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OBTRUSIVE AND SPILL LIGHTING REPORT

FOR

PROPOSED EXTERNAL LIGHTING

COMFORT DELGRO CABCHARGE (CDC) NSW BUS DEPOT

LOT 202 DP 1019363

15 JUBILEE AVENUE
WARRIEWOOD NSW 2102

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DISCLAIMER

This Obtrusive lighting Report is subject to an ongoing review. The information in this document may be amended at any time by the Author, Romanos Consulting. This document is provided for Comfort Delgro Cabcharge NSW on behalf of McNally Management. This document has been developed using information available from Noxongiffen, McNally Management and other sources and is intended to be applicable to External Lighting associated with the proposed Bus Depot.

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INTERPRETATION

If a user of this Report is uncertain about any information or provision, the user should request clarification from Romanos Consulting.

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EXECUTIVE SUMMARY

The purpose of this report is to provide a preliminary assessment of the effects of the proposed external lighting associated with the proposed bus depot at 15 Jubilee Avenue, Warriewood. This report has been prepared by Romanos Consulting for CDC NSW on behalf of McNally Management. This report includes preliminary calculations and conditions for the proposed external lighting, to address spill lighting in council's response to pre-lodgement of development application PLM2020/0140, of concern in regard to spill lighting to adjoining properties.

For the purposes of this report the reference levels and principles that will be used for comparison is those set out in AS 4282:2019 "Control of the Obtrusive Effects of Outdoor Lighting".

The results of the assessment indicate the concept external lighting design is compliant with the requirements of AS/NZS 4282 where site conditions are addressed as described in detail in the report.

The results of the assessment also indicate that the final external lighting design can be modified to ensure that the external lighting design is compliant with minimum council set-back for adjoining properties, where the recommendations are adopted.

1 INTRODUCTION

The purpose of this report is to provide a preliminary assessment of the effects of the proposed external lighting associated with the proposed bus depot at 15 Jubilee Avenue, Warriewood. This report has been prepared by Romanos Consulting for CDC NSW on behalf of McNally Management. This report includes preliminary calculations and conditions for the proposed external lighting, to address spill lighting in council's response to pre-lodgement of development application PLM2020/0140, of concern in regard to spill lighting to adjoining properties.

For the purposes of this report the reference levels and principles that will be used for comparison is those set out in AS 4282:2019 "Control of the Obtrusive Effects of Outdoor Lighting".

To provide quantitative assessment AGI32 software has been used which is a recognised lighting design and modelling software.

This report is preliminary only and is required to be amended/updated based on final external lighting design.

2 STANDARDS

Demonstration of compliance with AS 4282 is deemed to be achieved if evidence is provided that the relevant light technical parameter limits in Tables 3.2 and 3.3 and 3.5 are achieved of the standard are satisfied. The location of the calculation plane is made in relation to areas of the building containing windows to habitable rooms.

The relevant Australian Standard for lighting of outdoor parking areas is AS/NZS 1158.3.1: 2020, "Road Lighting Part 3.1: Pedestrian areas (Category P) lighting – Performance and installation design requirements". This standard will be referenced further in this report.

3 ASSUMPTIONS & EXCLUSIONS

Lighting calculations were carried out with the following assumptions based on information available:

- Estimated proximity to buildings;
- Shadowing and reflectance's of adjacent buildings and structures not considered;
- For worst case scenarios the maintenance factor of 1 was assumed meaning that the calculations are based on illuminance at the beginning of life before any depreciation in luminaire light output;
- Manufacturer's data accuracy.
- Assessment is based on specified luminaires;
- Proposed illuminated Signage has been excluded as part of this assessment;
- Ambient illuminance and luminance at the adjacent properties/buildings has been excluded as part of this assessment;
- The assessment has been based on the information provided on site plan drawing NGA-S2002-DWG-DA10 of the proposed development by Noxongiffen;

The following aspects are excluded for assessment in this report;

- Compliance with AS 4282 or AS 1158 series for any other areas including other adjacent residential areas or public road ways;
- Inclusion of changes in levels as part of lighting assessment.

4 BACKGROUND INFORMATION

A bus depot is proposed for the site consisting of bus parking areas and associated office, amenities, wash bay and fuel.

The proposed bus and car parking areas are proposed to be provided with external lighting compliant with AS 1158.3.1 category PC2 for safety of staff and to deter vandalism to buses. This category has been nominated by the client.

The site is located in a Business Park (B7) precinct surrounded by the following:

- Jubilee Ave on northern boundary;
- Residential dwelling/lot on eastern boundary;
- Industrial buildings/lots on southern boundary;
- Commercial building on western boundary.

The extent to which a lighting installation is obtrusive is categorised depending on the precinct and associated ambient light levels in the vicinity of the development. AS/NZS 4282 categories are based on the following:

- Ambient/Precinct Brightness (as defined in AS/NZS 4282);
- Major Sports Stadiums (as defined in AS/NZS 4282);
- Residential areas near traffic routes (as defined in AS/NZS 4282);
- Local residential areas (as defined in AS/NZS 4282).

