

Model Public Lighting Strategy

STREET LIGHTING AND
SMART CONTROLS PROGRAMME

Version 1.0



Acknowledgements

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SLSC Partners

Adelaide City Council	City of Ipswich	Signify
Australian Local Government Association	Itron	Southern Sydney Regional Organisation of Councils
Brisbane City Council	Lighting Council New Zealand	Sunshine Coast Council
Broadspectrum	Light Source Solutions	Strategic Lighting Partners
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City of Sydney	Next Energy	Telensa
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ENE.HUB	Pecan Lighting	VRT Systems
Illuminating Engineering Society Australia & New Zealand	Department of Industry, Science, Energy and Resources	
Institute of Public Works Engineering Australasia	Sylvania-Schröder	

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Note: For a glossary of common public lighting terminology, see SLSC Roadmap Appendix I: Glossary and SLSC Model Public Lighting Controls Specification Appendix A: Terms and Definitions.

1 | Introduction

The need for model public lighting documentation was first recognised in 2016 stakeholder consultations during the establishment of IPWEA's Street Lighting and Smart Controls Programme (SLSC) and is described on IPWEA's website www.slsc.org.au and www.slsc.org.nz.

After decades of relatively static public lighting technology, many people with oversight of public lighting are unfamiliar with how to best procure and manage new LEDs and smart controls. Compounding their knowledge gaps, they are being asked to oversee lighting retrofits and new lighting projects at a growing pace in the midst of a continuing evolution of lighting technologies and changing standards, suppliers and electricity distributor requirements.

A basic but robust model public lighting strategy can help address these issues and raise overall confidence levels about the appropriate management of public lighting for any local government or road authority.

1.1 Purpose and Target Audience

This model strategy is targeted at technical staff with responsibility for managing portfolios of public lighting assets within their local government or road authority. It may also be useful for universities, mine sites, military bases, hospitals, shopping malls and other larger owners of public lighting.

The purpose of this model strategy is to help an organisation develop a customised document that clearly lays out its public lighting objectives for all stakeholders and then successfully delivers on these objectives by detailing its lighting requirements, its standard equipment, its specifications, its approach to design and approvals and, its maintenance requirements.

The resulting strategy, once customised for the organisation, will offer guidance to internal staff, consultants, designers, contractors, suppliers, developers and other stakeholders about the organisation's strategic direction, requirements and controls for future public lighting works and maintenance.

1.2 Aim of the Model Public Lighting Strategy

The aim of the Model Public Lighting Strategy is to be:

- Technically robust and current;
- Compatible with AS/NZS standards and specifications and addressing gaps where AS/NZS guidance does not exist or is not suitably current;
- Written concisely in easy to understand language;
- Applicable to large and small lighting portfolios in urban and rural settings;
- Structured to include a range of selectable options to be chosen by the user to deliver a customised strategy meeting their needs;

- A living document, subject to ongoing review as the technology and market evolves; and
- Widely and freely available to reduce barriers to the uptake of new lighting technology and the effective management of public lighting.

Suggestions for improvements are welcomed. Please forward suggestions to the IPWEA head office using the contact details provided at www.ipwea.org.

1.3 Document Guidance

This model strategy is a multi-choice general guidance document targeted to assist organisations to develop their own customised strategy tailored to the exact needs and circumstances of the applicable region and organisation. The selectable content is divided into three categories, plus guidance notes (to be deleted after customisation):

- Suggested text for inclusion in the strategy document by **all** users is presented in normal black text;
- Alternative options considered suitable for **some** users, is presented in ***Bold Green Italic***; and
- Where text is used to instruct user action, this is identified by **bold blue coloured and/or by square brackets []**.

Note: Explanatory text to guide user customisation is in burgundy coloured text boxes (as per this example) which is intended to be deleted after Users have finished compiling their own Customised Strategy.

This Model Public Lighting Strategy document has been compiled and formatted in Microsoft Word V16. Formatting is very important to facilitate comprehension of a necessarily complex and comprehensive subject so we recommend that Microsoft Word 2016 or later is used.

1.4 User Customised Strategy - Source Acknowledgement

This IPWEA model strategy is free-issued publicly in editable Word document format to allow for ease of customisation and general user convenience. Updated versions will be issued in future by IPWEA, as and when required on the [SLSC Website](#). When undertaking the compilation of a Customised Strategy, Users should ensure that they are using the most current model strategy version.

When compiling a customised strategy IPWEA requests that:

- Users maintain the completeness and structural integrity of the Model Strategy document and customise only the user selectable options. Users should acknowledge the source of their Customised Strategy e.g. “Based on IPWEA Model Public Lighting Strategy Version 1.0 (or later if available)”;
- If the Model Strategy is materially altered, Users must not state or imply that the document is based wholly on the IPWEA Model Public Lighting Strategy. **Users must**

clearly indicate which part of the Model Strategy has been materially altered. Ideally IPWEA should be notified so that if the material change is one which would benefit the industry, it could be included in the next version of the Model Strategy; and

- Any excerpts of sections of the Model Strategy should acknowledge IPWEA as the source.

1.5 Disclaimer

Although the information in this publication is believed to be correct at the time of printing, the Institute of Public Works Engineering Australasia (IPWEA), and its agents, contractors, directors, employees, subcontractors and officers, do not accept any contractual, tortious or other form of liability (including in negligence) arising from the information contained herein, to the extent permitted by law. The information included in this publication is intended as a general guide only, and is not tailored to your needs and circumstances. People using the information contained herein should apply, and rely upon, their own skills and judgement to the particular lighting installation they are considering, and seek appropriate professional lighting design and engineering advice as needed.

This document is not a substitute for specialist, professional advice.

1.6 Document Information

Version 1.0 August 2020.

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2 | Lighting Strategy

2.1 Scope

This strategy is intended to apply to all streets and public areas within **[Insert organisation name]** that are under its control or for which it is the responsible public authority or road authority.

This strategy does not deal with the requirements of lighting for wayfinding, security lighting, advertising, illuminated signs, decorative, façade, tree, creative or dynamic type lighting that may also be present in the public domain. It is, however, expected that these types of lighting assets should be designed, installed and operated so as not to impact on the effectiveness of public lighting infrastructure.

2.2 Existing Lighting Portfolio

There are approximately **[Insert total number of lights]** lights encompassed by this strategy including **[Insert number of lights]** directly managed by the organisation and **[Insert number of lights]** owned and managed by **[Insert name of electricity distributor or other third party]** on behalf of the organisation.

