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WSP

SICEEP GLEBE ISLAND EXPO DEVELOPMENT AREAS

LIGHTING ASSESSMENT REPORT

14/02/2013

Quality Management

Issue/revision	Revision 3	Revision 4	Revision 5	Revision 6
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Signature				
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Signature				
Authorised by	GW	GW		
Signature				
Project number	SYD12228800	SYD12228800		

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1 Introduction

1.1 General

WSP have been engaged by APP in conjunction with Infrastructure NSW Corporation to undertake a lighting assessment of the proposed Glebe Island Expo development as required by the DGRs dated 16/10/2012 and the correspondence from the Department of Planning and Infrastructure dated 08/01/2013.

The assessment examines:

1. The existing exterior lighting installation of the Glebe Island Ports.
2. The lighting requirements for the Glebe Island Expo, including carparks, pedestrian walkways, billboards, general external areas, and the Glebe Island Expo entry roadway.
3. The cumulative impact of the existing and proposed lighting on sensitive surrounds.

This report identifies and assesses the necessary light technical parameters required to comply with current Australasian Standards adopted by the City of Sydney for exterior lighting. It also addresses the obtrusive lighting effects of the existing and proposed lights.

1.2 Site Description

Glebe Island is currently owned and operated by Sydney Ports Corporation. The site is occupied by and used for the purposes of Ports and Naval restricted activities. Currently, the Island is accessible off Sommerville Road and surrounded by Port Jackson and Johnsons Bay.

There are residential developments across the bays to the North, south and East. The nearest residential developments are to the East, located approximately 160m across from the bay.

The proposed three new carparks, Carpark A and Carpark B and C are located to the west of Port Jackson and are accessible via Robert Street. A new road is also proposed adjoining Carpark A for new event shuttle services to Glebe Island. The proposed new Carpark D is located on Glebe Island.

The original lighting to Glebe Island was supplied and installed over 30years ago. Additionally, 10 years ago supplementary 5 new floodlight towers were added. All installations are regularly maintained and operated by Sydney Ports Corportation.

The lighting for areas on Glebe Island external to the exhibition halls will utilise existing lighting and controls. The lighting for both carparks and billboards will be new installations including new electrical and controls.

The Glebe Island Expo is a temporary build, and at completion, Sydney Ports Corporation will regain full operation of the site.

1.3 Scope

This report covers the review of the existing flood light installation and proposed lighting design of the Glebe Island Ports, in particular:

1. The proposed Main Entry Road and Drop Off Area off James Craig Road;
2. The External Egress Area to the East; and,
3. The Back of House Circulation Area; and,

4. The proposed external Carparks A, B, C and D; and,
5. The proposed two (2) new Billboards.

1.4 Background Information

The following information has been made available to WSP for the purposes of this investigation:

1. As Built Information, 76 Sheets (Scanned), Maritime Services Board of NSW, 1971;
2. S5271-E100 – Glebe Island Electrical Services, AAT Floodlights, Rev B, Bassett, 2003;
3. 120046-A1002 SICEEP – Glebe Island Expo – Site Plan, Rev DRAFT, Woods Bagot, 12/11/12;
4. 120046-A2200 SICEEP – Glebe Island Expo – Floor Plan, Rev DRAFT, Woods Bagot, 12/11/12;
5. 120046-A2700 SICEEP – Glebe Island Expo – Carpark A Layout plan,, Rev DRAFT, Woods Bagot, 11/02/03;
6. 120046-A2701 SICEEP – Glebe Island Expo – Carpark B&C Layout plan, Rev DRAFT, Woods Bagot, 11/02/03;
7. 120046-A2702 SICEEP – Glebe Island Expo – Carpark D&E Layout plan, Rev DRAFT, Woods Bagot, 11/02/03;
8. Site Inspection held on site at 7.30am, 26th October, 2012, attended with Sydney Ports Asset Manager; and CMS (Glebe Island Electrical Site Maintenance Contractor).
9. DGR Conditions – Emailed to WSP via APP, 16/10/2012; and
10. SWGP556A – White Bay Glebe Island SPC Base Data (Dial Before You Dig), Sydney Ports Corportaion, 08/12
11. 120046-A2700 SICEEP – Glebe Island Expo – Carpark A Layout Plan, Rev DRAFT, Woods Bagot, 17/01/13;
12. 120046-A2701 SICEEP – Glebe Island Expo – Carpark B Layout Plan, Rev DRAFT, Woods Bagot, 17/01/13;

1.5 Methodology

The following methodology has been applied for the purposes of this investigation:

1. Assess background information;
2. Identify policies and standards applicable for the purposes of this assessment;
3. Identify lighting categories applicable for each element.
4. Identify lighting technical parameters required to satisfy minimum lighting levels for each element;
5. Identify control of obtrusive light parameters required to mitigate adverse effects from each light source;
6. Calculate the light technical parameters and check against parameters.
7. Calculate the obtrusive light from each light source and check against parameters.
8. Identify deficiencies where noted and make recommended conditions to mitigate any obtrusive light.

