# Dooleys Lidcombe Catholic Club

# Multi Deck Car Park

# Light Spill Assessment

Report Number 610.16491-R2

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Dooleys Lidcombe Catholic Club

24 John Street

LIDCOMBE NSW 2141

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# Multi Deck Car Park

# Light Spill Assessment

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# Executive Summary

SLR has been engaged by Dooleys Lidcombe to assess the light spill from the proposed multi deck car park which is part of the Phase 1 redevelopment of the Lidcombe Catholic Club located at 24-28 John Street, Lidcombe, NSW.

Due to the operating hours of the club the car park will be lit during curfew hours of 11:00 pm to 6:00am when there are tighter restrictions on any 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 1 and 2 Board Street, 36 – 44 John St, 13 and 15 Ann Street and 2 – 14 Ann Street. Recommendations such as additional shielding and particular lighting designs have been provided to reduce any light spill.

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 neighbouring properties should be below 2 lux or 4 lux depending on the use of each property.

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# 1 INTRODUCTION

This Light Spill Assessment has been prepared on behalf of DOOLEYS Lidcombe Catholic Club ("the Proponent"). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD_7603 for the staged development of the DOOLEYS Lidcombe site ("DOOLEYS") at Nos. 4B, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 and 28 Board Street, Nos. 3, 5, 7, 9, 11 and 17 Ann Street and Nos. 6, 8, 12A and 24-28 John Street, Lidcombe. This will be a qualitative study and SLR has been asked to focus on the above ground car park which is included in Phase 1 of the development.

The Environmental Planning and Assessment Act 1979 (EP&A Act) forms the statutory framework for planning approval and environmental assessment in NSW. The development qualifies as State Significant Development (SSD) under *State Environmental Planning Policy (State and Regional Development) 2011* due to its capital investment value.

## 1.1 The Project Site

**Figure 1 Site Location**


Image: Nearmap (5th May 2016)

## 1.1 Project Overview

Dooleys Lidcombe Catholic Club is located at 24-28 John Street, Lidcombe, approximately 17km west of the Sydney CBD. The Club owns approximately 2.7ha of land immediately adjacent to Lidcombe Railway Station in the Lidcombe Town Centre and generally bounded by John Street (east); Church Street (south); Olympic Drive (west) and Ann Street (north). Board Street bisects this precinct in an east west direction.

This application seeks staged development approval for tourist related purposes comprising a concept proposal (including building envelopes, basement envelope, land uses, internal roads and connections to external road network) and Stage 1 works (including early works, site preparation, basement excavation and above ground multi-deck car park).

Approval has been sought for the concept proposal for Phase 1 of the Club's Master Plan comprising:
Details of the project are described below:

### 1.1.1 Concept Proposal

A Concept Proposal has been prepared for the site to guide its future redevelopment and is intended to provide a statutory framework for the long term planning of the site. The concept proposal is for tourist related purposes, including building envelopes, basement envelope, land uses, internal roads and connections to external road network. Specifically, the concept proposal comprises:

- Two levels of basement car parking;
- New two storey podium containing new Club facilities and other facilities associated with the proposed hotel, including conferencing; food and beverage and gym;
- New 12 storey Club and hotel tower above the podium with approximately 260 rooms;
- New 5 storey above ground multi deck parking building (initially to provide car parking to enable the on-going operations of the existing Club through the redevelopment process); and,
- New internal road access and connection points to surrounding road network.

