

# REDFERN STUDENT VILLAGE

**90-102 Regent Street, Redfern  
Qualitative Light Spill Assessment**

**Prepared for:**

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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with The Trust Company (Australia) Limited ATF WH Regent Trust (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.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

## DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18313-R10-v2.0	2 October 2020	Peter Hayman	Neihad Al-Khalidy	Neihad Al-Khalidy
610.18313-R10-v1.0	16 September 2020	Peter Hayman	Neihad Al-Khalidy	Neihad Al-Khalidy

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## EXECUTIVE SUMMARY

SLR has been engaged by Regent Trust to assess the lighting environment around a proposed development at 90-102 Regent Street, Redfern as part of Application Number SSD-10382.

Due to the nature and use of the building there are areas that may be lit during curfew hours when there are tighter restrictions on light spill from the site. There is the possibility that some adverse light spill may fall on the facades of the nearby dwellings. Those most at risk are current and proposed surrounding residential apartment blocks. Recommendations to reduce any light spill are as follows:

- Lights should be aimed downward as much as possible and be shielded to prevent light escaping above the horizontal plane or off the site.
- Lights placed on the outside of the building should be kept as low as possible and correctly aimed.
- Any required lights should be placed around the outside of the terraces.

The light survey showed a significant amount of night time lighting in the surrounding area with a number of measurement locations showing illuminance values above the required limits.

Taking all of the above into account it is SLR's view that should the mitigation measures as recommended be implemented and a proper lighting fit out used, the effects of light spill on all potentially affected sensitive receivers should be below 2 lux or 4 lux depending on the use of each property. Also, the proposed development should not increase the amount of light spill on sensitive receivers which are already above the limit.

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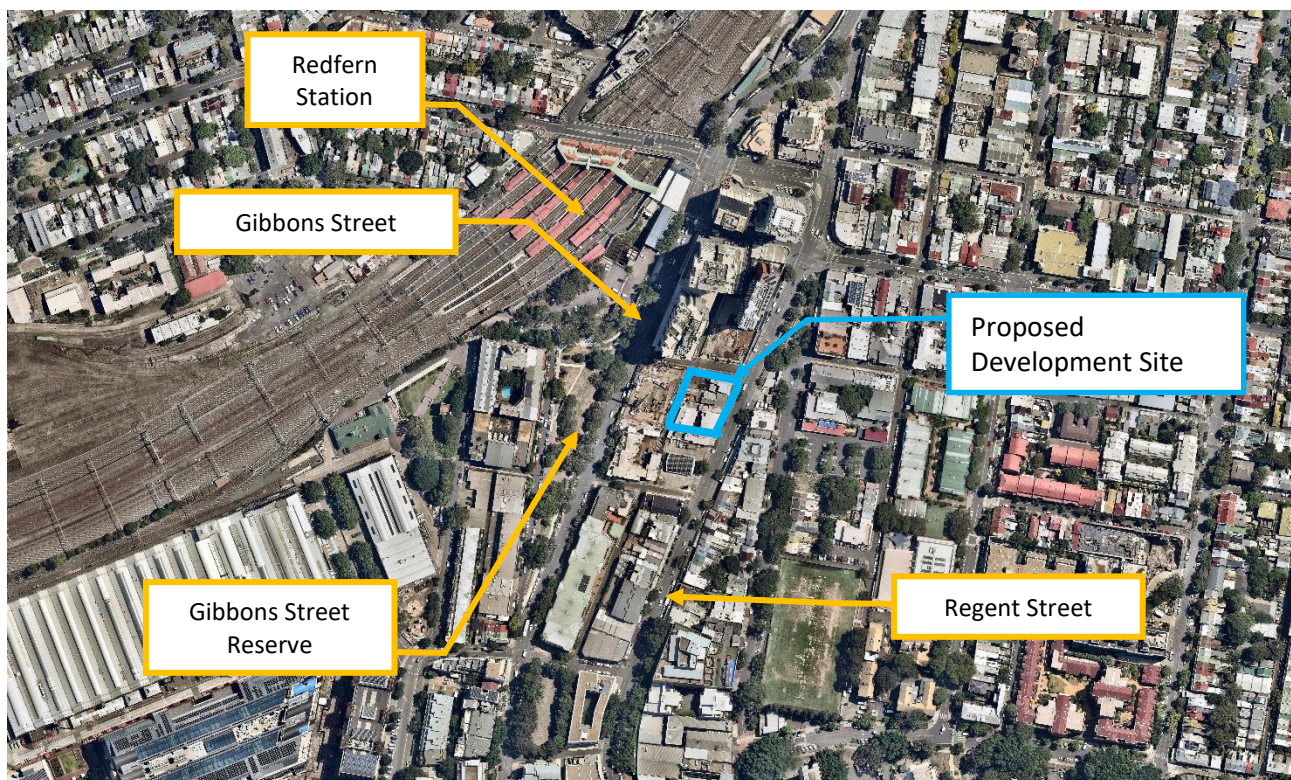
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# 1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by The Trust Company (Australia) Limited ATF WH Regent Trust to assess the lighting environment around a proposed development at 90-102 Gibbons Street, Redfern. This will involve qualitative study of the lighting systems to be used in the proposed development and their effect on the surrounding area. This will form part of the Development Application (SSD-10382) to comply to SEARSS request. The results of a light survey are reported in Section 3 and the light spill from the proposed building is discussed in Section 4.

