LUCID
CONSULTING AUSTRALIA

MARSDEN PARK NEW PRIMARY SCHOOL

Northbourne Drive, Marsden Park

EXTERNAL LIGHTING STRATEGY REPORT

SEARS ISSUE

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1. INTRODUCTION

1.1 OVERVIEW

This External Lighting Strategy Report has been prepared by Lucid Consulting Australia on behalf of Schools Infrastructure NSW (SINSW) (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD-9809) for the Marsden Park New Primary School at the corner of Northbourne Drive (to the east) and a proposed future road (to the north) within the Elara Estate, Marsden Park (the site). The site is legally described as Lot 2889 in Deposited Plan 1230906. The development footprint does not include a portion of the site to the west as this is reserved for a future alternative use.

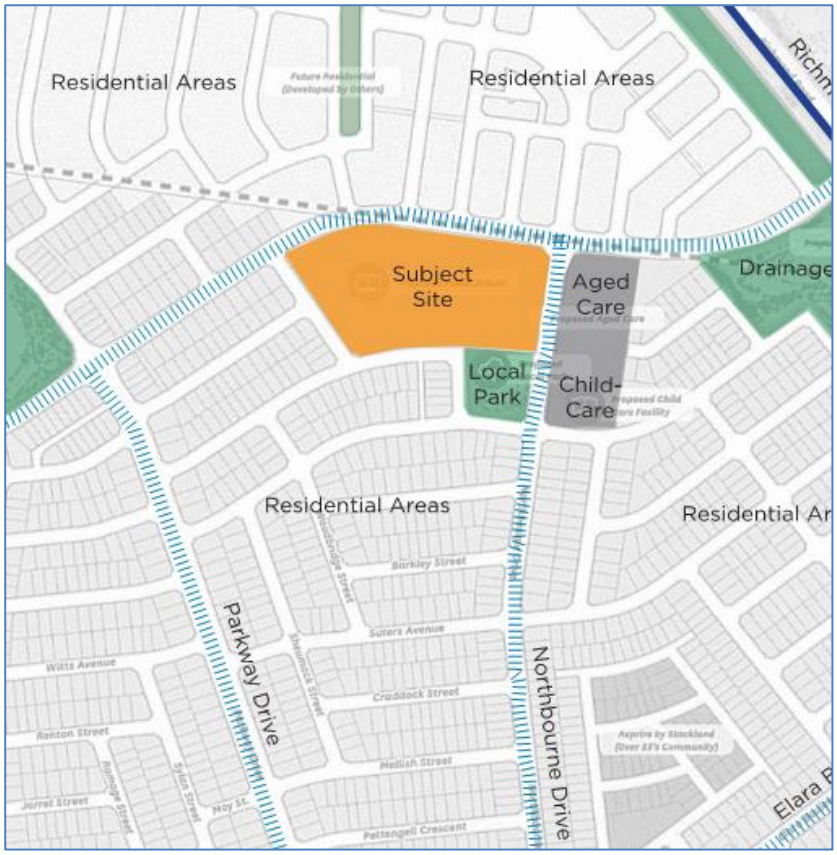

Figure 1. Proposed Site Location

The Marsden Park New Primary School will cater for 1,000 primary school students at completion. The proposal seeks consent for:

- Construction Stage 1 (Temporary School): a temporary school facility constructed within the western portion of the development site located on the future sports grounds. This temporary school facility is to accommodate a maximum of 500 students at any given time. Should the permanent school progress as per the program, the temporary school will not be required.

- Construction Stage 2 (Construction of Permanent School Facility): a permanent consolidated two storey courtyard building with capacity to accommodate a maximum of 1,000 students. This new school building is to comprise

- 40 teaching spaces;
- A canteen;
- Library;
- Multipurpose hall;
- Office and administration space;
- Staff and student amenities; and
- Out of school hours care accommodation.

- Multi-purpose sporting facilities and outdoor play spaces;
- Associated site landscaping and public domain improvements;
- An on-site car park for 48 parking spaces and a drop-off and pick-up area; and
- Construction of ancillary infrastructure and utilities as required.

