75-81 Murradoc Rd Drysdale

Light Spill Assessment

Bellarine Commercial Developments Pty Ltd

142A Fyans Street
South Geelong, VIC 3220

Prepared by:

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Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Bellarine Commercial Developments Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. SLR may have used AI in the preparation of this document.

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Executive Summary

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Bellarine Commercial Developments Pty Ltd to undertake a lighting impact assessment as part of the planning application to support the development of a service station and gym at 75-81 Murradoc Road, Drysdale, Victoria.

The site will consist of two developments, a service station at the southern end of the side and a gym on the mid-section of the site. The northern part of the site will be vacant at this stage. The site is zoned as Commercial within the Greater Geelong City Local Government Area.

The site is proposed to operate 24 hours a day meaning that the site would be operational during the curfew times and the relevant requirements of AS/NZS 4282:2023 would need to be applied.

The following comments have been made regarding the lights and signage for the proposed development:

- There are only three dwellings close to the site while all other directions have commercial developments.
- The majority of the lighting is toward the southern half of the overall site and away from the nearest residential dwellings.
- Signage generally faces away from the residential dwellings.

Taking the proposed design, surrounding sensitive receivers and general location into account it is SLR's opinion based on previous experience that the proposed site is capable of meeting the AS/NZS 4282:2023 requirements for surrounding residential dwellings. To achieve this the following recommendations should be incorporated into the detailed lighting design:

- Pole lighting should face inward toward the middle of the site. Specifically pole lighting for the gym site should face toward the south.
- Pole lighting should be set at the lowest possible mounting height.
- Use luminaires with minimal backlight rating.
- Lighting to be baffled and shielded as per the town planning reports.
- Site lighting should have an upward light ratio of zero meaning that no light is emitted above the horizontal.
- Lights placed on the outside of the building should be kept as low as possible.
- Lighting should be recessed into awnings or canopies where possible.
- Illuminated surfaces (signage) will have an average maximum luminous intensity of 350 Cd/m^2.

The conclusions of the current study can be verified using a lighting model once the lighting design and specifications have been finalised.

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Figures

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Bellarine Commercial Developments Pty Ltd to undertake a lighting impact assessment as part of the planning application to support the development of a service station and gym at 75-81 Murradoc Road, Drysdale, Victoria.

This will be a qualitative desktop assessment focusing on the potential impacts arising from the proposed site lighting and signage. The light sources will be assessed to the AS/NZS 4282:2023 Control of the Obtrusive effects of outdoor lighting.

1.1 Site and Surrounds

The subject site is located at 75-81 Murradoc Road, Drysdale, approximately 250 m west of the Drysdale / Portarlington Road.

The site is located in a Commercial 2 zone and is currently undeveloped.

Surrounding uses include:

- North - residential dwellings on large, rural allotments, closest dwelling being 22-24 Sproat Street Drysdale (land zoned RLZ).
- East – vacant land and commercial development (land zoned CZ2).
- South - Murradoc Road and commercial development beyond that (land zoned CZ2).
- West – derelict dwelling at the southern end of 65-73 Murradoc Road and commercial development further west (all land to the west is zoned CZ2).
- North west – residential dwelling at 19 Sproat Street, Drysdale (land zoned GRZ1).

Figure 1 Aerial view of Site

Image: Nearmap (March 2026)

1.2 Proposed Development Description

The proposal is for:

- A 24-hour service station at the southern end of the side, inclusive of:
  - A convenience store
  - Convenience restaurant (93 m²)
  - Carwash with 3 manual bays and 1 auto wash
- A 24-hour gym on the mid-section of the site, inclusive of:
  - 750 m², 6m high single level building housing all gym activities
  - Carparking to the north and west sides of the building
  - Individual and group training activities.
  - Amplified music within the gym.

  There are no external exercise areas proposed for the gym.

The nearest residential dwellings that may be affected by light spill are to the north and northwest of the subject site. The dwelling at 65-73 Murradoc Road has not been treated as sensitive due to its derelict status and the understanding that there are planning approvals for commercial development at that site.

Detailed plans of the proposed uses are provided in **Figure 2** and **Figure 3**.