A detailed inventory of these lights is managed by **[Insert job title of person responsible within the organisation]**. In summary, the inventory consists of the following types of lighting:

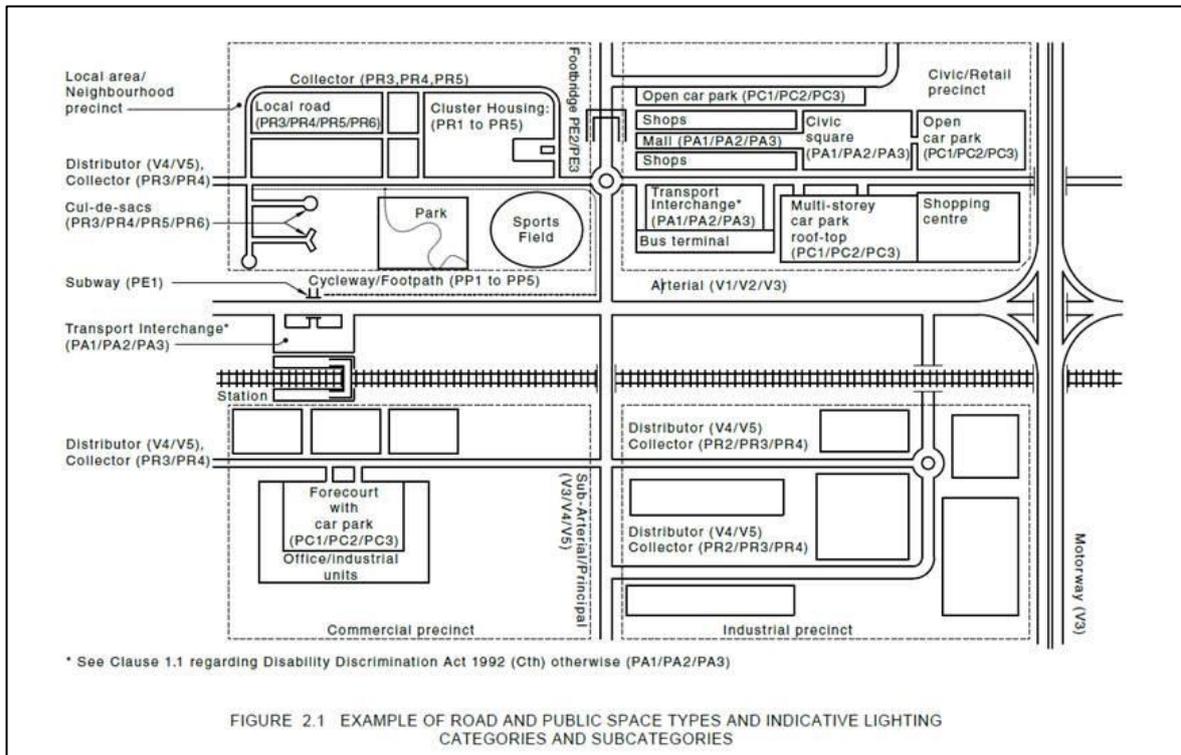
[Insert table summarising the number of each luminaire type in the inventory clearly separating out standard street lights from specialist categories of decorative lighting and floodlighting that may require special attention. Example table shown below for guidance.]

Table 1: Existing Lighting Inventory Summary

Assumed Lighting Category ¹	Types of Lighting	Number of Luminaires	% of Luminaires	Notes
PR4/PR5/PR6 Residential Road Lighting	<ul style="list-style-type: none"> • 50W Mercury Vapour • 80W Mercury Vapour • 50W High Pressure Sodium • 70W High Pressure Sodium • 32W CFL • 42W CFL • 1*40W Fluorescent • 2*20W Fluorescent • 10 - 40W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
PR2/PR3 Residential Road Lighting	<ul style="list-style-type: none"> • 70W Metal Halide • 125W Mercury Vapour • 20 - 40W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
V5 Main Road Lighting	<ul style="list-style-type: none"> • 100W HPS • 100W Metal Halide • 40 - 3000W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
V3 Main Road Lighting	<ul style="list-style-type: none"> • 250W Mercury Vapour • 150W High Pressure Sodium • 150W Metal Halide • 80 - 300W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
V1 Main Road Lighting	<ul style="list-style-type: none"> • 400W Mercury Vapour • 250W High Pressure Sodium • 250W Metal Halide • 400W High Pressure Sodium • 400W Metal Halide • 100 - 300W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
Other Subcategories of Road or Public Space Lighting	<ul style="list-style-type: none"> • 150 / 250W High Pressure Sodium floodlights • 150 / 250W Metal Halide floodlights • 10 – 300W LED <p>[insert other lighting types as needed]</p>	[insert # of each lighting type]	[insert % of each lighting type]	[insert notes on any special considerations for particular lighting types]
TOTAL LIGHTING		[insert total # of luminaires]		

¹ Approximate AS/NZS 1158 road lighting classification which can vary *in situ* as particular lighting types can be used across multiple road lighting subcategories

The following schematic, taken from AS/NZS 1158.3.1 (2020), provides a useful overview of the lighting sub-categories and their relationship to the road hierarchy and other types of public spaces.



Source: AS/NZS 1158.3.1 (2020)

2.3 Lighting Objectives

Public lighting's primary functions are to improve public security, improve road safety and enhance visual amenity at night while minimising negative effects on the environment

The organisation recognises that investment in street lighting provides one of the best returns on investment of all road safety measures to reduce crashes and resulting injuries and fatalities.

Public lighting also makes people feel safer in the public domain at night and may be a deterrent to antisocial behaviour and certain types of criminal activity at night. This strategy therefore recognises public lighting as a significant contributor to community wellbeing after dark by encouraging the active use of public spaces at night in a safe manner. Good public lighting can make important contributions to mobility, social well-being, placemaking, tourism and the overall economy of a community particularly in town centres and entertainment precincts.

There are three key unintended environmental consequences of public lighting: carbon emissions, light pollution and the use of harmful substances in lighting such as mercury. This public lighting strategy seeks to minimise these unwanted environmental consequences and implicitly recognises that these can be substantially addressed by carefully using the capabilities of modern LED lighting and controls to control where light goes, how much lighting is used and when.

[Optional: Including explicit recognition of decisions not to light to Australian Standards in certain areas is recommended. For example, "While generally seeking to meet Australian

lighting standards, this strategy also recognises that some areas within the local government area do not comply with the minimum lighting levels recognised in current Australian Standards for public lighting and Council is not proposing to upgrade the lighting in these areas as part of this strategy (see Section 3.1).”]