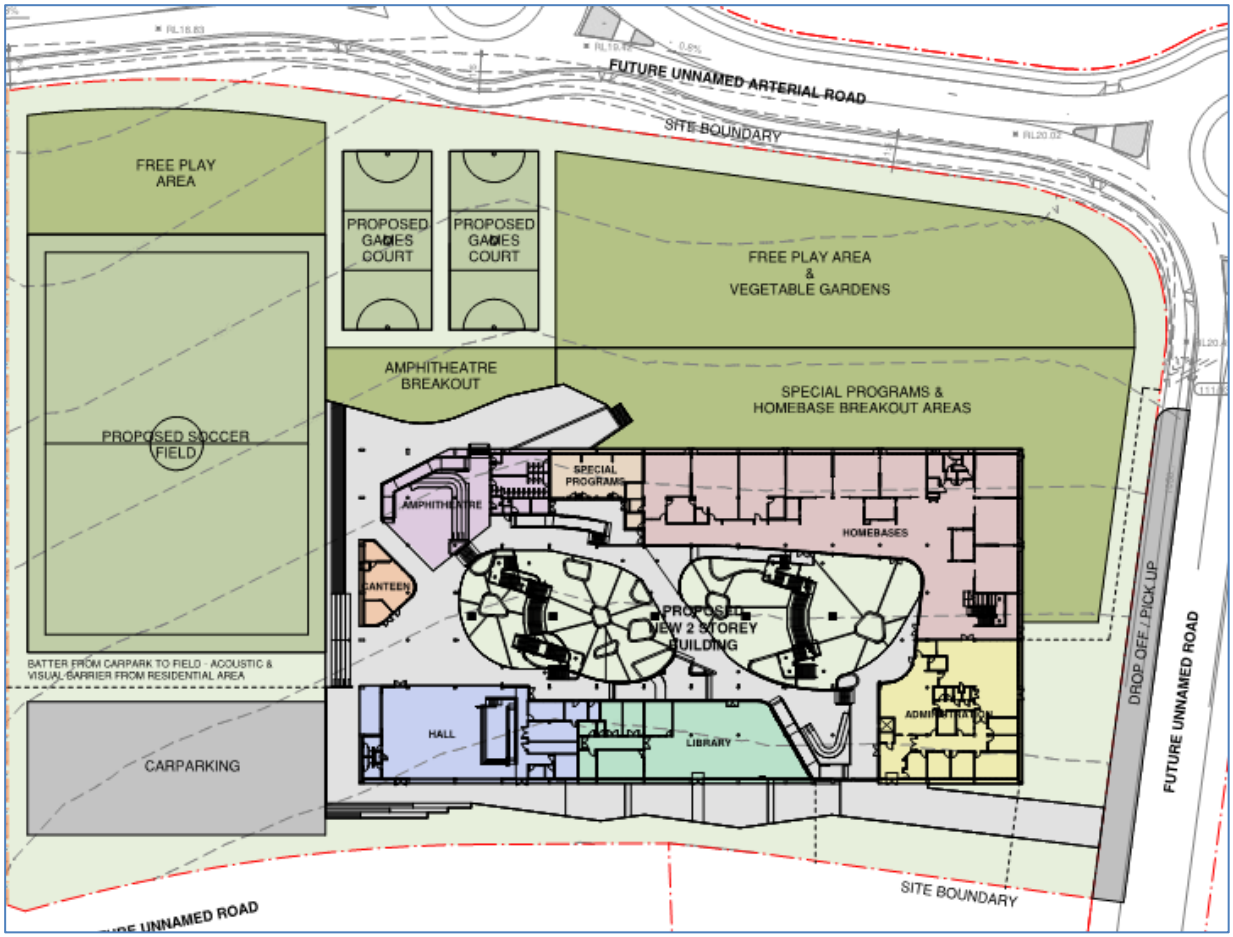

Figure 2. New Proposed Arrangement

The purpose of the External Lighting Strategy Report has been developed to provide an analysis of the lighting strategy which will minimise the effects of obtrusive lighting at the proposed Marsden Park New Primary School site.