2 Design and Assessment Criteria

2.1 Definitions

IES/Photometry file:	For a given luminaire and lamp, a table of the distribution of luminous intensity emitted through the photometric light centre of the luminaire in specified directions in space.
Illuminance (E):	The physical measure of illumination is illuminance. It is the luminous flux arriving at a surface divided by the area of the illuminated surface. Unit: lux (lx); 1 lx = 1 lm/m2.
(a) Horizontal illuminance (Eh):	The value of illuminance on a designated horizontal plane at ground level.
(b) Vertical illuminance (Ev):	The value of illuminance on a designated vertical plane at a height of 1.5m above ground level.
Luminaire:	The street light fitting or lantern. The luminaire normally consists of the lamp, reflector, control gear (including a photo-electric control switch), etc all included in a protective case with a glass or plastic diffuser.
Luminous Intensity (I):	The concentration of luminous flux emitted in a specified direction. Unit: candela (cd).
Luminous Flux (Φ):	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).
Threshold Increment:	The measure of disability glare expressed as the percentage increase in contrast required between a standard object and its background (the carriageway) for it to be seen equally as well with the source of glare present as with it absent, derived in the specified manner.
Tilt:	The angle by which the axis of the fixing spigot entry is tilted above the horizontal when the luminaire is installed.

2.2 Standards and Guidelines

The street lighting has been reviewed in accordance with relevant Authority specifications and guidelines at the time of the review. These were:

- City of Sydney Exterior Lighting Policy;
- AS/NZS 1158.0:2005 – Lighting for Roads and Public Spaces;
- AS/NZS 1158.2:2005 – Lighting for Roads and Public Spaces – Computer procedures for the calculation of light technical parameters for Category V and Category P lighting;
- AS/NZS 1158.3.1:2005 – Pedestrian area (Category P) lighting—Performance and design requirements;
- AS4282:2008 – Control of the Obtrusive effects of Outdoor Lighting.

2.3 Exemptions and Assumptions

1. WSP has not undertaken lighting assessments for areas outside the extent of works.
2. The existing electrical wiring to current installation is assumed to have been designed and installed in accordance with AS/NZS 3000:2007 Wiring Rules and requires no further approvals.

3. Where a luminaire model could not be confirmed at time of inspection, it is assumed to match other known lanterns in the immediate surrounds. The aiming and orientations of luminaires is approximated from inspection. The calculations are based on these assumptions. Variances to exact on site measurements should be expected.

4. It is assumed all installations currently on Glebe Island were permitted and compliant to the standards and guidelines relevant at the time of installation. Where existing luminaires and associated infrastructure are to remain as installed without repositioning, it is assumed these require no further approvals.

5. All existing towers and lighting structures shall remain. If, in any instance an existing light is to be removed, it shall be replaced to match existing installation.

6. It is assumed that the maintenance of lights is undertaken as set out in AS/NZS1158.1.3 to warrant a maintenance factor of 0.7 for all luminaires.

7. Bus-Shelters are excluded from this design. Additional lighting for the bus-shelter structures shall be lit to AS1158.3.1 subcategory P7.

8. Carpark E is excluded from this design. Additional lighting for this proposed covered carpark shall be designed to be lit to AS1158.3.1, AS1680 and AS428. The lighting shall be designed to integrate with the SICEEP structure.

9. The new connecting road proposed for shuttle services is excluded from this lighting design. Additional lighting for this road shall be lit to AS/NZS1158.

10. The electrical wiring shall be designed post DA approval of the lighting towers and installed in accordance with AS/NZS 3000:2007 Wiring Rules. It is assumed the electrical supplies of 40A/1P or 20A/3P will be made available to each carpark for the new lighting installations.

11. The electrical controls shall incorporate a daylight override photocell and 24hr, 7day dual channel programmable timer to limit operation of all lights between the hours of 10.00am and 10.00pm.

12. It is assumed all proposed locations of lights are clear of clashes with other services. Poles located in the parking bays will have kerbed platforms designed around them to prevent cars driving into them.

2.4 Lighting Sub-Category

The following subcategories have been selected based on the recommendations out of AS/NZS1158.3.1:2005 for the each element:

Category	Subcategory	Occupancy	Risk of Crime	Prestige
Main Entry Road	P2	Medium	Medium	Medium
External Egress Area East	P2	High	Medium	Medium
Back of House Circulation	P3	Medium	Low	Low
Carparks	P11b	<75%	Medium	N/A
Billboard (see section 2.4.1)				

Table 1 Lighting Subcategories

Note 1: Recommendations may be overridden by the Asset Manager.

2.4.1 Billboard Lighting

The following considerations apply for externally illuminated signs as stated in the City of Sydney Exterior Lighting Policy, Clause 7.3;

1. Illuminated signs are not to detract from the architecture of the host building during daylight.
2. Illumination (including cabling) of signs is to be concealed, or integral with the sign, or provided by means of sensitively designed and located external spot lighting.
3. The ability to adjust the light intensity of illuminated signs is to be installed where the consent authority considers necessary.
4. A curfew may be imposed on the operation of illuminated signs where continuous illumination may impact adversely on the amenity of residential buildings, serviced apartments or other visitor accommodation, or have other adverse environmental effects.
5. Flashing or intermittently illuminated signs are generally not appropriate for reasons of pedestrian and residential amenity and traffic safety.

2.5 Design Parameters

2.5.1 Design Light Technical Parameters

The following light technical parameters apply as set out in AS/NZS1158.3.1:2005 for the following sub-categories:

Category	Eavg (lux)	Eph (lux)	Epv (lux)	TI(%)	UWLR(%)
P2	3.5	0.7	0.7	NA	3
P3	1.75	0.3	0.3	NA	3
P11b	7	1.5	1.5	NA	3
P12 Note 2		>14			3

Table 2 Light Technical Parameters

Note 1: All Values quoted are maintained

Note 2: Subcategory P12 is applicable to designated disabled carparks only.