2.4 Principles

This section outlines the overall direction for the organisation’s public lighting by setting the principles it will follow and which are then reflected in the detailed lighting requirements, standard equipment lists, specifications, approach to design and approvals, and maintenance requirements in this strategy.

This strategy is based on the following overarching principles that the organisation has adopted:

- The organisation will provide reliable, consistent, high-quality public lighting that delivers appropriate service levels for pedestrians, cyclists and road users.
- All new and replacement luminaires (including for both spot replacements and for any larger-scale upgrades) will be LEDs to minimise energy use, lower consequent carbon emissions, reduce spot outages, reduce preventive maintenance needs and lower the total cost of operation and ownership of public lighting.
- For resident comfort and to minimise potential environmental harm, lighting with a colour temperature of 3000K will be the default in all residential roads, parks and pathways. Lighting with a colour temperature of 4000K will be used in commercial precincts for aesthetic reasons and on main roads where maximising road safety is the priority. The choice of colour temperature in civic and entertainment precincts will be location-specific depending on factors such as the dominant architecture of the precinct. Other colour temperatures may be used in specific circumstances (eg to address specific local environmental priorities).
- All new lighting designs will meet the requirements of AS/NZS 1158 *[Optional: and AS/NZS 4282 where specifically requested by Council]* and will be carried out by a suitably qualified and experienced lighting consultant.
- All new electrical installations will comply with the requirements of AS/NZS 3000 and will be carried out by a suitably qualified and experienced electrical engineer.
- Where public lighting is in proximity to areas of environmental significance, consideration will be given to the ‘*National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020*’ and any lighting design will be carried out by a suitably qualified and experienced lighting consultant in conjunction with specialist ecological advice.
- *[Optional: All new and replacement lighting will include smart controls to be able to better control lighting levels, reduce energy consumption, facilitate a variety of asset management benefits and monitor for faults which will allow optimisation of the maintenance regime.]*

- *[Optional: In keeping with best practice in asset management, the power supplies of all new and replacement luminaires will be pre-programmed with asset data in the format prescribed by DiiA specification DALI-251 Memory Bank 1 Extension to allow for the automatic downloading of this data by the smart controls system to the organisation's asset management system.]*
- *[Optional: All new and replacement lighting will have a density of smart sensor receptacles at a rate shown in Table 2.]*
- *[Optional: In locations where 4G/5G small cell base stations are to be deployed on street lighting columns, consideration will be given to the use of multi-function poles that are able to internally integrate these base stations particularly where other smart city functionality is to be co-deployed (eg CCTV, public WiFi, EV charging, speakers, help buttons, sensors, GPO outlets, USB charging, banners, displays.)]*
- *[Optional: The following specific areas will be the subject of detailed, precinct-specific lighting masterplans that are expected to generally follow the overall framework outlined in this strategy: [Insert list of specific areas to be given detailed attention]]*
- *[Optional: In managing its public lighting assets, the organisation will follow the IPWEA SLSC Model Public Lighting Inventory and Audit Guidelines [To be published in late 2020]].*

2.5 Alignment with other policies and strategies

This strategy is intended to sit within broader the strategic plans and policies of the organisation including:

- [\[Insert list of key strategies and policies of relevance\]](#)

2.6 Future Updates

It is expected that this strategy will be regularly reviewed and updated to reflect changes in technology and equipment specifications that improve street lighting services for the organisation and the community that it serves.

3 | Lighting Requirements

3.1 Standards and Specifications

A full list of applicable standards and specifications associated with this strategy are listed in Appendix A and all new public lighting shall comply with these.

The main standard referred to is AS/NZS 1158 (Parts 0 -5) - Lighting for Roads and Public Spaces. This standard is used to select the appropriate lighting sub-categories for roads, footways, public areas parks, carparks and other public spaces. The hierarchy of lighting sub-categories is illustrated in the schematic in Section 2.2 above.

Setting lighting levels for functional lighting applications requires consideration of a range of issues including pedestrian and vehicle volumes, crime statistics and the need to enhance the visual amenity of an area at night.

[Optional: Including explicit recognition of decisions not to light to Australian Standards in certain areas is recommended. The organisation, as the road authority and typically as the local authority as well and in accordance with AS/NZS 1158, has sole discretion as to whether to install public lighting in compliance with this standard and, if so, which subcategory of lighting is appropriate. As per Section 2.3, the organisation may wish to name specific locations and expand on the reasons that Council has decided that compliance with one of the lighting sub-categories is not required. For example, text along the following lines may be included:

“While generally seeking to meet Australian lighting standards, this strategy also recognises that some areas within the local government area do not comply with current Australian Standards for public lighting and Council is not proposing to upgrade the lighting in these areas as part of this strategy. Council recognises that, on a risk management basis, the current lighting approach in **[Insert specific area name areas]** as appropriate for these locations as the roads in these rural communities do not predominantly have formed edges nor formed footpaths and these locations have particularly low vehicle movements and little or no pedestrian activity during the hours of darkness. They are thus a poor fit with even the lowest lighting subcategories in AS/NZS 1158 and residents in these communities would be unlikely to support higher lighting levels as being relevant to their semi-rural lifestyle. In addition, the costs required to make these areas compliant with lighting standards are prohibitive in comparison with other priorities.”]

3.2 Application of Lighting Subcategories

The selection of the appropriate lighting sub-category for each location is dependent upon the way that the public use the location and can generally be split into the following types of precincts, areas or zones:

- Commercial and entertainment precincts
- Residential areas
- Rural areas

- Industrial zones
- Precincts with special requirements (eg requiring decorative lighting, having heritage lighting, requiring consideration of environmental sensitivities or that need to accommodate communications infrastructure/CCTV/WiFi and other smart city functionality)

[Insert schematic map here showing different lighting precincts, areas and zones]

The table below summarises the default lighting sub-category and default standard equipment for each type of location.