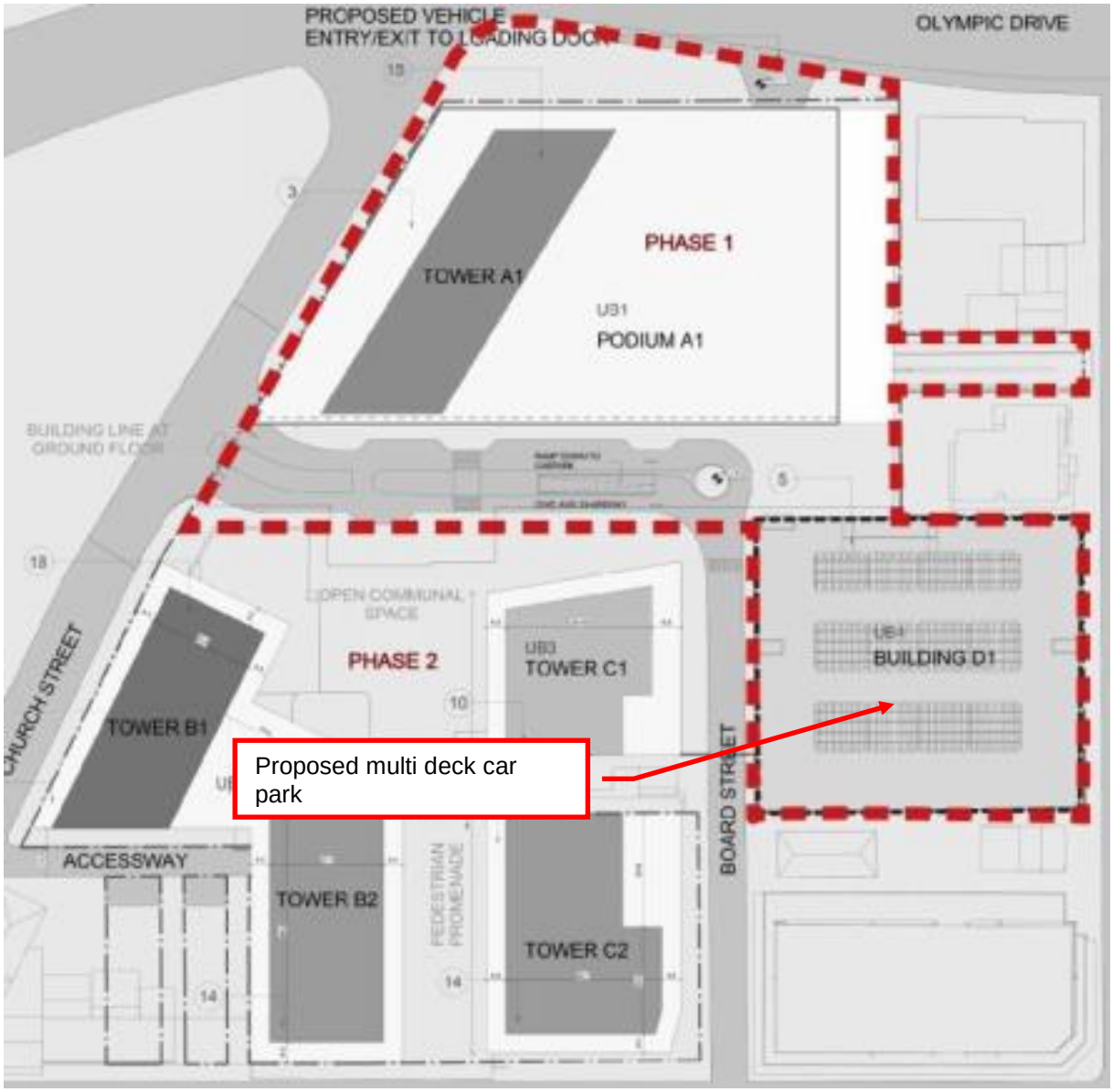
### 1.1.2 Detailed Proposal for "Stage 1" development

This is a detailed proposal for early works, site preparation, excavation of the basement and construction of the above ground multi deck car park.

- Bulk earthworks for two levels of basement;
- Hoarding;
- Site establishment;
- Infrastructure preparation works;
- Construction Management including proposed site access and construction traffic management;
- Construction of an above ground multi deck car park located between Board Street and Ann Street.

The purpose of this light spill report is to provide an assessment of the proposal as described above and detailed within the EIS. This report focuses on the above ground multi deck car park located between Board Street and Ann Street.

**Figure 2 Site Plan**




The SSD will include a detailed proposal for the construction of an above ground multi deck car park located between Board Street and Ann Street. The car park will allow continuation of the Club's operations while the new Club and Hotel is constructed. The car park will continue to be used after the new Club and Hotel is completed, in addition to basement parking.

The car park will be five storeys and will have a maximum height of 18.93 m to RL 34.7. The car park will accommodate 610 vehicles. The structure is setback 2.5 m from Ann Street.

