

17 December 2020

Gray Puksand Pty Ltd (Architect)
1/56 Clarence Street
Sydney NSW 2000
Australia

Attention: Barry Hackett

**RE: TAFE NSW CONSTRUCTION CENTRE OF EXCELLANCE, KINGSWOOD
SSD LIGHTING CONSULTANT REPORT**

Please find attached Haron Robson SSD Lighting Consultation Report for the above project.

Should you have any questions on this matter please do not hesitate to contact the undersigned at this office.

Yours faithfully
HARON ROBSON



Tom Russell
Technical Director

tr@haronrobson.com.au

Attachment Haron Robson SSD Lighting Consultation Report

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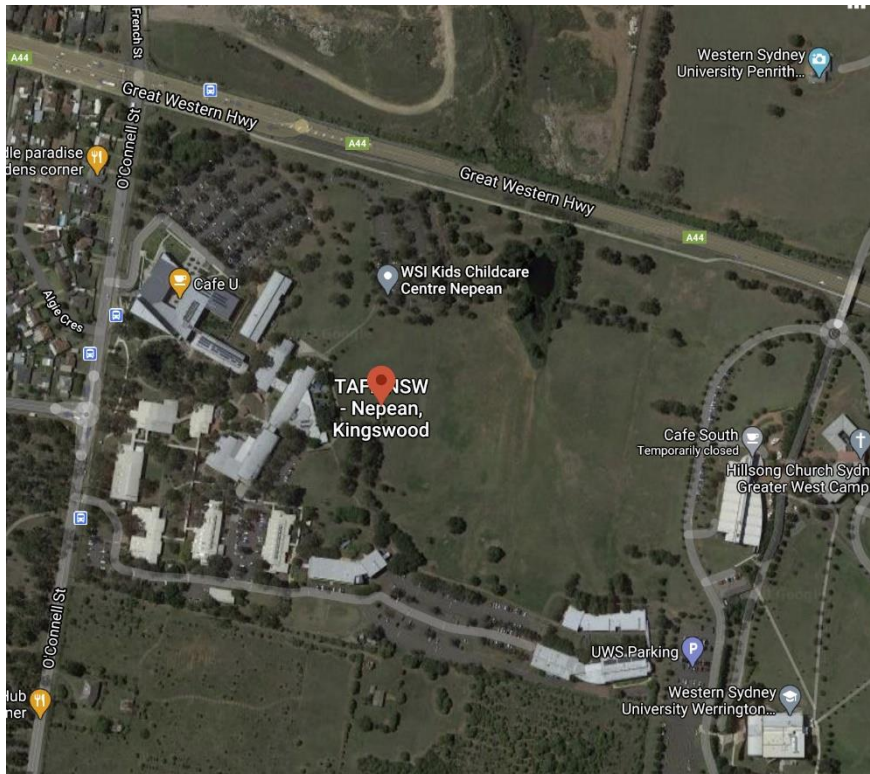
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**TAFE NSW CONSTRUCTION CENTRE OF EXCELLANCE, KINGSWOOD
SSD LIGHTING CONSULTANT REPORT**

SSD Lighting Consultant Report

For

**TAFE NSW Construction Centre of Excellence (TAFE CCoE), Nepean Kingswood
Campus**



This report, dated 17/12/2020, has been prepared by Haron Robson Pty Ltd for Gary Punksand Pty Ltd. at 1/56, Clarence Street, Sydney, NSW 2000, Australia

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**TAFE NSW CONSTRUCTION CENTRE OF EXCELLENCE, KINGSWOOD
SDD LIGHTING CONSULTANT REPORT**

1 INTRODUCTION

This report has been prepared to accompany a detailed State Significant Development Application (SSDA) SSD_8571481 for the development of an educational facility at the TAFE Nepean Kingswood Campus, located at 2-44 O'Connell Street, Kingswood (the site). The legal description of the site is Lot 1 in DP 866081. The site comprises a rectangular lot with an area of approximately 23 hectares.

Specifically, the SSDA seeks development consent for the construction and operation of the TAFE NSW Construction Centre of Excellence (**TAFE CCoE**) a multi-level, integrated educational facility designed to accommodate specialised training and education for construction-related TAFE NSW courses (**the project**). The TAFE CCoE will be a new learning environment with an emphasis on flexibility and adaptability, to encourage cross-disciplinary collaboration, industry engagement and educational excellence. On 27 February 2019, the NSW Government announced the delivery and associated funding for the CCoE.

The proposed development is classified as State Significant Development (**SSD**) on the basis that it falls within the requirements of clause 4, Schedule 19 of the *State Environmental Planning Policy (State and Regional Development) 2011* (**SRD SEPP**), being 'development for the purpose of a tertiary institution... that has a capital investment value of more than \$30 million'.

The Minister for Planning, or their delegate, is the consent authority for the SSDA and this application is lodged with the NSW Department of Planning, Industry and Environment (**NSW DPIE**) for assessment.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (**SEARs**) issued for the project. Specifically, this report has been prepared to respond to the following SEARs:

SEARs		Report Section
Key Issues	3. Operation <ul style="list-style-type: none"> Provide details of the existing and proposed operations, including staff and student numbers, and hours of operation. Provide a detailed justification of suitability of the site to accommodate the proposal. 	Report Section 3.1
	4. Built Form and Urban Design <ul style="list-style-type: none"> Address the height, density, bulk and scale, setbacks and interface of the proposal in relation to the surrounding development, topography, streetscape and any public open spaces. Address design quality and built form, with specific consideration of the overall site layout, streetscape, open spaces, façade, rooftop, massing, setbacks, building articulation, materials and colours. Provide details of any digital signage boards, including size, location and finishes. Detail how services, including but not limited to waste management, loading zones, and mechanical plant are integrated into the design of the development. Provide detailed site and context analysis to justify the proposed site planning and design approach including massing options and preferred strategy for future development. Provide a detailed site-wide landscape strategy, including consideration of integration with built form, security, shade, topography and existing vegetation. Provide a visual impact assessment that identifies any potential impacts on the surrounding built environment and landscape including views to and from the site and any adjoining heritage items. Address CPTED Principles. Provide details of integration with the wider campus site and the adjoining Western Sydney University site (if relevant), including contextual integration and spatial arrangements, vehicle and pedestrian connections, landscaping, 	Report Section 3.1 Report Section 3.2

