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WSP

SICEEP MAXIMISATION OF PORTS STAGE 1 DEVELOPMENT AREAS

LIGHTING ASSESSMENT REPORT

5/11/2012

Quality Management

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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 existing exterior lighting installation of the Glebe Island Ports, and highlighting the fact of possible supplementary lighting in areas which can't achieve the relevant Lux levels to meet code. The assessment is limited to those areas affected by the proposed interim exhibition facility.

This report conveys the condition and suitability of the existing lighting installation for the proposed new temporary development. It also makes recommendations on upgrading existing installations where identified as necessary to comply with current Australasian Standards and good practice.

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 original lighting was supplied and installed over 30years ago. Additionally, 10 years ago supplementary 5 new floodlight towers were added.

1.3 Scope

This report covers the review of the existing flood light installation and 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 West; and,
3. The External Egress Area to the East; and,
4. The Back of House Circulation Area; and,
5. The proposed External Carpark.

The contents of this report advise the Sydney Port Corporation of any deficiencies in the currently installed lighting performance when reviewed against their relevant standards.

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-SK0093 SICEEP – Option 3 Maximization of Ports Stage 1 Development Areas, Rev B, Wood Bagot, 06/12;

4. 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).

5. SWGP556A – White Bay Glebe Island SPC Base Data (Dial Before You Dig), Sydney Ports Corportaion, 08/12

2 Design 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 Design Standards

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 Design Exemptions and Assumptions

1. WSP has not undertaken lighting assessments for areas outside the extent of works.
2. The existing electrical wiring is assumed to have been designed and installed in accordance with AS/NZS 3000:2007 Wiring Rules

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 time of installation. Where existing luminaires and associated infrastructure are to remain as installed without repositioning, it is assumed these are exempt from current rules and regulations.

5. Sydney Ports have advised that the buildings will be designed to avoid any existing tower structures. For the purposes of this assessment, it is assumed that the existing towers are all remaining, unless advised otherwise.

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

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 West	P2	High	Medium	Medium
External Egress Area East	P2	High	Medium	Medium
Back of House Circulation	P3	Medium	Low	Low
External Carpark	P11b	<75%	Medium	N/A

Table 1 Lighting Subcategories

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

2.5 Design Parameters

2.5.1 Design Light Technical Parameters

The following light technical parameters apply as stated in AS/NZS1158.3.1:2005 for the following subcategories:

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

Category	Eavg (lux)	Eph (lux)	Epv (lux)	TI(%)	UWLR(%)
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 stated 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 is 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 Assessment

3.1 Existing Lighting

There are currently 24 Lighting towers installed with a varying number of luminaires. The installations are roughly 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 B for the lighting layout plan.

3.2 Existing 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.

4 Calculations

The following notes apply to the lighting calculations models used to determine the suitability of existing luminaires for the proposed new works:

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 5.

4. A maintenance factor of 1.0 has been applied to ALL luminaires for the Obtrusive Light Control Parameter calculations. Refer to Table 6.

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.

4.1.1 Calculated Light Technical Parameters

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

Category	Eavg **(Limit)**	Eph **(Limit)**	Epv **(Limit)**
Illuminance in Vertical Plane (Ev)	29.6 (**3.5**)	2.0 (**0.7**)	4.8 (**0.7**)
Luminous Intensity (I)	20.1 (**3.5**)	1.4 (**0.7**)	4.3 (**0.7**)
Threshold Increment (TI)	13.5 (**3.5**)	3.6 (**0.7**)	3.4 (**0.7**)
Back of House Circulation	34.3 (**1.75**)	5.3 (**0.3**)	1.5 (**0.3**)
External Carpark	19.1 (**7**)	1.6 (**1.5**)	7.4 (**1.5**)
Philips Optivision UWLR@ 0º Tilt	0% (**3**)		
Philips Widelite UWLR@ 53º Tilt	10.3% (**3**)		

Table 5 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.

4.1.2 Calculated Obtrusive Light Control Parameters

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

Parameter	**Area**	**Calculated Result (Limit)**

Parameter	Area	Calculated Result (Limit)
Illuminance in Vertical Plane (Ev)	Port Jackson Boundary	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 6 Calculated Light Technical Parameters for the control of obtrusive light

The calculations above indicate that the existing lighting installations do not control Obtrusive effects of lights to current standards. However, it may 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.