**Figure 3 3D view of the proposed development**

# 2 LIGHT SPILL RISKS

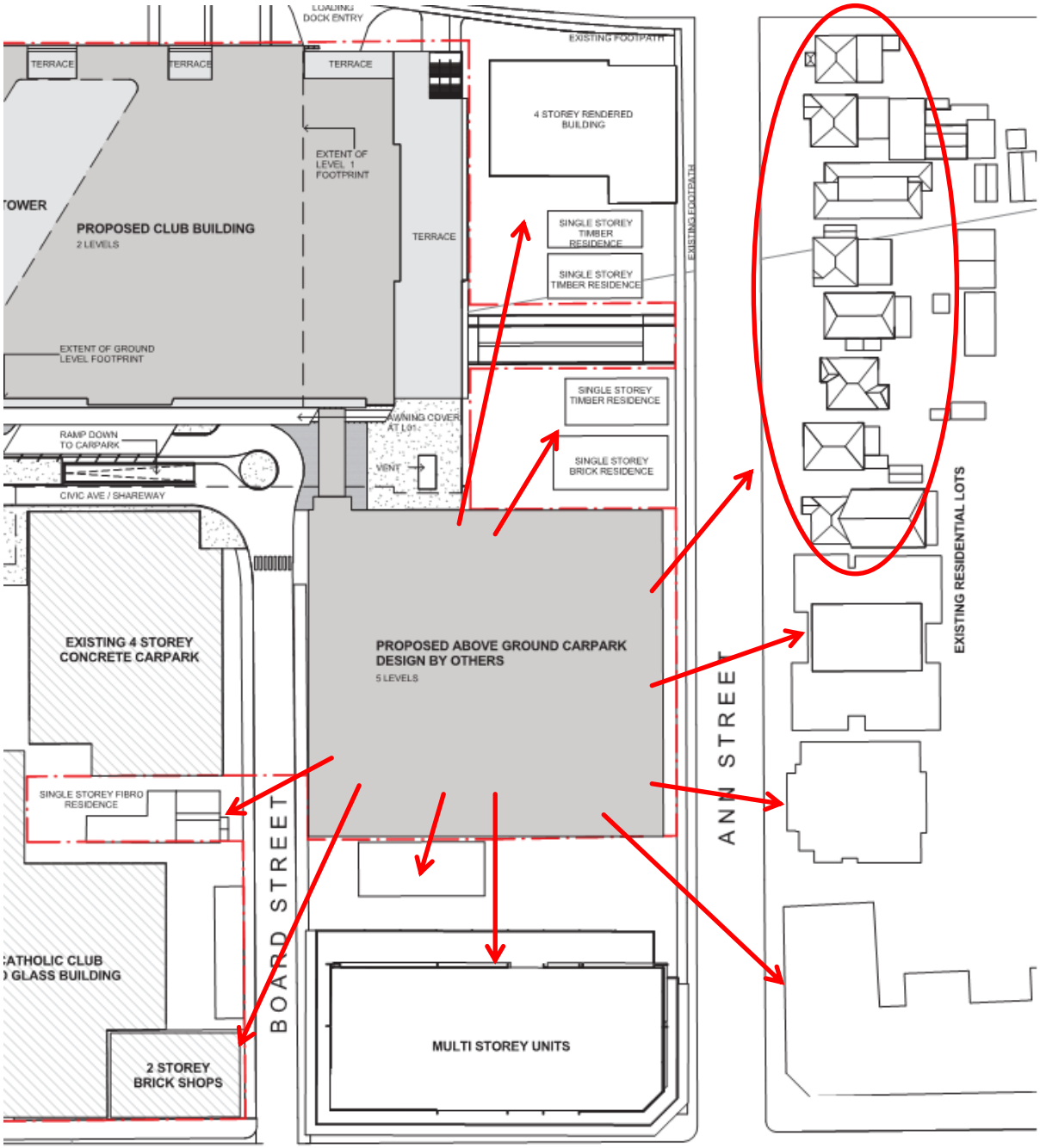
When designing outdoor lighting the effects on the following four areas should be taken into account:

- Check effects on residents.
- Check effects on road users (e.g. motorists, cyclists, pedestrians).
- Check effects on transport signalling systems (e.g. air, rail).
- Check effects on astronomical observations.

Due to the proposed development's location in suburban Sydney where there will already be a reasonable amount of night time lighting it is unlikely that lighting used for the car park will affect transport signalling systems or astronomical observations.