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	and consideration of significant view corridors & preservation of significant views and features, where relevant.	
	<p>5. Environmental Amenity</p> <ul style="list-style-type: none"> Assess amenity impacts on the surrounding locality, including solar access, visual privacy, visual amenity, overshadowing, wind impacts and acoustic impacts. A high level of environmental amenity for any surrounding residential land uses must be demonstrated. Conduct a view analysis to the site from key vantage points and streetscape locations (photomontages or perspectives should be provided showing the building and likely future development). Include a lighting strategy and measures to reduce spill into the surrounding sensitive receivers. 	Report Section 3.3
	<p>7. Transport and Accessibility</p> <p>Include a transport and accessibility impact assessment, which details, but not limited to the following:</p> <ul style="list-style-type: none"> proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance; an assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures and personal safety in line with CPTED; details of anticipated peak hour and daily construction vehicle movements to and from the site; details of on-site car parking and access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicles; and details of temporary cycling and pedestrian access during construction. 	Report Section 3.1
	<p>8. Ecologically Sustainable Development (ESD)</p> <ul style="list-style-type: none"> Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development; Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy; Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance; Include an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level; and Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change, specifically: <ul style="list-style-type: none"> hotter days and more frequent heatwave events extended drought periods more extreme rainfall events gustier wind conditions how these will inform landscape design, material selection and social equity aspects (respite/shelter areas). 	Report Section 3.5
Plans and Documents	<p>The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents.</p> <p>In addition, the EIS must include the following:</p>	Report Section 3.1

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	<p>A section 10.7(2) and (5) Planning Certificates (previously Section 149(2) and (5) Planning Certificate) Architectural drawings showing key dimensions, RLs, scale bar and north point, including:</p> <ul style="list-style-type: none"> • plans, sections and elevation of the proposal at no less than 1:200; • illustrated materials schedule including physical or digital samples board • with correct proportional representation of materials, nominated colours and finishes; • details of proposed signage, including size, location and finishes; • detailed annotated wall sections at 1:20 scale that demonstrate typical cladding, window and floor details, including materials and general construction quality; • site plans and operations statement; • Site Survey Plan, showing existing levels, location and height of existing and adjacent structures / buildings and site boundaries; <p>Site Analysis and Context Plans, including:</p> <ul style="list-style-type: none"> • site and context plans that demonstrate principles for future development and expansion, built form character and open space network; • precinct scale plan showing relationship of the proposal to any proposed development on surrounding land; • active transport linkages with existing, proposed and potential footpaths and bicycle paths and public transport links; • and site and context plans that demonstrate principles for future network, active • transport linkages with existing, proposed and potential footpaths and bicycle paths and public transport links. • Sediment and Erosion Control Plan; • Shadow Diagrams; • View analysis, photomontages and architectural renders, including from those from public vantage points; <p>Landscape architectural drawings showing key dimensions, RLs, scale bar and north point, including:</p> <ul style="list-style-type: none"> • integrated landscape plans at appropriate scale, with detail of new and retained planting, shade structures, materials and finishes; • plan identifying significant trees, trees to be removed and trees to be retained or transplanted; <p>Design report to demonstrate how design quality will be achieved in accordance with the above Key Issues including:</p> <ul style="list-style-type: none"> • architectural design statement; • diagrams, structure plan, illustrations and drawings to clarify the design intent of the proposal; • detailed site and context analysis; • analysis of options considered to justify the proposed site planning and design approach; • visual impact assessment identifying potential impacts on the surrounding built environment and adjoining heritage items; • summary of feedback provided by GANSW and NSW State Design Review Panel (SDRP) and responses to this advice; • summary report of consultation with the community and response to any feedback provided; and • how Aboriginal culture and heritage has been considered and incorporated into the design; <p>Geotechnical and Structural Report;</p> <p>Accessibility Report;</p> <p>Arborist Report;</p> <p>Salinity Investigation Report (where required);</p> <p>Noise and Vibration Assessment;</p> <p>Contamination Assessment;</p> <p>Acid Sulphate Soils Management Plan (where required); and</p> <p>Schedule of materials and finishes.</p>	
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2 PURPOSE OF THIS REPORT

To advise on SSD Lighting Consultation in relation to:

- Suitability for the project based on classification of the site and buildings
- Compliance with the NCC 2019 Building Code of Australia Volume One and relevant Australian Standards such as AS4282, AS1158 and AS1680 on exterior and interior lighting design for the project
- Lighting Design with Penrith City Council – Public Domain Policy recommendations whose main objectives is to acknowledge ESD (Ecologically Sustainable Development) and CTPED (Crime Prevention through Environmental Design) principles.