## 1.1 Site and Surrounds

**Figure 1 Aerial Image of Site Location**



*Image: courtesy Nearmap (January 2020)*

The site is located in Redfern and is bounded by Regent Street to the east, Marian Street to the north and William Lane to the west.

In terms of the surrounding buildings:

- The surrounding built environment is a mixture of predominantly low to mid-level buildings, comprising of a mix of commercial, retail and residential buildings.
- Gibbons Street Reserve lies immediately to the west with Redfern train station to the northwest.
- There are a number of planned and approved future residential developments of similar height located immediately to the north, west and southwest of the proposed development, running between Gibbons Street and Regent Street.

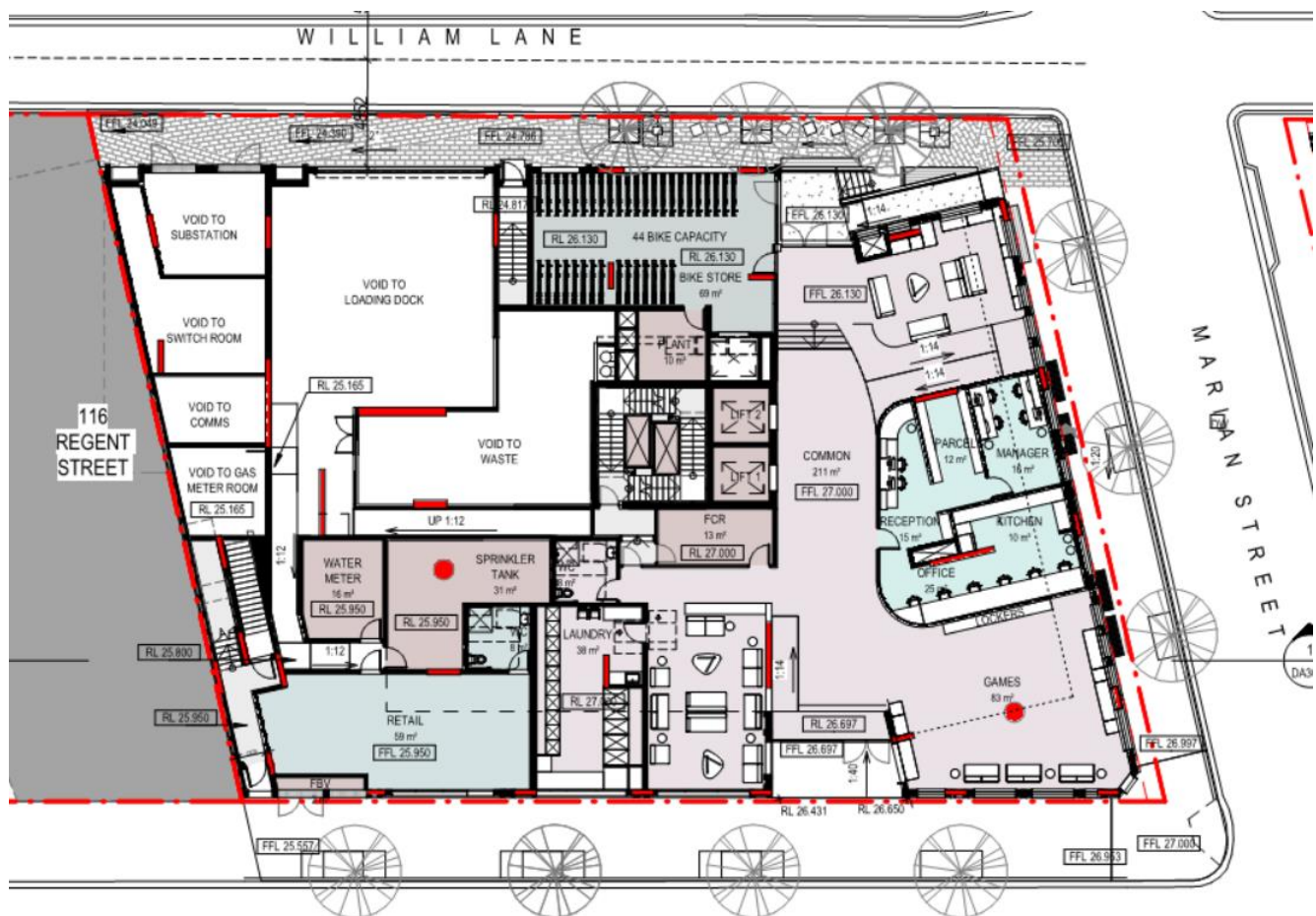


## 1.2 Proposed Development Description

The proposal comprises (refer Error! Reference source not found.):

- Level 1 (Ground Floor) with building entry, common areas, retail units and plant rooms.
- Mezzanine Level with common areas, gym and outdoor terrace areas.
- Level 2 to 18 for student units; and
- Roof Level (Plant and Equipment)