Figure 2 Plan of Proposed Service Station

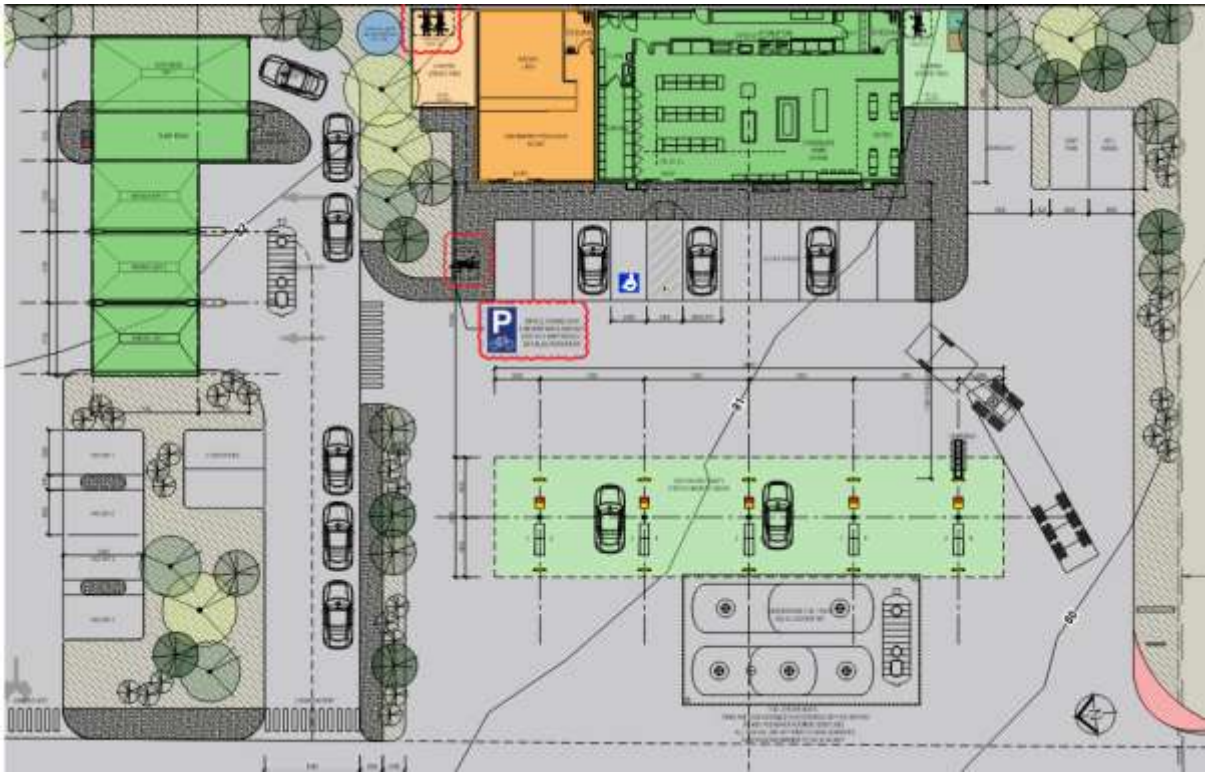


Image: J.R. Design Australia Pty Ltd Town Planning drawing TP.01B dated 29/01/2026