Based on the development location the site is classified as a zone A4 with the proposed external lighting to operate during curfewed hours. As this is a new development the Non-curfew category is L1 as defined in AS/NZS 4282.

5 CALCULATIONS

Calculations were completed on the basis of the classification described above. Calculations included the effect associated with proposed Amenities building and acoustic wall along eastern side of the site.

A summary of the calculations is provided below in Table 5.1 with a complete set of calculations provided in Attachments 1 & 2.

Table 5.1 – Calculation Assessment Summary (at council set-back)

Light Technical Parameter	**AS/NZS 4282 limit**	**Calculated**
Illuminance in vertical Plane (E_v) – Non-Curfew L1	25 lux	24.11 lux*
Luminous Intensity emitted by luminaires (I) – Non-Curfew L1	25 000 Cd	10340 Cd
Illuminance in vertical Plane (E_v) – Curfewed Hours	5 lux	24.11 lux*
Luminous Intensity emitted by luminaires (I) – Curfewed Hours	2500 Cd	10340 Cd

Table 5.2 – Calculation Assessment Breakdown (at council set-back)

Boundary	Maximum Illuminance (lux)	Maximum Intensity (Cd)
Eastern	1.67	1427
Southern	13.56	3951
Western	24.11	10340

Table 5.3 – Calculation Assessment Breakdown (at building line)

Boundary	Maximum Illuminance (lux)	Maximum Intensity (Cd)
Eastern	1.31	1338
Southern	24.85	5364
Western	18.57	8632

* - Calculated maximum illuminance on one of the worst-case configurations. This will be required to be verified on final design.

Based on the calculation with consideration to critical aspects of the design it is possible that installation be completed with conformance to AS/NZS 4282.

6 DISCUSSION & RECOMMENDATIONS

The calculations indicate that the concept lighting design is compliant for Pre-Curfew, but not curfewed hours for lots on southern and western boundaries. However, it is possible to rationalise the results. In addition, the concept lighting design is compliant for threshold increment for traffic along Jubilee Ave. Upward light ratio associated with concept lighting design is compliant.

Pre-curfew limits are higher as they apply to operation of lighting before a curfew hour set by local government.

Curfewed hours limits are lower and are specifically intended for application at habitable windows of adjacent buildings. The calculations have been completed based on the current building lines of existing buildings and minimum 3m council set-back.

External lighting is compliant with obtrusive lighting limits for council set-back and existing building line of residential dwelling on eastern boundary for both pre-curfew and curfewed limits. Existing building line is approximately 5m from eastern boundary.

Calculations indicate that the concept lighting design is not compliant for curfewed hours limits for properties on southern and western boundaries.

On southern boundary, existing commercial buildings are located on the boundary. These sides of the building have no windows. As such no nuisance lighting would be created to existing buildings on southern boundary. In addition, in relation to calculation at council set-back, non-compliance area directly behind proposed external lighting, approximately 2.5m either side and 5m high area. This can be addressed by the use of a rear glare shield on proposed offending luminaires.

On western boundary, existing commercial building is set back approximately 5m. The adjacent site has trees located along the western boundary. There a several small windows on this side of the building at approximately 5m high. Calculations indicate that non-compliant/obtrusive lighting is identified up to a height of 3m which is below the existing window height. In addition, in relation to calculation at council set-back, non-compliant area is up to approximately 4.5m which is below the existing window heights. This can also be addressed by the use of a side glare shield on proposed offending luminaires.

Calculations indicate that the concept lighting design is compliant with curfewed hours limits for adjacent southern and western building but can be rationalise and mitigated for compliance with AS 4282.

These are acceptable values for provisions in relation to existing and future unknown development activity for adjacent properties and can/will be addressed at the CC design stage by one or more of the following:

- Alternative luminaire specification including output and distribution;
- Alternate luminaire location and mounting height;
- Glare shields incorporated to offending luminaires;

It is also worth noting that the conflict between obtrusive lighting and personnel safety/risk of crime is important however are not mutually exclusive. Local mitigation measures such as customised shields can be provided in instances where nuisance lighting to an adjacent occupier are identified and cannot be mitigated by standard methods.

7 APPENDICES

7.1 APPENDIX 1 – NOT USED

7.2 APPENDIX 2 – A446BOLR001[D1] – OBTRUSIVE LIGHTING REPORT: PRE-CURFEW AT MINIMUM COUNCIL SETBACK (3M)

7.3 APPENDIX 3 – A446BOLR002[D1] – OBTRUSIVE LIGHTING REPORT: CURFEWED HOURS AT MINIMUM COUNCIL SETBACK (3M)

7.4 APPENDIX 4 – A446BOLR003[D1] – OBTRUSIVE LIGHTING REPORT: CURFEWED HOURS AT BUILDING LINE

7.5 APPENDIX 5 – OBTRUSIVE LIGHTING CALCULATIONS