PENRITH CITY COUNCIL

Policy Document

POLICY NAME
Public Domain Lighting Policy

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23 August 2004

REVIEW DATE
The policy is currently under review

COUNCIL MINUTE NUMBER
PRC 202

POLICY TYPE
Council Policy

RESPONSIBLE DEPARTMENT
Strategic Asset Management

RELATED DOCUMENTS
Click or tap here to enter text.

Purpose
The Public Domain Lighting Policy shall apply to all designated lighting schemes that are either separate entities or part of a development which require consent of Council or are initiated by Council.

The Policy shall be used by developers and lighting scheme designers and the relevant Council officers. It will also be of assistance to residents and other interested parties in gaining an understanding of lighting in general and of Council policy.

Policy statement
This section sets out objectives common to all lighting schemes. The objective is to:

- Provide a lighted environment that acknowledges Council's commitment to Crime Prevention through Environmental Design (CPTED) and Ecologically Sustainable Development (ESD) principles

Scope
This Policy applies to Councillors, Staff and the general public.

Document Control

Policy History	Approving Authority	Date
Adoption of the policy	Council	23 August 2004
The policy is currently under review		24 June 2026

COMMUNITY SAFETY

PENRITH CITY COUNCIL

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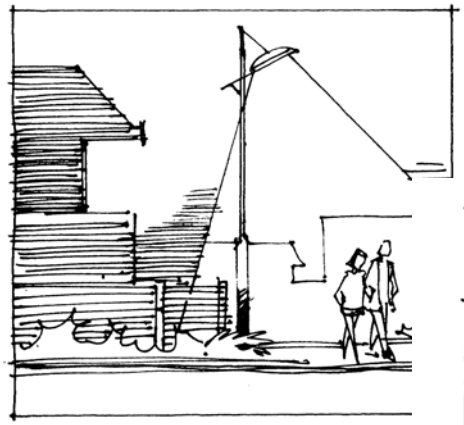
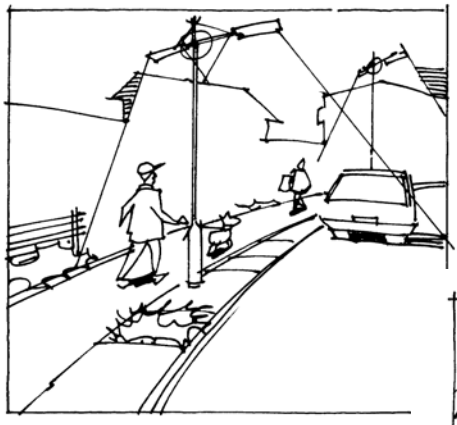
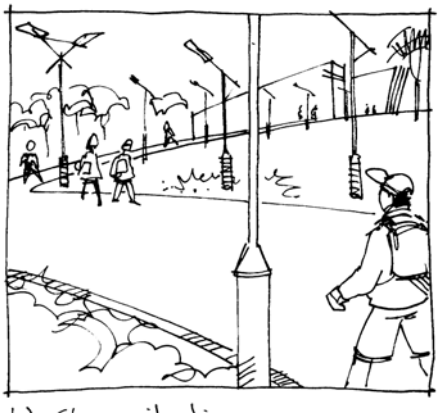
PUBLIC DOMAIN LIGHTING POLICY







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1. APPLICATION OF THE POLICY

The Public Domain Lighting Policy shall apply to all designated lighting schemes that are either separate entities or part of a development which require consent of Council or are initiated by Council.

The Policy shall be used by developers and lighting scheme designers and the relevant Council officers. It will also be of assistance to residents and other interested parties in gaining an understanding of lighting in general and of Council policy.

Where reference is made to an Australian Standard it shall be taken to refer to the Standard current at the time of the consent application for the lighting scheme.

A glossary of terms underlined, as they first appear, in the Policy are given in Appendix 4 and Appendix 5 contains a bibliography of the relevant Standards and other sources of information.

2. DESIGNATED LIGHTING SCHEMES

The Policy encompasses all types of lighting schemes on roads and areas that are open to public use, in both urban and rural areas, which include:

(i) The road network embracing traffic routes, local roads, Pedestrian and cycle dedicated paths, and traffic calming devices.

(ii) Commercial and retail sites in CBD, regional centres and neighbourhood precincts.

(iii) Open-air car parks.

(iv) Transport facilities.

(v) Community buildings surrounds and approaches.

(vi) Open spaces including parks, and installed infrastructure.

(vii) Pedestrian Laneways.

3. OBJECTIVES OF THE LIGHTING POLICY

This section sets out objectives common to all lighting schemes. The objective is to:

> Provide a lighted environment that acknowledges Council's commitment to Crime Prevention through Environmental Design (CPTED) and Ecologically Sustainable Development (ESD) principles,

with the aim to achieve the following:

3.1 Enhancement of night-time amenity.

Poorly designed public lighting can result in what is generally known as light pollution. There are a significant number of satellite photographs that highlights the effects of light escaping upwards due to poor design or inefficient methods of lighting.

The aim of public domain lighting is to optimise illumination only to where it is required.

The International Dark Sky Association has as its vision;

> "to preserve and protect the night time environment and our heritage of dark skies through quality outdoor lighting".

There are also the obvious economic benefit in preventing upward light spillage. A number of CPTED principles can be linked to well designed public lighting and the reduction in crime and antisocial behaviour.

Enhanced lighting of city and regional centres and residential precincts can also raise the perceived prestige of the location and draw in users to commercial and leisure facilities.

