate glare and skyglow effects.
20. Calculations presented in the attached design include all flood lights operating on all 12 cranes having a light loss factor of 1.0 being the worst-case scenario when lamps are new and before any degradation for dirt and dust and aging of LED lamps.
21. Cumulative effects from other lighting in the area is not included in the calculations however vertical spill light calculations attached show that proposed lighting will not affect residents in Whareroa Marae. It is also observed that existing lighting on poles in the Whareroa Boat Ramp carpark and the State Highway 2 street lighting will also be visible and are located between the Marae and proposed new cranes.
22. Visual intrusion caused by the daytime appearance of outdoor lighting systems, including associated support structures, has not been addressed in this report.

Summary

23. Information provided in the Evolve Lighting design adequately addresses spill light and glare applicable to the Port Expansion Project, nearby residential properties at Whareroa Marae and their boundaries from proposed crane lighting. The Tauranga City Plan limit of 10 lux spill light at night will be met at the Marae boundaries in addition to glare requirements outlined in AS/NZS 4282 : 2019 being a maximum of 2,500cd.
24. Illuminance at residential boundaries will meet the lower value required by AS / NZS 4282 for Zone A4 requirements of 2 lux during nighttime curfew hours. Calculated vertical spill light at the Marae boundary is 0.0 lux. Calculations are presented in a vertical plan being the worst case compared to horizontal spill light given the 675m separation from the crane lighting.
25. Glare from proposed crane lighting will be 315cd and is less than permitted 2,500cd after curfew to meet AS / NZS 4282 Zone A4 requirements.
26. Threshold increment is negligible on State Highway 2 and crane lighting will not affect motorists. The measure of disability glare expressed in the calculations is the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present.
27. Conformance with lighting standards has been adequately demonstrated by the results of attached calculations and an analysis of design methods used in the proposal.


28. The determination of when spill light and glare will become obtrusive to others is difficult since both physiological and psychological effects are involved. Just because the lights may be seen across the harbour does not mean they will be obtrusive. Calculated results for spill light is zero lux and glare at 315cd is substantially less than the permitted value of 2,500cd.

Conclusion

29. External lighting proposed for the new cranes will meet Tauranga City Plan criteria and AS/NZS 4282 Control of the obtrusive effects of outdoor lighting to limit spill light and glare and the design adequately addresses adverse effects on the surrounding environment and persons.
30. The luminaire selection and orientation if installed as presented in the design outlined in the attached lighting design is localised to the wharf area and will reduce obtrusive effects at residential boundaries to acceptable limits well below required standards.

Please contact the writer should you need to discuss any aspects of the above report.

Prepared on behalf of
Kern Consultants Ltd



Russ Kern MIES

Obtrusive Light - Compliance Report

Tauranga Standards, Post Curfew

Filename: Port of Tauranga Crane spill light

11/09/2022 1:49:48 pm

Illuminance

Maximum Allowable Value: 10 Lux

Calculations Tested (2):

<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>
ObtrusiveLight_Marae_Ill_Seg1	PASS	0.1
ObtrusiveLight_Marae_Ill_Seg2	PASS	0.0

Luminous Intensity (Cd) Per Luminaire

Maximum Allowable Value: 2500 Cd

Control Angle: 83 Degrees

Luminaire Locations Tested (264)

Test Results: **PASS**

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 2500 Cd

Calculations Tested (2):

<u>Calculation Label</u>	<u>Test Results</u>
ObtrusiveLight_Marae_Cd_Seg1	PASS
ObtrusiveLight_Marae_Cd_Seg2	PASS

Threshold Increment (TI)

Maximum Allowable Value: 15 %

Calculations Tested (2):

<u>Calculation Label</u>	<u>Adaptation Luminance</u>	<u>Test Results</u>
ObtrusiveLight_TI_SH2 North	10	PASS
ObtrusiveLight_TI_SH2 West	10	PASS