To check the effects on residents SLR has been asked to qualitatively assess the risk of light spill from the proposed multi deck car park on to surrounding properties. This could be in the form of general area lighting or from vehicle headlights exiting and moving through the structure. This will be most critical onto nearby properties along Board Street and Ann Street. The figure below shows the general risks of the site.

**Figure 4 Light Spill Risks**




Properties that could be affected by light spill risks marked in red

# 2 LIGHTING CRITERIA

## 2.1 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, e.g.: 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, e.g.: land zoned for residential development. |
| Dwelling | A building in which people normally reside, especially during the hours of darkness, e.g. 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<br>(a) Disability Glare – Glare that impairs the visibility of objects without necessarily causing discomfort.<br>(b) Discomfort Glare – Glare that causes discomfort without necessarily impairing the visibility of objects. |

## 2.2 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 adverse 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 could 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, e.g. 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 |

### 2.2.1 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, is less likely to give cause to complaints from adjacent residential properties, while a more restrictive limit is applicable to *curfew hours*.

The club currently operates through the night till 6:00 am so it is likely that there will be night time lighting operating as part of the redeveloped club. Therefore the limits for curfew hours will apply to the proposed site between the hours of 11pm and 6am.

### 2.2.2 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 rooms or dwellings 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, i.e. 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 times where users of transport systems are subjected to a reduction in the ability to see essential information | 20% based on adaption luminance ($\bar{L}$) of 10 cd/m$^2$ | 20% based on adaption luminance ($\bar{L}$) of 10 cd/m$^2$ | 20% based on adaption luminance ($\bar{L}$) of 10 cd/m$^2$ |

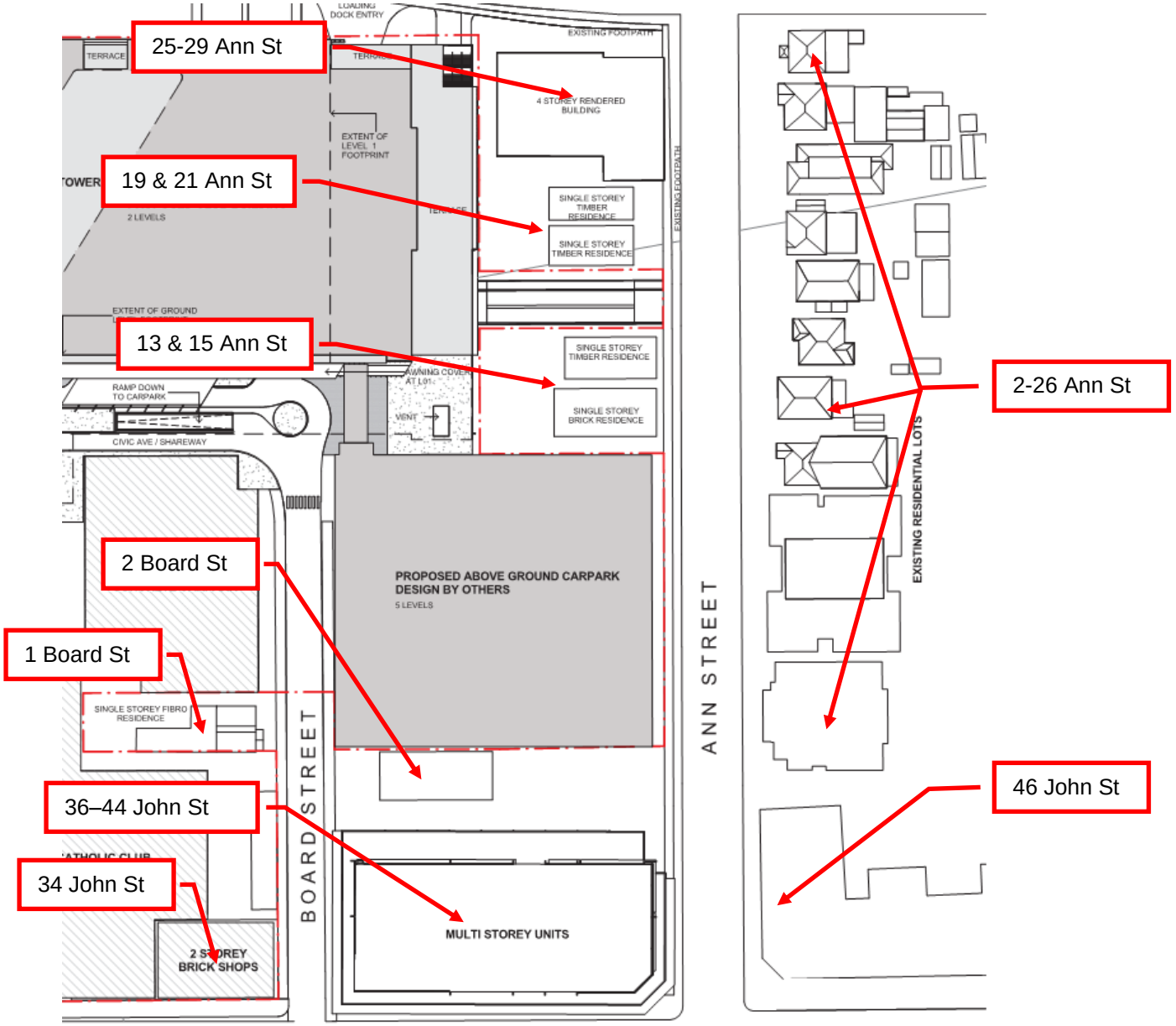
The site is located in suburban Sydney and may affect both commercial and residential properties. The residential properties can be best classed as being in a residential area with light surrounds therefore light spill from the proposed site on the facades of the surrounding residential dwellings should be kept below 10 lux during pre-curfew hours and 2 lux during the curfew hours. Light spill from the proposed site at the boundaries of the surrounding commercial properties should be kept below 25 lux during pre-curfew hours and 4 lux during the curfew hours.