3 BASIS OF REPORT

This report on the lighting design for the TAFE CCoE, is primarily based on the SEARs Requirement issue for this project under the following key issues

- Operations
- Built Form and Urban Design
- Environmental Amenity
- Transport and Accessibility
- Ecologically Sustainable Development (ESD)

Codes, Rating Schemes and Australian Standards covered in this report relevant to the SEARs requirement issued are as follows:

- Penrith City Council –Domain Lighting Policy (2004)
 - Penrith Development Control Plan – 2014 – CPTED
 - Green Star – Interiors v1.2 – 10 Lighting Comfort
 - NCC (National Construction Code) 2019 Building Codes of Australia – Volume One
- Australian Standards:

- (1) **AS 4282:2019** : Control of the Obtrusive effects of Outdoor Lighting
- (2) **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
- (3) **AS 1158.3.1** : Pedestrian Area (Category P) Lighting – Performance and Installation Design
- (4) **AS 1680.2.3 2008** Interior and workplace lighting - Specific applications - Educational and training facilities
- (5) **AS 1680.2.4 2001** Interior lighting – Maintenance pf electrical lighting systems
- (6) **AS/NZS 3000:2018**, Electrical installations **known as the Australian/New Zealand Wiring Rules**)
- (7) **AS/NZS 2293.2:2019** Emergency Lighting and Exit Signs for buildings Part 2 – Routine service and Maintenance

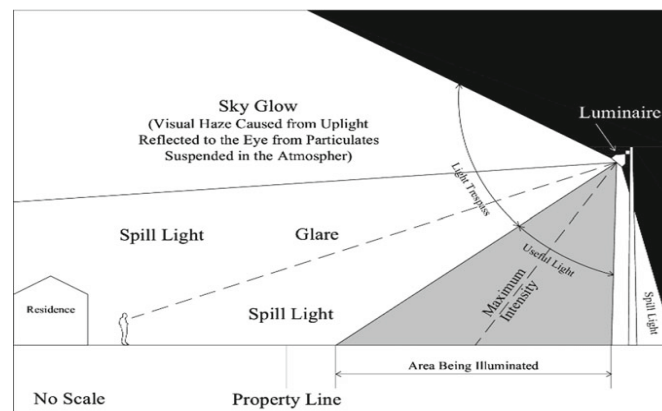
3.1 Operation

Lighting Design is key to Operation, in regards to operating times of the building. It affects the car park lighting, interior lighting and is essential to know how the lighting design can be sustainable in terms of energy saving methods, with the use of occupation sensors, motion detectors, etc.

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In terms of outdoor lighting, local government authorities have applied restrictions on the frequency of use and hours of operation of outdoor lighting, and on the levels of light spilled beyond the boundaries of the subject site. The Penrith Council also recommends that the lighting design be categorised against Prestige and Fear of Crime, desired for the campus.

The carpark lighting will comply with the non-curfew / curfew hours recommended maximum values of spill light and glare for residential areas, in accordance with **AS 4282 "Control of the Obtrusive Effects of Outdoor Lighting"**. Documentation for the compliance will be prepared using relevant lighting software such as Agi32. Details of the various lighting parameters and the relevant codes are include in Refer to **Appendix A** for information.



Source: Research Gate

3.2 Built Form and Urban Design

Analysing the level of prestige awarded to the campus site and assessing the possible Fear of Crime rating, based on local police bureau statistics will be essential. This will be crucial to assess the car park lighting and entry and exit points into the site and all buildings.

The Crime Prevention through Environmental Design (CTPED) principles under the Penrith Development Control Plan – 2014 recommends various Lighting Control methods to refer to, while designing lighting for security and protecting the built form against any possible vandalism threat. The CTPED highlights the light spill over the surroundings and the need to use energy efficient light fittings to save energy.

It is to be noted, that the CTPED principles, also highlights the need to integrate and coordinate lighting design with Landscape from the early stages, to reduce shadows overlooking common areas and ensure there are no negative spaces to enable crime.

Lighting Design for the interiors, needs to also be comply with **AS 1680.2.3 2008** Interior and workplace lighting - Specific applications - Educational and training facilities, to maintain minimum illumination(lux) levels and also refer to **Green Star – Interior (10. Lighting Comfort)**, to ensure high degree of visual comfort for the users within the built form.

The design of Emergency and Exit Lighting is also a crucial design objective for the project, enabling the safe and secure passage of the occupants during any fire or distress situation. Design of Emergency and Exit lighting will comply with **AS/NZS 2293.2:2019 Emergency Lighting and Exit Signs for buildings Part 2 – Routine service and Maintenance**.

Green Star – Lighting Comfort encourage and recognise that the lighting design uses good colour quality and low glare light fittings and maintain the relevant illumination levels as per **AS 1680.2.3 2008**, in order to apply for credits.

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All these recommendations and standards are mentioned in the Penrith City Council –Domain Lighting Policy (2004), which is the lighting code relevant to the project. In addition, the policy also advises on how to prepare the documentation for local council approval.

3.3 Environmental Amenity

As previously discussed in Section 3.1, the visual impact of the light spill in the site and within the built form into the surrounding areas needs to be assessed against the **AS 4282 "Control of the Obtrusive Effects of Outdoor Lighting"**.

3.4 Transport and Accessibility

Pedestrian and road safety within the campus is a SEARs requirement and the CTPED principles stipulates required lighting control design to enable the safe use of the buildings, streetscape and outdoor car parking, wherever relevant.

The recommendation to control light spill and use energy efficient light fittings is key to the safe and effective lighting design of the campus.

3.5 Ecologically Sustainable Development (ESD)

The Penrith City Council –Domain Lighting Policy (2004), discusses extensively on Ecologically Sustainable Development (ESD) principles.

The key areas it covers are:

- The use of minimum hardware installation for the lighting design
- The minimum direct and indirect impact – direct being the light spill on the surrounding sites and the indirect impact being the upward spill on the sky, all covered in **AS 4282 "Control of the Obtrusive Effects of Outdoor Lighting"**.
- Maintenance of the lighting installations (both General and Emergency Lighting); and
- Certification and Preparation of Energy Audits to ensure the lighting design utilises minimal hardware and minimum energy in the operation on the site.

AS 1680.2.4 2001 Interior lighting – Maintenance of electrical lighting systems and **AS/NZS 2293.2:2019** Emergency Lighting and Exit Signs for buildings Part 2 – Routine service and Maintenance, explains the routine maintenance the light fittings need to comply with based on the usage of the space. They are essential to reduce costs and saving energy consumption to ensure the longevity of the light fittings.