2.5.2 Obtrusive Light Control Parameters

The following controlling parameters apply as s in AS4282:1997 – Table 2.1 and 2.2 for all proposed installations:

Category	6.00am – 11.00pm	11.00pm – 6.00 am	Notes
Illuminance in Vertical Plane (Ev)	25lux	4lux	Measured vertivally on site boundary
Luminous Intensity (I)	7,500cd	2,500cd	
Threshold Increment (TI)	20%	20%	Relevant for public roads only

Table 3 Recommended maximum values of light technical parameters for the control of obtrusive light

Note 1: All Values quoted are initial and non-maintained.

Note 2: The selection criteria above are based on *commercial areas or at boundary of commercial and residential areas.*

Note 3: The controlling level is based on Level 1 control, *appropriate where abutting properties are close to the installation where they are residential in nature.*

3 Lighting Installations

3.1 Existing Lighting Installations

3.1.1 Glebe Island

There are currently 19 Lighting towers installed with a varying number of luminaires. The installations are approximately in the following arrangements:

Tower	Height	Luminaire fittings	No. Of fittings	Tilt (approx.)	Notes
T1	25m	Philips Widelite 1000W MH (F Series)	9	53°	Orientations vary
T2	25m	Philips Widelite 1000W MH (F Series)	4	53°	Orientations vary
T3	25m	Philips Widelite 1000W MH (F Series)	4	53°	Orientations vary
T4	25m	Philips Widelite 1000W MH (F Series)	5	53°	Orientations vary
T5	25m	Philips Widelite 1000W MH (F Series)	6	53°	Orientations vary
T6	25m	Philips Widelite 1000W MH (F Series)	4	53°	Orientations vary
T7	25m	Philips Widelite 1000W MH (F Series)	6	53°	Orientations vary
T8	30m	Philips Widelite 1000W MH (F Series)	0	53°	Orientations vary
T9	30m	Philips Widelite 1000W MH (F Series)	8	53°	Orientations vary
T10	30m	Philips Widelite 1000W MH (F Series)	7	53°	Orientations vary
T11	30m	Philips Widelite 1000W MH (F Series)	3	53°	Orientations vary
T12	30m	Philips Widelite 1000W MH (F Series)	0	53°	Orientations vary
T13	30m	Philips Widelite 1000W MH (F Series)	7	53°	Orientations vary
T14	30m	Philips Widelite 1000W MH (F Series)	1	53°	Orientations vary
T19	30m	Philips Optivision 1000W MH	4	0°	Orientations vary
T20	30m	Philips Optivision 1000W MH	4	0°	Orientations vary
T21	30m	Philips Optivision 1000W MH	4	0°	Orientations vary
T22	30m	Philips Optivision 1000W MH	4	0°	Orientations vary
T23	30m	Philips Optivision 1000W MH	4	0°	Orientations vary
		TOTAL QTY	84		

Table 4 Light Assemblies at Glebe Island

Refer to SYD1222800-SKE100 Rev E for the lighting layout plan.

3.1.2 Existing Glebe Island Lighting Controls

The lighting towers are supplied from the Substation 2 LV Main Switchboard. Each light is across two phases with 16mm2 Cu 3x1c + e SDI Cables.

All controls contactors are located in the Substation 2 LV Main Switchboard. For towers T1-T14, there are three contactors per tower to allow for the following controls:

1. 1/3 of the tower lights switch on for general security.
2. ½ of the tower lights switch on for lighting to the East.
3. ½ of the tower lights switch on for lighting to the West.

Lights on towers T19 – T23 are grouped as one per tower.

All lights are switched via four latching push button switches located in the guardhouse. Additionally, there is a timeclock and bypass switch located inside the guardhouse.

WSP understands that currently the installed time clock is not used. There are no photocell overrides installed.

3.2 Proposed Lighting Installations

3.2.1 Carpark A

There are 13 mobile lighting poles proposed for the carpark A.

Tower	QTY	Height	Luminaire Fittings	No. of Fittings	Tilt	Orientation
P1	7	9m	Ruud AREA CUTOFF 150W MH	1 ea.	0º	As Shown
P2	6	9m	Ruud AREA CUTOFF 150W MH	2 ea.	0º	As Shown

Table 5 **Light Assemblies at Glebe Island – Carpark A**

Refer to Appendix A: SYD1222800-E200 for the lighting layout plan.

3.2.2 Carpark B

There are 24 lighting poles proposed for the carpark B.

Tower	QTY	Height	Luminaire Fittings	No. of Fittings	Tilt	Orientation
P1	24	9m	Ruud AREA CUTOFF 150W MH	2 ea.	0º	As Shown

Table 6 **Light Assemblies at Glebe Island – Carpark B**

Refer to Appendix A: SYD1222800-E300 for the lighting layout plan.

3.2.3 Carpark C

There are 4 lighting poles proposed for the carpark C.

Tower	QTY	Height	Luminaire Fittings	No. of Fittings	Tilt	Orientation
P1	4	9m	Ruud AREA CUTOFF 150W MH	2 ea.	0º	As Shown

Table 7 **Light Assemblies at Glebe Island – Carpark C**

Refer to Appendix A: SYD1222800-E400 for the lighting layout plan.

3.2.4 Carpark D

There are no new lights proposed for Carpark D. The existing lighting towers on Glebe Island provide adequate levels of lighting to meet the light technical parameters. Refer to Table 8 for results.

3.2.5 Billboards

There are two billboards proposed for the new Glebe Island Expo. These are indicated at 8m Wide by 3m Tall.

The lighting to illuminate the billboards will be controlled via a photocell and programmable timer to limit operation as required.

It is proposed the lighting including cabling be fixed discretely to each sign.

Each billboard shall be lit with 5 off WeeF FLC145 20W Ceramic Metal Halide symmetric beam mini floodlights.

Each luminaire will be located at 1.5m centres and fixed to a 1m bracket on the top edge of the billboard and aimed downward. The tilt angle of each luminaire shall be 40º off the normal facing into the billboard.