Figure 3 Plan of proposed gym

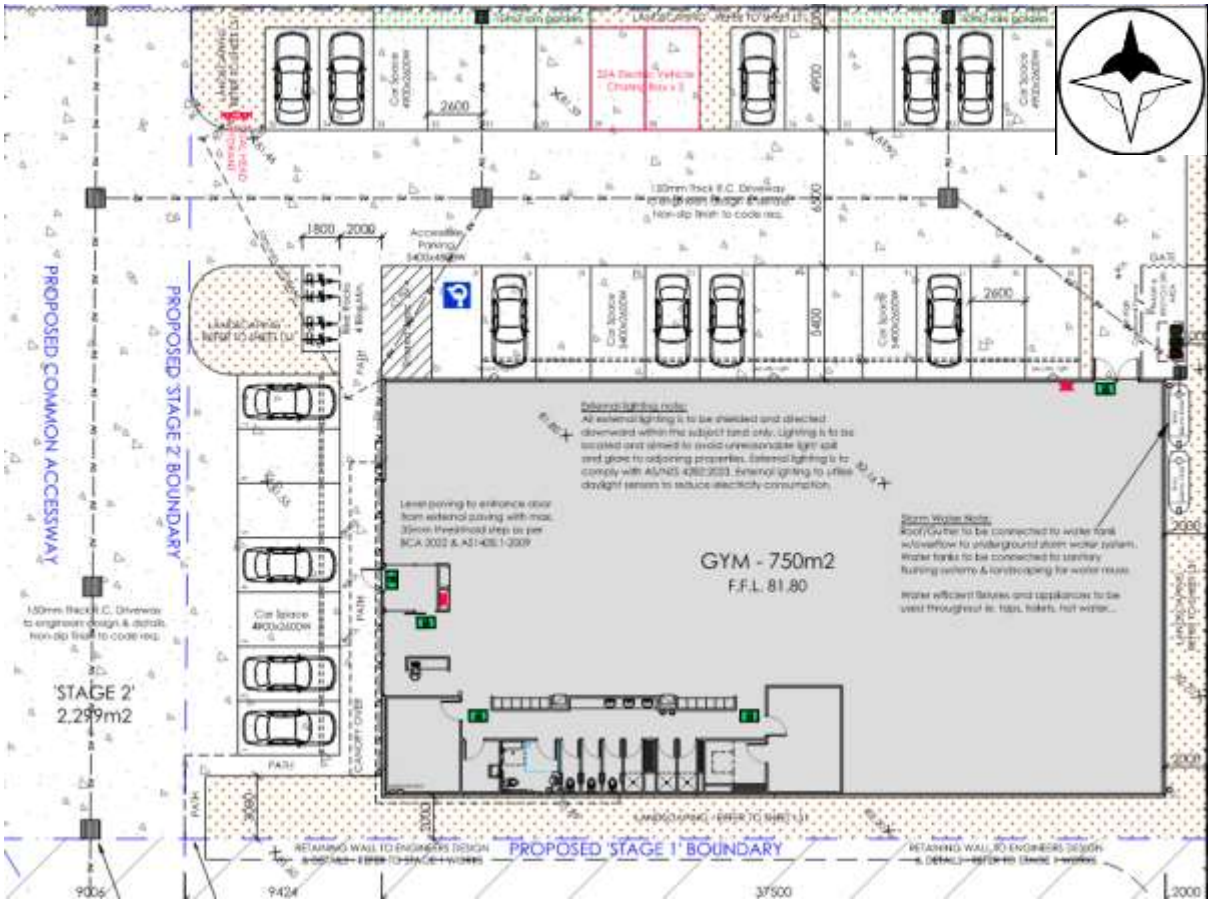


Image: Briclok Town Planning drawing TP3 dated 27/04/2026

2.0 Lighting and Light Spill

2.1 Methodology

SLR has reviewed the proposal in relation to compliance with AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting*

A description of the common terminology used in this lighting study, taken from AS/NZS 4282:2023, is shown in **Table 1.**

Table 1 Lighting Terminology (Consistent with AS/NZS 4282:2023)

Obtrusive light	Spill light which, because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information, eg traffic lights.
Spill light	Light emitted by a lighting installation which falls outside the boundaries of the property on which the installation is sited.
Residential property	Land upon which a dwelling exists or may be developed, eg land zoned for residential development.
Dwelling	A building in which people normally reside, especially during the hours of darkness, eg house, hotel, motel, hospital.
Illuminance	The luminous flux arriving at a surface divided by the area of the illuminated surface. Unit: lux(lx); 1 lx = 1 lm/m^2
Luminous intensity	The concentration of luminous flux emitted in a specific direction. Unit: candela (Cd).
Luminous flux	The measure of the quantity of light. For a lamp or luminaire it normally refers to the total light emitted irrespective of the directions in which it is distributed. Unit: lumen (lm).
Luminaire	Apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except for the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary circuit auxiliaries together with the means for connecting them to the electrical supply.
Glare	Condition of vision in which there is a discomfort or a reduction in the ability to see, or both, caused by an unsuitable distribution or range of luminance, or to extreme contrast in the field of vision Disability Glare – Glare that impairs the visibility of objects without necessarily causing discomfort. Discomfort Glare – Glare that causes discomfort without necessarily impairing the visibility of objects.

2.2 Light Spill Effects

The effect of light spill from outdoor lighting impacting on residents, transport users, transport signalling systems and astronomical observations is governed by the Australian Standard: *AS/NZS 4282-2023 Control of the Obtrusive Effect of Outdoor Lighting.*

The obtrusive effects of light spill are due both to an increase in general illuminance that can lead to sleep deprivation, and from the direct view of the light source that can cause glare issues.

The adverse effects of light spill from outdoor lighting are influenced by a number of factors:

- The topography of the area.
  - Light spill is more likely to be perceived as obtrusive if the lighting installation is located higher up than the observer. Lighting installations are usually directed towards the ground, and an observer would hence have a direct view of the luminaire.
- The surrounding area.
  - Hills, trees, buildings, fences and general vegetation have a positive effect by shielding the observer from the light installation.
- Pre-existing lighting in the area.
  - Light from a particular light source is seen as less obtrusive if it is located in an area where the lighting levels are already high, eg in cities. The same lighting installation would be seen as more bothersome in a quieter and likely darker residential area.
- The zoning of the area.
  - A residential area is seen as more sensitive compared to commercial areas where high lighting levels are seen as more acceptable.

Typical illuminance levels for a variety of circumstances are given in **Table 2** for comparison.