# 3 LIGHT SPILL ANALYSIS

Using the plans provided SLR has assessed the risk of adverse light spill at each of the nearby surrounding properties. At this stage no lighting plan has been provided so SLR will assume some typical lighting on and around the multi deck car park, this could include:

- Fluorescent lighting for the interior levels of the car park.
- Pole mounted lighting for the roof level of the car park.
- Some security lighting on the exterior of the structure.
- Vehicle headlights at the carpark exits.

**Figure 5 Analysed Properties**



### 3.1 1 Board Street

This residential dwelling sits across the road from the Board Street exit of the carpark. It is possible that light from vehicles, security lighting or light from the roof level could fall on the facades of the dwelling.

### 3.2 2 Board Street

This residential dwelling sits directly to the east of the car park. It should not be affected by vehicle headlights and it is unlikely that there would be security lighting facing this direction. Lighting on the top level could fall on the facades of the dwelling.

### 3.3 34 John Street

This two storey commercial property is approximately 40 metres from the car park and will receive some shielding from 36-44 John Street. Some light from the top level may fall on the buildings facades. It is likely that this façade already receives light from other sources on John Street.

### 3.4 36-44 John Street

This residential apartment block has a number of apartments on the western façade that face the car park. Apartments lower that the level of the lights could receive light on their facades. Vehicle headlights could also be pointed toward the apartments as they move around the top level.

### 3.5 13 & 15 Ann Street

These two residential dwellings sit directly to the west of the car park. They should not be affected by vehicle headlights and it is unlikely that there would be security lighting facing this direction. Lighting on the top level could fall on the facades of the dwellings. There may be some shielding provided by existing vegetation.

### 3.6 19 & 21 Ann Street

These two residential dwellings sit approximately 40-50 metres to the west of the car park. They should not be affected by vehicle headlights or security lighting. Lighting on the top level could fall on the facades of the dwellings but the risk will be reduced when compared to 13 and 15 Ann Street. There may also be some shielding provided by existing vegetation

### 3.7 25-29 Ann Street

This four storey apartment building will have apartments facing toward the car park with little shielding in between. . They should not be affected by vehicle headlights or security lighting. Lighting on the top level could fall on the facades of the dwellings but the risk will be reduced due to the distance from the car park.

### 3.8 46 John Street

This nine storey mixed use block has apartments on the southern and western façades that could have views of the car park. Apartments lower that the level of the lights could receive light on their facades. Vehicle headlights could also be pointed toward the apartments as they move around the top level.