The uniformity achieved is 10:1, and the billboard captures majority of the main spread of the light without significant spill over the edges (Approximately 15 lux immediately on the edges with sharp drop off further out).

Luminaire and brackets will be painted black, further reducing daytime visual impact.

No flashing or dimmable lighting is proposed.

3.2.6 Proposed Carpark and Billboard Lighting Electrical and Controls

The lighting electrical design shall be in accordance with AS/NZS3000.

All mobile poles shall be supplied with a minimum 2c+E 10mm² Neutral Screened Cu cable. Cabling within the poles to the post-top luminaires shall be 2c+E 2.5mm² PVC/PVC cable.

All lighting circuits shall be protected by 30mA RCDs.

Refer to Section 5 for controls to mitigate obtrusive light.

Lighting controls shall include the following:

1. Timer Clock to limit use of lights during normal operating hours in the DA submission; and
2. Daylight override photocell; and
3. Manual Override switch located at the lighting switch board.

4 Lighting Assessment

4.1 General

The following notes apply to the lighting calculations models used to determine the suitability of existing luminaires for the proposed Glebe Island Expo:

1. All included luminaires are installed on towers within proposed Scope of Works area as advised by Sydney Ports.

2. It has been discussed with Sydney Ports that all luminaires will ultimately remain under the control of Sydney Ports. As such, all luminaires on towers have been considered in the calculations, including those facing away into port.

3. A maintenance factor of 0.7 has been applied to ALL luminaires for the Design Light Technical Parameter calculations. Refer to Table 8.

4. A maintenance factor of 1.0 has been applied to ALL luminaires for the Obtrusive Light Control Parameter calculations. Refer to Table 9 and 10.

5. Point vertical calculations are orientated to achieve the best results within the models.

6. All calculations are carried out using AGI32 software licensed by Lighting Analysts.

4.2 Calculated Light Technical Parameters

The following table illustrates the calculated results for each element under consideration:

Category	Eavg **(Limit)**	Eph **(Limit)**	Epv **(Limit)**
Main Entry Road	32.4 (**3.5**)	2.7 (**0.7**)	4.8 (**0.7**)
External Egress Area East	13.5 (**3.5**)	3.6 (**0.7**)	3.4 (**0.7**)
Back of House Circulation	31.7 (**1.75**)	14.2 (**0.3**)	2.7 (**0.3**)
External Carpark A	12.51 (**7**)	2.1 (**1.5**)	1.6 (**1.5**)
External Carpark B	12.90 (**7**)	1.5 (**1.5**)	1.6 (**1.5**)
External Carpark C	15.88 (**7**)	1.8 (**1.5**)	2.6 (**1.5**)
External Carpark D	45.88 (**7**)	10.5 (**1.5**)	4.5 (**1.5**)
Billboards	95	N/A	N/A
Philips Optivision UWLR@ 0º Tilt	0% (**3**)		
Philips Widelite UWLR@ 53º Tilt	10.3% (**3**)		
Ruud MAC615 UWLR@ 0º Tilt	0% (**3**)		
WeeF FLC145 UWLR@ 40º Tilt	<1% (**3**)		

Table 8 Calculated Light Technical Parameters

The calculations above indicate that the existing lighting installations provide adequate levels to comply with current standards with the exception of UWLR.

The Widelite 1000W MH luminaires with a tilt of 53º above horizontal exceed the recommended limit of 3%. This can be rectified by readjusting the fittings down to 25º.

4.3 Calculated Obtrusive Light Control Parameters of Existing installations

The following table illustrates the calculated results for each element under consideration:

Parameter	Area	Calculated Result (Limit)
Illuminance in Vertical Plane (Ev)	Port Jackson Boundary (Glebe Island)	51 Lux (25 lux)
	Johnstons Bay Boundary	111 Lux (25 lux)
Luminous Intensity (I)	Philips Optivision @ 0º Tilt	170 cd (7,500cd)
	Philips Widelite @ 53º Tilt	14,738.7 cd (7,500cd)
Threshold Increment (TI)	Sommerville Road (Calculated Veiling Luminance of 0.06)	1% (20%)

Table 9 Calculated Light Technical Parameters for the control of obtrusive light

The calculations above indicate that the existing lighting installations within the port site do not control Obtrusive effects of lights to current standards. However, it must be noted these installations are existing and would assume that the installation complied to the standards at the time of installation.

The main areas of non-compliance are Vertical Spill levels and Maximum Intensity of the Philips Widelite exceeding maximum limits set by AS4282. The installations, again, were 30 years ago and may have complied to the standards at the time of installation.

It should also be noted that the Philips Optivision luminaires, installed approximately 10 years ago, comply with current standards.

The Glebe Island Expo does not propose to alter the lights as they are required for ongoing Port Operations.

4.4 Calculated Obtrusive Light Control Parameters of Proposed installations

The following table illustrates the calculated results for each new proposed element under consideration:

Parameter	Area	Calculated Result (Limit)
Illuminance in Vertical Plane (Ev)	Port Jackson Boundary (Carpark B)	4.8 Lux (25 lux)
	Robert Street Boundary (Carpark A)	20.8 Lux (25 lux)
	Booth Street Boundary	0 Lux (25 lux)
	Robert Street Boundary (Carpark C)	7.9 Lux (25 lux)
Luminous Intensity (I)	Ruud MAC615 UWLR@ 0º Tilt	<3,882 cd (7,500cd)
	WeeF FLC145 UWLR@ 40º Tilt	<1,650 cd (7,500cd)
Threshold Increment (TI)	Robert Street Only	1% (20%)

Table 10 Calculated Light Technical Parameters for the control of obtrusive light

The calculations above indicate that the proposed lighting installations adequately control Obtrusive effects of lights to current standards.