Table 2: Lighting Categories & Equipment Specifications

Area	Street Type	Default Column Type	Default Luminaire Type	Lighting Sub-Category (AS / NZS 1158)	[Optional: Additional Sensor Port Density]
Central Business District or Commercial Precinct	Arterial routes	Column: Standard steel 8-10m MH or MFP (multi-function pole)	[Insert range: eg 100 – 300W] LED luminaire at 4000K	Vehicle V1 -V3 Pedestrian PA1	25% with D4i/Zhaga interface
	Commercial areas	Column: Standard steel 8-10m MH or MFP	[Insert range: eg 100 – 300W] LED luminaire at 4000K	Vehicle V1 – V3 Pedestrian PA1 – PA2	50-100% with D4i/Zhaga interface
	Laneways	Column: Standard steel 5-6 MH or wall-mounted	[Insert range: eg 10-30W] LED luminaire at 4000K	PP2	Nil
	Civic Plazas / Shared Zones	Column: Standard steel 6-10m MH or MFP	[Insert range: eg 20-300W] LED luminaire at 4000K	PA1 -PA3	25% with D4i/Zhaga interface
	Primary Parks	Column: Standard steel 6-10m MH or MFP	[Insert range: eg 20-150W] LED luminaire at 3000K	Main paths PP1 – PP3 Secondary paths PP3	25% with D4i/Zhaga interface
	Heritage Areas	[Insert heritage style and supplier]	[Insert range: eg 20-300W] LED luminaire at 3000K	Vehicles V1 – V3 Pedestrian PR1 - PR2	10% with D4i/Zhaga interface

Residential	Distributor / Collector Roads	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 20-40W] LED luminaire at 3000K	PR2 – PR3	10% with D4i/Zhaga interface
	Local Shopping or Entertainment Centres	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 20-80W] LED luminaire at 3000K or 4000K (subject to assessment)	PA2	50% with D4i/Zhaga interface
	Shared Access Zones	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 20-40W] LED luminaire at 3000K	PR2 – PR3	10% with D4i/Zhaga interface
	Local Housing	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 10-40W] LED luminaire at 3000K	PR3 – PR6	10% with D4i/Zhaga interface
	Cycleways	Council standard 5-6m MH steel column or DNSP pole	[Insert range: eg 10-40W] LED luminaire at 3000K	PP3	10% with D4i/Zhaga interface
	Local Parks	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 20-40W] LED luminaire at 3000K	Main paths PP2 Secondary paths PP3	25% with D4i/Zhaga interface
Rural	Arterial / Sub-Arterial Routes	Council standard 6-10m MH steel column or DNSP pole	[Insert range: eg 40-300W] LED luminaire at 4000K	Vehicle V3-V5 Pedestrian PR2	10% with D4i/Zhaga interface
	Local Housing	Council standard 5-8m MH steel column or DNSP pole	[Insert range: eg 10-40W] LED luminaire at 3000K	PR3 – PR6	10% with D4i/Zhaga interface
Industrial Zones	Arterial / Sub-Arterial Routes	Council standard 6-10m MH steel column or DNSP pole	[Insert range: eg 40 – 300W] LED luminaire at 4000K	Vehicle V1-V5 Pedestrian PR1	50% of luminaires to be installed with port
Special Areas	Pedestrian Crossing	Council standard 8-10m MH steel column or DNSP pole	[Insert range: eg 80 – 300W] LED luminaire at 4000K	AS / NZS 1158.4 Arterial: Road PX1	Nil

				Local road: PX2 – PX3	
	Stairs / Ramps	Column: Standard steel 6-8 MH	[Insert range: eg 40 – 100W] LED luminaire at 4000K	PE1 -PE3	<i>Nil</i>

3.3 Policy on Lighting Additions, Removals and Modifications

The organisation’s policy with respect to requests for additional lighting (including infill and new lighting schemes), removal of existing lighting or modifications to existing lighting (eg changes to mounting height, bracket arms or addition of glare shields) is that: **[Insert organisational policy including where requests are to be directed, what supporting information is required and policy on who will pay for any lighting changes.]**

4 | Standard Equipment

4.1 Default Material specification

Luminaires

Luminaires used in lighting designs shall be from the organisation’s List of Preferred Standard LED Luminaires unless otherwise specifically agreed in writing by the organisation. The current Preferred List is as per the table below.

Table 3: List of Preferred Standard LED Luminaires

Supplier	[Insert: Supplier A]	[Insert: Supplier B]	[Insert: Supplier C]
Lighting Sub-Category	Luminaire model number, link to IES file, link to technical details <i>[Optional: and thumbnail pictures]</i>	Luminaire model number and link to IES file and link to technical details <i>[Optional: and thumbnail pictures]</i>	Luminaire model number and link to IES file and link to technical details <i>[Optional: and thumbnail pictures]</i>
PA1			
PA2			
PA3			
PE1			
PE2			
PE3			
PP1			
PP2			
PP3			
PR1			
PR2			
PR3			
PR4 - PR6			
PX1			
PX2			
PX3			
V1			
V3			
V5			

[Insert if required: Electricity distributor’s standard approved luminaire list and drawings can be located here: **(insert links)]**

Columns

Columns used in lighting designs shall be from the List of Preferred Standard Columns unless otherwise specifically agreed in writing by the organisation. The current Preferred List is as per the table below.

Table 4: List of Preferred Standard Columns

Supplier	[Insert: Supplier A]	[Insert: Supplier B]	[Insert: Supplier C]
Column Type	Column model number and link to technical details <i>[Optional: and thumbnail pictures]</i>	Column model number and link to technical details <i>[Optional: and thumbnail pictures]</i>	Column model number and link to technical details <i>[Optional: and thumbnail pictures]</i>
<5m column top			
5 – 6.5m side entry			
7 - 9.0m side entry			
>9m side entry			
MFP [Insert standard heights to be used]			
[Insert if required: Electricity distributor’s standard approved column list and drawings can be located here: (insert links)]			

Switchboards

Switchboards used in lighting designs shall be from the List of Preferred Standard Switchboard unless otherwise specifically agreed in writing by the organisation. The current Preferred List is as per the table below.

Table 5: List of Preferred Standard Switchboards

Supplier	[Insert: Supplier A]	[Insert: Supplier B]	[Insert: Supplier C]
Switchboard Type	Switchboard model number and link to technical details	Switchboard model number and link to technical details	Switchboard model number and link to technical details
Panel			
Single Phase			
Three Phase			

Shop drawings for switchboards must be provided for review and approval before manufacture. If a non-standard switchboard is required, shop drawings for review and written approval must be obtained before manufacturing and installing switchboard.

Conduits

All cabling installed underground for public lighting reticulation shall be enclosed in 63mm dia heavy duty (HD) rigid PVC conduits, unless otherwise requested.

Cables

Main underground cables shall be single phase or three phase, 2C or 4C Cu/PVC/ XLPE +earth, 0.6/1kV. Minimum cable size shall be 16 sq.mm. All cables shall have type V75 or V90 insulation and shall have stranded copper conductors.