5 Observations

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

2. The existing installation fails on effectively controlling Obtrusive light to the residential surrounds. However, as no changes are proposed to these installations, these fittings may be continued for use under the permits granted as existing works at the time of installation.

3. The controls of the lights would continue to be operated by Sydney Ports. Agreements on timing and operation during events would need to be coordinated directly between City of Sydney and Sydney Ports.

4. It is expected that some areas may require additional lighting with shading caused from the erection of tents and stalls. Additionally, non-illuminated signs may be considered for direct lighting once numbers and locations are confirmed.

5. In the instances noted in point 4, it is recommended, portable floodlights be installed, as required. These temporary installations would be required to be aimed to comply with AS4282. Electrically, they would be connected to existing power supplies available on site. No excavation works will be required with this option.

6. It is suggested that within the proposed site a number of signs shall be strategically placed throughout, these signs may have a requirement to be specially illuminated. Careful consideration shall be undertaken for the position of the illuminated signs and the light source installed to provide the lighting concept.

6 Development Application External Lighting Criteria

General

(a) The lighting of the buildings and surrounds shall reflect the iconic nature of the Precinct and support the creation of an interim facility

(b) Lighting shall be provided to enhance architecture and features utilising direct and indirect lighting.

(c) Illumination levels for the Facilities must comply with the minimum requirements of AS1680.

External and Accessible area Lighting

(a) Existing lighting control to all light towers shall remain in situ, with SICEEP identifying there requirements for energising the associated lights around the site to Sydney harbour. Supplimentry external lighting shall be incorporated within the design for main pathways and routes of egress.

(b) Existing light towers within the site shall remain, with additional lights added to suite the facilities requirements, D&C contractor shall review all spare light towers currently within Sydney ports storage area, and provide a cost to undertake all remedial works to make them compliant.

(c) It shall enhance and improve the connection of the Precinct through the use of illuminated elements to create a cohesive and intuitive link between divided and visually obstructed areas.

- General external lighting shall:
- Be controlled by intelligent control systems that facilitate static and dynamic lighting scenes;
- Facilitate pedestrian movement and security patrols, and provide a sense of safety;
- Provide minimum lighting levels to AS/NZS1158 series for each designated area for its intended use;
- Activate and reinforce main promenades connecting the various elements of the facility through the use of prominent and distinctive lighting elements;
- Provide a suitable aesthetic, and functionally compatible outcome in co-ordination with adjoining areas;
- Be integrated with and enhance the way-finding and signage across the site to be simple and intuitive; and
- Identify Facility entrances and key locations as identifiable destinations.
- All external lighting equipment and controls are to be discrete, vandal resistant, and maintainable, provide glare control, and be energy efficient and effective.
- External lighting poles shall be provided with features that integrate way finding, power, AV, lighting and technolgy services

Areas external to the buildings allocated for exhibition purposes shall be provided with facilities for the installation of temporary feature lighting.

Explanatory Note: Temporary feature lighting refers to lighting provided by exhibitors, utilising permanent services provided by the D&C Contractor

Provide distinctive lighting on building facades as part of the external lighting scheme. Façade lighting shall be concealed and integrated in the architecture of the building, accenting discrete architectural elements.

7 Conclusion

The current lighting installation at Glebe Island is dated and was designed to comply with relevant standards at the time of installation, near 30 years ago.

These installations when switched as a whole are able to provide sufficient levels of light to meet the design light technical parameters. As such, they comply with City of Sydney Exterior Lighting Policy.

These same installations, however fail to comply with current standards adopted by Council to control the adverse effects of Obtrusive Lighting. However, it may be noted these installations may have complied to the standards current at the time of commissioning.

Furthermore, as no changes are required to any existing installations in regards to design parameters, it is assumed these fittings may be continued for use under permits that would have been granted as existing works at time of commissioning.

If additional lighting is deemed as required on site after the installation of tents, stalls and signs, these may be supplemented with additional temporary portable floodlights, connected to existing power distributed on site.

0 APPENDIX A SYD1222800-SKE100 REV B LIGHTING LAYOUT PLAN