Table 2 Typical Illuminance Levels for Various Scenarios

Lighting Scenario	Horizontal Illuminance (lux)
Moonless overcast night	0.0001
Quarter Moon	0.01
Full Moon	0.1
Twilight	10
Indoor office	300
Overcast day	1,000
Indirect sunlight clear day	10,000-20,000
Direct sunlight	100,000-130,000

3.0 Site Lighting and Requirements

3.1 Light Sources

The lighting for the two sites generally falls into the following categories:

- Pole mounted light fittings to provide adequate lighting for the safe movement of pedestrians and vehicles through the car park areas and vacuum bays.
- Underside canopy lighting for the service station filling area and carwash bays.
- Wall lighting attached to the service station buildings or gym building
- Signage Lighting will be at the vehicle ingress and egress locations, around the filling area canopy, on the buildings mainly facing west and south and used for the pricing pylon.

Figure 4 Assumed Lighting Fixtures – Service Station

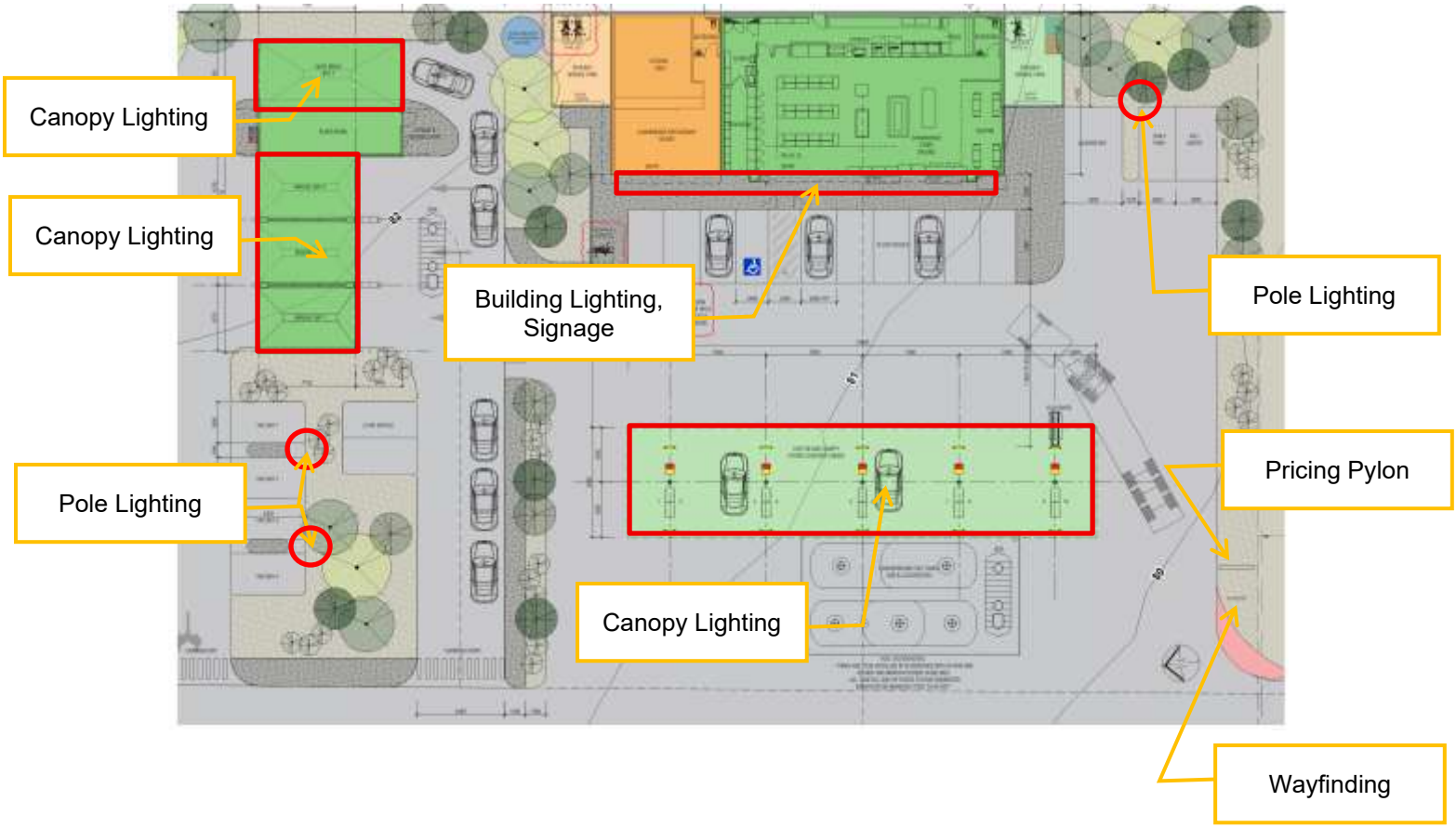
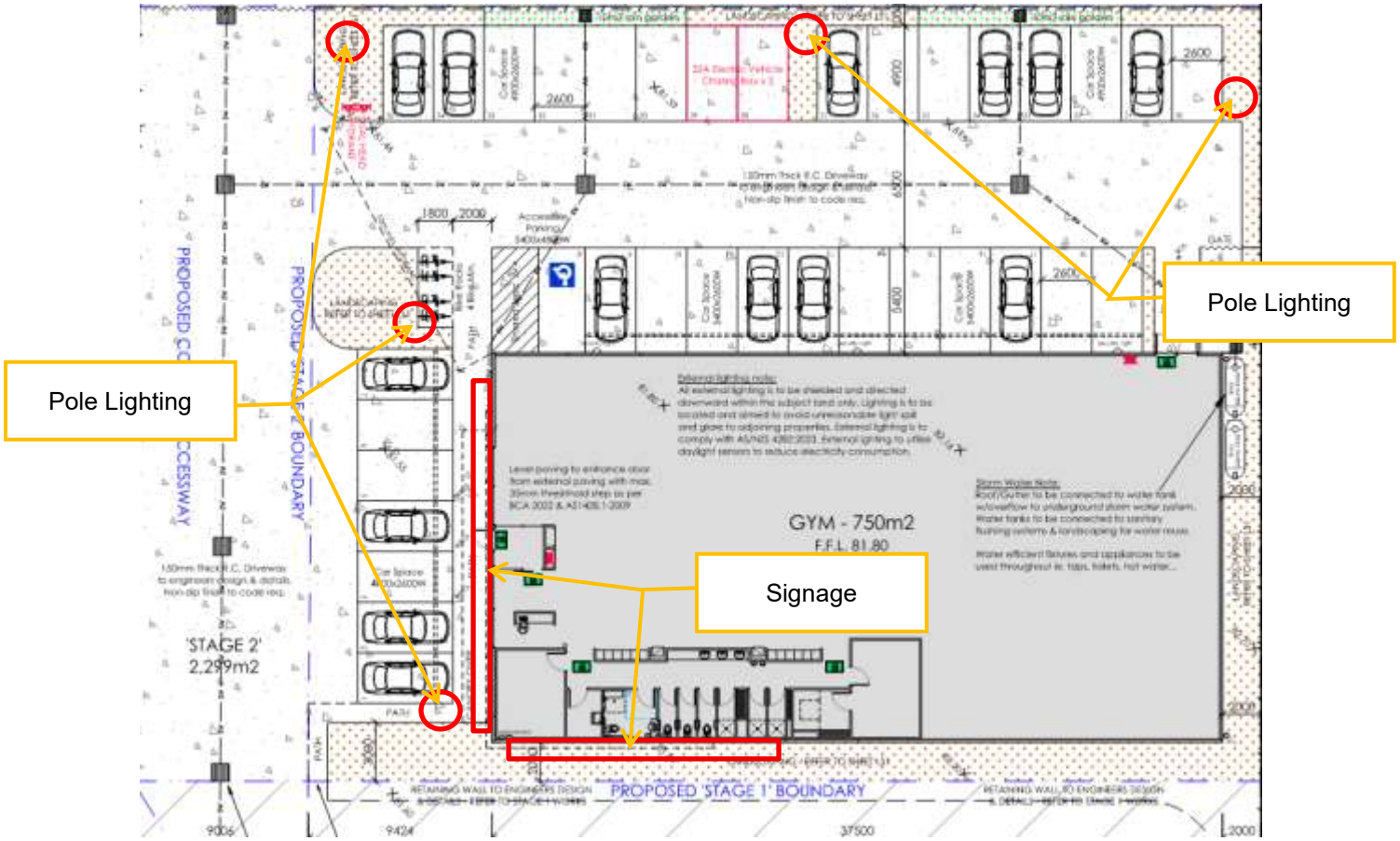