### 3.9 2-26 Ann Street

These residential dwellings and four storey apartment blocks range from 25 – 100 metres from the car park. 2-10, 12 and 14 Ann Street have the highest risk of being affected by vehicle headlights at the Ann Street exit. Light from security lighting and the top level could fall on the facades of these dwellings. The risk of light spill will reduce as the distance increases from the car park but the road also slopes down as it goes west which could increase the risk. There will also be some shielding provided by existing vegetation.

## 4 RECOMMENDATIONS

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

### 4.1 General mitigation

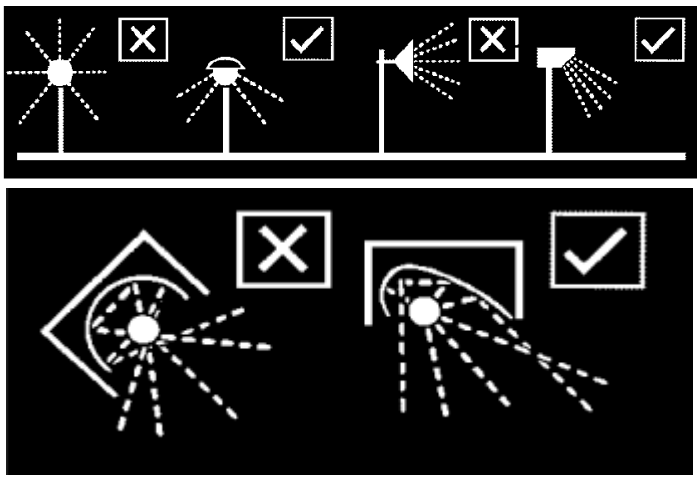
The following general mitigation methods should be incorporated into the detail design.

*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.

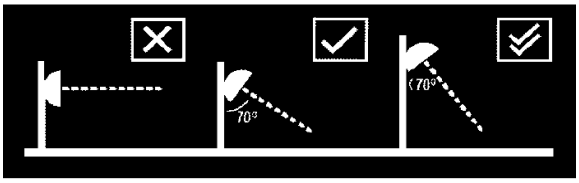
- Use luminaires that are aimed to minimise light spill, e.g. full cut off luminaires where no light is emitted above the horizontal plane. Less spill light mean that more of the light output can be used to illuminate the area and a lower power output can be used. The energy consumption for the fitting can thus be reduced without decreasing the illuminance of the area. Refer **Figure 6**.

**Figure 6 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 7**.
- 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 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

## 4.2 Site Specific Recommendations

In an effort to minimise the light spill from the proposed car park on to the nearby residential properties SLR has the following recommendations.

- From the plans provided it appears that light will be contained inside the car park by green walls. This design should be retained to prevent light spilling onto surrounding dwellings.
- The balustrades on all levels of the carpark should be high enough to prevent light from vehicle headlights spilling on to surrounding dwellings.
- Pole mounted lights on the roof level should face in toward the middle of the car park to reduce the risk of light spill, also the mounting height of the lights should be high enough to allow for tight beam control.
- 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 roof level lights are much higher than the nearby 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.
- Additional shielding may be required for properties near the exits of the car park. This could be in the form of a fence or additional vegetation.

## 4.3 Summary of Recommendations

These recommendations should help reduce the amount of 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.

## 4.4 Detail Design

This report is based on SLR's past experience and engineering judgement. To ensure there is no adverse light spill from the site further light spill model calculations should be conducted once the detail design is progressed.

# 5 CONCLUSION

SLR has been engaged by Dooleys Lidcombe to assess the light spill from the proposed multi deck car park which is part of the Phase 1 redevelopment of the Lidcombe Catholic Club located at 24-28 John Street, Lidcombe, NSW.

Due to the operating hours of the club the car park will be lit during curfew hours. There is the possibility that some adverse light spill may fall on the facades of the nearby dwellings. Those most at risk are 1 and 2 Board Street, 36–44 John St, 13 and 15 Ann Street and 2 – 14 Ann Street. Recommendations to mitigate and minimise light spill have been given in **Section 4**. As additional detailed information on the site lighting (e.g. type and aim) becomes available exact illuminance requirements and levels for the site and on the nearby dwelling facades can be confirmed through modelling and calculation.

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 neighbouring properties should be below 2 lux or 4 lux depending on the use of each property.