[Optional: Smart Controls]

[Optional: Any lighting control system must be approved by the organisation prior to installation and be compatible and interoperable with all other systems of the organisation. The control schedule for all lights will be set and operated by the organisation. The organisation's specification for smart controls can be located here: [\[Insert link\]](#)

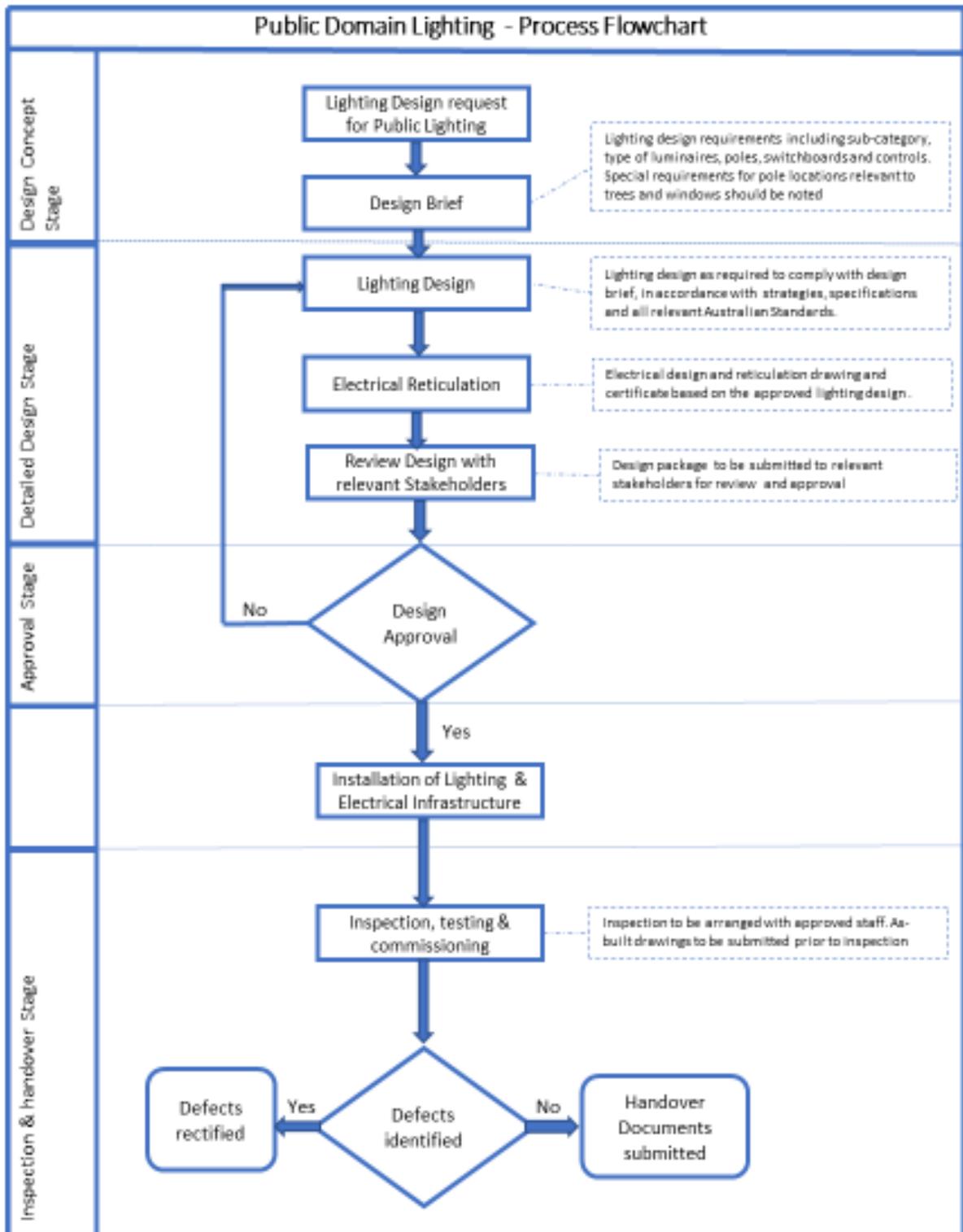
4.2 Standard Installation Drawings

Standard installation drawings can be located here: [\[Insert links to the standard organisation drawings of footpath allocation, column footing and installation configuration, switchboard footing and installation configuration, conduit depths and suitable backfill etc\]](#).

5 | Lighting and Electrical Design, Approvals, Installation and Handover Requirements and Process

The process for the design, approval, installation and handover of public lighting is explained in chart form below and can be summarised as follows:

1. Requirement for lighting identified
2. Design brief agreed with Council
3. Lighting design completed and submitted to Council for approval
4. Electrical design completed and submitted to Council for approval
5. Lighting and electrical designs approved by Council
6. Installation completed with relevant hold points witnessed by Council or appointed consultants
7. Inspection, testing and commissioning carried out witnessed by Council or appointed consultants
8. Defects rectified completed (if required)
9. Handover documentation prepared and submitted to Council



5.1 Nomination of Lighting Subcategory

Lighting schemes are to be designed and installed to maximise safety, minimise energy consumption and avoid unwanted light spill and light pollution.

The organisation, as the road authority [*Optional: and as the local authority*] and in accordance with AS/NZS 1158, has sole discretion as to whether to install public lighting in compliance with this standard and, if so, which subcategory or sub-categories of lighting are appropriate.

The lighting designer shall confirm the lighting level requirements with the organisation before commencing any lighting design, as set out in the Lighting Design Brief & Certificate which can be located at Appendix B.

All schemes will be considered for adaptive lighting by the organisation to limit the environmental impact of the lighting installation. The lighting designer should discuss the available options with the organisation. Variable lighting levels may not always be appropriate, and each lighting scheme's requirements will have differing needs.

5.2 Lighting Designs

Lighting designs shall be undertaken by a suitably qualified and a competent practising lighting designer who must be conversant with Australian local codes for outdoor lighting and is a full member of the Illuminating Engineering Society Australia and New Zealand unless otherwise agreed with the organisation.

The designer must provide a lighting design and a signed statement confirming it complies with requirements of the AS/NZS 1158 and any other requirements nominated by the organisation in this Strategy and associated documentation. It is the designer's responsibility to ensure that the lighting scheme meets all the requirements of the organisation as well as other relevant jurisdictional and Australian requirements. This includes, as applicable, the relevant requirements of the electricity distributor, CASA and CPTED. Submitted designs should be in AGI32, Lighting Reality or Perfectlite software program format.

