

# Street Lighting Design Guidelines



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Acronyms	Full form
AHD	Australian Height Datum
AS/NZS	Australian Standard/New Zealand Standard
CADD	Computer Aided Design and Drafting
DIPL	Department of Infrastructure, Planning and Logistics
GDA94	Geocentric Datum of Australia 1994
LED	Light Emitting Diode
LV	Low Voltage
MEN	Multiple Earthed Neutral
MGA	Map Grid of Australia
NT	Northern Territory
NTG	Northern Territory Government
POS	Point of Supply
PWC	Power and Water Corporation
RCD	Residual Current Devices
RODP	Road Owner Distribution Pillar
VIAC	Vehicle Impact Absorbing Column

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## 1. General

The provision of street lighting on Territory roads is necessary to maintain road safety standards, amenity and personal safety. The requirements for street lighting with illumination levels appropriate for the lighting environment on Territory roads are to be in accordance with the current version of AS/NZS 1158 *Lighting for roads and public spaces* (all parts), the Austroads *Guide to Road Safety and Guide to Road Design* and the Northern Territory Government's *Roadworks Master Specification*.

These Street Lighting Design Guidelines are an interim guide and will remain in place until withdrawn or updated by the DIPL.

Power and Water Corporation (PWC) is currently contracted by the DIPL to service and maintain the DIPL owned road/street lighting infrastructure. Consequently, designs are generally intended to remain as per the previous specified standards of PWC.

## 2. Electrical Compliance

### 2.1 AS/NZS3000

All new road/street lighting infrastructure on the NTG Road Network is owned by DIPL and is required to comply with AS/NZS3000.

The exception is road/street lighting infrastructure fixed to PWC overhead distribution infrastructure.

### 2.2 Power and Water Corporation

Refer to PWC document NP027 for details of PWC requirements for:

- The design, construction, and service connection of new and modified street lights assemblies fixed to PWC pole structures;
- The design, construction, and service connection of new and modified underground street light schemes (stand-alone);
- Relocation of street lights fixed to PWC pole structures and street light columns for underground street light schemes; and
- The approval process for alternative designs are to be submitted that depart from PWC Standard Drawings.

## 3. Designing Street Lighting

### 3.1 Design Process

All street lighting designs must:

- Be approved by the Road Owner,
- Be submitted to PWC for review,
- Comply with PWC standard design criteria for overhead networks or,
  - Be submitted for review as an Alternative Design.
- Be designed and documented consistent with the Department's NTG Technical Drawings Part 2 – Civil CADD Manual [https://dipl.nt.gov.au/\\_data/assets/pdf\\_file/0017/430019/ntg-technical-drawings-part-2-civil-cadd-manual.pdf](https://dipl.nt.gov.au/_data/assets/pdf_file/0017/430019/ntg-technical-drawings-part-2-civil-cadd-manual.pdf)
- The designer must design lighting in accordance with the Lighting Design Category appropriate for the Road Category nominated by the Road Owner, or as agreed with the Road Owner.
- The designer must provide a copy of calculations for lighting designs to allow validation of the installation.

### 3.2 General Design Requirements

All lights shall be controlled for lighting duration by time switches.

As a general requirement, use LED luminaires in all areas.

Where LED luminaires are to be fixed to PWC power poles, all connection arrangements must be fully designed, structurally certified by an NT registered practitioner and submitted to PWC for approval.

All infrastructure designed to support LED lighting, ie outreach arms, brackets, rag bolt assemblies etc, must be dimensionally the same as previous PWC designs.

Where LED luminaires are to be mounted on new poles, the designer must obtain certification from the pole supplier that the pole, outreach arm and rag bolt assembly are suitable for the specified luminaire in the local wind and terrain conditions.

Where existing lighting on roads and/or intersections affected by the development does not meet current standards, the Developer shall be responsible for upgrading works to current standards.

### 3.3 Arterial Road Requirements

All intersections on urban arterial roads or on urban sections of National Highways require street lighting. The minimum lighting level requirement is Category V3.

Where a subdivision road or a property development connects to a rural arterial road or section of National Highway in a rural environment, street lighting will also be required at the intersection.