In terms of Interior Lighting, the NCC (National Construction Code) 2019 Building Codes of Australia – Volume One under Section J6 (Artificial lighting and power), also describes the power consumption limitations of the light fittings and lighting control devices, relative to the space usage and building classification. Section J6 provides a calculator for use while selecting the light fittings and compliance to ensure the project uses energy efficient light fittings.

Selection of light fittings is also key to the lighting design and **AS/NZS 3000:2018, Electrical installations known as the Australian/New Zealand Wiring Rules**), stipulates the proper insulation of light fittings to avoid fire hazards, possibly arising due to the integration of lighting with other services in the built form.

4 CONCLUSION

The lighting design for the CCoE will be prepared based on the recommendations from the Penrith City Council – Public Domain Lighting Codes and complied to the relevant Australian Standards. The objectives of the Penrith City Council – Public Domain Lighting Codes adhere to ESD and CTPED principles, which are among the many requirements of the SEARs report issued for the project.

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Appendix A - Relevant Lighting Parameters, Codes and Standards

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A.1 Environmental Zones and the ambient light conditions for determining limiting values for light technical parameters

TABLE 3.1
ENVIRONMENTAL ZONES

Zones	Description	Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA Dark Sky Parks. Major optical observatories No road lighting -unless specifically required by the road controlling authority
A1	Dark	Relatively uninhabited rural areas No road lighting - unless specifically required by the road controlling authority
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas
A3	Medium district brightness	Suburban areas in towns and cities
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas
TV	High district brightness	Vicinity of major sports stadium during TV broadcasts
V	Residences near traffic routes	Refer AS/NZS1158.1.1
R1	Residences near local roads with significant setback	Refer AS/NZS 1158.3.1
R2	Residences near local roads	Refer AS/NZS 1158.3.1
R3	Residences near a roundabout or local area traffic management device	Refer AS/NZS 1158.3.1
RX	Residences near a pedestrian crossing	Refer AS/NZS 1158.4

NOTE: Recreational areas are not considered commercial.

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TABLE 3.2
MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

Zones	Vertical illuminance levels (E_v) lx		Threshold increment (TI)		Sky glow
	Non-curfew	Curfew	%	Default adaptation level (L_{ad})	Upward light ratio
A0	See Note 1	0	N/A	N/A	0
A1	2	0.1	N/A	N/A	0
A2	5	1	20%	0.2	0.01
A3	10	2	20%	1	0.02
A4	25	5	20%	5	0.03
TV	See Table 3.4	N/A	20%	10	0.08
V	N/A	4	Note 2	Note 2	Note 2
R1	N/A	1	20%	0.1	Note 3
R2	N/A	2	20%	0.1	Note 3
R3	N/A	4	20%	0.1	Note 3
RX	N/A	4	20%	5	Note 4

NOTES:

- 1 For A0, E_v shall be as close to zero as practicable without impacting safety considerations.
- 2 Refer to AS/NZS 1158.1.1.
- 3 Refer to AS/NZS 1158.3.1.
- 4 Refer to AS/NZS 1158.4.
- 5 N/A means 'Not Applicable'.
- 6 For an internally illuminated sign in an A2 zone, $L_{ad} \leq 0.25 \text{ cd/m}^2$.

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A.2 Maximum Luminous Intensity per Luminaire for non-Curfew and Curfew Operating Times

TABLE 3.3
MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE

Zone	Luminous intensity (<i>I</i>), cd		
	Non-curfew L1	Non-curfew L2	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	150 000	0

NOTE: For A0, *I* shall be as close to zero as practicable without impacting safety considerations.

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A.3 Values of Light Technical Parameters and Permissible Luminaire Types for Outdoor Carparks

AS/NZS 1158.3.1:2020

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TABLE 3.7

VALUES OF LIGHT TECHNICAL PARAMETERS FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b} (E_{rh})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E1})	Point vertical illuminance ^{a,b} (E_{pv})
	lx	lx		lx
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	—
PCD ^d	—	≥ 14 and $\geq (\bar{E}_h)^d$	—	—
PCX ^e	21	5	8	—

^a These values are maintained.

^b Conformance is achieved by being greater than or equal to the applicable table value.

^c Conformance is achieved by being less than or equal to the applicable table value.

^d E_{rh} shall be determined for each PCD area in the car park and, in each case, it shall be greater than the value stated and greater than the average for the overall car park.

^e This level shall be used for any marked areas for pedestrians to cross.

NOTES:

- See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.
Conformance to the light technical parameters in Table 3.7 is based on an open, unoccupied car park, i.e. free of vehicles.
- Where raised obstructions are present, e.g. to limit vehicle movement in parking areas, these obstructions present potential hazards for pedestrians. Such obstructions should therefore be of such a material, or so finished, as to provide a high visual contrast with the paved surface.
- See Table 3.6 for the requirements that apply to connecting elements, including steps and ramps within car parks.
- The luminaires should be positioned to highlight physical obstructions or other similar hazards to pedestrian and vehicular traffic.
- Lighting performance requirements for indoor car parks are specified in AS/NZS 1680.2.1.

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TABLE 2.2
LIGHTING SUBCATEGORIES FOR PEDESTRIAN AND CYCLIST PATHS

1	2	3	4	5
Type of pathway	Selection criteria ^{a,b,c}			Applicable lighting subcategory
General description	Basic operating characteristics	Pedestrian/cycle activity	Fear of crime	
Pedestrian or cycle orientated pathway, e.g. footpaths, including those along local roads ^d and arterial roads ^e , walkways, lanes, park paths, cyclist paths	Pedestrian and or cycle traffic only	N/A	High	PP1 ^e
		High	Medium	PP2 ^e
		Medium	Medium	PP3
		Medium	Low	PP4
		Low	Low	PP5

^a The selection criteria of Columns 3 to 4 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the pathway will determine the applicable lighting subcategory.