1.2 RESPONSE TO SEARS

This lighting strategy report is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD-9809. This table identifies the SEARs and relevant reference within this report:

SEARs Item	Report Reference
Environmental Amenity Lighting strategy and measures to reduce spill into the surrounding sensitive receivers.	5. Lighting Strategies

2. POTENTIAL OBTRUSIVE EFFECTS

This section provides guidance on effects that outdoor lighting may have on surrounding areas.

2.1 POTENTIAL OBTRUSIVE EFFECTS OF OUTDOOR LIGHTING

Outdoor lighting that is intended for a specific purpose may have some adverse effect on the surrounding environment in which it is installed. Obtrusive light is spill light that causes annoyance, discomfort distraction or reduction in the ability to see essential information.

Obtrusive light can affect:

- **Residents** – Sleeping difficulties may be experienced due to light entering bedroom windows or due to direct view of bright light sources;
- **Transport System Users** – Glare reduces the visibility of transport signalling systems and the ability to see objects in the environment;
- **Astronomical Observations** – Sky Glow from lighting systems reduces the ability to see the night sky.

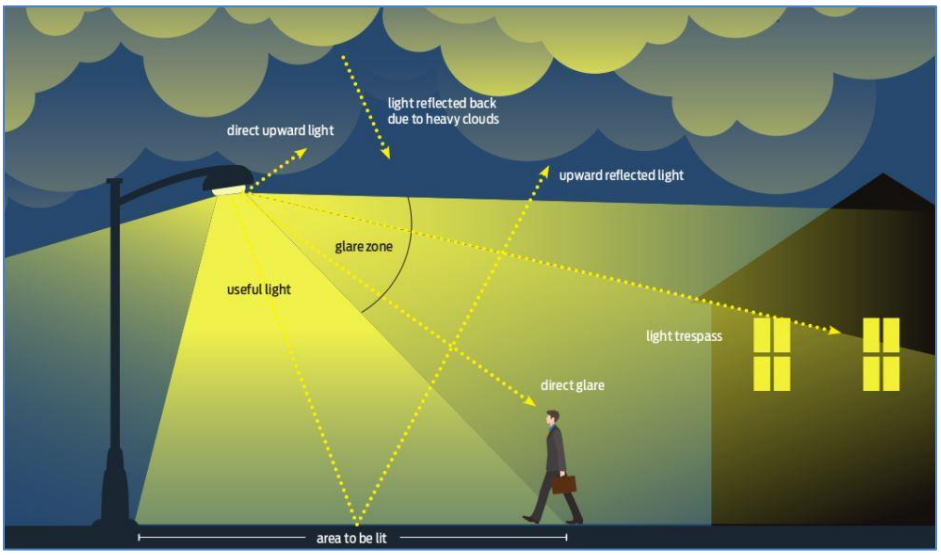

Figure 3. Examples of Obtrusive Light

3. LIGHT TECHINCAL PARAMETERS

This section specifies the limits for the relevant light technical parameters (LTPs) and where they are to be applied as specified AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.

3.1 LIMITS FOR LIGHT TECHINICAL PARAMETERS

This Lighting Strategy report recommends light technical parameters such as lighting levels, uniformities and colours. This report also suggests means of achieving the LTP's with mitigation and a lighting strategy.

The following technical parameters are intended to control obtrusive lighting effects, but will not necessarily ensure spill light being emitted from the lighting installation.

- Maximum values of light measured in Lux (lx)
- Maximum luminous intensities per luminaire measured in Candela (cd),
- Maximum vertical illuminance (I)
- Maximum average luminance of surfaces (cd/m^2)

Different limits of the Light Technical Parameters have been applied to different environmental zones based on ambient light conditions. These ambient conditions are described in the figure 4 below (Table 3.1 in AS/NZS 4282:2019).

The Marsden Park New Primary School will be classified as a zone A3 Medium Brightness Environmental Zone as illustrated in figure 4 below.