**Figure 2 Site Plan (Ground Floor)**



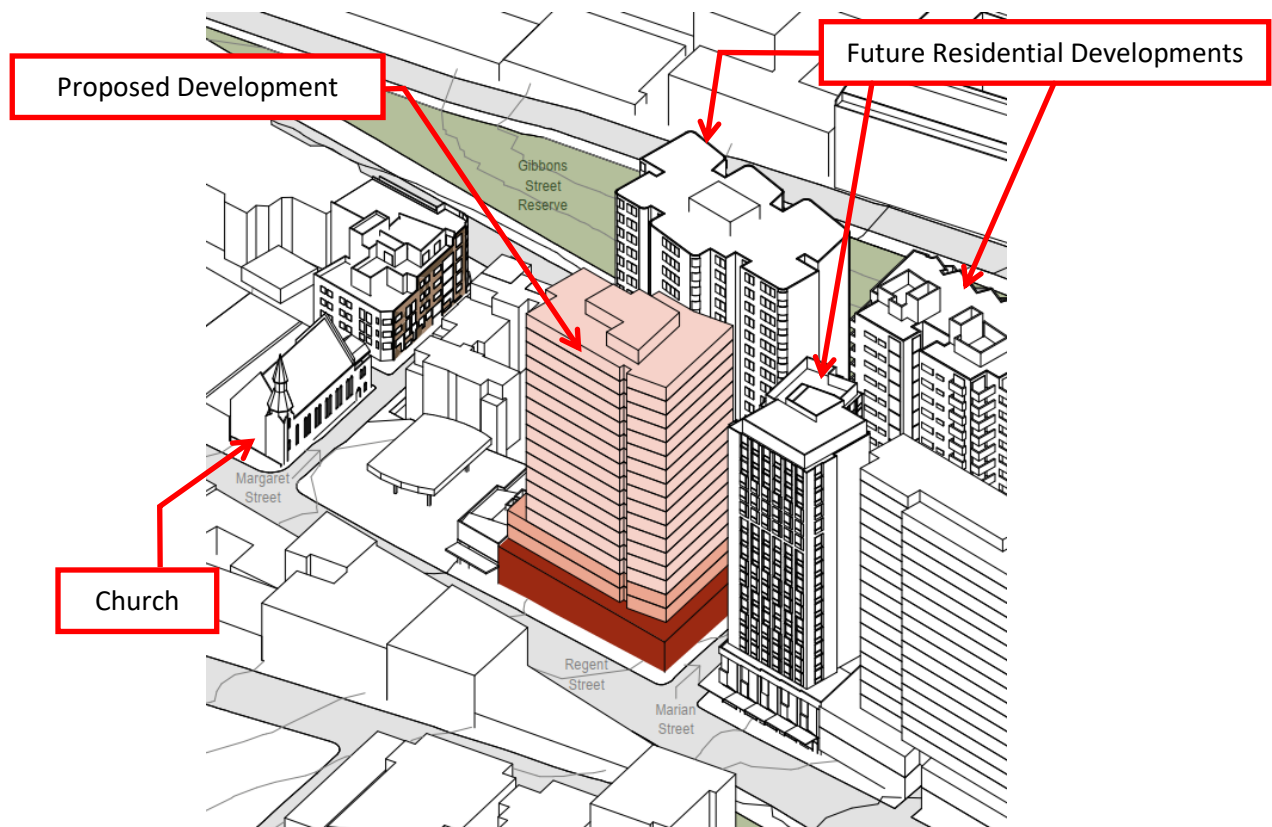
## 2 Light Spill

### 2.1 Background

As part of the Development Application, SLR has been asked to qualitatively assess light spill from the proposed development on to the surrounding streetscape. There are a number of areas within the proposed development that are likely to be lit artificially that will be assessed in this report. The site is surrounded by a number of different land uses such as:

- Service station to the south.
- St Luke's Presbyterian Church further to the south.
- Planned residential towers to the north, northwest and west.
- Mixed use residential and commercial buildings to the east up to three storeys.

**Figure 3 3D View of Proposed Development and the Surroundings**



## 2.2 Lighting Terminology

A description of the common terminology used for the lighting study, taken from *AS 4282: Control of the Obtrusive Effects of Outdoor Lighting*, is shown in **Table 1**

**Table 1 Lighting Terminology (Consistent with AS4282)**

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 exist 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 <sup>2</sup>
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 <ul style="list-style-type: none"> <li>(a) Disability Glare – Glare that impairs the visibility of objects without necessarily causing discomfort.</li> <li>(b) Discomfort Glare – Glare that causes discomfort without necessarily impairing the visibility of objects.</li> </ul>

## 2.3 Light Spill Criteria

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 4282-1997 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 topology 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 far more bothersome in a dark 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