^b See Appendix A for guidance on choosing the applicable level of each selection criteria for the environment and purpose of a lighting scheme.

^c Where there are vertical surfaces of high reflectance (e.g. light coloured walls bordering on an alleyway) alongside the pathway, the next lower lighting subcategory may be selected.

^d Where the footpath is along a local road and subcategory PP1 or PP2 is selected, the light technical parameters for that subcategory should only apply to the formed footpath.

^e Footpaths associated with arterial roads are deemed not to require separate lighting provided that—

- (a) the road is lit to at least the applicable level of Category V lighting conforming to AS/NZS 1158.1.1; and
- (b) the footpath is unshaded, e.g. there are no substantially continuous building awnings, trees (refer to AS/NZS 1158.1.2) and the footpath is contiguous with the roadway.

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TABLE 2.5
LIGHTING SUBCATEGORIES FOR OUTDOOR CAR PARKS
(INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4
Type of area	Selection criteria ^{a,c}		
	Night time vehicle and/or pedestrian movements	Fear of crime	Applicable lighting subcategory ^b
Parking spaces, aisles and circulation roadways	High	High	PC1
	Medium	Medium	PC2
	Low	Low	PC3
Designated parking spaces specifically intended for people with disabilities	N/A	N/A	PCD
For any designated areas for pedestrians to cross	N/A	N/A	PCX

^a The selection criteria of Columns 2 to 4 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the area type will determine the applicable lighting subcategory.

^b Providing a lighting scheme that meets the requirements of more than one subcategory by the use of switching is permitted.

^c Consider the use of adaptive lighting controls for variable night time utilization.

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TABLE 2.3
LIGHTING SUBCATEGORIES FOR PUBLIC
ACTIVITY AREAS (EXCLUDING CAR PARKS)

1	2	3	4	5	6
Type of area or activity	Selection criteria ^{a,b}				Applicable lighting subcategory
General description	Basic operating characteristics	Night time vehicle movements	Fear of crime	Need to enhance amenity	
Areas primarily for pedestrian use, e.g. city, town, suburban centres, including outdoor shopping precincts, malls, open arcades, town squares, civic centres	Generally pedestrian movement only	N/A	High	High	PA1
		Medium	Medium	Medium	PA2
		Low	Low	N/A	PA3
Transport terminals and interchanges, service areas ^c	Mixed pedestrian and vehicle movement	High	High	High	PA1
		Medium	Medium	Medium	PA2
		Low	Low	N/A	PA3

^a The selection criteria of Columns 3 to 5 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the area type will determine the applicable lighting subcategory.

^b See Appendix A for guidance on choosing the applicable level of each selection criteria for the environment and purpose of the lighting scheme.

^c See Clause 1.1.1.

NOTE: See Table 2.5 for lighting subcategories applicable to outdoor car parks, including roof-top car parks.

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A.4 Interior and Workplace lighting – Educational and Training Facilities – Lighting Recommendations

**TABLE D1
SPECIFIC RECOMMENDATIONS FOR EDUCATIONAL AND TRAINING FACILITIES**

1	2	3	4	5	6
Type of interior or activity	Maintained illuminance lx	Lamp colour appearance group	Lamp colour rendering group (minimum)	Maximum glare index	Other recommendations and advice
1 AUDITORIUMS					See recommendations of Clause 10.15.
1.1 Assembly halls—General use	160	1, 2	1B, 2	19	Include provision for higher illuminance for exhibitions.
1.2 Social activity	80	1, 2	1B, 2	19	Switching and dimming facilities are desirable.
1.3 Examinations	240	1, 2	1B, 2	19	
1.4 Theatre use	(Special application, see Clause 10.15.4)				Aisle lighting may be required.
2 CLASSROOMS					
2.1 Art rooms	(See recommendations under Item 5)				
2.2 Computer training rooms	(See recommendations of AS/NZS 1680.2.2)				
2.3 Drafting rooms	(See recommendations of AS/NZS 1680.2.2 and Clause 10.9 herein)				
2.4 General use	240	1, 2	1B, 2	19	Higher illuminances may be required depending on the nature of the laboratory tasks.
2.5 Laboratories	320	1, 2	1A, 1B	19	
2.6 Lecture rooms	240	1, 2	1B, 2	19	
2.7 Music rooms	320	1, 2	1B, 2	19	
2.8 Reading rooms	320	1, 2	1B, 2	19	
2.9 Seminar rooms	240	1, 2	1B, 2	19	
2.10 Sewing rooms					
(a) General	320	1, 2	1B, 2	19	
(b) Task area	800	1, 2	1B, 2	—	The use of local lighting is recommended.

* Refer to Table 8.2 of AS/NZS 1680.1:2006.

(continued)

**TAFE NSW CONSTRUCTION CENTRE OF EXCELLENCE, KINGSWOOD
SDD LIGHTING CONSULTANT REPORT**
TABLE D1 (continued)

1	2	3	4	5	6
Type of interior or activity	Maintained illuminance lx	Lamp colour appearance group	Lamp colour rendering group (minimum)	Maximum glare index	Other recommendations and advice
3 CONFERENCE ROOMS					
3.1 Conferring	240	1, 2	1B, 2	19	See additional recommendations for meeting rooms in AS/NZS 1680.2.2.
3.2 Video conferencing					See recommendations of Clause 10.16. The illuminances provided should be compatible with the type of camera.
(a) Conference table	600	–	–	–	
(b) Rear wall	160	–	–	–	
(c) Auxiliary graphics	800	–	–	–	The illuminance should be provided on the plane of the display. Portable lighting may be used for this purpose where the facility is required only occasionally.
4 FOOD SERVICE FACILITIES—DINING AREAS	(See recommendations of AS/NZS 1680.2.1)				
5 GRAPHIC DESIGN AND MATERIAL					
5.1 Colour selection	800	1, 2, 3	1A	19*	For colour matching, the spectral quality of the light source is important. The use of specially lit colour matching booths may be appropriate for some tasks.
5.2 Charting and mapping	800	1, 2, 3	1A	19*	
5.3 Graphs	800	1, 2, 3	1A	19*	
5.4 Keylining	800	1, 2, 3	1A	19*	
5.5 Layout and artwork	600	1, 2	1B	19*	
5.6 Photographs, moderate detail	400	1, 2	1B	19*	Veiling reflections may occur on glass surfaces.