3.2 Enhancement of the safety of users by reducing the potential of accident occurrence.

On traffic routes – the lighting of traffic routes to Category V lighting is acknowledged to be an effective night accident counter-measure. It has been demonstrated that Category V lighting can provide significant community benefits and that the costs involved in providing the lighting can be offset by the financial returns from the reduction in road accidents. Studies in Australia and other countries have led to the conclusion that this lighting is likely to

reduce night accidents by about 30 per cent, taken over the total traffic route network.

However road-side objects are potential hazards. Thus conventional road lighting columns should be set back from the kerb line to as great a distance as is possible, a distance of 3m essentially minimises risk, or frangible columns may be applicable where it us not possible for the columns to be set back. (See Appendix 5 for sources further information on these aspects of lighting).

On local roads and spaces – the lighting of local or residential roads and other public space to Category P lighting will aid pedestrians to see their way safely. Note that this category of lighting is not meant to light the way for motorists along local roads, in this case they rely on the vehicle headlights.

3.3 Enhancement of the security of users by reducing the potential for the occurrence anti-social behaviour.

It is acknowledged that lighting can be an effective counter to both the occurrence of crime and to the fear of crime. It has been demonstrated, in studies from Great Britain and the USA, that lighting can provide significant community benefits and that the costs involved in providing the lighting can be offset by the financial returns from the reduction in crime.

However the lighting levels involved need to be relatively high, to Category V3 or, on local roads and other public areas, to the relevant higher Category P. (See Appendix 5 for sources of further information on this aspect of lighting).

3.4 Minimal adverse environmental impact.

Lighting has the potential to produce unwanted side effects of both a direct and indirect nature, but this can be ameliorated by careful lighting design.

Direct impacts – light from luminaires aimed directly towards the eyes may cause glare by which the luminaires appear excessively bright and results in a reduction of visibility The ‘glare light’ from road lighting luminaires is controlled by the relevant Australian Standards but any use of floodlights in public spaces, other than those of the type that are mounted with the flat emitting face horizontal, needs careful application.

A second impact is the spill of light onto adjacent properties to the extent that it becomes obtrusive. Here too the relevant Australian

Standard sets out permissible limits. *(*See Appendix 5 for sources of further information on this aspect of lighting).

Indirect impacts – upward light from luminaires, both directly emitted upwards and reflected upwards from illuminated surfaces, will contribute to sky glow by being scattered in the atmosphere. This will lighten the dark sky and inhibit the view of the night sky. The 'upward light' from road lighting luminaires is controlled by application of the relevant Australian Standard but any use of floodlighting needs careful application.

There are luminaries designed with flat light emitting faces which are designed to be mounted horizontally to prevent the upward emission of light. Eg, aeroscreen luminaries.
By focusing the direction of light only to the area required, and eliminating the upward spill of light there is a reduction in power usage and hence a reduction in greenhouse gas emissions from the generation of the electricity to power the lighting.

Minimising the energy in public domain lighting assists in reaching Council's policy on sustainability. (See Appendix 5 for sources of further information on this aspect of lighting).

4. LIGHTING SCHEME DESIGN PROCEDURE

This Section sets out a common procedure in a series of steps to be followed in the design of all lighting schemes. Section 4 should be read in conjunction with Section 5 that sets out requirements specific to particular types of lighting schemes.

4.1 Lighting schemes - general

Most of the designated lighting schemes, covered by this Policy, and listed in Section 2 are the subject of the AS/NZS 1158 Road Lighting set of standards, except item 2(vi) Open spaces including parks (other than park paths), playgrounds and picnic areas.

The roads, paths and areas and the associated lighting are set out in a hierarchy as shown in Figure 1. For example the traffic routes consist of the arterials, including freeways and motorways, through to sub-arterials and distributors as one progresses from the inter-region connections to local area access and onto to the local roads. Also included are various other public spaces, eg. malls, transport interchanges and associated access ways, such as stairs.

Lighting Categories

There are two generic lighting categories, Category V for traffic routes where the lighting needs of the vehicular traffic are dominant and Category P for residential roads, paths and public areas where the lighting needs of the pedestrian traffic are dominant. Within each of the two categories there are a range of options or sub-categories.

The lighting sub-category applicable is determined by reference to this Policy and the appropriate Standard, from the description of the road and abutting land use or area type and the operating characteristics and traffic conditions.

Category V - within this category, the majority of urban traffic routes would warrant Category V3 lighting, which typically employ luminaires with 250 watt high pressure sodium lamps (yellow-white light) mounted at a height of 12m on both sides of the carriageway and spaced about 70m apart.

In urban centres the lighting shall be increased to Category V1 and use white light because of the type of activity and the enhanced amenity afforded. On the other hand a distributor or major collector may only warrant Category V5 because of the relatively low traffic volume, a category designed to be easily upgraded whenever the increase in traffic warrants this.

Category P - within this category, the majority of urban residential roads will be lit to either Category P4 or P5, depending on whether the electricity supply is undergrounded so necessitating stand-alone lighting columns or whether there are electricity reticulation poles on which the luminaires can be mounted.

Category P4 lighting (underground power) will typically consist of luminaires at a height of 6 to 7m spaced about 60m apart on one side of the roadway only; the lamp wattage may be as low as 50W. For Category P5 lighting (overhead power) the luminaires will be mounted on every other pole, giving economical lighting.