## 2.4 Time of Operation

The applicable limits for adverse spill light depend on the time of operation for the lighting installation. Operation taking place during *pre-curfew hours*, between 6am and 11pm (Refer AS 4282-1997), is less likely to give cause to complaints from adjacent residential properties, while a more restrictive limit is applicable to *curfew hours*.

It is possible that lights could be used late at night therefore the limits for curfew hours will be used.

## 2.5 Requirements

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

The vertical illuminance limits for *curfew hours* apply in the plane of the windows of habitable room or dwelling on nearby residential properties. 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, ie: no reflected light is taken into account.

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.

**Table 3 Recommended Maximum Values of Light Technical Parameters (AS4282)**

Light Technical Parameter	Time of Operation	Commercial Areas	Residential Areas	
			Light Surrounds	Dark Surrounds
Illuminance in vertical plane ( $E_v$ )	Pre-curfew hours	25 lx	10 lx	10 lx
	Curfew hours	4 lx	2 lx	1 lx
Luminous Intensity emitted by luminaires (I)	Pre-curfew hours	7,500 cd (for a medium to large area with Level 1 control)	100,000 cd (for a large area with Level 1 control)	100,000 cd (for a large area with Level 1 control)
	Curfew hours	2,500 cd	1,000 cd	500 cd
Threshold Increment (TI)	Limits apply at all time where users of transport systems are subjected to a reduction in the ability to see essential information	20% based on <u>ad</u> aption luminance (L) of 10 cd/m <sup>2</sup>	20% based on <u>ad</u> aption luminance (L) of 10 cd/m <sup>2</sup>	20% based on <u>ad</u> aption luminance (L) of 10 cd/m <sup>2</sup>

The limiting requirement for light spill will vary depending on the use of the surrounding sites. It is likely to be either 2 or 4 lux.