* Refer to Table 8.2 of AS/NZS 1680.1:2006.

(continued)

TABLE D1 (continued)

1	2	3	4	5	6
Type of interior or activity	Maintained illuminance lx	Lamp colour appearance group	Lamp colour rendering group (minimum)	Maximum glare index	Other recommendations and advice
6 LIBRARIES					
6.1 Audio listening areas	160	1, 2	2	19	
6.2 Audiovisual areas	240	1, 2	1B	19	
6.3 Book repair and binding	320	1, 2	1B, 2	19	
6.4 Book stacks	240	1, 2	2	19	Locate luminaries so that there will be adequate vertical illuminance on the face of stacks.
6.5 Card files	320	1, 2	2	19	
6.6 Carrels, individual study areas	320	–	–	–	The use of local lighting may be appropriate.
6.7 Cataloguing	320	1, 2	2	19	Task subject to veiling reflections.
6.8 Circulation desk	320	1, 2	2	19	
7 OFFICES	(See recommendations of AS/NZS 1680.2.2)				
8 INDOOR SPORTS FACILITIES	(See recommendations of AS 2560.2.2)				
9 WORKSHOPS					
9.1 Rough bench or machine work	240	1, 2	2, 3	22	Eye protection will be required for some activities.
9.2 Medium bench work or machine work	400	1, 2	2	19	Supplementary local lighting may be desirable. Eye protection will be required for some activities.
9.3 Fine bench or machine work	800	1, 2, 3	2	19	Supplementary local lighting may be desirable. Eye protection will be required for some activities.
9.4 Extra-fine bench or machine work	1 200	1, 2, 3	2	19*	Supplementary local lighting may be desirable. Eye protection will be required for some activities.

* Refer to Table 8.2 of AS/NZS 1680.1:2006.

**TAFE NSW CONSTRUCTION CENTRE OF EXCELLENCE, KINGSWOOD
SDD LIGHTING CONSULTANT REPORT**

A.5 Crime Prevention through Environmental Design (CTPED) – Penrith Development Control Plan 2014

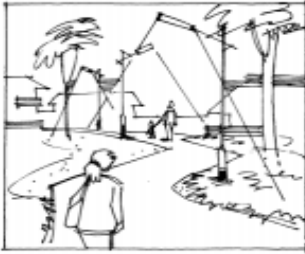
D. Controls

- 1) Lighting:** Lighting plays a vital role in crime prevention and personal safety as you can see and respond to what is around you and ahead of you. Others can also see you, which further reduces the likelihood of a crime being committed.
 - a) All areas intended to be used at night should allow appropriate levels of visibility.**
 - b) Pedestrian pathways, lane ways and access routes in outdoor public spaces should be lit to the minimum Australian Standard of AS1158. Lighting should be consistent in order to reduce the contrast between shadows and illuminated areas. Lighting should be designed in accordance with AS4282 – Control of the obtrusive effects of outdoor lighting.**
 - c) Lighting should have a wide beam of illumination, which reaches to the beam of the next light, or the perimeter of the site or area being traversed. Lighting should clearly illuminate the faces of users of pathways.**
 - d) Streetlights should shine on pedestrian pathways and possible entrapment spaces as well as on the road.**
 - e) Lights should be directed towards access/egress routes to illuminate potential offenders, rather than towards buildings or resident observation points.**
 - f) Lighting should take into account all vegetation and landscaping that may act as an entrapment spot.**
 - g) Lighting should be designed so that it is “vandal tough” or difficult for vandals to break.**
 - h) Where appropriate, use movement sensitive and diffused lights.**
 - i) Avoid lighting spillage onto neighbouring properties as this can cause nuisance and reduce opportunities for natural surveillance.**
 - j) Illuminate possible places for intruders to hide.**
 - k) As a guide, areas should be lit to enable users to identify a face 15m away.**
 - l) All lighting should be maintained and kept in a clean condition with all broken or burnt out globes replaced quickly.**
 - m) Use energy efficient lamps/fittings/switches to save energy.**

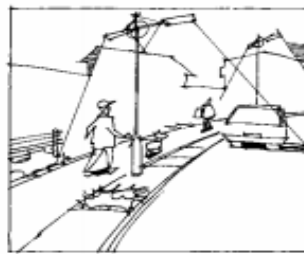
Note: Please refer to the Public Domain Section for further controls on lighting which may need to be incorporated into the development application.