These levels are appropriate for operation of lights up to 11.00pm. Refer to Section 5, item 2, for recommendations if these lights are proposed for operation beyond 11.00pm.

5 Recommended Draft Conditions for Mitigating Obtrusive Light

The lighting installation at Glebe Island currently provides adequate levels to satisfactorily meet current lighting design standards adopted by City Of Sydney in their Exterior Lighting Policy. Subsequently, no changes to the existing lighting tower arrangements would be required to meet Light Design Technical Parameters.

The lighting at Glebe Island shall be provided with the following controls to mitigate any obtrusive light produced at Glebe Island and minimize impact:

1. The lighting poles proposed for the carpark shall be mobile poles to negate any excavations. Electrical Supplies to new lighting installations shall be by means of surface cabling protected by appropriate means to the requirement of AS/NZS3000.

2. If the new lighting of the carparks is proposed to operate after the hours of 11.00pm, the obtrusive spill light of the carparks shall be exceeding the limit of 4lux. This however, occurs at a maximum height of 1.5m above ground level and will have negligible effects on the surrounds. It is recommended that the lighting controls switch off the external perimeter luminaires proposed as facing into the water, independently of the carpark general lighting, after the hours of 11.00pm.

3. Disabled carparks nominated for each carpark shall be located within 3 parking bays of a proposed carpark light location.

4. Any existing lights identified in this assessment that are removed, shall be replaced with new installations to match existing like for like. All new installations shall be designed and installed to comply with the City of Sydney Exterior Lighting Policy, AS/NZS1158, AS4282 and AS/NZS3000.

5. The lighting for the future shuttle road shall be designed and installed to comply with the City of Sydney Exterior Lighting Policy, AS/NZS1158, AS4282 and AS/NZS3000.

6. The lighting for the future undercover carpark (Carpark E) shall be designed and installed to comply with the City of Sydney Exterior Lighting Policy, AS/NZS1158, AS4282 and AS/NZS3000. The structure of the SICEEP tent shall be designed to shield any light spill onto property boundaries.

7. The lighting for the future bus shelters shall be designed and installed to comply with the City of Sydney Exterior Lighting Policy, AS/NZS1158, AS4282 and AS/NZS3000. Bus Shelter structures shall be designed to shield any light spill onto the property boundary.

8. The lighting for the new wharf shall be designed and installed to comply with the City of Sydney Exterior Lighting Policy, AS/NZS1158, AS4282 and AS/NZS3000. Wharf Structures shall be designed to shield light spill onto the property boundary.

9. Externally illuminated billboards that are identified in this report shall be located no closer than 2m to any site boundary.

10. Additional lighting for the proposed covered Carpark E shall be designed to be lit to AS1158.3.1, AS1680 and AS428. The lighting shall be designed to integrate with the SICEEP structure.

6 Conclusion

It is WSPs opinion that the lighting installations proposed for the Glebe Island Expo will add no additional obtrusive light to the area.

The above statement is based on the following points:

1. **Glebe Island Expo and Carpark D**: Existing lighting that has been installed near 10-30years will remain unchanged and serve the new Expo. No additional obtrusive light from existing will be produced from this area.

2. **Carparks A, B and C**: The design and subsequent light spill has been strictly controlled to meet the requirements of the City of Sydney District Plan; Exterior Lighting Policy and the AS/NZS1158, AS4282 lighting standards quoted within.

3. **Billboards**: The design and subsequent light spill has been strictly controlled to meet the requirements of the City of Sydney District Plan; Exterior Lighting Policy and the AS/NZS1158, AS4282 lighting standards quoted within.

4. **Conditions**: The conditions for mitigating obtrusive lighting as recommended in Section 5 are implemented

0 APPENDIX A DRAWINGS

SYD1222800-SKE100 Rev E LIGHTING LAYOUT PLAN
SYD1222800-E200 Rev A CARPARK A LIGHTING LAYOUT PLAN
SYD1222800-E300 Rev A CARPARK B LIGHTING LAYOUT PLAN
SYD1222800-E400 Rev A CARPARK C LIGHTING LAYOUT PLAN