### 3 Light Survey

A light survey of the area surrounding the site was conducted on the night of the 26<sup>th</sup> February 2020. The measurements were taken around the edge of the site and at several surrounding facades facing the site.

**Figure 4 Measurement Locations**



Measurements were taken at a height of 1.5 metres above the ground spaced approximately 17 metres apart. A Testo 545 light meter was used for the testing.

**Table 4 Illuminance Measurements (Lux)**

Position	Horizontal (Lx)	Vertical (Lx)	Location	Nearby Lighting Fixtures
1	5	4	North side of façade	
2	2	2	North side of façade	
3	1	2	North side of façade	
4	4	6	North side of façade	
5	3	1	East side of facade	
6	2	2	East side of façade	
7	1	2	East side of façade	
8	71	39	East side of façade	Awning commercial light
9	72	47	East of Regent Street	Awning commercial lights
10	31	18	South of petrol station	Petrol station commercial lights
11	56	18	South of petrol station	Petrol station commercial lights
12	4	10	South of petrol station	
13	No Access		Southeast of site	
14	7	11	Southeast of site	3m Street light
15	9	8	West side of facade	
16	3	3	West side of façade	
17	1	2	West side of façade	
18	1	2	West side of façade	
19	19	11	North to Marian Street	3m Street light
20	9	5	North to Marian Street	
21	2	2	North to Marian Street	
22	2	1	North to Marian Street	
23	1	1	North to Marian Street	
24	2	1	North to Marian Street	
25	32	9	North to Marian Street	3m Street light
26	11	21	East to Regent Street	
27	7	13	East to Regent Street	
28	6	3	East to Regent Street	
29	1	1	East to Regent Street	
30	1	1	East to Regent Street	
31	1	2	East to Regent Street	
32	4	4	East to Regent Street	
33	1	2	East to Regent Street	
34	13	8	East to Regent Street	

Position	Horizontal (Lx)	Vertical (Lx)	Location	Nearby Lighting Fixtures
35	33	21	East to Regent Street	3m Street light
36	6	5	South to Margaret Street	
37	2	8	South to Margaret Street	
38	3	5	South to Margaret Street	
39	9	19	West to petrol station	
40	30	6	West to Gibbons Street	Construction site – awning over pedestrian walkway with side lights
41	5	2	West to Gibbons Street	
42	4	2	West to Gibbons Street	
43	20	11	West to Gibbons Street	Construction site – awning over pedestrian walkway with side lights
44	12	4	North to Marian Street	
45	1	2	West to William Lane	
46	1	2	West to William Lane	
47	1	2	West to Gibbons Street	
48	1	3	West to Gibbons Street	
49	30	28	West to Gibbons Street	3m Street light

The horizontal and vertical lux levels are quite variable depending on the location of the measurement. At 23 locations the vertical illuminance exceeds the requirements. There are a number of areas around the site that have significant lighting in the form of streetlights or other commercial lighting such as the fuel price board. With the three lane roads and night time commercial operations of the service station this amount of illuminance is likely in some locations. As the detail design is progressed SLR can provide advice and modelling to ensure the proposed development does not increase light spill at surrounding sensitive receivers above the required limits.



## 4 Qualitative Assessment

### 4.1 Ground Level

There will likely be lighting fixtures for pedestrian movement around the exterior of the site, particularly on the north and east sides of the development and around the entrance on William Lane. Light could also emanate from the common areas and retail areas.

Awnings could be used over the entrances and any required lighting for these areas the east and west sides could be recessed into the awnings. If awnings are not used light fixtures should be well shielded and orientated to only illuminate the required area. This will result in a low potential for light spill above the required limits at surrounding sensitive receivers.

