

18 July 2022

Da-Silva Builders Ltd
Attention Cameron Young

Dear Cameron

Please see attached the illumination design for 96 Beach Haven Road, Beach Haven this has been designed to comply with the:

- Auckland Unitary Plan (Operating in Part) Section E24 Lighting-requirements.

Illuminations predictions have been performed on Lighting Analysts Illumination Engineering Software (AGI32) Version 19.9 Please refer to the following.

-Page One for the Executive Summary.

-Page Two for Maintained Illumination Results.

-Page Three for Locations

-Page Four and Five for Obtrusive Lighting ISO and Report.

-Page Six and Seven for calculation summary

Lighting calculations are subject to the accuracies and tolerances in accordance with AS/NZS 3827.1:1998 & AS/NZS 3827.2:1998. These accuracies and tolerances include variances in the building dimensions and obstructions, surface finishes, luminaire positioning and aiming, ambient temperature, atmospheric conditions, luminaire photometry, lamp output, lighting design software, electrical supply and instrument calibration.

These predictions are offered as accurate calculation of an acceptable lighting design that complies with the above stated standard.

Yours Sincerely.



Ali Al-Derzi
Technical Sales Representative / Illuminations Designer

Executive Summary

Supply of external lighting is to provide security and functional lighting of sufficient quality to enable the safe circulation of vehicles and personnel at night as required by Unitary Plan Section E27.6.3.7 for a site with more than 10 parking spaces planned.

The external lighting calculation has been developed to meet Unitary Plan Lighting Standard E24 and is suitable for a Terrace Housing Development of this scale while minimising adverse effects for neighbouring residential properties.

The site is in a Residential - Terrace Housing & Apartment Building Zone - So Unitary Plan Lighting Category 3 (medium brightness) applies.

External lighting is designed to meet AS/NZS 1158.3.1-2020

Driveways Paths and Carparks subcategories are selected from tables 2.1, 2.2 and 2.5 Respectfully under the following criteria:

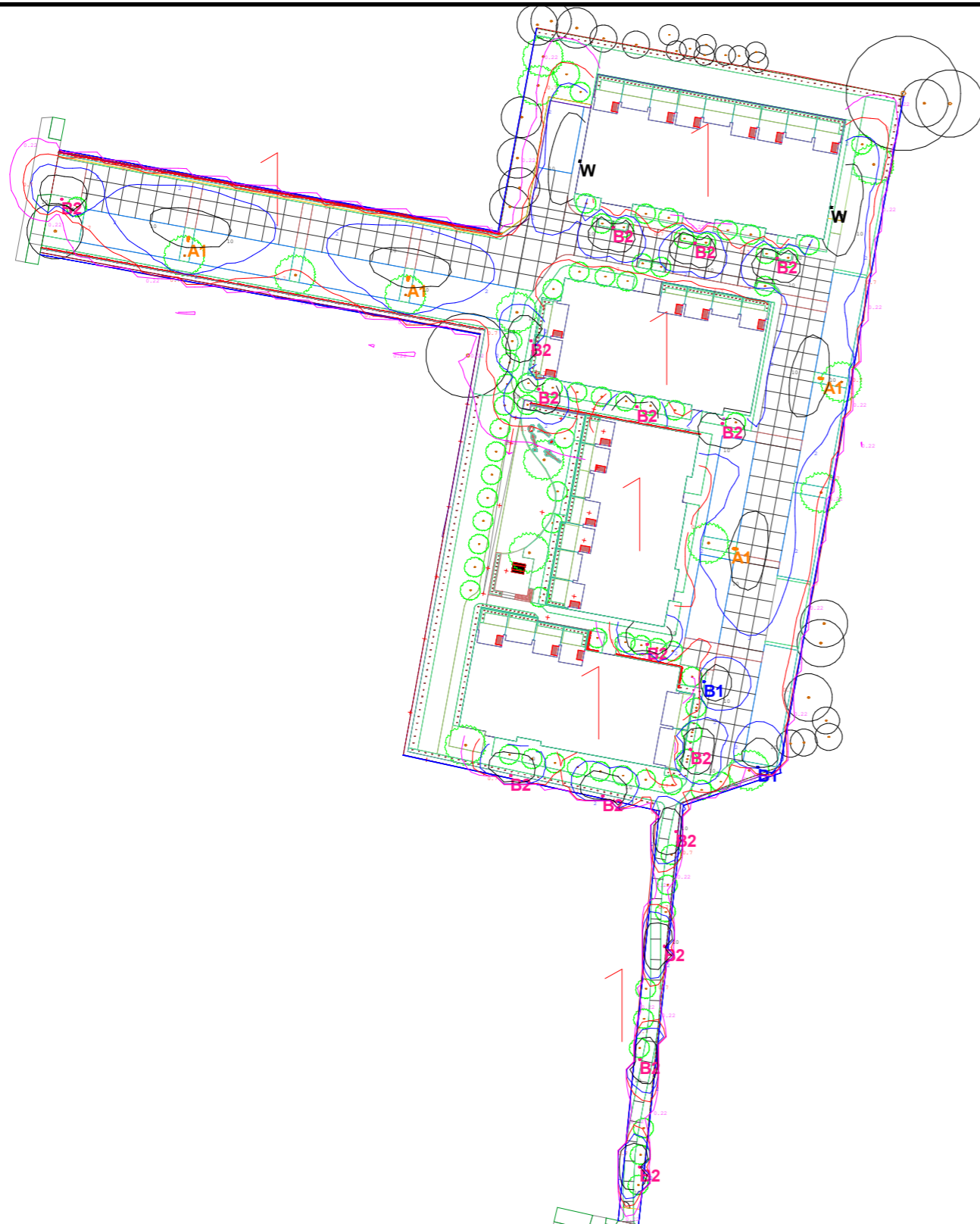
- Night-time vehicle or pedestrian movements - medium
- Risk of crime - low