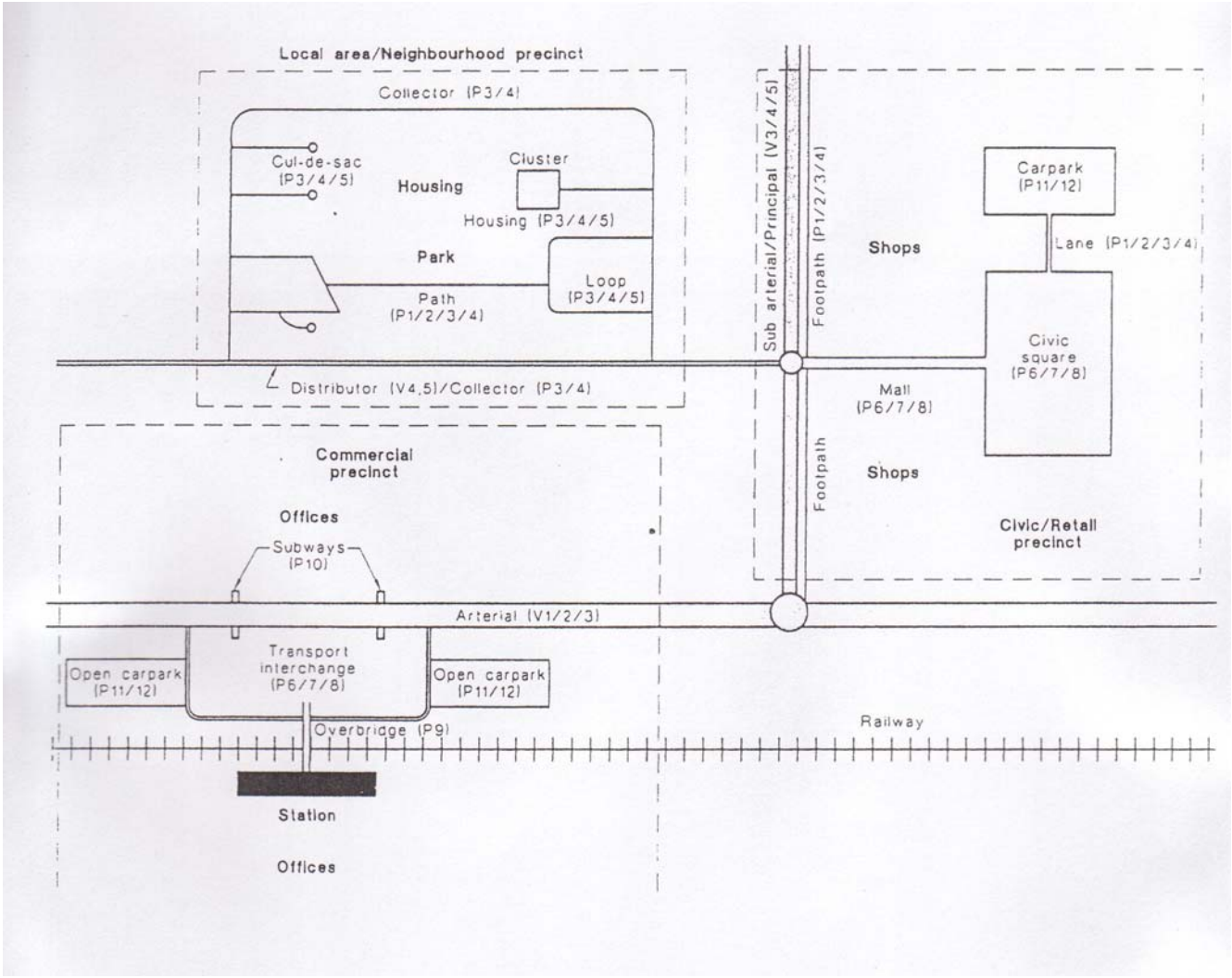

Figure 1 ILLUSTRATION OF ROAD AND AREA TYPES AND THE ASSOCIATED INDICATIVE LIGHTING CATEGORIES (After AS/NZS 1158)

Note: The lighting category for any particular location shall be determined by reference to this Policy.

Where lighting is required:

- for enhanced amenity and prestige
- for inhibiting the risk of crime
- or for the lighting of public spaces other than roads,

there other relevant sub-categories, generally necessitating an increase in lighting. Such lighting will require special justification.

4.2 Decision process for determining appropriate lighting

This Section is an aid to decide initially whether a public domain at a particular location should be lit and then if the decision is yes as to what lighting standard should be installed. The end point is that the user is referred to the general requirements of Section 4.3 and the specific ones of Section 5.

1. *Is the public domain completely unused at night or that use at night is discouraged?*

If *yes*, with supporting documentation, no lighting is to be implemented and process is complete.

If *no* then lighting may be required and proceed to 2.

2. *Is the location of the public domain rural, or urban?*

If *rural* proceed to 3.

If *urban* proceed to 4.

3. *What kind of rural public domain is it?*

- If a traffic route then only intersections are required to be lit; see Sections 4.3 and 5.2(a).

- If it involves the inter-connecting roads of a large area block development then only intersections are required to be lit; see Sections 4.3 and 5.2(b).

- If it involves the interconnecting roads of a village then these are treated as an urban location and proceed to 4.

- If it is a public facility, building or area then these are treated as if an urban location and proceed to 4.

4. *What kind of urban public domain space is it?*

- If a traffic route then Category V lighting is required; see Sections 4.3 and 5.1(a).

- If it is a residential road or footpath or a cycleway then Category P lighting is required; see Sections 4.3 and 5.1(b).

- If it is a traffic calming device lighting or other visibility treatment is required; see Sections 4.3 and 5.1(c).

- If it is a public site, facility, building or area then Category P or other specified lighting is required; see Sections 4.3 and 5 as follows:

  Commercial and retail sites – 5.3(a) to (d)
  Open-air car parks – 5.4
  Transport facilities – 5.5
  Community buildings and facilities – 5.6
  Open spaces, parks and playgrounds – 5.7(a) to (c).

4.3 Lighting schemes - steps in design

The steps in the common procedure to be followed in the design of *all* lighting schemes are as follows:

(i) Establish the need for lighting as given in Section 4.2; if the need has been established proceed to step (ii) and subsequent steps.