5.3 Lighting and Electrical Design Drawing Information

For each lighting design, the lighting and electrical design drawings and accompanying luminaire schedule and description shall be provided with the following details:

- Manufacturer, model of luminaire, total power consumption (Watts), optical distribution type, colour temperature, outreach arm dimensions, column type, mounting height to luminaire optical centre, column offset, initial luminaire lumens, light loss factor (LLF) and luminaire/column colour.
- Calculation summary shall indicate all relevant light technical parameters and compliance as per AS/NZS 1158 for category V and P lighting respectively.
- In the case of category V straight sections of road lighting, an AGI32, Lighting Reality or Perfectlite column spacing table confirming compliance for relevant subcategory V shall be

submitted along with the lighting layout. Lighting layout shall indicate column spacing as a reference point.

- Lighting calculation points for horizontal / vertical illuminance shall comply with the requirements as specified in AS/NZS 1158.2.
- Provide luminaire labels with mounting heights.
- Provide obtrusive lighting calculations on adjacent residential properties as per Australian standards, where required. If a glare shield is required, the calculations must reflect the changes to the photometrics of the luminaire. **[Optional: In areas where there may be a particular need to control obtrusive light, the organisation may wish to include a requirement to meet AS/NZS 4282].**
- Where the organisation has indicated that the proposed public lighting is in proximity to areas of environmental significance, the lighting designer will give consideration to the *'National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020'* and, if the organisation requests it, undertake lighting design work in conjunction with an ecological specialist nominated by the organisation.
- Indicate luminaire orientation where it is not shown by symbol.
- Highlight all areas of non-compliance.
- Electrical design shall comply with AS/NZS 3000 Parts 1 and 2, the relevant jurisdiction's wiring rules and, if any electricity distributor assets are involved, all requirements of the electricity distributor.
- The electrical design will follow the organisations current standards for reticulation, circuit layouts and routes **[Note: Reticulation design and installation requirements vary widely from jurisdiction to jurisdiction and should be confirmed for your location].**

5.4 Designs Affecting Existing Lighting of the Electrical Distributor

If the proposed lighting layout requires removal, addition or relocation of existing electricity distribution poles, luminaires or cables, an electrical engineer meeting the requirements of the electricity distributor shall be engaged to undertake design works in accordance with the electricity distributor's Network Standards and to obtain approval from the electricity distributor prior to construction.

Designs shall be submitted to the organisation for review and approval prior to submitting to the electricity distributor for approval and before construction commences.

The electrical engineer shall be responsible for lodging applications with the electricity distributor for all lighting upgrade-related works with the organisation's approval included on the application form.

5.5 Lighting and Electrical Design Approvals

Lighting and electrical designs are to be submitted to the **[Insert job title of person with responsibility for approval in the organisation]** for review and approval, prior to ordering luminaires, columns, cables, conduits or switchboards.

The lighting design, layout and supporting documents shall be as per the requirements specified in the current version of the Lighting Design Brief & Certificate which can be located at Appendix B.

5.6 Installation, Testing & Inspection

- Installation of all works shall be as per the drawings approved by **[Insert job title of person with responsibility for approval in the organisation]**.
- All installation work shall be carried out by suitably qualified and experienced contractors.
- Any deviation from the approved drawings, shall be reported back to **[Insert job title of person with responsibility for approval of deviations in the organisation]** and requires written approval on deviation before commencing any works.
- At the practical completion of installation works, contractor to organise an inspection date / time and liaise with **[Insert job title of person or name of team with responsibility for inspections in the organisation]**.
- **[Insert job title of person or name of team with responsibility for inspections in the organisation]** will be available on site to carry out visual site inspections and witness all the electrical tests on site.
- Electrical contractor to carry out all the electrical tests required as per AS/NZS 3017.
- Electrical contractor will organise all relevant tools and equipment before commencing electrical test on site.
- Organisation Standard Abloy padlocks (2) are to be installed to the switchboard cabinet.
- Contractor to supply and install asset ID labels to the organisation's requirements.
- A laminated copy of as-built drawings and an electrical single line diagram are to be attached on the inner side of the switchboard cabinet door.
- The organisation's representative will advise the contractor of defects, if any. Upon receiving a defects list, the contractor must rectify the issues and arrange for final inspection.
- Contractor shall provide revised as-built drawings before arranging for final inspection.
- Contractor to sign off on the organisation's "New Lighting Installation Inspection, Test and Completion Certificate" found in Appendix C

5.7 Hold and Witness Points

Contact **[Insert job title of person or name of team with responsibility for inspections in the organisation]** to arrange suitable times for the following to be checked:

Hold Points

- Marked ductline route and the location of each pit and street/path light;
- Switchboard delivered;
- Switchboard fitted to plinth; and
- Lighting operational prior to decommissioning of existing lighting (if applicable).

Witness Points

- Excavation with conduit and pits in place prior to backfill;
- Footing inspection prior to pouring concrete;
- Columns prior to mounting on footing;
- Survey check of column position;
- Draw wires and cables pulled in; and
- Electrical inspection and test.

5.8 As – Built Drawing Requirements

The following information shall be provided on the As-Built drawings in AutoCAD & PDF format:

- Drawings in AutoCAD & PDF format stamped “AS-BUILT” showing column locations with GPS Coordinates and offset dimensions as per site reference points. Plans must be provided in hard copy and electronic format based on Australian Height Datum (AHD) and Map Grid of Australia (MGA) orientation, Zone **[Insert appropriate zone]**.
- Column schedule to include footing type, Asset ID label numbers, column height, column offset, column type, luminaire details, outreach arm length, luminaire mounting height, column colour, luminaire colour etc.
- Drawing shall indicate electrical conduits layout / pits / cable runs per conduit including depths, offset & circuit labels as installed on site for the complete installation. Cables and conduit size to be specified on the drawing.
- Location of switchboards and feeder number from where switchboards are fed from.

5.9 Hand Over Documents

The following documents are to be submitted as part of hand over:

- As-built drawings as per specified in Section 5.8 above.

- Certified structural footing designs to suit site specific underground obstructions and soil conditions.
- Electrical contractors must issue Certificate of Compliance for Electrical Work (CCEW) form for all Electrical Installation works. CCEW forms are available from NECA. It is essential that the installation work complies with AS/NZS 3000 Wiring Rules and any other relevant standard and is tested as required and certified as being safe.
- Lighting Design Brief and Certificate from the electrical engineer engaged on the project. (Appendix B)
- New Lighting Installation Inspection Test and Completion Certificate (Appendix C)
- Structural engineer's certification for footing construction (if applicable).
- Lighting designer's certification confirming as installed lighting complies with design intent.
- Operation & Maintenance manual(s) of switchboards, luminaires and control system (if applicable).
- Inventory details as shown in [\[Insert location of required inventory structure\]](#). [\[Note IPWEA SLSC Model Public Lighting Inventory and Audit Guidelines is to be published in late 2020\]](#).