Luminaires comprise low level LED bollards and pole mounted LED luminaires for pedestrian, vehicle circulation and car park areas.

E24.6.1 Compliance items:

1. Lighting limits have been assessed to Standard AS 4282-1997.
2. A Maintenance Factor of 1.0 has been used in all Obtrusive and Spill Calculations.
3. Lighting category 3 (medium brightness) has been used for the site.
4. Noted regarding artificial light from nearby luminaires, this is not available nor considered applicable to this calculation.
5. Lighting Curfew time noted as commencing at 10.00pm each night until 7.00am the next day.
6. Added illuminance does not exceed 10 lux horizontal and vertical on the adjacent residential
7. Luminaires have been selected, located, aimed, and adjusted to be less than the luminous intensity limit of 1,000cd for the neighbouring residences.
8. Calculation methods have been noted and AGi software has been used to simulate conditions in accordance with AS 4282 Control of obtrusive effects of outdoor lighting.

This been calculated with reasonable care and diligence to the required standards and unitary plan.



GENERAL NOTES:

1. Lighting calculations are based upon initial lamp lumens with a maintenance factor applied & derived in accordance with AS/NZS 1158 as shown below. When calculating Obtrusive and Spill Lighting, calculation is Initial Luminance - LLF 1.000
2. Isolux lines show illuminance values at grade.
3. Luminaires are mounted at the heights & tilts as indicated on the drawing.
4. All luminaires have 0deg upcast (flat glass).
5. All poles are CREE 'PS' Premium Steel, Crown-Weld, base plate mounted & Finished in Powdercoat Black.
6. Lighting calculations are subject to the accuracies & tolerances in accordance with AS/NZS 3827.1:1998 & AS/NZS 3827.2:1998. These accuracies & tolerances include variances in the building dimensions & obstructions, surface finishes, luminaire positioning & aiming, ambient temperature, atmospheric conditions, luminaire photometry, lamp output, lighting design software, electrical supply & instrument calibration.