Figure 5 Assumed Lighting Fixtures – Gym



3.2 Time of Operation

Both sites are proposed to operate from 24 hours a day meaning that lighting would be operational during the curfew times and the relevant requirements of AS/NZS 4282:2023 would need to be applied. Curfew hours as defined in the standard run from 11:00 pm till 6:00 am.

3.3 Area Zoning

Initially, the environmental zone of the site and surrounding area should be determined.

This is defined in Table 3.1 of AS/NZS 4282-2023.

As outlined in **Section 1.1** the site sits within a Commercial 2 Zone, with commercial, residential and rural living zones surrounding it. This would result in the following environmental zone being applied.

- A4 (High District Brightness) for commercial areas and residential areas abutting commercial areas.

3.4 Light Spill

The maximum recommended values of light technical parameters for the control of obtrusive lights are given in **Table 3**.

Table 3 Recommended Maximum Values of Light Technical Parameters (AS4282:2023 Table 3.2)

Light Technical Parameter	Time of Operation	Zone "A4"	Zone "A3"	Zone "A2"	Zone "A1"	Zone "A0"
Illuminance in vertical plane (E_v)	Pre-curfew hours	**25 lx**	10 lx	5 lx	2 lx	ALARP [2]
	Curfew hours [1]	**5 lx**	2 lx	1 lx	0.1 lx	0 lx
Luminous Intensity emitted by luminaires (I)	Pre-curfew hours	**25,000 Cd**	12,500 Cd	7,500 Cd	2,500 Cd	ALARP [2]
	Curfew hours [1]	**2,500 Cd**	2,500 Cd	1,000 Cd	500 Cd	0 Cd

Zone A0	"Intrinsically Dark", e.g. UNESCO Starlight Reserve; IDA Dark Sky Parks; major optical observatories; no road lighting, unless specifically required by the relevant road controlling authority.
Zone A1	"Dark", e.g. relatively uninhabited rural areas; no road lighting, unless specifically required by the relevant road controlling authority.
Zone A2	"Low District Brightness", eg sparsely inhabited rural and semi-rural areas.
Zone A3	"Medium District Brightness", eg suburban areas in towns and cities
Zone A4	"High District Brightness", eg town and city centres and other commercial areas; residential areas abutting commercial areas

Note 1 Curfew Hours = 11:00 pm to 6:00 am

Note 2 ALARP = as low as reasonably practical (as close to zero as possible)

With regard to signage the maximum average luminance of surfaces is to be 350 candela per square metre (Cd/m^2) for Zone A4 which is taken from Table 3.4 of AS 4282:2023.

Limits for luminous intensity for curfew hours apply in directions where views of bright surfaces of luminaires are likely to be troublesome to residents from positions where such views are likely to be maintained.

Limits for luminous intensity for pre-curfew hours apply to each luminaire in the principal plane, for all angles at and above the control direction.

The relevant limits in **Table 3** are:

- Zone A4
  - 25 lux Pre-Curfew
  - 5 lux for Curfew times

The following guidance is made relevant to the recommended illuminance limits:

- The vertical illuminance limits for curfew hours apply in the plane of the windows of habitable rooms or dwellings on nearby residential properties when they are less than 10 m from the property boundary.
  - This refers to windows looking out toward the site as opposed to a horizontal measurement, which would be parallel to the ground looking up.
  - If the facades are more than 10 m from the boundary, the vertical illuminance limits will apply at that 10 m line, facing toward the site.

- The vertical illuminance criteria for pre-curfew hours apply at the boundary of nearby residential properties in a vertical plane parallel to the boundary.
    - Values given are for the direct component of illuminance, i.e. no reflected light is considered.

4.0 Sensitive Receivers

The following surrounding dwellings have been identified.

Table 4 Nearest Residential Dwellings

Project Area	Approximate Street view image from Site (Source: Nearmap)	Address	Notes
North		22-24 Sproat Road	Multiple single level dwellings
North West		19 Sproat Road	Single level dwellings

5.0 Assessment

5.1 General Comments

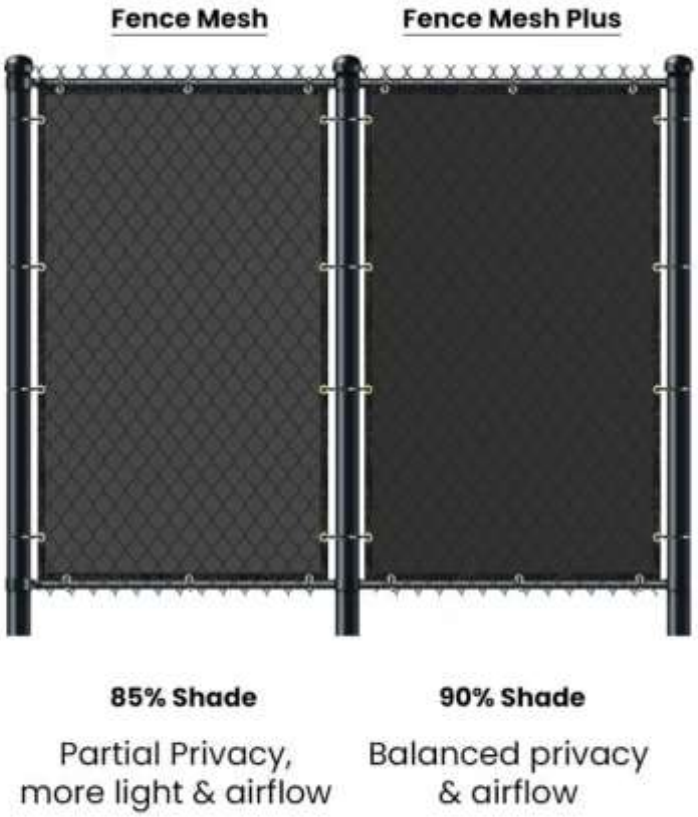
The following general notes have been made regarding the site with its expected lighting and signage:

- The entrance is set to the south of the overall site on Murradoc Road where vehicles exiting the site are not expected to affect residential dwellings.
- There is a vacant future development site at the rear of the property. This gives a minimum of approximately 44 metres between any lighting fixtures and the dwellings of 22-24 Sproat Road, and an approximate minimum of 95 metres to 19 Sproat Road. At 95 metres there will be no light spill above the requirements.
- The property neighbouring 19 Sproat Road has also been considered as it is zoned as residential. However, due to the distance from the proposed site, orientation and lack of residential dwellings there is not expected to be any light spill above the requirements of AS/NZS 4282:2023.
- The town planning report for the gym calls for the site lighting to be baffled shielded and directed downward. The majority of the pole lighting will be on the north side of the gym site.
- The town planning report for the service station calls for the site lighting to be baffled. Pole lighting for the service station will be isolated to the parking areas on the north side and southeast of the site.
- There appears to be significant existing vegetation along the northern boundary of the overall site. This will provide screening to the dwellings at 22-24 Sproat Road.
- Carwash and filling area lighting is expected to be recessed into the canopies which will help to reduce light spill. Light is expected to be well contained by the auto-wash bay.
- Signage for the gym faces west and south. Assuming this meets the limit for luminous surfaces of 350 Cd/m^2 (worst case scenario) it is not expected to cause illuminance above the required limit at the facades of surrounding dwellings.
- Signage for the service station is mainly on the buildings, around the canopy and on the Murradoc Road side of the site. Assuming this meets the limit for luminous surfaces of 350 Cd/m^2 (worst case scenario) it is not expected to cause illuminance above the required limit at the facades of surrounding dwellings.
- Overall, the gym building will provide a shielding effect for the service station lighting

5.2 Vehicle Headlights

Vehicles heading north on the common accessway are likely to have their headlights briefly aimed in the direction of the dwellings at 22-24 Sproat Road as they enter the gym carpark and come to a stop in the parking spaces. As headlights are designed with driver and pedestrian safety in mind rather than minimising light spill there is a low risk they could impact on the facades of the dwellings at 22-24 Sproat Road. The current proposal is for a 2 metre high black PVC chainmesh fence to the northern side of the gym site with a 90% shade cloth attached (refer **Figure 6**). In conjunction with the distance to the facades there is not expected to be any light spill above the requirements of AS/NZS 4282:2023.

Figure 6 Fence Design



6.0 Recommendations

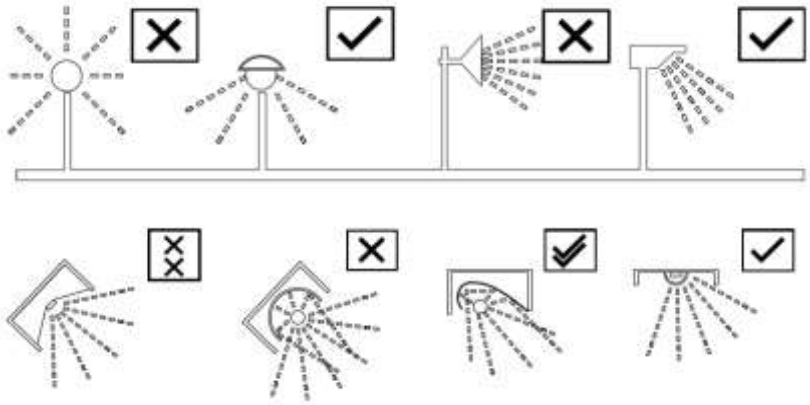
The lighting design should aim to mitigate any light spill from the proposed development to achieve the best performance outcome for the site's use while having a minimal impact on the surroundings. The following recommendations should be kept in mind when producing the detail design.

6.1 General Mitigation

The following general mitigation methods should be incorporated into the detail design.

- In general AS/NZS 4282:2023 has the following recommendations that should be applied when designing outdoor light to minimise any adverse effect of the light installation:
  - Direct lights downward as much as possible.
  - Use luminaires that are aimed to minimise light spill, e.g. full cut off luminaires
  - Do not waste energy and increase light pollution by over-lighting.
  - Wherever possible use floodlights with asymmetric beams that permit the front glazing to be kept at or near parallel to the surface being lit.