TABLE 3.1

ENVIRONMENTAL ZONES

Zones	Description	Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA Dark Sky Parks. Major optical observatories No road lighting -unless specifically required by the road controlling authority
A1	Dark	Relatively uninhabited rural areas No road lighting - unless specifically required by the road controlling authority
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas
A3	Medium district brightness	Suburban areas in towns and cities
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas
TV	High district brightness	Vicinity of major sports stadium during TV broadcasts
V	Residences near traffic routes	Refer AS/NZS1158.1.1
R1	Residences near local roads with significant setback	Refer AS/NZS 1158.3.1
R2	Residences near local roads	Refer AS/NZS 1158.3.1
R3	Residences near a roundabout or local area traffic management device	Refer AS/NZS 1158.3.1
RX	Residences near a pedestrian crossing	Refer AS/NZS 1158.4

Figure 4. Environnemental Zones

4. MITIGATION MEASURES

4.1 GUIDELINES AND STANDARDS

While this report outlines the obtrusive lighting strategy, detailed specifications of light fittings and poles will be provided as well as a software lighting design. The final lighting for the proposed new primary school shall be designed to meet the following guidelines, standards and regulations:

- AS 4282:2019 Control of the obtrusive effects of outdoor lighting.
- AS 1158:2005 Lighting for roads and public areas.
- State Environmental Planning Policies.
- NSW Educational Facilities Standards and Guidelines

5. LIGHTING STRATEGIES

This section covers the various lighting strategies that will be implemented to control the obtrusive effects of outdoor lighting and complying with the standards and guidelines mentioned above are set out below:

5.1 LIGHTING CONTROL STRATEGY

A lighting control strategy will be implemented to minimise light pollution to neighbouring residences and the night sky.

The lighting control strategy will include:

- Daylight sensors and exterior motion detectors will be utilized on all external lighting to prevent luminaires operating when not required and consuming power unnecessarily.
- Electronic Timed Clock control (with battery backup) will be provided on all external area lighting, floodlighting and carpark lighting to ensure the lights are switched on and off as per the timer. This will reduce the reliance on occupants to turn the lights off, and it will extend the life of lamps and ballasts due to reduced run-times.

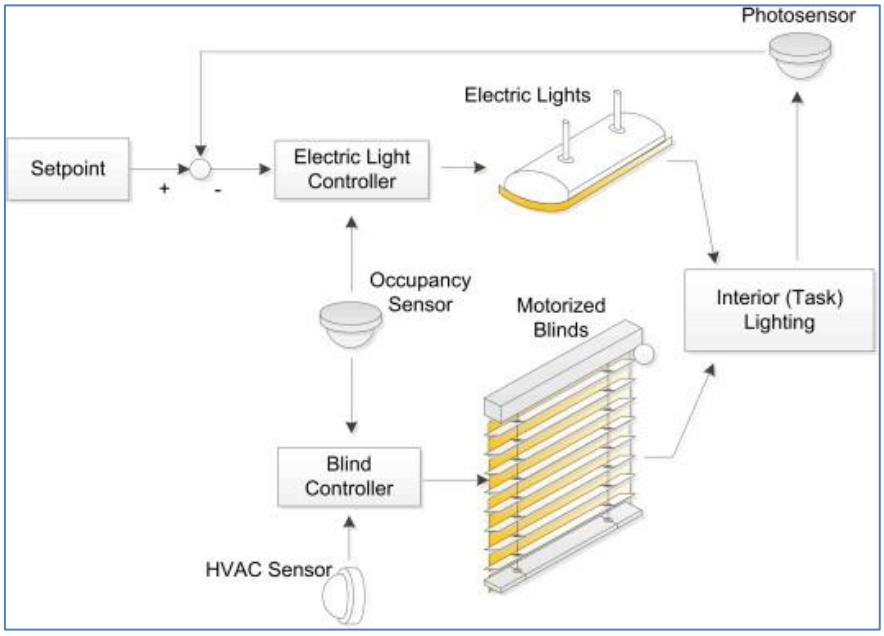

Figure 5. Typical Lighting Control Strategy

5.2 LIGHTING INSTALLATION STRATEGY

Obtrusive light is not only a nuisance but also a waste of energy. Efficient lighting systems directs the light where it is needed.

The installation strategy will include:

- All luminaires will be directed into the development and away from the adjacent sites to ensure that the maximum light that is spilled over the development boundary is in accordance with AS4282:1997.
- Installing the luminaires at suitable mounting heights and ensuring the main beam angle of luminaires directed towards any potential observer is kept below a certain angle to minimise the

glare and to ensure that the Upward Light Output Ration (ULOR) does not exceed 5% relative to the luminaires mounting orientation.