6 | Maintenance

Properly maintained lighting is an essential requirement of all lighting installations. It is not only important from an aesthetic aspect but primarily to ensure the safe, correct operation of the lighting.

Lighting maintenance will be required for all lighting infrastructure including luminaires, columns, switchboards, supply cabling, pillars and pits.

All maintenance works must be carried out in a safe manner by competent, trained and authorised personnel, in accordance with all requirements of the organisation as well as local and national standards and agreements.

Maintenance of lighting assets owned by the organisation is carried out by an approved nominated contractor *[Optional: while lights owned by the electrical distributor (insert name) are maintained directly by them].*

The organisation's public lighting maintenance specification can be found here [\[Insert link or delete if not appropriate\]](#). The key elements of the organisation's public lighting maintenance policy are as follows:

1. **Spot Maintenance** - Requests for spot repairs to lights that are non-operational shall be carried out in accordance with the organisation's policy, but in the first instance, should be reported to [\[Insert job title of person with responsibility for spot repairs in the organisation or telephone number or website for fault reporting\]](#).
2. **Preventive Maintenance** – Preventive maintenance is to be undertaken on all lighting assets and is to include but is not limited to:
 - a. **Luminaires:** visual inspection; routine, regular cleaning; tightening and ensuring correct orientation
 - b. **Columns:** condition of paintwork; correct operation of doors and locks; check for corrosion, leaning, cracks; non-destructive condition rating
 - c. **Switchboards:** correct operation of door and lock; electrical inspection and test
 - d. **Cabling:** Routine electrical inspection and testing of cabling, pillars and pits
 - e. **Database:** Verify inventory data including labelling, column and luminaire type, source, location and condition
3. **Emergency Maintenance** - In the case of an accident, act of vandalism or other occurrence that involves any lighting installation that creates an immediate threat to public safety, it should be attended to by organisation's nominated maintenance contractor within [\[Insert service standard in hours\]](#) of receiving the report.
4. **Vegetation Management** - Council recognises that there are two distinct tree trimming requirements for street lighting and other forms of public lighting:
 - a. **Safe Access to Lights** –A clearance zone forming a cylinder around the light of 2m in radius extending 1.5m below the light and 0.5m above the light will facilitate safe access by a person in a bucket truck to repair or replace a light. *[Optional: In the case*

of street lighting owned by the electrical distributor, this trimming task is performed by the electrical distributor].

- b. **Light Performance** – To achieve what it is designed to do, light has to be able to go from the luminaire to all parts of the pathway or road reserve (eg property boundary to property boundary) up to a point halfway between it and the next luminaire. This geometry sets the trimming requirements for light egress which are more consequential closer to the luminaire (eg the foliage just outside the safe access zone has the most impact on what happens to light distribution).

Appendix A

AUSTRALIAN STANDARDS & OTHER REQUIREMENTS

Lighting and electrical design specifications must, at a minimum, comply with the relevant Australian standards and other requirements below:

- AS/NZS 1158 Part 0 to 5: Lighting for Roads & Public Spaces
- SA/SNZ TS 1158.6: Lighting for Roads and Public Spaces. Luminaires - Performance
- AS/NZS 1798 – Streetlight Poles and Outreaches
- AS/NZS 4282: Control of the obtrusive effects of outdoor lighting
- AS/NZS 3000: Electrical Installations (Known as the Australian / New Zealand Wiring Rules)
- AS/NZS 3017: Electrical Installations—Verification guidelines
- AS 3439: Low-voltage Switchgear
- Service and Installation Rules of [\[Insert name of State or Territory\]](#)
- CASA Manual of Standards Part 139 – Aerodromes
- Crime Prevention Through Environmental Design (CPTED) Guidelines

Appendix B

Lighting Design Brief & Certificate

For Office Use Only	
Design Requirements:	Scheme:
Scheme Reference Number:	Signed by Organisation’s Lighting Representative:

Location	Lighting Sub-Category (AS / NZS 1158)	Installation Geometry	Column Type	Luminaire Type	Control Type

The following sections are to be completed by an accredited lighting designer and approved by the organisation prior to any work commencing:

LIGHTING DESIGN CERTIFICATE

(Note: Please do not merge cells even if responses are identical)

	Location	Location	Location
Lighting Category			
Computer package used			
Column Manufacture, Type & Model			
Mounting Height (m)			
Column arrangement			
Overhang (m)			
Effective Width (m)			
Luminaire Type, Brand & Model			
Luminaire System Wattage (W)			

Luminaire Initial Lumens			
Upcast Angle			
Luminaire IES File Number			
Maintenance Factor			
Power Supply Type			
Smart Control MC Node Type			
Non-standard Column Footing			
Required Maintained Ave. Horizontal Illuminance or Min. Ave. Luminance			
Calculated Maintained Ave Horizontal Illuminance (\bar{E}_m Maint) or Min. Ave Luminance ($L_{\bar{a}}$)			
Required (Up maint) or (U_o)			
Calculated (Up maint) or (U_o)			
Required Min (E_h maint)			
Calculated (E_h maint)			
Required (E_v maint)			
Calculated (E_v maint)			
Required Min (UL)			
Calculated (UL)			
Required Max T_i			
Calculated (T_i)			
Required Min (E_s)			
Calculated (E_s)			

ELECTRICAL DESIGN CERTIFICATE

	Circuit 1	Circuit 2	Circuit 3	Circuit 4
Cable Type				
Cable Size (mm x No. of cores)				
Calculated Volt Drop (V)				
Overcurrent Protective Device Type				
Calculated Short Circuit Current (A)				
Maximum Disconnection Time (sec)				

Mains Switch AS:	Type:	Rating: A
Number of Poles:		
Street Lighting Control System		
Contactors/Relay type:	Rating: A	No. of Poles:
Electronic Time Clock (If required):	Type:	
Power Supply: V	1PH:	
Method of Earthing:		

NOTE: All calculations to be shown on a separate sheet.

I / we being the person(s) responsible (as indicated by my / our signatures below) for the design of the lighting / electrical installation, particulars of which are described on Page 1 and 2 of this form certify that the said work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with the current Code of Practice for Lighting AS/NZS 1158, current specification of the approving authority for the installation of public domain lighting and the Rules for Electrical Installations published in AS/NZS3000, except for the departures, if any, stated in this certificate. The extent of the liability of the signatory is limited to the work described above as the subject of this certificate.