### 4.2 Mezzanine Outdoor Terrace Areas

The outdoor terrace areas on the east and west aspects of the building will require lighting if they are to be used at night time. There are residential developments planned to the north and west of the site and currently residential dwellings on the east side of Regent Street. Lighting fixtures can appear to be more obtrusive when mounted higher up. Lighting in the east and west terrace areas should be placed around the outside of the terrace so that it faces away from the surrounding buildings to the east and west. This will reduce the potential for light spill above the required limits. Shielding could also be used to prevent back lighting.

### 4.3 Overall Impact

This development is one of several buildings at various stages of development in local area. While it is possible that some sensitive receivers could have a view of more than one building it is unlikely that all buildings will affect any one particular area due to some buildings blocking the view of others.

While the addition of the developments will increase the overall amount of light in the local area, much of the light will be diffuse and reflected. The location of the of the developments in inner Sydney means that this will have a minimal effect due the amount of lighting fixtures already present in built-up areas such as this.

## 5 Recommendations

The lighting design should aim to mitigate any light spill from the proposed development. In order to achieve the best performance outcome for the building's use while having a minimal impact on the surrounding properties the following recommendations are given.

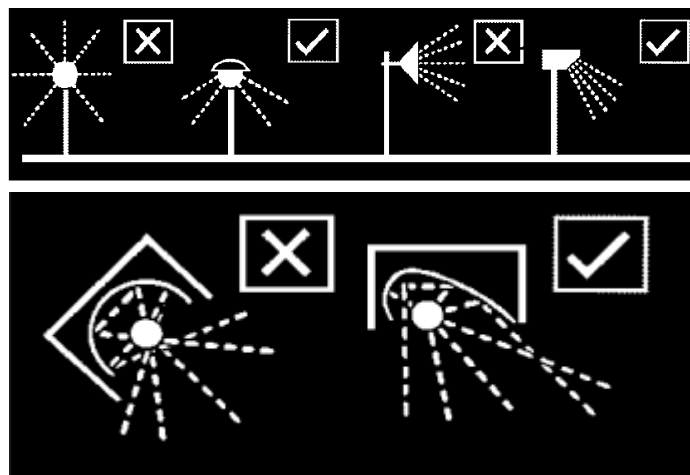
### 5.1 General Mitigation

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

*AS4282-1997 Control of the Obtrusive Effect of Outdoor Lighting* sets out general principles that should be applied when designing outdoor light to minimise any adverse effect of the light installation.

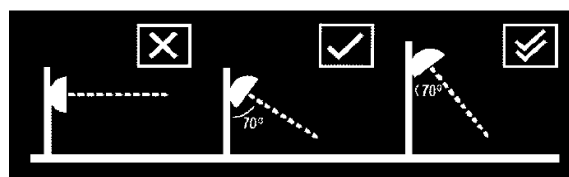
- Direct lights downward as much as possible.
- Use luminaires that are aimed to minimise light spill, e.g. full cut off luminaires where no light is emitted above the horizontal plane. Less spill light mean that more of the light output can be used to illuminate the area and a lower power output can be used. The energy consumption for the fitting can thus be reduced without decreasing the illuminance of the area. Refer **Figure 5**.

**Figure 5** Minimise Light Spill



- Do not waste energy and increase light pollution by over-lighting.
- Keep glare to a minimum by keeping the main beam angle less than 70°. Refer **Figure 6**.
- 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 6** Minimise Glare



- Use floodlights with asymmetric beam where possible.

- Direct the site lighting away from sensitive locations such as residential properties.
- Where possible position site lighting as far away from site boundaries as possible

## 5.2 Site Specific Recommendations

- Lights should be aimed downward as much as possible and be shielded to prevent light escaping above the horizontal plane or off the site. This is especially important as the outdoor areas could be higher than some surrounding dwellings.
- Lights placed on the outside of the building should be kept as low as possible and correctly aimed to prevent light spilling on to areas where it is not needed.
- Any required lights should be placed around the outside of the terraces.

## 5.3 Summary of Recommendations

These recommendations aim to reduce any light spill coming from the site and if implemented correctly during detail design the proposed development should achieve the desired outcome with no more than 2 lux falling on the nearby residential facades during curfew hours and no more than 4 lux at the boundaries of nearby commercial facades during curfew hours.

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