BOOTH STREET LIGHT SPILL BOUNDARY

CARPARK C SUBCATEGORY P11b

ROBERT STREET CARPARK C LIGHT SPILL BOUNDARY

BILLBOARD

CARPARK B SUBCATEGORY P11b

EGRESS AREA EAST SUBCATEGORY P2

PORT JACKSON

PORT JACKSON CARPARK B LIGHT SPILL BOUNDARY

PORT JACKSON (GLEBE ISLAND) SPILL BOUNDARY

CARPARK A SUBCATEGORY P11b

ROBERT STREET CARPARK A LIGHT SPILL BOUNDARY

MAIN ENTRY ROAD SUBCATEGORY P2

BOH AREA SUBCATEGORY P3

JOHNSTON BAY LIGHT SPILL BOUNDARY

BILLBOARD

CARPARK D SUBCATEGORY P11b

ROBERT STREET

SOMMERVILLE ROAD

JAMES CRAIG ROAD

JOHNSTONS BAY

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T19 T20 T21 T22 T23

LEGEND

1	SICEEP MAIN ENTRANCE
2	VEHICLE DROP-OFF ZONE
3	SICEEP RECEPTION (BELOW)
4	SICEEP ADMINISTRATION OFFICES
5	PRE-FUNCTION AREA
6	5000m² EXHIBITION HALL
7	FORECOURT
8	FERRY TERMINAL
9	WASTE AREA
10	EXTERNAL STORAGE AREA
11	BOH LOADING AREA
12	EXISTING ELECTRICAL SUBSTATION #5
13	EXISTING ELECTRICAL SUBSTATION #2
14	EXISTING SYDNEY WATER PUMP STATION (INSIDE EXHIBITION HALL)
15	PORT OPERATIONS ERS FACILITY
16	SYDNEY PORTS OPERATIONS DRY BULK USE AREA
17	BUS PASSENGER DROP-OFF / PICK ZONE
18	ACCESS ROAD (INDICATIVE LINE MARKING ONLY)
19	EXHIBITION BILLBOARDS / SIGNAGE LOCATIONS
20	CAR PARK A
21	CAR PARK B
22	EXISTING GRAIN SILOS FACILITIES
23	PROPOSED NEW ROUNDABOUT
24	PROPOSED NEW ROAD LINK TO ROBERT STREET

LIGHT SPILL ASSESSMENT BOUNDARY LINES

LIGHTING ASSESSMENT AREAS

NOTE: FOR ADDITIONAL CAR PARK INFORMATION REFER TO PLANS A2700 & A2701

UNUSABLE AREA / NO ACCESS

SITE BOUNDARY

EXISTING LIGHTING STRUCTURES

WOODS BAGOT

INSW SICEEP Glebe Island Expo - Site Plan

FOR INFORMATION ONLY

Project number	Date generated	Scale
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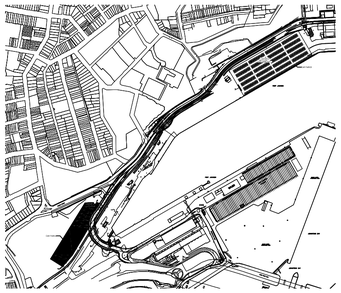
Drawing number	Revision	
A1002	DRAFT	

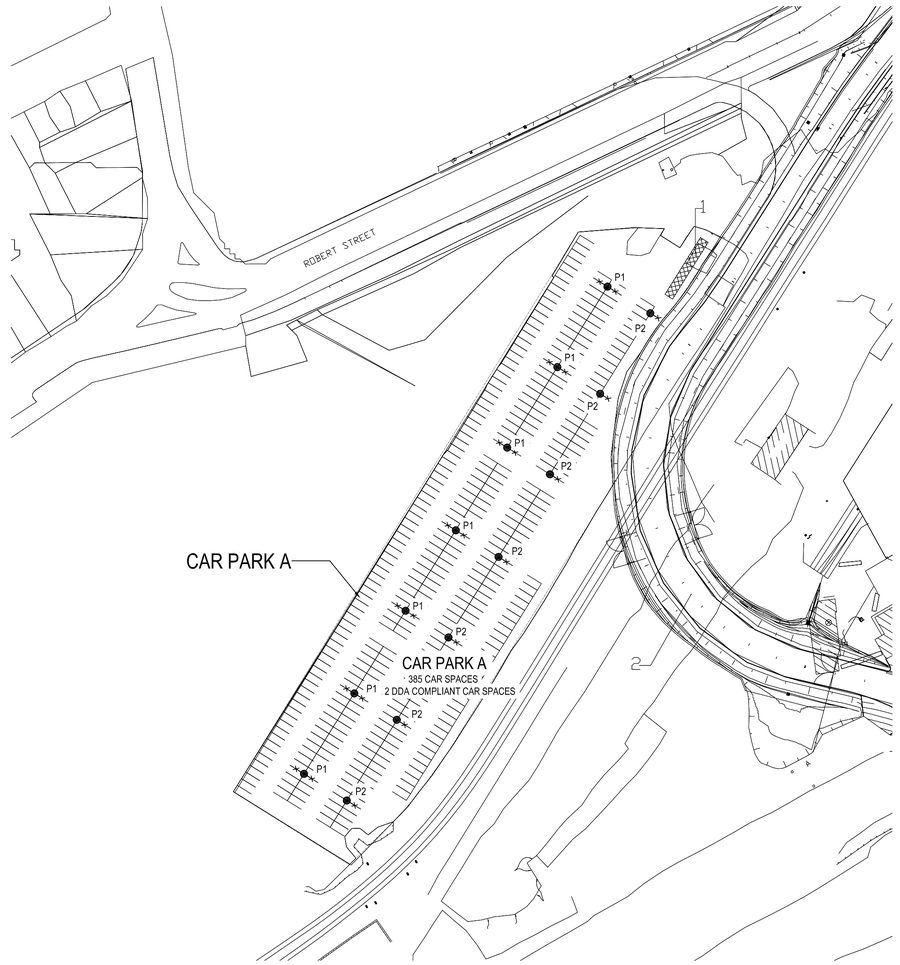
SYD1222800 SKE 100 LIGHTING LAYOUT - REV E

DO NOT SCALE



GENERAL NOTES:

1. THIS DRAWING IS FOR INFORMATION ONLY. DO NOT SCALE.
2. ALL LIGHTING DESIGNS ARE TO AS/NZS 1158 AND AS4282.
3. ALL ELECTRICAL DESIGNS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH AS3000
4. THE SELECTED LIGHTING SUBCATEGORY IS P11b.
5. THE LIGHTING CONTROLS SHALL INCORPORATE A PHOTOCELL AND A DUAL CLOCK 24-7 PROGRAMMABLE TIMER. ADDITIONALLY A MANUAL OVERRIDE CONTROL SWITCH SHALL BE PROVIDED.
6. BUS SHELTER/PICK UP-DROP OFF ZONE LIGHTING BY OTHERS
7. REFER TO LIGHTING REPORT FOR CALCULATED SPILL LEVELS
8. STRUCTURAL DESIGNS BY OTHERS.