Figure 7 Minimising Light Spill Through Design



6.2 Site Specific Recommendations

Taking the proposed design, surrounding sensitive receivers and general location into account it is SLR's opinion based on previous experience that although there could be a general brightening of the area that could be noticeable for residents, the site is capable of meeting the AS/NZS 4282:2023 requirements for surrounding residential dwellings. To achieve this the following recommendations should be incorporated into the detailed lighting design:

- Pole lighting should face inward toward the middle of the site. Specifically pole lighting for the gym site should face toward the south.
- Pole lighting should be set at the lowest possible mounting height.
- Use luminaires with minimal backlight rating.
- Site lighting to be baffled and shielded as per the town planning reports.
- Site lighting should have an upward light ratio of zero meaning that no light is emitted above the horizontal.
- Lights placed on the outside of the building should be kept as low as possible.
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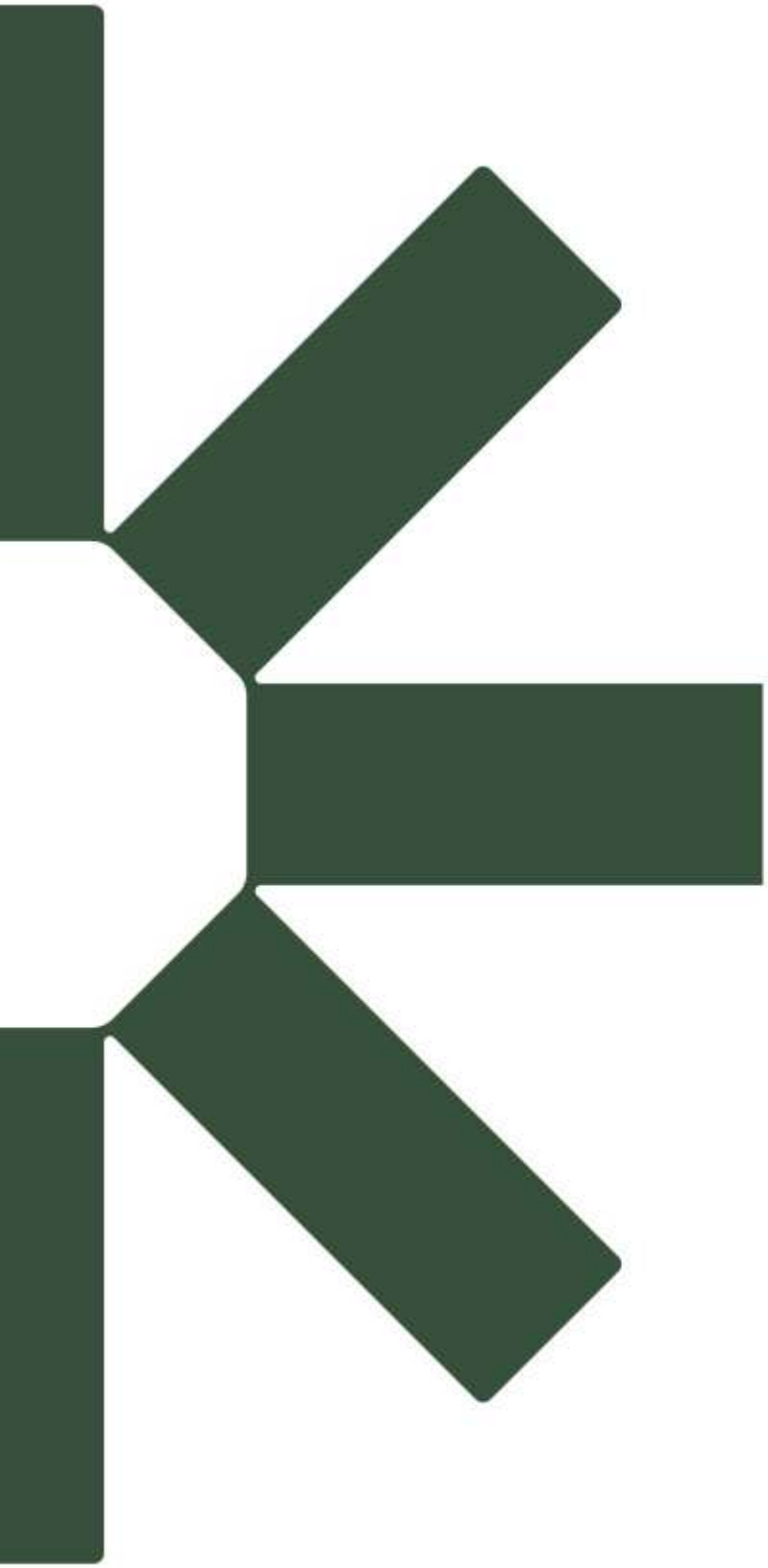

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