The lighting level requirement at these rural environment intersections will vary from a V3 category, down to “Flag” lighting levels, subject to the following contributing factors:

- the location,
- type of intersection,
- projected traffic volumes,
- the nature of abutting property development, and
- the characteristics of the affected arterial road or National Highway, including speed environment and road geometry.

### 3.4 Subdivision Road Requirements

The lighting standard for subdivisional roads, where required, shall cater for the following:

1. all intersections, including signalised intersections, with raised traffic control devices or where the traffic volumes and speed environment justify its installation
2. the ends of cul-de-sacs
3. curved sections of a road
4. the end of all walkways or cycle paths not adjacent to roads
5. every traffic calming device
6. Delineation of pedestrian crossing and all on road hazards including kerbed islands

Light poles and underground cabling shall not conflict with any infrastructure, including stormwater pits, pedestrian crossing points or driveways, and shall be located opposite shared lot boundaries where possible.

### 3.5 Pedestrian and Cycle Path Requirements

Pedestrian/cycle paths located immediately adjacent to roads or on road cycle paths are to be adequately illuminated by the roadway lighting.

Paths adjacent to roads but separated by wide nature strips or should be checked to ensure adequate luminance from the roadway lighting. If the roadway lighting is insufficient or shielded by trees, then provide additional pathway lighting to a Category P2 level.

Where a path is providing a link between roads in a subdivision the path as a general rule will require Category P2 level lighting.

### 3.6 On-site Lighting and Illuminated Signage

Any floodlighting, security lighting or signage lighting provided within a development or land parcel, is to be installed in such a manner that is not a nuisance or hazardous to traffic on the abutting road. On-site lighting shall comply with the requirements of Australian Standard AS 4282-1997 *Control of the obtrusive effects of outdoor lighting*. On-site lighting and illuminated signage shall also comply with the provisions of Part IV of the *Traffic Act*.

The finish of any illuminated prime identification sign shall be such that day and night readability is the same and is of constant display (i.e. not flashing or of variable message).

The sign shall be positioned so as not to create sun or headlight reflection to motorists; and be located entirely (including foundations and aurally) within the subject Lot.

Advertising signage, either permanent or temporary, i.e. 'A' frame, vehicle or trailer mounted, shall not be erected or located within a Territory road reserve, without specific approval from the Department.

## 4. Point of Supply

### 4.1 General

Each Road Owner must be provided with a dedicated point of supply to its Road Owner Distribution Pillar (RODP).

### 4.2 Underground Distribution

The source of supply in a new underground distribution area is the designated street lighting stripe fuse in the LV compartment of Mark III substations.

The Point of Supply (POS) for underground cable installations is the line terminals of the Road Owners Distribution Pillar (RODP), i.e. the cable to the RODP is a PWC asset.

### 4.3 Overhead Distribution

The source of supply and Point of Supply for existing and new roads in established areas is the overhead LV conductors at nearest power pole or PWC owned distribution pillar.

Refer to PWC drawing OVERHEAD-01 for details.

### 4.4 Overhead Supply to Underground Lighting

A freestanding RODP must be used to supply street lighting installations, underground.

A pole mounted control panel may only be used to supply lighting mounted on power poles.

### 4.5 Road Owners Distribution Pillar

Each Road Owner is responsible for the design of its RODP.

Modify and use the standard PWC three slot lighting pillar to comply with AS/NZS3000.

Refer to PWC Standard documents for details.



## 5. LV Distribution

### 5.1 Underground Distribution

All underground lighting circuits are to be installed in orange 80mm diameter HD PVC conduit with pits where required.

Each circuit is to include insulated 25<sup>2</sup> mm copper XLPE/NJ/PVC active and neutral cables and 25<sup>2</sup> mm copper PVC earth conductors within the conduit.

### 5.2 Overhead LV Pole Mounted Lighting

This form of distribution does not comply within AS/NZS3000.

Refer to PWC standard drawings for details.