CAR PARK A
SCALE 1:1000

LIGHTING LEGEND

- LIGHTING COLUMN WITH SINGLE LUMINAIRE
- LIGHTING COLUMN WITH TWO BACK TO BACK LUMINAIRES

LUMINAIRE SCHEDULE

ITEMS	LUMINAIRE	LAMP	WATTAGE	TILT	ORIENTATION	POLE	MOUNTING HEIGHT	NOTES
P1	2XRuud Area Cut-Off	HIT-CE	150W	0°	AS SHOWN	SQUARE HDG STEEL	9m AFFL	TWIN OUTREACH FOR 2 LUMINAIRES (BACK TO BACK)
P2	Ruud Area Cut-Off	HIT-CE	150W	0°	AS SHOWN	SQUARE HDG STEEL	9m AFFL	SINGLE OUTREACH WITH 1 LUMINAIRE ONLY

REV	DATE	BY	DESCRIPTION	CHK	APD
A	23.01.2013	AXK	FOR INFORMATION ONLY	SXB	GXW

DRAWING STATUS:

REFERENCE COORDINATION DRAWINGS

DESCRIPTION	DRAWING NO.	REV	CHK

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CLIENT:

ARCHITECT:

WOODS BAGOT

PROJECT:

GLEBE ISLAND EXPO

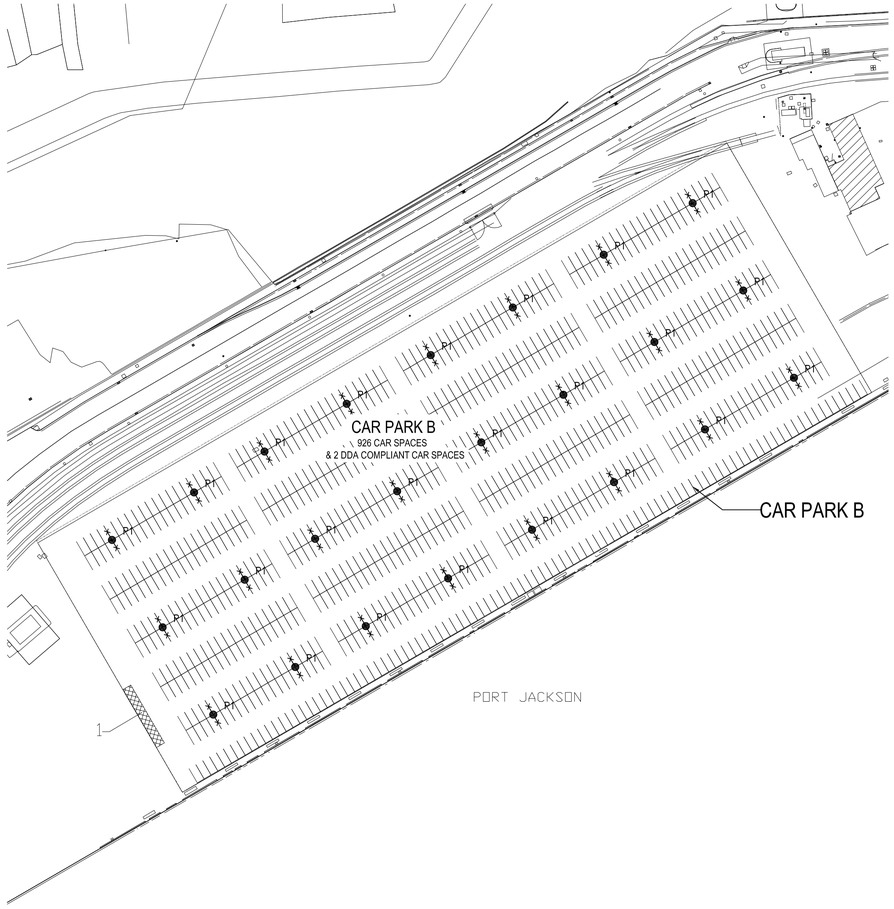
TITLE:

ELECTRICAL SERVICES
CARPARK A LAYOUT PLAN
LIGHTING LAYOUT

SCALE @ A1:	CHECKED:	APPROVED:
1:1000	SXB	GXW
PROJECT No: SYD1222800	DRAWN: AXK	DATE: JANUARY 2013

DRAWING No:	REV:
E-200	A

DO NOT SCALE



CAR PARK B
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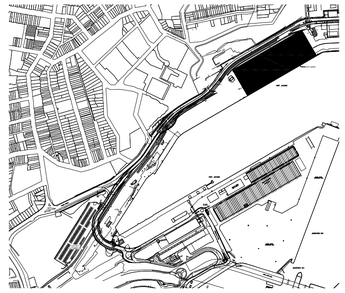

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8. STRUCTURAL DESIGNS BY OTHERS.