FALCON PRO 320W

EVOLVE
LIGHTING

PROFESSIONAL SERIES HIGH OUTPUT LED FLOODLIGHT



170lm/W
System Efficacy



7 Year
Warranty



IK10
Rated



IP67
Rated

- ✓ Ultra efficient system efficacy of up to 170lm/W
- ✓ Long lifetime of >102,000hrs to L70
- ✓ High quality Lumileds LED chips and Mean Well Driver
- ✓ Multiple beam angles available
- ✓ Tough IP67 and IK10 construction
- ✓ Suitable for coastal areas (with optional 316 stainless steel bracket)
- ✓ Durable Interpon Polyester coating



CODE

FALCONPRO-320-750

LIGHTING DATA

Light Source	Lumileds 5050
Lumen Output	54,400lm*
Luminaire Efficacy	170lm/W*
Lifetime @L70 (TM-21)	>102,000hrs
Lifetime @L80 (TM-21)	74,000hrs
Lifetime @L90 (TM-21)	36,000hrs
CCT	5000K (Further CCTs on request)
CRI	>70 (CRI80, CRI90 on request)
SDCM	<5
Beam Angle	30°, 60°, 90°, 85°x 135°, 60°x130°

DESIGN / CONSTRUCTION

Housing Material	Corrosion-resistant aluminium
Lens Material	Polycarbonate
Bracket Material	Hot-dip galvanised steel
Bracket Type	Oblique
Powder Coat	Interpon Polyester
Colour	Graphite Black (RAL 9011) (White available on request)
Weight	15.3kg

ELECTRICAL DATA

Power Source	Mean Well HLG-320H-48A
System Wattage	320W
Mains Voltage	AC100-277V / 50-60 Hz
Power Factor	>0.95
THD	<10%
Inrush Current	70A
Surge Protection	10kV
Driver Lifetime	Up to 100,000hrs
Connection	1.2m 3 core cable via connection box
Dimmable Options	DALI, 1-10V

TECHNICAL DATA

IP Rating	IP67
IK Rating	IK10
Operating Temp	-30° to +45°C
Protection Class	Class 1
Certifications	SAA
Documentation	LM-79, LM-80, ISTMT, TM-21
Warranty	Standard 7 year warranty