MAINTENANCE FACTOR (MF)

Lamp Lumen Maintenance Factor (LLMF)
 * LED lamp lumen depreciation after 50,000 hours of operation
 - Cree TD-13 data (in accordance with IESNA TM-21-11 & LM-80-08)
 utilised to obtain this value, 15degC average night time ambient

Luminaire Maintenance Factor (LMF)
 * IP6X Luminaire IP rating
 * Urban Environmental Zone
 * Luminaire cleaning every 72 months
 - Value obtained from table 3.2 of AS/NZS 1158.3.1:2020



Denver Bollard



Cree Energy



Cree XSPW

Luminaire Schedule					
Symbol	Label	Qty	LLF	Arrangement	Description
	A1	4	0.805	Single	Cree Energy UNO- SCP Optic 21W 3000K LED Mounted on Cree 4.5m Pole
	B1	2	0.790	Single	ADLT Holophane Denver Elite Single Lens 23W 3000K Bollard at 1m height
	B2	16	0.790	Single	ADLT Holophane Denver Elite Double Lens 23W 3000K Bollard at 1m height
	W	2	0.790	Single	ADLT Cree XSPW T2M 20W 3000K LED Wall Mounted 3m AFFL

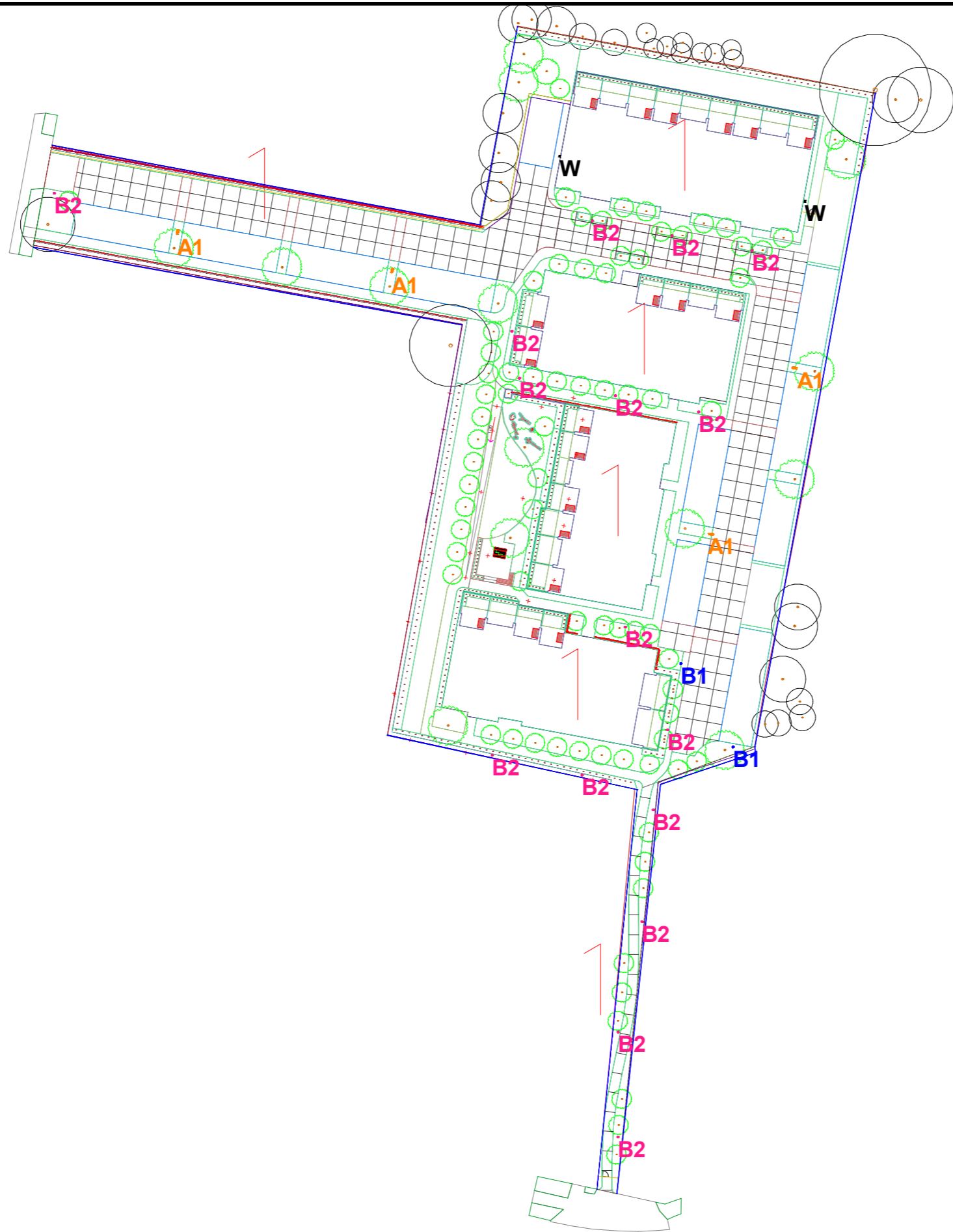
LUX ISOLINE LEGEND

Color	Value
	0.22
	0.7
	2
	10

MAINTAINED ISO

TITLE	96 Beach Haven Road	PROJECT #	Designed	A.D.	REVISION	#	DATE	DESCRIPTION
CLIENT		Page 3 of 6	Checked					
			Date	18/07/2022				
			Scale	N.T.S.				





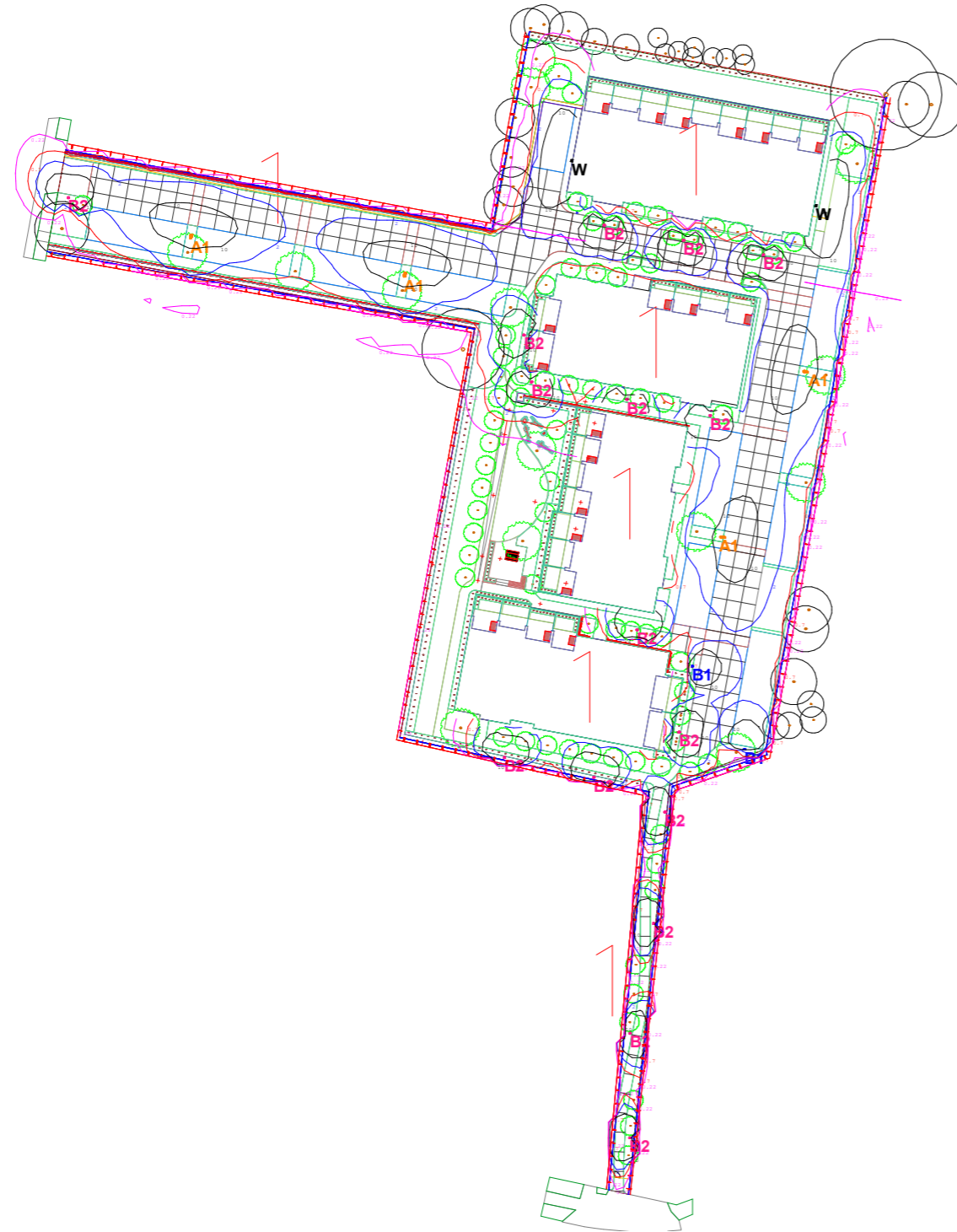
TITLE	96 Beach Haven Road
CLIENT	

PROJECT #	
Page 4 of 6	

Designed	A.D.
Checked	
Date	18/07/2022
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GENERAL NOTES:

1. Lighting calculations are based upon initial lamp lumens with a maintenance factor applied & derived in accordance with AS/NZS 1158 as shown below. When calculating Obtrusive and Spill Lighting, calculation is Initial Luminance - LLF 1.000
2. Isolux lines show illuminance values at grade.
3. Luminaires are mounted at the heights & tilts as indicated on the drawing.
4. All luminaires have 0deg upcast (flat glass).
5. All poles are CREE 'PS' Premium Steel, Crown-Weld, base plate mounted & Finished in Powdercoat Black.
6. Lighting calculations are subject to the accuracies & tolerances in accordance with AS/NZS 3827.1:1998 & AS/NZS 3827.2:1998. These accuracies & tolerances include variances in the building dimensions & obstructions, surface finishes, luminaire positioning & aiming, ambient temperature, atmospheric conditions, luminaire photometry, lamp output, lighting design software, electrical supply & instrument calibration.

MAINTENANCE FACTOR (MF)

Lamp Lumen Maintenance Factor (LLMF)
 * LED lamp lumen depreciation after 50,000 hours of operation
 - Cree TD-13 data (in accordance with IESNA TM-21-11 & LM-80-08)
 utilised to obtain this value, 15degC average night time ambient

Luminaire Maintenance Factor (LMF)
 * IP6X Luminaire IP rating
 * Urban Environmental Zone
 * Luminaire cleaning every 72 months
 - Value obtained from table 3.2 of AS/NZS 1158.3.1:2020

Calculation Summary			
Label	CalcType	Max	Units
Obtrusive 1_Cd_Seg1	Obtrusive - Cd	87	N.A.
Obtrusive 1_Cd_Seg2	Obtrusive - Cd	88	N.A.
Obtrusive 1_Ill_Seg1	Obtrusive - Ill	1	Lux
Obtrusive 1_Ill_Seg2	Obtrusive - Ill	1	Lux
Obtrusive 2_Cd_Seg1	Obtrusive - Cd	85	N.A.
Obtrusive 2_Cd_Seg2	Obtrusive - Cd	86	N.A.
Obtrusive 2_Cd_Seg3	Obtrusive - Cd	99	N.A.
Obtrusive 2_Ill_Seg1	Obtrusive - Ill	2	Lux
Obtrusive 2_Ill_Seg2	Obtrusive - Ill	0	Lux
Obtrusive 2_Ill_Seg3	Obtrusive - Ill	2	Lux
Obtrusive 3_Cd_Seg1	Obtrusive - Cd	130	N.A.
Obtrusive 3_Cd_Seg2	Obtrusive - Cd	147	N.A.
Obtrusive 3_Ill_Seg1	Obtrusive - Ill	1	Lux
Obtrusive 3_Ill_Seg2	Obtrusive - Ill	0	Lux

Luminaire Schedule					
Symbol	Label	Qty	LLF	Arrangement	Description
	A1	4	1.000	Single	Cree Energy UNO- SCP Optic 21W 3000K LED Mounted on Cree 4.5m Pole
	B1	2	1.000	Single	ADLT Holophane Denver Elite Single Lens 23W 3000K Bollard at 1m height
	B2	16	1.000	Single	ADLT Holophane Denver Elite Double Lens 23W 3000K Bollard at 1m height
	W	2	1.000	Single	ADLT Cree XSPW T2M 20W 3000K LED Wall Mounted 3m AFFL

LUX ISOLINE LEGEND

Illuminance (Lux)

Color	Value
	0.22
	0.7
	2
	10

OBTRUSIVE AND SPILL ISO

TITLE	96 Beach Haven Road	PROJECT #	
CLIENT		Page 2 of 6	

Designed	A.D.
Checked	
Date	18/07/2022
Scale	N.T.S.

REVISION	#	DATE	DESCRIPTION



Obtrusive Light - Compliance Report

Residential Terraced Housing & Apartment Zone 3 Medium Brightness Measured at the Boundary - Post Curfew

Filename: 96 Beach Haven Road - Copy

18/07/2022 10:49:07 AM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (9):

<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>
Obtrusive 3_Ill_Seg1	PASS	1
Obtrusive 3_Ill_Seg2	PASS	0
Obtrusive 1_Ill_Seg1	PASS	1
Obtrusive 1_Ill_Seg2	PASS	1
Obtrusive 1_Ill_Seg3	PASS	2
Obtrusive 2_Ill_Seg1	PASS	2
Obtrusive 2_Ill_Seg2	PASS	0
Obtrusive 2_Ill_Seg3	PASS	2
Obtrusive 2_Ill_Seg4	PASS	1

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 1000 Cd

Calculations Tested (9):

<u>Calculation Label</u>	<u>Test Results</u>
Obtrusive 3_Cd_Seg1	PASS
Obtrusive 3_Cd_Seg2	PASS
Obtrusive 1_Cd_Seg1	PASS
Obtrusive 1_Cd_Seg2	PASS
Obtrusive 1_Cd_Seg3	PASS
Obtrusive 2_Cd_Seg1	PASS
Obtrusive 2_Cd_Seg2	PASS
Obtrusive 2_Cd_Seg3	PASS
Obtrusive 2_Cd_Seg4	PASS

TECHNICAL CALCULATION NOTES - (CATEGORY P LIGHTING)

TABLE 3.7 - VALUES OF LTP FOR OUTDOOR CARPARKS (INCLUDING ROOF-TOP CARPARKS) - AS/NZS 1158.3.1:2020				
1	2	3	4	5
Lighting Subcategory	Light Technical Parameters (LTP)			
	Average Horizontal Illuminance (a,b)	Point Horizontal Illuminance (a,b,c)	Illuminance (Horizontal) Uniformity (c) Cat. P	Point Vertical Illuminance (a,b)
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	-
PCD (d)	-	>14 and >(Eph) (d)	-	-
PCX (e)	21	5	8	-

- a These values are maintained. See Clause 3.2 pertaining to lumen derating values for non-white light sources.
- b Conformance is achieved by being greater than or equal to the applicable table value.
- c Conformance is achieved by being less than or equal to the applicable table value.
- d Conformance of 50% of Eph shall also be demonstrated over an area of 5m either side of the pathway - where a verge exists - or up to any structure/fence/property boundary that forms the edge of the path, unless deemed otherwise by the relevant authorities (see Clause 3.1.3.5).
- e For luminaires with mounting heights of 1.5m or less, the Epv values need not be applied.

**Table 2.5 LIGHTING CATS FOR OUTDOOR CAR PARKS
(INCLUDING ROOF-TOP CAR PARKS)**

Type of area	Selection Criteria		
	Night time vehicle and/or pedestrian movements	Fear of crime	
Parking spaces, aisles and circulation roadways	High	High	PC1
	Medium	Medium	PC2
	Low	Low	PC3
Designated parking spaces specifically intended for people with disabilities	N/A	N/A	PCD
For any designated areas for pedestrians to cross	N/A	N/A	PCX

Illuminance Calculation Summary						
Description	CalcType	Units	Average	Max	Minimum	Uniformity
Carpark 1 - PC3	Illuminance	Lux	5.92	27.5	1.0	4.65
Carpark 2 - PC3	Illuminance	Lux	3.96	56.6	0.7	14.29
Carpark 3 - PC3	Illuminance	Lux	3.51	15.5	0.7	4.42
JOAL - PR3	Illuminance	Lux	6.34	50.59	0.53	7.98
Pathway - PP4	Illuminance	Lux	13.06	55.39	0.25	4.24

TITLE	96 Beach Haven Road	PROJECT #	Designed	A.D.	REVISION	#	DATE	DESCRIPTION
CLIENT			Checked					
			Date	18/07/2022				
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TECHNICAL CALCULATION NOTES - (CATEGORY P LIGHTING)

TABLE 3.3 - VALUES OF LIGHT TECHNICAL PARAMETERS FOR ROADS IN LOCAL AREAS

1	2	3	4
Lighting Subcategory	Light Technical Parameters (LTP)		
	Average Horizontal Illuminance (a,b)	Point Horizontal Illuminance (a,b,c)	Illuminance (Horizontal) Uniformity (c) Cat. P
PR1	7	2	8
PR2	3.5	0.7	8
PR3 (e)	1.75	0.3	8
PR4 (d,e)	1.3	0.22	8
PR5 (d,e)	0.85	0.14	10
PR6 (d)	0.7	0.07	10

- a These values are maintained.
- b Conformance is achieved by being greater than or equal to the applicable table value.
- c Conformance is achieved by being less than or equal to the applicable table value.
- e See Clause 3.2 pertaining to lumen derating values for non-white light sources.
- d When the luminaires are to be supported by an existing electricity reticulation poles, the subcategories PR3, PR4 and PR5 may be reduced to the next lower subcategory PR4, PR5 and PR6 respectively

Table 2.1 LIGHTING CATS FOR ROAD RESERVES IN LOCAL AREAS

Type of area	Selection Criteria			
	pedestrian/cycle activity	Fear of crime	Need to enhance amenity	
Collector roads or non-arterial roads which collect and distribute traffic in an area, as well as serving abutting properties	N/A	High	N/A	PR1
	High	Medium	High	PR2
	Medium	Low	Medium	PR3 or PR4
	Low	Low	Low	PR5
Local roads or streets used primarily for access to abutting properties, including residential, commercial and industrial	N/A	High	N/A	PR1
	High	Medium	High	PR2
	Medium	Low	Medium	PR3 or PR4
	Low	Low	Low	PR5
	N/A	N/A	N/A	PR6
Common areas, forecourts of cluster housing	N/A	High	N/A	PR1
	High	Medium	High	PR2
	Medium	Low	Medium	PR3 or PR4
	Low	Low	Low	PR5

Description	CalcType	Units	Average	Max	Minimum	Uniformity
Carpark 1 - PC3	Illuminance	Lux	5.92	27.5	1.0	4.65
Carpark 2 - PC3	Illuminance	Lux	3.96	56.6	0.7	14.29
Carpark 3 - PC3	Illuminance	Lux	3.51	15.5	0.7	4.42
JOAL - PR3	Illuminance	Lux	6.34	50.59	0.53	7.98
Pathway - PP4	Illuminance	Lux	13.06	55.39	0.25	4.24