For the design installation at:	
Name of Lighting Designer: (BLOCK Letters)	Position:
Company Name:	
Signature: (of Designer in BLOCK Letters)	Date:
For and ON BEHALF of CLIENT:	
Address:	

For the design installation at:	
Name of Electrical Engineer: (BLOCK Letters)	Position:
Company Name:	
Signature: (of Designer in BLOCK Letters)	Date:

For and ON BEHALF of CLIENT:
Address:

Appendix C

New Lighting Inspection Test & Completion Certificate

All commissioning and pre-handover inspections are to be carried out by the contractor and witnessed by an accredited representative from the approving organisation. All completed forms are to be submitted to [\[Insert job title of person or name of team with responsibility for inspections in the organisation\]](#).

VISUAL INSPECTION

Location:
Contractor:
Type of Installation:
Date of Inspection:
Name of Inspector(s):

STRUCTURAL INSPECTION

Mark Satisfactory or Unsatisfactory

On Completion:

1	<input type="checkbox"/>	Location of Lighting Equipment as per Drawing
2	<input type="checkbox"/>	Planting Depth/ Footing size of Lighting Equipment as per Specification
3	<input type="checkbox"/>	Location of Cable as per Drawing
4	<input type="checkbox"/>	Depth of Cable as per Specification
5	<input type="checkbox"/>	Location of Road Crossing as per Drawing
6	<input type="checkbox"/>	Depth of Road Crossing as per Specification
7	<input type="checkbox"/>	Column footing as per Specification
8	<input type="checkbox"/>	Verticality Correct
9	<input type="checkbox"/>	Optical Orientation Correct

ELECTRICAL INSPECTION

Mark Satisfactory or Unsatisfactory

On Completion:

1	<input type="checkbox"/>	Correct termination of cables in the column, luminaire and control gear
2	<input type="checkbox"/>	Circuit conductors identified correctly
3	<input type="checkbox"/>	Conductor size correct for normal operation (or as specified)
4	<input type="checkbox"/>	Single pole which or fuse in the phase conductor only
5	<input type="checkbox"/>	Outer contact of ES lampholder is connected to the Neutral conductor (if applicable)
6		Method of protection against direct contact
	<input type="checkbox"/>	a) Insulation of live parts
	<input type="checkbox"/>	b) Barrier or enclosure
	<input type="checkbox"/>	c) Out of reach (overhead lines only)
7		Method of protection against indirect contact
	<input type="checkbox"/>	a) Presence of protective conductors
	<input type="checkbox"/>	b) Presence of main equipotential bonding conductor
	<input type="checkbox"/>	c) Presence of supplementary equipotential bonding conductor including doors of steel columns but excluding that of concrete columns
8	<input type="checkbox"/>	Presence of method of local isolation
9	<input type="checkbox"/>	Fuse ratings correctly rated for their purpose
10	<input type="checkbox"/>	Labelling in control pillar/switchboard enclosure of isolators and fuses
11	<input type="checkbox"/>	Prevention of mutual detrimental influence. Proximity of non-electrical services (fences or safety barriers etc)
12	<input type="checkbox"/>	Selection of equipment and protective measures appropriate to external influences
13	<input type="checkbox"/>	Adequate access to installed equipment
14	<input type="checkbox"/>	Presence of danger notices or other warning notices
15	<input type="checkbox"/>	Presence of circuit diagrams enclosed within control pillars/switchboard enclosure
16	<input type="checkbox"/>	Installation method of cables
17	<input type="checkbox"/>	Deviation from the materials listed in the specification
18	<input type="checkbox"/>	Other _____

NEW LIGHTING INSTALLATION INSPECTION TEST & COMPLETION CERTIFICATE

(All entries recorded on this sheet to be determined by measurement. All instruments must bear a current calibration label).

Date of Test: _____ / _____ / _____

Instruments to be used

Date calibrated

Voltmeter 240/415V

Ammeter 0-50 amp

Megger 500V

Loop Impedance Meter

Prospective Short Circuit Tester

Control Pillar

Installation de-energised (with all fuser carriers removed)

Continuity of protective conductors

Polarity (Rph + Re):-

Mark Satisfactory or Unsatisfactory

Circuit 1	Ω	Circuit 1	
Circuit 2	Ω	Circuit 2	
Circuit 3	Ω	Circuit 3	
Circuit 4	Ω	Circuit 4	

Insulation Resistance

Insulation resistance (column wiring)

(Note Remove neutral conductor from PME system)

(All columns)

Circuit 1	P - N	Ω
	P - E	
	N - E	

Circuit 1	Column No	
	P - E	MΩ
	N - E	MΩ

Circuit 2	P - N	Ω
	P - E	
	N - E	

Circuit 2	Column No	
	P - E	MΩ
	N - E	MΩ

Circuit 3	P - N	Ω
	P - E	
	N - E	

Circuit 3	Column No	
	P - E	MΩ
	N - E	MΩ

Circuit 4	P - N	Ω
	P - E	
	N - E	

Circuit 4	Column No	
	P - E	M Ω
	N - E	M Ω

METHOD OF EARTHING	TN-C-S
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Installation Energised

(Measurements taken under load at cut-out incoming terminals)

Voltage at Origin _____ V

Prospective Short Circuit Current at Origin _____ KA

Loop Impedance at Origin _____ Ω

No. of Phases _____

Load at Origin _____ A

Measured Load

Voltage at end of Circuit

Circuit 1	A	Circuit 1	V
Circuit 2	A	Circuit 2	V
Circuit 3	A	Circuit 3	V
Circuit 4	A	Circuit 4	V

Loop Impedance at end of each circuit

Prospective Short Circuit

Circuit 1	Ω	Circuit 1	kA
Circuit 2	Ω	Circuit 2	kA
Circuit 3	Ω	Circuit 3	kA
Circuit 4	Ω	Circuit 4	kA

I/We being the person(s) responsible (as indicated by my/our signature(s) below) for the inspection and test of the street lighting and associated electrical installation particulars of _____ which are described on the attached appendices of this form certify that the said work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with Council current Specification for the Installation of Public Domain Lighting and the Rules for Electrical Installations (AS/NZS 3000) except for departure, if any, stated in this certificate.

The extent of liability of the signatory is limited to the work described above as the subject of this certificate.

For the inspection and test of the installation at:	
Name: (BLOCK LETTERS)	Position
Licence No:	
Company name	
Signature (of Designer in BLOCK letters)	Date
For and on behalf of:	
Address:	
Witnessed By (Name) (BLOCK letters)	Position
Signature:	
Comments:	