(ii) Analyse the lighting requirements in terms of the objectives of lighting set out in Section 3 with respect to the operating characteristics and layout of that particular site.

(iii) Establish the requisite lighting Category as defined in the AS 1158 series of standards in conjunction with any special requirements set out in Section 5, or if the lighting is not the subject of the AS1158 series, ie. open spaces, parks and playgrounds, as given in Section 5.7.

Note that if lighting is intended for enhanced security or prestige it must be justified, following the procedure given in Appendix 2.

(iv) Make the choice of luminaire, column and associated hardware, referring to the relevant Australian Standard where appropriate and the lighting supplier and to any special requirements set out in Section 5, taking into account the following:

(a) The restriction of glare, obtrusive and upward waste light appropriate with the situation.
(b) The integration of the lighting with proposed landscaping, as set out in Appendix 3.
(c) The minimisation of lighting infrastructure minimisation of energy use and hence the associated reduction in greenhouse gas emissions.
(d) The minimisation of the need for maintenance whilst ensuring the continuing compliance of the performance of the lighting scheme and the maximisation of the operating life of the lighting.

(v) Design the lighting to achieve the performance requirements relevant to the lighting Category required or as given in Section 5, using the methods as documented in the AS 1158 series of standards for *all* the types of lighting scheme as set out in Section 2.

(vi) Documentation of the lighting scheme, including an energy audit, as set out in Section 6.

5. ADDITIONAL SPECIFIC REQUIREMENTS FOR LIGHTING SCHEMES

Section 5 sets out requirements specific to particular types of lighting schemes.

5.1 URBAN ROADS

5.1(a) Traffic routes

Lighting Category

The lighting category for a particular urban traffic route shall be determined by Council with reference to AS/NZ 1158.1.1. Generally the applicable category will be Category V3, except where the traffic route passes through a CBD or regional centre in which case the category will be Category V1.

Other Requirements

(i) Lamp type – the lamp used shall have the highest efficacy as possible, appropriate to the required operational characteristics and colour of light emitted.

In the CBD's and regional centres the colour of the light shall be, in general, white with excellent colour rendering. The lamp used shall, normally, be metal halide. However, if footpaths adjacent to the carriageway are lit separately with white light of excellent colour rendering (also see 5.3(b) and (c)) then high pressure sodium lamps may be used to light the carriageway.

On other traffic routes the lamp type will be high pressure sodium.

(ii) Luminaire – the luminaires shall have a downward light output ratio (DLOR) as high as is possible and a light distribution such as to maximise the light on the roadway and to minimise the number of luminaires used.

The luminaires shall comply with AS/NZ 1158.6 and have an ingress protection (IP) rating of 6X to facilitate excellent maintenance properties.

(iii) Lighting columns - where the luminaires are mounted on dedicated columns, the form of the columns and the alignment of them along the road shall be pleasing in appearance by day and provide clear optical guidance by night.

5.1(b) Residential Roads, Footpaths and Cycle-ways

Lighting Category

The lighting category shall be determined with reference to AS/NZ 1158.3.1. Generally the applicable category for an urban residential road will be Category P4 where there are dedicated lighting columns (underground power) and P5 where the luminaires are mounted on electricity reticulation poles. However, if there is a dense over-arching tree canopy it may be appropriate to install lighting on every pole to achieve the desired category of lighting – see Appendix 3.

Wherever a lighting category higher than P4 is selected, for any application, on the grounds of prestige or to reduce the occurrence of crime of the fear of crime it shall be justified using the method in Appendix 2.

Other Requirements

(i) Lamp type - the lamp used shall have the highest efficacy as possible, appropriate with required operational characteristics and colour of light emitted.

For Categories P4 and P5 the colour of the light shall be white and of the highest colour rendering practical, in order that the road reserve appear as bright as possible at these intrinsically low light levels.

Unless stated otherwise all Category P lighting shall be white light.

(ii) Luminaires – in some lighting schemes the luminaires used may have an emphasis on their decorative appearance. The use of such luminaires and columns requires the specific endorsement of Integral Energy, which is the Council road lighting service provider. Nonetheless all luminaires regardless of type shall have a downward light output ratio (DLOR) as high as is possible in order to maximise the light on the road reserve and minimise the number of luminaires used.

All luminaires shall comply with AS/NZ 1158.6 and have an ingress protection (IP) rating of at least 5X to facilitate good maintenance properties.

5.1(c) Traffic Calming Devices

Two situations arise when traffic calming devices, ie. roundabouts, speed-humps, slow points, are installed on residential roads and which require different lighting schemes:

Collector roads

Here the devices are installed to slow traffic and regulate flow at conflict points but not to deter the through traffic volume. The devices shall be lit in accordance with AS/NZ 1158.3.1 with an illumination of 3.5 lux over the relevant area, in addition to the general road lighting.

Local roads

Here the devices are installed to slow and deter traffic. The devices shall either be lit with a luminaire, used in the general lighting scheme, placed in close proximity to the device or the device shall be adequately fitted with retro-reflection, that is well maintained, which unambiguously highlights the device to the oncoming motorist.

5.2 RURAL ROADS

5.2(a) Rural traffic routes

On rural traffic routes, in general, only intersections will be lit. Intersections with significant night-time traffic, eg. the intersection of two arterial roads, as determined by Council, shall be lit over the extent of the intersection to Category V5 or above.

Other intersections, eg. the intersection of a local with an arterial road shall be lit by flag or guidance lighting as described in AS/NZ 1158.1.1 (Isolated intersections and junctions).

For traffic controlling devices, including roundabouts on rural roads, refer to clause 5.1 (c)

5.2(b) Rural Residential Areas

Two situations are considered:

Small, dense, homogeneous settlement

Such a village shall be lit as if it were an urban residential area, in accordance with 5.1(b).