- Using software to ensure that the lights are spaced in such a way there are is a high average of uniformity and no areas of excessive illuminance or "hotspots".

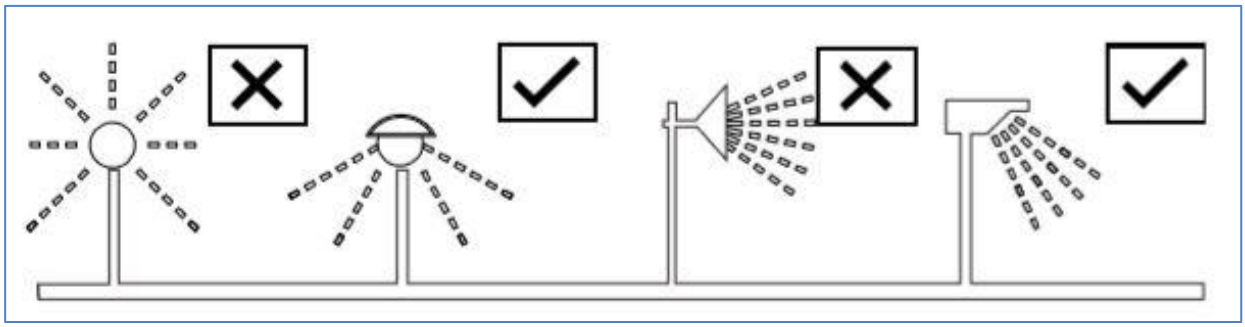

Figure 6. Lighting types illustrating the spread of light above the horizontal

5.3 LUMINAIRE SELECTION STRATEGY

Different application areas require different solutions that not only meet lighting standards but different energy requirements.

The lighting selection strategy will include:

- Selecting Luminaires that uses appropriate diffusers and reflectors to ensure suitable lighting levels are achieved while maintaining accurate control of light to minimise the effects of artificial lighting on the surrounding residences as shown in figure 6.
- Select high performance LED's that provide efficient control, colour rendering and more direct illumination which in tern will minimise light spill.
- The use of energy efficient lighting with a good luminous efficacy rating and luminaire efficiency.

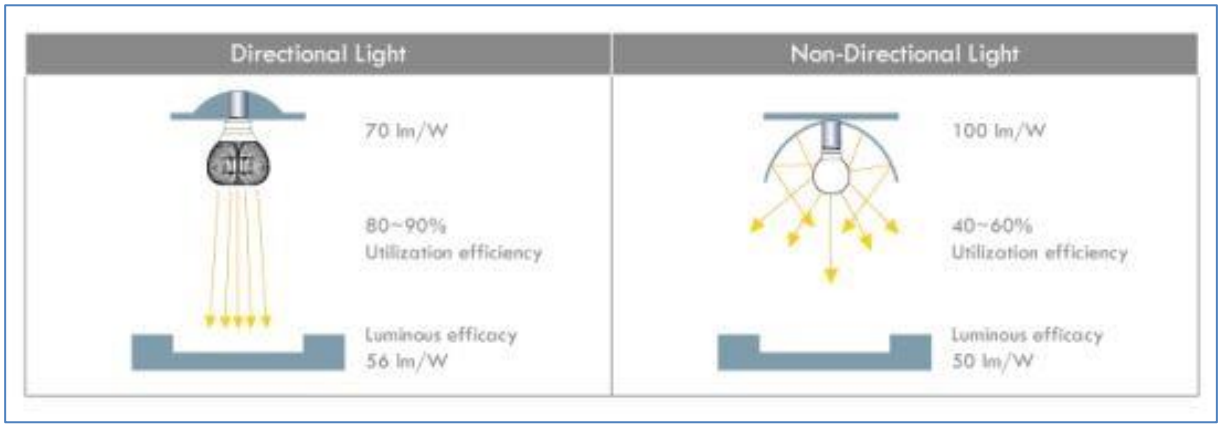

Figure 7. Illustration of Luminous Efficacy and Utilization Efficiency