TAFE NSW CONSTRUCTION CENTRE OF EXCELLANCE, KINGSWOOD
SDD LIGHTING CONSULTANT REPORT

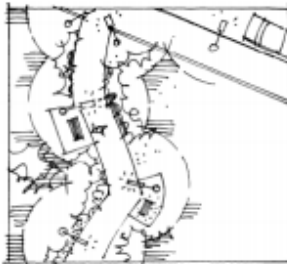
Well lit pedestrian pathways



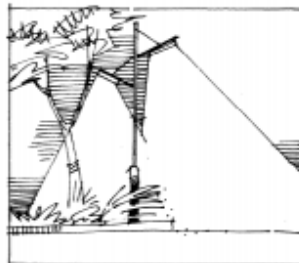
Appropriate lighting of a footpath and street



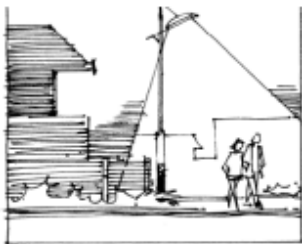
Wide circle of illumination that meets the next



Lighting that considers the vegetation to ensure that the area of illumination is maximised



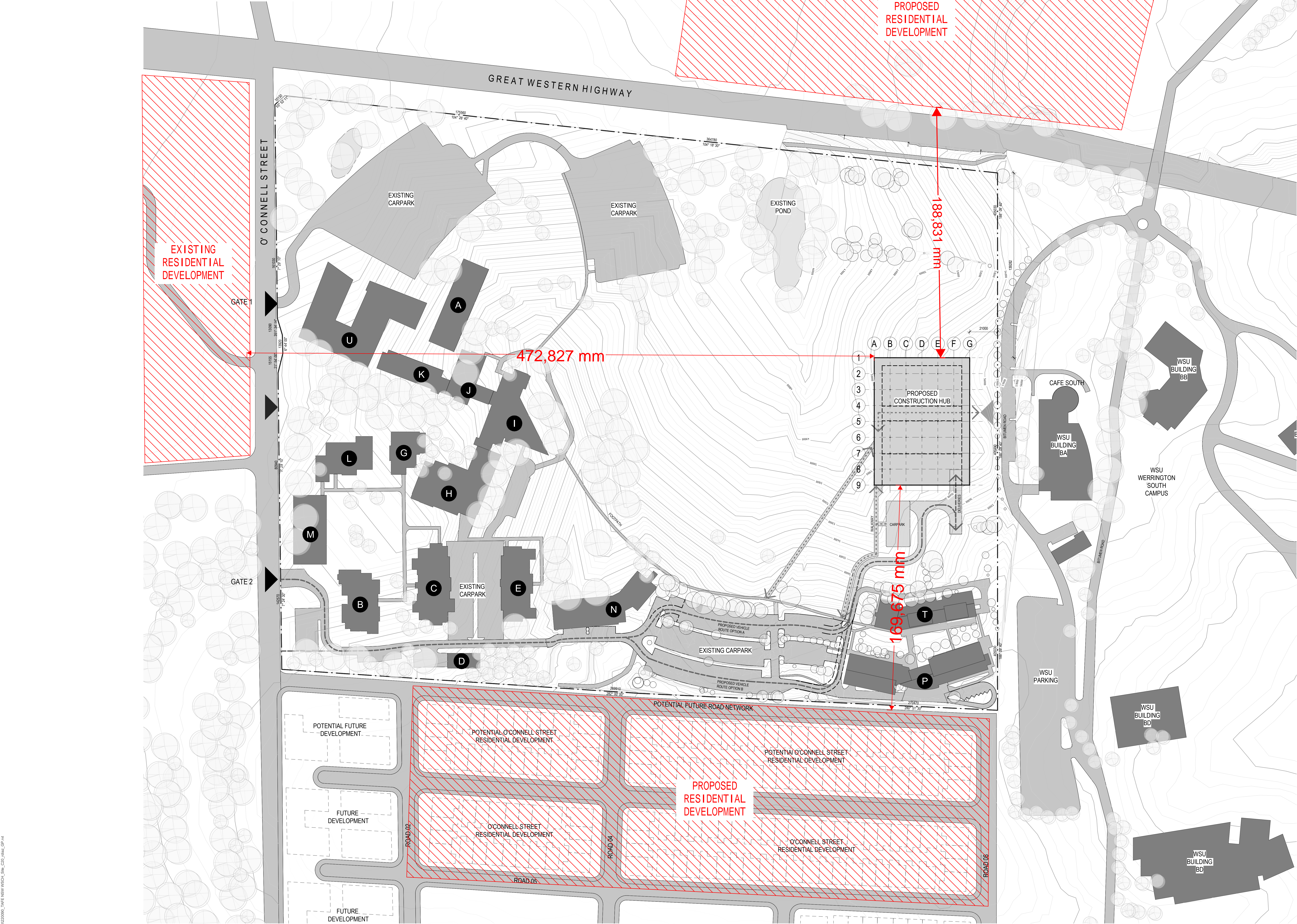
Lighting that respects the neighbouring property owners by not causing a lighting nuisance



**TAFE NSW CONSTRUCTION CENTRE OF EXCELLANCE, KINGSWOOD
SDD LIGHTING CONSULTANT REPORT**

Appendix B - LIGHTING SITE PLAN

SITE PLAN - SURROUNDING NEIGHBOURHOOD (DRAFT)



- LEGEND
- EXISTING PEDESTRIAN ACCESS
 - PROPOSED PEDESTRIAN ACCESS
 - EXISTING VEHICULAR ACCESS
 - PROPOSED VEHICULAR ACCESS
 - BOUNDARY LINE
 - EXISTING BUILDING NAME
 - PROPOSED VEHICULAR ROUTE CARPARK RECONFIGURATION
 - PROPOSED PEDESTRIAN PATH
 - PROPOSED CONSTRUCTION HUB
 - PROPOSED ROADS WALKWAYS AND RECONFIGURED CARPARK
 - EXISTING ROADS, WALKWAYS AND CARPARKS
 - PROPOSED LANDSCAPE

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Any Discrepancies should be immediately referred to the Architect.

All work to comply with N.S.W. C. C. Statutory Authorities & Relevant Australian Standards.