LIGHTING LEGEND

- LIGHTING COLUMN WITH SINGLE LUMINAIRE
- LIGHTING COLUMN WITH TWO BACK TO BACK LUMINAIRES

LUMINAIRE SCHEDULE

ITEMS	LUMINAIRE	LAMP	WATTAGE	TILT	ORIENTATION	POLE	MOUNTING HEIGHT	NOTES
P1	2XRuud Area Cut-Off	HIT-CE	150W	0°	AS SHOWN	SQUARE HDG STEEL	9m AFFL	TWIN OUTREACH FOR 2 LUMINAIRES (BACK TO BACK)
P2	Ruud Area Cut-Off	HIT-CE	150W	0°	AS SHOWN	SQUARE HDG STEEL	9m AFFL	SINGLE OUTREACH WITH 1 LUMINAIRE ONLY

REV	DATE	BY	DESCRIPTION	CHK	APD
A	23.01.2013	AXK	FOR INFORMATION ONLY	SXB	GXW

DRAWING STATUS:

REFERENCE COORDINATION DRAWINGS

DESCRIPTION	DRAWING NO.	REV	CHK

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CLIENT:

ARCHITECT:
WOODS BAGOT

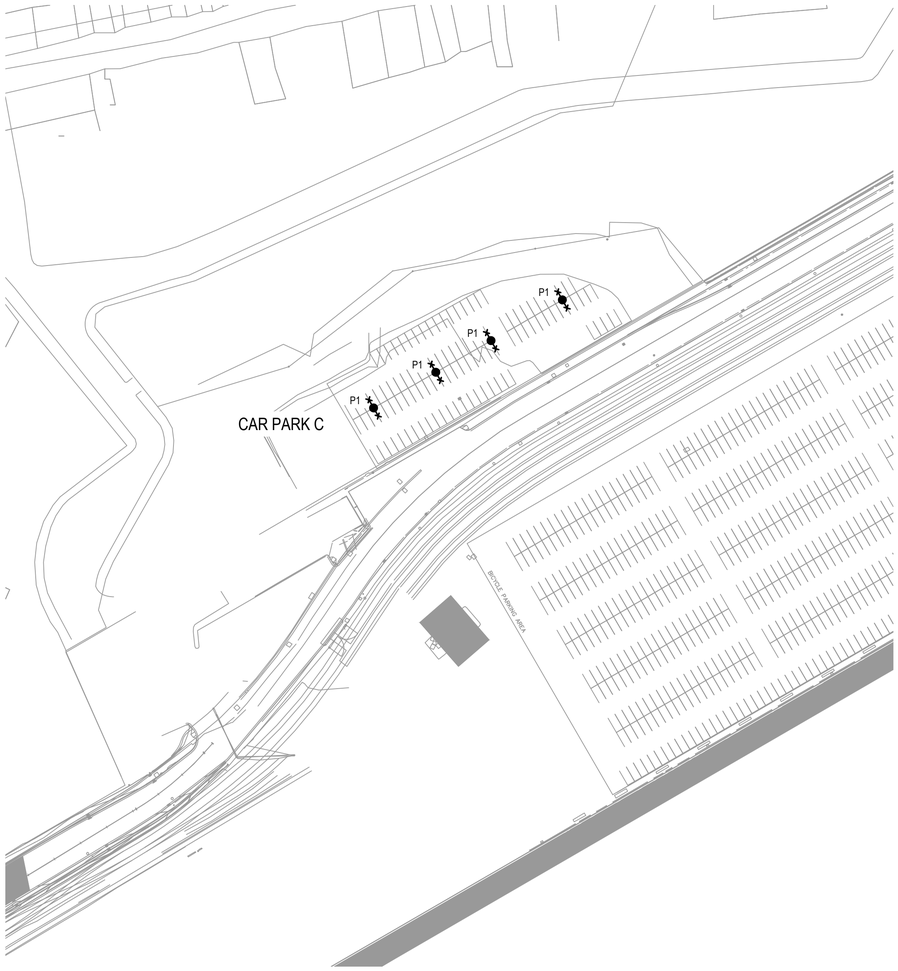
PROJECT:
GLEBE ISLAND EXPO

TITLE:
ELECTRICAL SERVICES
CARPARK B LAYOUT PLAN
LIGHTING LAYOUT

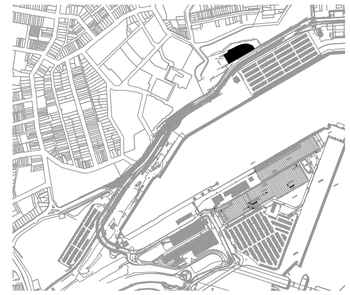
SCALE @ A1:	CHECKED:	APPROVED:
1:1000	VXD	RAB
PROJECT No: SYD1222800	DRAWN: AXK	DATE: JANUARY 2013

DRAWING No: E-300 REV: A

DO NOT SCALE



CAR PARK C
SCALE 1:1000



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7. REFER TO LIGHTING REPORT FOR CALCULATED SPILL LEVELS
8. STRUCTURAL DESIGNS BY OTHERS.

LIGHTING LEGEND

LIGHTING COLUMN WITH TWO BACK TO BACK LUMINAIRES

LUMINAIRE SCHEDULE

ITEMS	LUMINAIRE	LAMP	WATTAGE	TILT	ORIENTATION	POLE	MOUNTING HEIGHT	NOTES
P1	2XRuud Area Cut-Off	HIT-CE	150W	0°	AS SHOWN	SQUARE HDG STEEL	9m AFFL	TWIN OUTREACH FOR 2 LUMINAIRES (BACK TO BACK)

REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	AXK	FOR INFORMATION ONLY	SXB	GXW

DRAWING STATUS:

REFERENCE COORDINATION DRAWINGS

DESCRIPTION	DRAWING NO.	REV.	CHK.

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CLIENT:

ARCHITECT:
WOODS BAGOT

PROJECT:
GLEBE ISLAND EXPO

TITLE:
ELECTRICAL SERVICES
CARPARK C LAYOUT PLAN
LIGHTING LAYOUT

SCALE @ A1:	CHECKED:	APPROVED:
1:1000	VXD	RAB
PROJECT No:	DRAWN:	DATE:
SYD1222800	AXK	JANUARY 2013

DRAWING No: E-400 REV: A