* Achieved with 90° beam angle

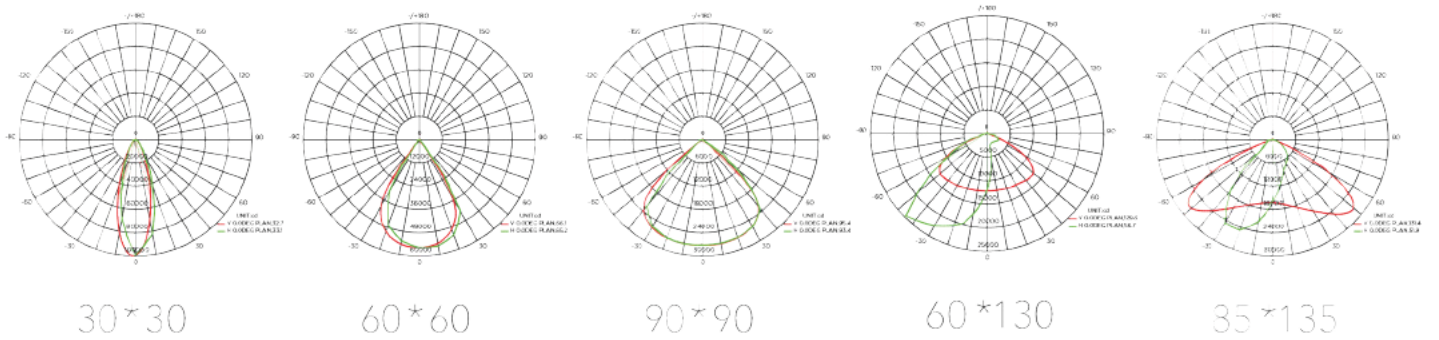
FALCON PRO

TECHNICAL DETAILS

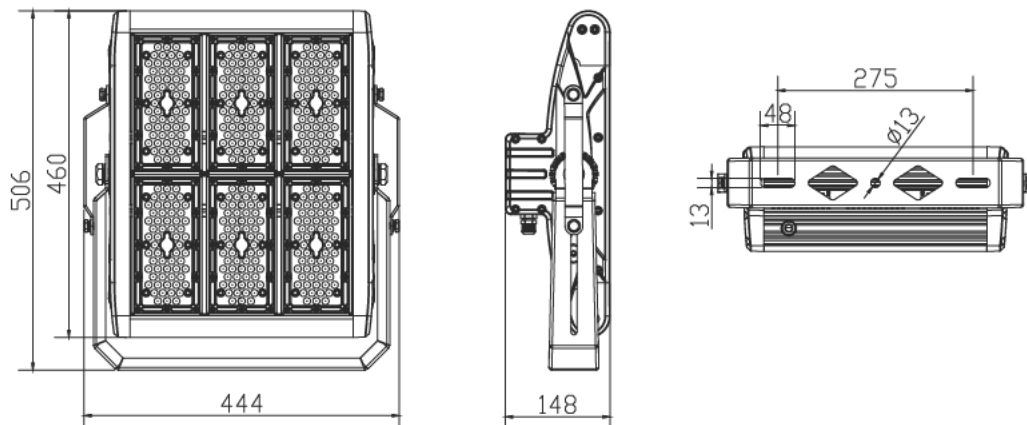
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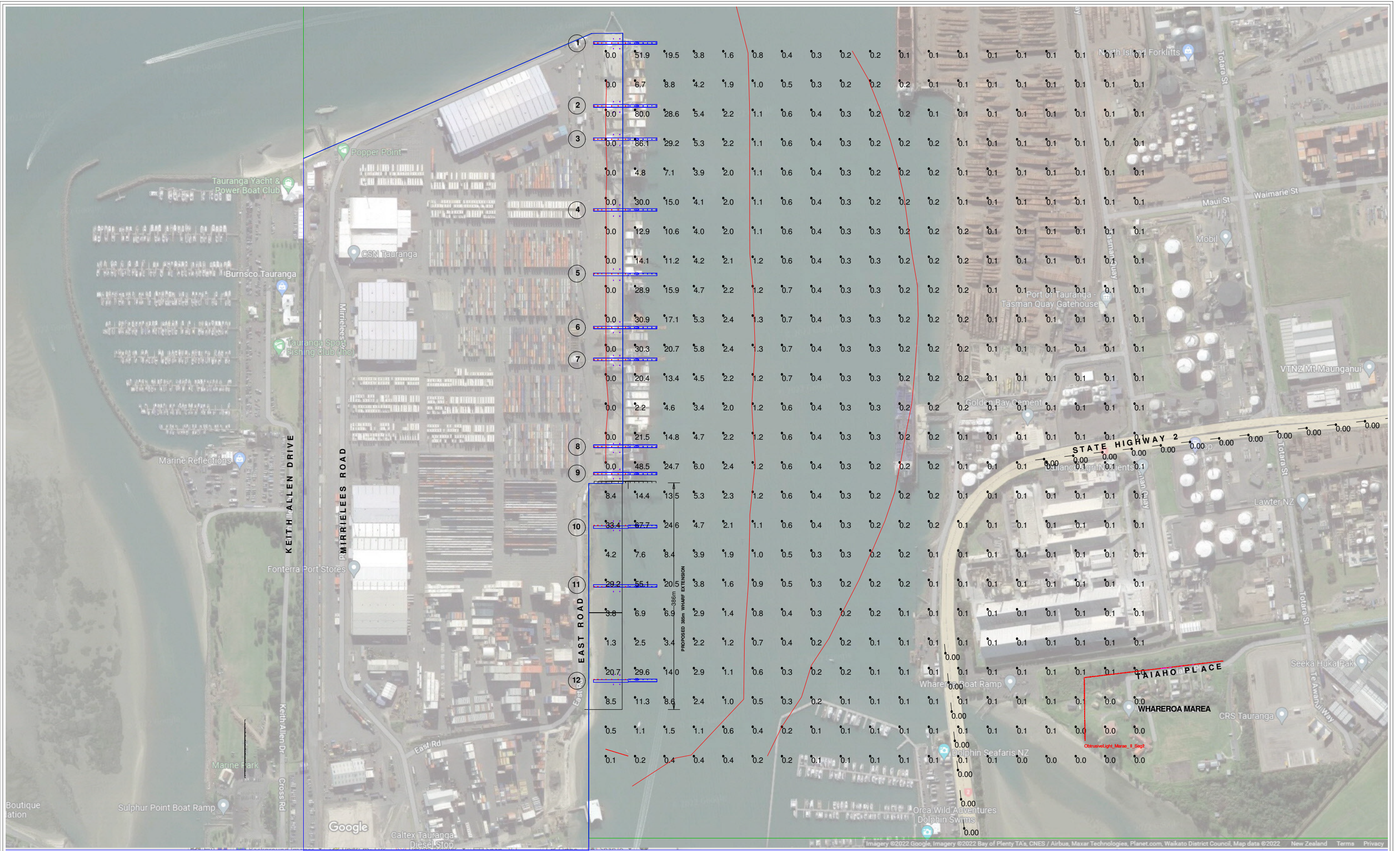