N2021 Nominated Architects Scott Major 7147 Gray Settlement 0509

REV	DESCRIPTION	DATE
A	For Information	03-12-20
B	For Information	04-12-20
C	Issue For Information	08-12-20

PROJECT NO	220990
DRAWN	RD
CHECKED	SS
APPROVED	BH

TAFE NSW Western Sydney
Construction Hub
12-44 O'Connell St, Kingswood
NSW 2747

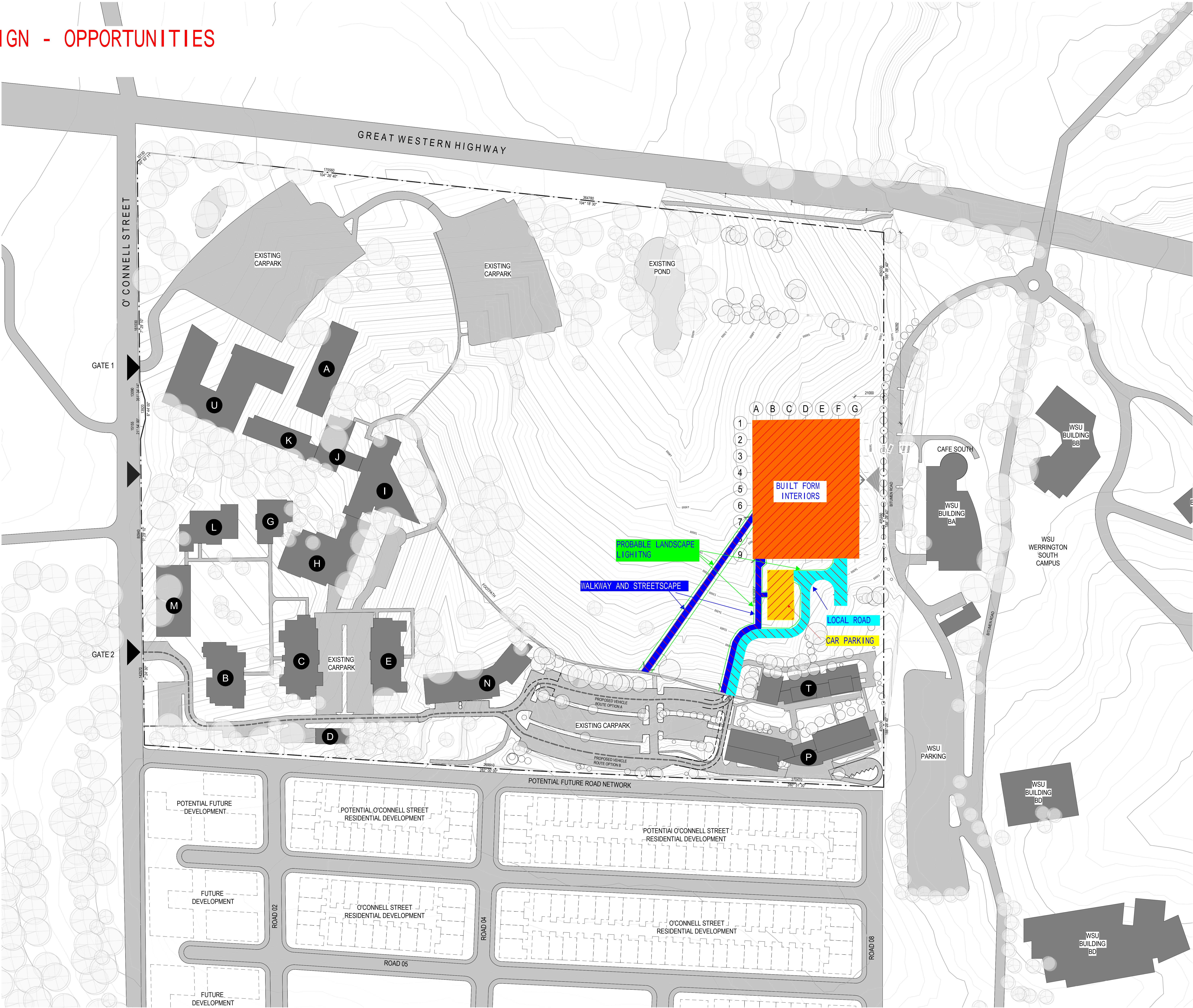
PRELIMINARY

SITE PLAN - PROPOSED

DWG # A0102 REV C
SCALE @ A0 As indicated



LIGHTING DESIGN - OPPORTUNITIES



LEGEND

- ▲ EXISTING PEDESTRIAN ACCESS
- ▲ PROPOSED PEDESTRIAN ACCESS
- ▲ EXISTING VEHICULAR ACCESS
- ▲ PROPOSED VEHICULAR ACCESS
- BOUNDARY LINE
- A EXISTING BUILDING NAME
- PROPOSED VEHICULAR ROUTE CARPARK RECONFIGURATION
- PROPOSED PEDESTRIAN PATH
- PROPOSED CONSTRUCTION HUB
- PROPOSED ROADS WALKWAYS AND RECONFIGURED CARPARK
- EXISTING ROADS, WALKWAYS AND CARPARKS
- PROPOSED LANDSCAPE

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All works to comply with N.C.C. Statutory Authorities & Relevant Australian Standards.

N202 Haron Robson Architects Scott Major 7147 Gray Settlement 0509

REV	DESCRIPTION	DATE
A	For Information	03-12-20
B	For Information	04-12-20
C	Issue For Information	08-12-20

PROJECT NO	220990
DRAWN	RD
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APPROVED	BH

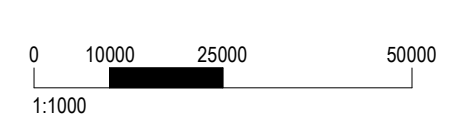
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NSW 2747

PRELIMINARY

SITE PLAN - PROPOSED

DWG #	A0102	REV	C
SCALE @ A0	As Indicated		

1 SITE PLAN - PROPOSED
1:1000



SITE PLAN - SURROUNDING NEIGHBOURHOOD