**HOLD POINT – requires PWC approval.**

## 6. Existing Installations

As existing sites can vary based on previous installation methods and can have variable distances from the RODP, the design consultant must investigate the site thoroughly and review As Constructed Drawings to determine if the existing infrastructure can be upgraded to AS3000 requirements and identify possible issues with the integration with other existing circuits.

Items to consider include:

- Can a protective earth be installed in the existing pit and pipe network,
- Upgrade of the existing RODP to AS/NZS3000,
- Full replacement of direct buried installations.

Upon completion of the investigation, the Design Consultant shall:

- Provide DIPL with design options and cost estimates for a determination by DIPL before continuing with any further design (**HOLD POINT**), or
- Provide the developer or third party other than DIPL with design options and cost estimates, when the works are required as part of a development.

The design options and or recommendations are to ensure that the subsequent completed installation is provided with a certificate of compliance to AS3000 by the installation contractor.

## 7. System Protection

### 7.1 RCD Protection

Each lighting circuit is to be provided with RCD protection at the RODP in accordance with AS/NZS3000 unless the Road Owner has completed a Risk Assessment.

### 7.2 Earthing

Each RODP must be provided with a protective earth electrode connected to the earth bar in the RODP by an earth conductor.

Each RODP must be provided with a MEN connection.

Each run of lighting conduits is to be installed with a bare 35<sup>2</sup> mm copper earth conductor for pole equipotential bonding buried outside the conduit and an insulated 25<sup>2</sup> mm copper protective earth conductor inside the conduit with earth fault loop impedance to achieve required disconnection times.

### 7.3 Surge Protection

Control panels must have surge protection as per drawing S03-1-5-189.

DIPL approved equipment to be DENHE, NOVARIS or CRITEC.

## 8. Lighting Furniture

### 8.1 Luminaires

Luminaires must be selected from the following LED luminaire types:

- GE eco R250 gen2,
- Gerrard Road- LED series, or
- Aldridge aero V-LED ALS162.

Any minor changes to roadways with new poles or relocated poles are to maintain the existing light fitting type and not be upgraded to LED.

### 8.2 Light Poles

#### Rigid Poles:

Provided in roads with speed limits of 60km/h or less, have moderate to low pedestrian activity, and are at offsets to the kerb of 0.9m or more.

#### Frangible Poles:

- Slip-base: Generally used in roads with speed limits greater than 60km/h, have low pedestrian activity, and are at offsets to the kerb/shoulder of 0.9m or more. Slip-base poles are not recommended for areas with high pedestrian activity.
- VIAC (Vehicle Impact Absorbing Column): Generally used in roads with speed limits greater than 60km/h, have high pedestrian activity and are at offsets to the kerb/shoulder of 0.9m or more.

Typical offsets can vary depending on the pole setback zones determined by the Road Owner.

Light poles must be manufactured in accordance with, and physically the same dimensions as detailed on PWC standard drawings S03-01-01-01 to S03-01-01-09 and S03-01-01-14 and AS1798:2014 *Lighting poles and bracket arms-Recommended dimensions*.

The designer must obtain certification from the pole supplier that the pole, outreach arm and rag bolt assembly are suitable for the specified luminaire in the local wind and terrain conditions and are compliant to AS1798:2014.

### 8.3 Outreach Arms, Base Plates and Rag Bolt Assemblies

Outreach arms, base plates and rag bolt assemblies for poles supporting LED luminaires must be structurally certified and dimensionally the same as previous PWC designs.

## 9. Development Path

It is expected that LED luminaire selection criteria for the various pole types will be implemented in the future. Until then all components must be certified by the manufacturers as being suitable for the local wind and terrain conditions for the specified luminaire.

## 10. Design Drawings

### 10.1 General

Design drawings must be prescriptive and legible and must include schematic diagrams with allocated phases and a detailed lighting schedule with pole numbers, types, outreach arm details, luminaire details.

Pole setout coordinates must be obtained from the design cad file.

The design must use an appropriate geodetic datum and level datum consistent with the project survey and design.

### 10.2 PWC Accredited Contractors

Design drawings must note that all installation works must be carried out by PWC accredited contractors who will submit a works program and completion notices to PWC.