PHOTOMETRIC DIAGRAMS



DIMENSIONS





Drawing Name:
Plan View

Project Name:
Port of Tauranga Crane Lighting - Spill Light

Designed by:
Michael Strong

Revision:
0

Scale:
NTS

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Date:
12/09/2022

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EVOLVE
 LIGHTING

Luminaire and Calculation Summary

Calculation Summary

Label	Avg	Max	Min	Min/Avg
ObtrusiveLight_Marae_Cd_Seg1	1.24	316.0	0.0	0.00
ObtrusiveLight_Marae_Cd_Seg2	0.00	0.0	0.0	N.A.
ObtrusiveLight_Marae_Ill_Seg1	0.02	0.05	0.00	0.00
ObtrusiveLight_Marae_Ill_Seg2	0.01	0.03	0.00	0.00
ObtrusiveLight_TI_SH2 North	0.00	0.00	0.00	N.A.
ObtrusiveLight_TI_SH2 West	0.00	0.00	0.00	N.A.
Spill light_Horizontal	6.72	351.7	0.0	0.00
Spill Light_Vertical	2.83	86.1	0.0	0.00

Max for environmental zone A4 (AS/NZS 4282:2019)

Vertical illuminance: 10lux
Luminous intensity: 25,000 Cd

Luminaire Schedule

Symbol	Tag	Qty	Label	Lumens	LLF	Description	Total Watts
■	A	84	FALCONPRO-320-750-B60	54275	1.000	320W Evolve Falcon PRO LED IP67 Floodlight	26880
■	B	132	FALCONPRO-320-750-B30	48557	1.000	320W Evolve Falcon PRO LED IP67 Floodlight	42240
■	C	48	FALCONPRO-320-750-AW	49170	1.000	320W Evolve Falcon PRO LED IP67 Floodlight	15408

Design Notes

This lighting design has been designed on an open plan basis. Buildings and trees have not been included in the calculations. Light loss factor has been set at 1.0 being the worst case scenario for a new floodlight before ant degradation from dirt and age can affect light levels.

This design is completed in accordance with AS/NZS 4282 : 2019 and is subject to the tollerances described in AS/NZS 3827.1-1998 & AS/NZS 3827.2-1998

Design Parameters

Reflectances:
Ground - 0.20

Working plane heights:
Exterior - 1.m AGL

Spill Light At Night:
Horizontal - - 10 Lux Maximum
Vertical - - 10 Lux Maximum

Project Name:
Port of Tauranga Crane Lighting - Spill Light

Designed by:
Michael Strong

Revision:
0

Scale:
NTS

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Project Address:

Date:
12/09/2022

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