Diffuse, large area block settlements

The lighting on these public roads will have as a minimum the required lighting level for any controlled traffic calming devices (refer 5.1c), flag lighting at intersections of the inter-connecting roads and at any significant horizontal road alignment change. (refer 5.2a).

5.3 COMMERCIAL AND RETAIL SITES

This section deals with the lighting of areas and roads and footpaths adjacent to the buildings on sites in the CBD, regional centres and neighbourhood precincts.

5.3(a) Outdoor plazas and pedestrian areas

Lighting Category

The lighting category shall be determined with reference to AS/NZ 1158.3.1. Generally the applicable category will be either Category P6 or P7, which are based primarily on security and amenity considerations. The use of Category P8 will need the

special justification that there is a low crime risk at the particular site.

Other Requirements

(i) Lamp type – the lamp used shall have the highest efficacy as possible, appropriate with required operational characteristics and colour of light emitted. The colour of the light shall be, white with excellent colour rendering.

(ii) Luminaires – the lighting used can include the use of decorative luminaries and columns. The use of such luminaires and columns requires the specific endorsement of Integral Energy. Decorative luminaries shall maintain a downward light output ratio (DLOR) as high as is possible in order to maximise the light on the area and minimise the number of luminaires used. Requests for an upward component of light to illuminate permanent foliage, interest points and the like shall be assessed and approved by Council on a case by case basis.

All luminaires shall comply with AS/NZ 1158.6 and have an ingress protection (IP) rating of at least 5X to facilitate good maintenance properties.

(iii) Lighting columns –The luminaires shall be mounted on dedicated columns at a height appropriate to the location and landscaping where proposed for implementation. The form of columns and the alignment of them shall be in keeping with the surrounding built form and landscaping. The design shall be influenced by any proposed or pending infrastructure implementation/changes proposed for the area.

5.3(b) Adjacent roads, footpaths and laneways

Lighting Category

All roads, if subject to Category P lighting, footpaths, lanes and pedestrian laneways immediately adjacent and within the areas shall have lighting to at least Category P3 for security, particularly those giving access from car parks.

Other Requirements

(i) Wall surfaces – where lanes and pedestrian laneways are bounded by walls these should be finished with a light coloured surface with good reflecting characteristics so that the brightness of the way is enhanced.

(ii) Adjacent roads in the CBD and regional centres – for amenity reasons the footpaths along traffic routes may be lit separately using luminaires which are aesthetically pleasing, installed at low mounting height and emitting white light with excellent colour rendition. If the footpath has building awnings see 5.3(c) below. (also see 5.1(a)).

(iii) Roads adjacent to a neighbourhood precinct – for reasons of security it may be warranted to extend higher Category P lighting some distance along those roads used by pedestrians for access, see Appendix 2. Such lighting is to engender a feeling of security and encourage the use of the facilities.

5.3(c) Building awnings

Two situations arise here:

Awnings overshadow the footpath

Awnings can overshadow the footpath to an extent that it will not be adequately illuminated by light from the traffic route lighting. Therefore supplementary lighting to the relevant Category P will need to be installed (also see 5.1(a)). White light with excellent colour rendering shall be installed

5.3(d) Convenience Store, shopping strip, Recreational, Community facility (within or bordering residential areas).

Where there are residential dwellings bordering these sites with extended hours of use, there shall be no spill of light beyond the site.

5.4 0PEN-AIR CAR PARKS

Lighting Category

The lighting category shall be determined with reference to AS/NZ 1158.3. Generally the applicable category will be Category P11, which is based primarily on security considerations and P12 for parking spaces for disabled persons.

AS/NZ 1158.3 does not differentiate between a major shopping centre car park, commuter car parks or a local neighbourhood shopping strip car park.

A lower level of lighting of one half the lux horizontal illumination values of P11 (with no requirement for vertical illumination) may be applied to car parks with low activity after dark, after justification, which takes into account the specific circumstances pertaining to the site. This shall be considered by Council on a case-by-case basis. However it should be noted by all parties that such lighting will not meet all the objectives set out in Section 3.

Consideration may be given to only lighting a specific section of a car park that has low usage at night. Lighting is to be located within the predicable pedestrian desire lines designated for this purpose and clearly marked with appropriate pedestrian safe route signage.

Other Requirements

(i) Integration of landscaping and lighting – landscaping of the car park, both peripheral and within the area, shall be laid out so that it does not reduce the specified level of lighting. The landscaping shall conform with Appendix 3 "The integration of trees and public space lighting."

(ii) Obtrusive light – where there are residential dwellings bordering a car park, there shall be no spillage of light beyond the boundaries so that it is not obtrusive to residents.

5.5 TRANSPORT FACILITIES

Transport facilities include bus/rail interchanges, bus interchanges and termini.

Lighting Category

The lighting category shall be determined with reference to AS/NZ 1158.3.1. Generally the applicable category will be Category P6 or P7, which is based primarily on security and pedestrian and bus safety considerations. The use of Category P8 will need the special justification that there is a low crime risk at the particular site.

Other requirements
All roads, if subject to P Category lighting, footpaths, lanes and alleyways immediately adjacent to a transport facility should have lighting to, at least, Category P3 for security, particularly those access ways from car parks.

For reasons of security it may be warranted to extend higher Category P lighting for a distance along those roads used by pedestrians for access; see Appendix 2.

Such lighting is to convey a feeling of security and encourage the use of the facilities.

5.6 COMMUNITY BUILDINGS and FACILITIES

Lighting Category

All roads, if subject to P Category lighting, footpaths, lanes, alleyways and areas immediately adjacent to a community building or other facility, such as a sporting one, should have lighting to, at least, Category P3 for security, particularly those access ways from car parks.

Other requirements

Roads accessing community buildings and facilities – for reasons of security it may be warranted to extend higher Category P lighting for a distance along those roads used by pedestrians for access; see Appendix 2.

Such lighting is to convey a feeling of security and encourage the use of the facilities.

5.7 OPEN SPACES

Open spaces includes parks, recreational facilities and picnic areas. It is not envisaged that that the entirety of a park would be lit but rather discrete elements. The lighting and extent of lighting of these facilities shall be determined on an individual basis, based on the proposed use of the park, playground of picnic area. The determination of any proposed lighting shall be made in conjunction with an assessment of any crime or perceived crime risk that may exist in the location.

5.7(a) Park paths and cycle-ways

If it is determined that a path or cycle-way is to have lighting, then that lighting shall beat least to Category P3.

5.7(b) Recreational Facilities

If it is determined that a recreational facility is to have lighting, the area, other than those involving activity requiring speed and accuracy, shall be lit with an illumination of 14 lux maintained average and 3 lux minimum at any point over the relevant area, with white light of good colour rendition.

Recreational facilities involving activity requiring speed and accuracy such as for skateboards, shall be lit with an illumination of 100 lux maintained average and 10 lux minimum at any point, over the relevant area, with white light of good colour rendition. Attention must be given to providing good vertical illumination, good modelling and minimisation of shadows over the play equipment.

Floodlighting should be avoided in such locations due to inherent glare and poor aesthetic quality.

The high illuminations entailed may give rise to significant spill light, therefore any scheme must be analysed for obtrusive light and the design of the scheme must fulfil the requirements of AS 4282.

5.7(c) Picnic and barbeque areas

If it is determined that picnic and barbeque areas are to have lighting they shall be lit with an illumination of 14 lux maintained average and 3 lux minimum at any point over the relevant area, with white light of good colour rendition.

Particular attention should be paid to the lighting of any installed barbeque cookers because of the potential of injury. In particular shadowing by the user must be minimised.

Floodlighting should not be used for lighting picnic and barbeque areas because of inherent glare and poor aesthetic quality.

The high illuminations entailed may give rise to significant spill light, therefore any scheme must be analysed for obtrusive light and the design of the scheme must fulfil the requirements of AS 4282.

The lighting in all of the above areas may be installed with time cut off switches with prominent notices to this affect.

5.7(d) Adjacent car parks

Car parks shall be lit in accordance with Section 5.4

The lighting in those areas identified in 5.7 (a) to 5.7 (d) can be controlled by either the street lighting network or by a curfew designated for facilities for use by the public at time-limited venues.

6. DOCUMENTATION OF THE LIGHTING SCHEME

The lighting scheme, including an energy audit, shall be documented as set out in Appendix 1. The initial and subsequent compliance with this Policy and relevant Standards are demonstrated by documentation.
Note that: (i) That the luminaire types and columns used must be approved by Council's lighting service provider (Integral Energy).

(ii) That the scheme must be approved for connection to the supply by Council's electricity service provider (Integral Energy).

(ii) That the scheme must contain a statement signed by a qualified person, as defined by Council, certifying that the scheme meets the requirements of Appendix 1.

APPENDIX 1

DOCUMENTATION OF THE LIGHTING SCHEME

The documentation for any lighting scheme subject to the Policy is set out below in this Appendix. It is based on the documentation requirements for demonstrating compliance with the AS/NZS 1158 Standards, as set out in AS/NZS 1158 1.1 and 3.1, and with Council requirements as set out in this Policy.

The documentation is required in stages.

- the lighting scheme design and energy audit
- certification that the lighting scheme has been constructed in accordance with the approved design and energy audit
- where applicable annual certification of maintenance.

1. LIGHTING SCHEME DESIGN

1.1 Justification for lighting

Give reasons why lighting is necessary at this site and for the lighting Category on which the scheme is based.

1.2 Site details and layout of lighting scheme

Scale site plan showing the essential details of all the elements of the public space to be lit with the lighting scheme layout superimposed.

1.3 Lighting Category

Category V – Justification of the category of Vehicular traffic (Category V lighting) selected.

Category P – Justification of the category of Pedestrian area (Category P) lighting selected. Note that if lighting is for enhanced security or prestige then justification must be given as set out in Appendix 2.

Other – light technical parameters and values used.

1.4 Environmental considerations

Glare restriction – luminaire types used are compatible with Standard requirements.

Upward waste light - luminaire types used are compatible with Standard requirements.

Obtrusive light – the design of the scheme has taken into account Standard requirements for the limitation of obtrusive light.

Greenhouse gas emissions – refer to Section 2. Energy Audit below.

1.5 Lighting scheme details

Roads and pathways - Arrangement; mounting height; overhang; upcast angle (for side entry luminaires: if different from 5 degrees give justification); set-back from the kerb line (if not 3m or greater give justification); spacing.

Other public space - Layout; mounting height; bracket length and upcast angle (for side entry luminaires: if different from 5 degrees give justification).

1.6 Luminaire and lighting column details

Luminaire – luminaire type and identification details; ingress protection (IP) rating; origin of the luminaire photometric data and IP rating (if not NATA accredited give justification).

Lamp – lamp type, wattage, initial luminous flux (origin of data) and colour attributes of the light (with justification).

Lighting column – type (including bracket arm if applicable), material and finish.

1.7 Maintenance

Maintenance factor – maintenance factor used in the design of the scheme and the justification of it.

Maintenance schedule – cleaning and lamp replacement cycles and their justification and a lamp failure replacement regime.

1.8 Lighting performance

Design methods – for each spatial element give the design method used; if a computer program is used give the name and a statement that it complies with the computational requirements of AS 1158.

Values of the light technical parameters – state the values of the light technical parameters obtained and compare to the limiting values required for compliance. *All* the light technical parameters must at least be to the limiting value specified or better.

However the scheme should not be over designed – indicative of this is if the limiting value of the average maintained luminance or illuminance, as appropriate, is exceeded by 25 per cent or more.

1.9 Certification

Compliance – a statement signed by a qualified person, as defined by Council, certifying that the scheme complies with the requirements of the applicable Standards and of Council as set out in this Policy and is documented in accordance with this Appendix.

Luminaires and columns – a statement by Council's lighting service provider (Integral Energy) that the luminaire types and columns to be used are approved.

Connection – a statement by Council's electricity service provider (Integral Energy) that the scheme is approved for connection to the electricity supply.

2. ENERGY AUDIT

The purpose of this audit is to ensure that the designer of the lighting scheme complies with Council's commitment to Ecologically Sustainable Development Principles (ESD),

The lighting design shall minimise the use of energy in the following areas:

(i) Minimise the use of hardware, the minimisation of the use of which will utilise less energy in its production and installation.

(ii) Minimise the energy used in the operation of the lighting scheme.

2.1 Hardware

Check that the equipment to be installed, ie. luminaires, columns, bracket arms and cabling, is the minimum necessary to ensure compliance of the lighting performance of the scheme.

2.2 Electricity use

Check that electricity consumption is the minimum necessary to ensure compliance of the lighting performance of the scheme, ie. that the luminaires have the highest practical DLOR, the lamps have the greatest practical efficacy, the switches have close operating tolerance and the scheme is not over-designed.

2.3 Maintenance

Check that the maintenance schedule is sufficient to ensure continuing compliance of the lighting performance of the scheme.

2.4 Certification

A statement signed by a qualified person, as defined by Council, certifying that the scheme incorporates provisions to minimise energy use as required by Council as set out in this Policy and documented as set out in this Appendix.

3. INSTALLATION OF LIGHTING

An as-constructed verification statement, signed by a qualified person as defined by Council, certifying that the installed lighting accurately implements the design of the lighting scheme.

4. MAINTENANCE OF LIGHTING

A periodic statement, signed by a qualified person as defined by Council, certifying that the lighting scheme has been maintained as required in the scheme design to ensure continuing compliance of the lighting.

APPENDIX 2

ENHANCED LIGHTING FOR SECURITY AND PRESTIGE

Security

Lighting may be used to reduce the fear of crime and the potential for actual crime occurrence. Refer Section 3.3 for further information on this aspect of lighting. Lighting for enhanced security should be implemented as part of Council's CPTED Development Control Plan and any justification for it *must* be verified by a relevant Council Officer.

Category V lighting

Category V1 in City and regional centres and Category V3 on general traffic routes should provide adequate lighting in this regard for the carriageway and *contiguous* footpaths, unless these are overshadowed by awnings.

Category P lighting

Where Category P lighting is appropriate for the location then the level of lighting required for security can be much greater than normally provided. Therefore the need for security lighting needs to be justified (note that some categories, eg. Category P10 subway, Category P11 car parks, are already based on the need for security lighting at those locations).

The following procedure should be followed in determining whether lighting based on security considerations is justified for new schemes or for the upgrading existing ones:

Data collection

Conduct an assessment/audit of the location, the type of facilities and the layout and, particularly, the likely or actual pedestrian usage of facilities, and examine the frequency and type of anti-social behaviour to determine if additional/upgrading of lighting infrastructure is required

For new developments this policy will need to be examined in conjunction with the Crime Prevention through Environmental Design Development Control Plan.

The following elements may particularly warrant security lighting:

Residential roads – pedestrian laneways providing short cuts between roads.

Neighbourhood shopping precincts and community buildings – the immediate surrounds and the main access roads for pedestrians in the vicinity of these facilities.

Car parks – some car parks are already lit for security, however pathways to and from the facilities they service, eg. retail and commercial sites, transport facilities, community buildings, park facilities etc, should also be so lit to a similar standard.

Transport facilities – the facility itself, eg. bus interchange, the immediate surrounds and the main access roads for pedestrians in the vicinity of these facilities.

Parks –Consideration should be given to discouraging the use of a path *through* a park at night by not lighting it, but rather lighting a path on the periphery which provides a route of similar direction and distance if deemed appropriate. Each location shall be assessed on a case by case basis.

Determination of the Category P

Refer to Section 5 to ascertain whether there any minimum requirements specified for enhanced lighting for security for a particular scheme. Then refer to AS/NZS 1158.3.1 for the applicable Category making a determination based on the type of open space and the level of actual or potential anti-social behaviour at the site.

Documentation

Document fully the justification for the need for security lighting and the Category P so determined.

Prestige

Lighting schemes may be used to enhance the amenity and prestige of an area by the provision of infrastructure that has been designed to be of a higher level of illumination and through the use of decorative poles.

These schemes will be considered on application.

APPENDIX 3

POLICY ON THE INTEGRATION OF TREES AND PUBLIC DOMAIN LIGHTING

GENERAL

The performance requirements for public domain lighting, as specified in Standards, are for unobstructed spaces. The design process does not generally take into account the presence of trees.

Trees can cause gross shadowing in a space and seriously undermine the effectiveness of the lighting. The cost of lighting is based on light emitted and not on the light actually reaching the target area. On the other hand trees are an integral part of the amenity of a space. Thus there needs to be an integration of lighting and trees in order to realise the dual objectives of the effectiveness of the lighting and amenity of trees.

In essence the policy involves the simple principle that, ideally, the foliage of mature trees or bushes shall be significantly above or well below the luminaires.

The realisation of this policy relies on the placement of the luminaires and on the initial selection and placement of trees and shrubs, in relation to the luminaires, and their subsequent shaping and pruning. In doing so a decision must be made as to whether for a public space, particularly a road, the trees are to be a particular feature, especially an over-arching canopy. In this case the lighting may need special treatment.

This policy should be read in conjunction with the requirements of the service provider of electricity and lighting with regard to the clearance between foliage and conductors, where there is overhead electricity reticulation, and between foliage and electricity poles and lighting columns.

The policy as set out deals specifically with roads but the principles are applicable to all public spaces. It is applicable to established spaces as well as new ones.

APPLICATIONS

Category V lighting

The primary function of the lighting is to light the carriageway and the immediate verges on which there may be footpaths.
Two tree scenarios may be considered:

Tall trees and over-arching canopy

Select a species of tree that will eventually grow to a height substantially *above* the design height of the lighting. The trees should have single trunks and be set back as far as is practical from the carriageway edge and branches should be restricted so as to produce a canopy which is solely *above* the luminaires and with sufficient clearance for maintenance of the luminaires. The luminaires should be mounted on bracket arms such that there is overhang, from the kerb line into the carriageway.

Whilst maturing the trees will need periodic pruning and shaping to minimise shadowing.

If a final lower canopy height is required or there already exists a mature canopy causing shadows and only a minimum of pruning is practical or desired, a lower luminaire mounting height will need to be used to achieve clearance of the luminaires below the canopy.

Small trees or tall shrubs

Select a species of tree or shrub that will eventually grow to a height substantially *below* the design height of the lighting, so that the luminaires clear the foliage by about 3 to 4m, and that have an open habit but restricted spread (in accordance with CPTED principles). The species should have single trunks and be set back as far as is practical from the carriageway edge. The branches should be restricted so as to produce a canopy which is solely *below* the luminaires and with sufficient clearance for maintenance of the luminaires.

In addition branches lower than 3m should be pruned back to allow for light to illuminate the verge and for visibility by road users. .

Note that, if in the scenarios considered above, the footpaths are well set back from the carriageway edge sufficient shadowing may still occur to necessitate supplementary footpath lighting.

Category P lighting

The primary function of the lighting is to light the whole road reserve width from property boundary across to property boundary. The mounting height will be about 6 to 7m and the lighting will be generally on one side of the roadway only. The amount of light used is very much less than for Category V lighting. This together with the long spacings has the potential for severe shadowing on tree-lined roads.

The best lighting outcome will be where there are no plantings or only low or ground cover shrubs on the side of the roadway on which the lighting is mounted and a footpath runs. Two further tree scenarios may be considered:

Trees and over-arching canopy

Select a species of tree that will eventually grow to a height substantially *above* the design height of the lighting. The trees should have single trunks and be set back as far as is practical from the carriageway edge and branches should be restricted so as to produce a canopy which is solely *above* the luminaires and with sufficient clearance for maintenance of the luminaires.
Whilst maturing the trees will need periodic pruning and shaping to minimise shadowing.

A final lower canopy height may be required or there is already a mature canopy causing shadows and only a minimum of pruning is practical. In this case a lower luminaire mounting height and closer spacing of the luminaires will be necessary to reduce severe shadowing. In the case where the lighting is mounted on the electricity reticulation poles the luminaires should be mounted on every pole instead of every second pole. More lighting will need to be installed to give the specified lighting performance.

Small trees or tall shrubs

Select a species of tree or shrub that will eventually grow to a height substantially *below* the design height of the lighting, so that the luminaires clear the foliage by about 2 to 3m and that have an open habit but restricted spread (in accordance with CPTED principles). The species should, preferably, have single trunks and be set back as far as is practical from the carriageway edge. The branches should be restricted so as to produce a canopy which is solely *below* the luminaires and with sufficient clearance for maintenance of the luminaires.

In addition branches lower than 2m should be pruned back to allow for light to illuminate the verge and for visibility by road users.

APPENDIX 4

GLOSSARY OF TERMS

COUNCIL POLICIES

Crime Prevention Though Environmental Design (CPTED) – A policy under which the design all the physical aspects of a development are individually considered and coordinated to minimise the potential for crime and anti-social behaviour.

Ecologically Sustainable Development (ESD)
Practices and policies, which support the preservation, maintenance and rehabilitation of natural resources and the environment to the extent that the needs of future generations are not compromised.

ROAD LIGHTING

Category V lighting - The lighting for traffic routes, on which visibility for motorists is dominant, and the performance requirements of which are the subject of AS/NZS 1158.1.1

Category P lighting - The lighting for local and residential roads and public areas, on which visibility for pedestrians is dominant, and the performance requirements of which are the subject of AS/NZS 1158.3.1

Lighting scheme - The layout of lighting, in order to achieve a specified standard of performance, stated in terms of luminaire and lamp type, arrangement geometry, mounting height and spacing.

Light technical parameter –Lighting quantities used to specify the performance of lighting schemes. Normally there are multiple parameters each with limiting values, which need to be at least achieved for compliance.

Lux – The technical measure of illumination, short for lumens per square metre. It is one of the light technical parameters used in the lighting performance requirements of AS/NZS 1158.1.1 and 3.1.

Maintenance – a maintenance regime is an integral part of a lighting scheme since continuing compliance with the relevant standard requires that performance be maintained during the life of the scheme. Over time luminaires become dirty inside and out and the light output of lamps deteriorates and lamps can fail. Since maintenance is costly and energy consuming it must be minimised

by optimum initial performance design and choice of lighting hardware.

ROAD LIGHTING HARDWARE

Lamps

The light sources; for public space lighting discharge lamps are used. Those emitting yellow-white light are high pressure sodium (HPS) and find general application on traffic routes because they have superior efficacy and reliability. