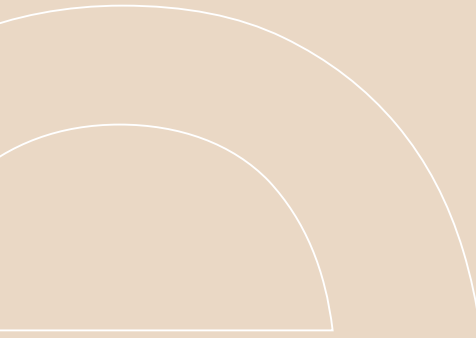




APPENDIX 24

Visual Lighting Advice : Lucid Consulting



MEMORANDUM

To: Ekistics

Attention: Beck Thomas

From: Galvin Chuong Reference: LCE21310-005A

Project Name: Barossa Hotel

Subject: Visual Lighting Advice Date: 04/08/2025

In response to Ekistics' request for an assessment against the relevant carpark lighting standards and obtrusive lighting requirements, we provide the following analysis.

The project scope includes designing external lighting that complies with the Australian Standard requirements. Based on preliminary landscape drawings received by LANDSKAP it is understood that this may include:

- Wayfinding signage
- Tree uplighting
- Totem lighting
- Carpark and pathway lighting
- Various feature lighting which is understood to likely include façade illumination.

RELEVANT ACTS, COES AND STANDARDS

The Australian Standards that are considered for the design/installation are as follow:

- AS1158.3.1:2020 - Pedestrian Area (Category P) Lighting – Performance and Design Requirements
- AS4282:2023 – Control of Obtrusive Effects of Outdoor Lighting
- Department of Climate Change, Energy, the Environment and Water - National Light Pollution Guidelines for Wildlife

AS1158.3.1:2020 LIGHTING SUBCATEGORY SELECTIONS

The key purpose of the lighting based Australian Standards are to facilitate safe movement and reduce fear of crime at night.

The lighting requirements in the relevant Australian standards listed above are categorised into specific areas defined by functionality e.g. Roadways, pathways. These areas are then further subcategorised with varying levels of required Light Technical Parameters (LTP), which are dependent on the fear of crime and volume of traffic.

The typical Light Technical Parameters are defined below:

- Average Horizontal Illuminance (\bar{E}_h) – Average of all horizontal point of illuminance across the horizontal plane, measured in lux.
- Point Horizontal Illuminance (E_{Ph}) – Minimum horizontal point of illuminance across the horizontal plane, measured in lux.
- Illuminance (Horizontal) Uniformity (U_{E2}) – The ratio of the maximum point of horizontal illuminance to the average horizontal illuminance (U_{E2}/\bar{E}_h).
- Point Vertical Illuminance (E_{Ph}) – Minimum illuminance calculated in a vertical orientation (in a specific direction). This is typically calculated at 1.5 m above ground level, measured in lux.

The demonstration of compliance to these LTP's can be achieved by using lighting simulation software such as AGi32.

The relevant subcategories and corresponding Lighting Technical Parameters can be seen below highlighted in yellow. The lighting subcategories have been selected based on a low level of traffic/activity and a low level for fear of crime.

Pathways

1	2	3	4	5
Type of pathway		Selection criteria ^{a,b,c}		Applicable lighting subcategory
General description	Basic operating characteristics	Pedestrian/cycle activity	Fear of crime	
Pedestrian, cycle, etc. orientated pathway, e.g. footpaths, including those along local roads ^d and arterial roads ^e , walkways, lanes, park paths, cyclist paths	Pedestrian, cycle, mobility devices, scooter, etc. traffic only	N/A	High	PP1 ^c
		High	Medium	PP2 ^c
		Medium	Medium	PP3
		Medium	Low	PP4
		Low	Low	PP5

1	2	3	4	5	6
Lighting sub-category	Light technical parameters				
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2}) (max/avg)	Point vertical illuminance ^{a,b} (E_{pv})	Pathway Surround Illuminance ^{a,b,d} (E_{ps})
	lx	lx		lx	lx
PP1	10	2	5	1	1
PP2	7	1	5	0.3	0.5
PP3	3	0.5	5	0.1	0.25
PP4 ^f	1.5	0.25	5	0.05 ^e	0.12
PP5 ^f	0.85	0.14	5	0.02 ^e	0.07

Figure 1 AS1158.3.1 Pathway Lighting Categorisation and Associated LTP.

Car Parks

Note PCD requirements apply for any accessible carparks.
PCX requirements apply for any marked pedestrian crossings.

1	2	3	4
Type of area	Selection criteria ^{a,c}		
	Night time vehicle and/or pedestrian movements	Fear of crime	Applicable lighting subcategory ^b
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
Designated areas for pedestrians to cross circulation roadways and access roadways ^a	N/A	N/A	PCX

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2}) (max/avg)	Point vertical illuminance ^{a,b} (E_{pv})
	lx	lx		lx
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	—
PCD ^d	—	≥ 14 and $\geq (\bar{E}_h)^d$	—	—
PCX ^e	—	≥ 5 and $\geq (\bar{E}_h)^e$	—	—

Figure 2 AS1158.3.1 Carpark Lighting Categorisation and Associated LTP.

AS4282:2023 REQUIREMENT ANALYSIS

AS/NZS 4282:2023 is the Australian Standard providing guidance on obtrusive lighting. The standard is not mandatory, but it is often necessary to comply for the purposes of Council planning permits and referenced within lighting standards.

The standard defines different classifications for external lighting installations, depending on their use, and proximity to commercial and residential areas.

The standard is written to provide design criteria and guidance to designers to minimise light spill outside of the venue, reduce light pollution, and disruption to neighbouring residents and road users.

As the location of the site is within a sparsely inhabited semi-rural area and is understood to have no existing street lighting along Hoffnungsthal Road and Menzel Road, the surrounding area would be considered Zone A2 – low district brightness condition. Refer table below for relevant extract from AS4282.

Zones	Maximum vertical illuminance (E_v) lux		Threshold increment (TI)		Upward Light Ratio
	Non-curfew	Curfew	Maximum TI %	Default Adaptation level (L_{ad}) cd/m ²	Maximum ULR _S or ULR _L
A0	0*	0.0	N/A	N/A	0.00
A1	2	0.1	20	0.1	0.00
A2	5	1	20	0.2b	0.01
A3	10	2	20	1	0.02
A4	25	5	20	5	0.03
TV	N/A	N/A	20	10	0.08

^a For A0, E_v shall be as close to zero as practicable without impacting safety considerations.
^b For an internally illuminated sign in a A2 zone, $L_{ad} \leq 0.25$ cd/m²

Zone	Luminous intensity (I), cd		
	Non-curfew Level 1 (L1)	Non-curfew Level 2 (L2)	Curfew
	A0	See Note	See Note
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	165 000	0

NOTE For A0, I shall be as close to zero as practicable without impacting safety considerations.

Application conditions	Environmental zones				
	A0	A1	A2	A3	A4
See Clause 3.3.3	0.1	50	150	250	350

Figure 3 AS4282:2023 Obtrusive Lighting Categorisation and Associated LTP.

The control of obtrusive lighting shall be particularly applicable for adjacent roadways Hoffnungsthal Road and Menzel Road, as well as what is understood to be accommodation across Hoffnungsthal Road.

Based on the nature of the site it is also assumed that the site will operate in curfew hours, which require more stringent Light Technical Parameters in accordance with AS4282 per Figure 3 above.

Demonstration for compliance to the above LTP is achieved through desktop photometric simulation calculations, such as industry standard software AGI32. This requires the finalisation of the lighting design.

Provided the external lighting design is installed in alignment with the below limitations, it is anticipated that compliance with AS4282 is achievable.

- Externally lit signs shall be lit from the top in order to control upwards waste light.
- Luminaire selections to ensure beam angle cut off below the horizontal.
- Beam type of luminaires to be selected to suit the functional illumination area.

For illumination of a vertical surface including but not limited to façade uplighting, signage illumination, tree uplighting the following control measures shall be implemented to limit the spill light into the sky.

- Capturing light overshoot with an obstruction such as canopy or ledge.
- Lighting from above where possible.
- Increased setbacks from vertical surface with use of narrow beam angled luminaires.
- Narrow beam luminaires where maintaining illumination at higher up objects/structures.

It is suggested that an angle of incident of 55 degrees shall be used for the most efficient solution for illumination of vertical surfaces. This aiming angle in consideration with the beam angle of luminaire shall be used to optimally determine the setback distance of installation.

ADDITIONAL NATIVE WILDLIFE CONSIDERATIONS

With reference to the National Light Pollution Guideline for Wildlife, there may be need to provide an overall lighting design that is sympathetic to the needs of native wildlife and will minimise the impact of light pollution on adjoining areas. It is important that the external lighting design for the development:

- Does not disrupt wildlife within important habitat.
- Allows wildlife to undertake critical behaviours such as foraging, reproduction, and dispersal.

Lighting design will aim to maintain darkness across the majority of the site and minimise any large areas being illuminated for extended periods at night times.

Additional measures that are proposed to be implemented to reduce the impact of lighting on native wildlife:

- External lighting will consist of warmer lighting temperatures (below 3000K) with low amounts of short wavelength (blue) light content. PC amber lighting may be considered.
- Adaptive lighting controls employed in pedestrian areas with presence detection and the ability to dim or completely turn off lighting when areas are not being utilised or during post-curfew operational hours.
- Any lighting long or in close proximity to the building will be placed with consideration for external reflective building elements to avoid inadvertent transmission through reflection.
- Lower intensity / output lighting will be employed in lieu of high output area lighting and where possible located in close proximity to ground level such as long vehicle movement areas.

The following are intended to provide a visual representation of the types of lighting solutions that will be employed to address the concerns relating to native wildlife raised above:



Example of a low output ground light



Example of a warm colour with low content short-wavelength bollard light

The proposed external lighting and control systems serving the Barossa Hotel development shall be based on the above technical content of this memorandum to ensure compliance with the legislative requirements for safe movement while minimising obtrusive lighting to neighbours and the potential effect on native wildlife.

Through implementation of the recommendations in this memorandum the proposed lighting strategy will be sympathetic to the needs of native wildlife so that darkness remains across the majority of the site. Final photometric simulation calculations shall be conducted to verify the above once the external lighting arrangement is finalised.

Trusting the above is satisfactory for the purposes of development application process.

If you have any queries, please do not hesitate to contact the undersigned.

Regards,

Galvin Chuong



Electrical Engineer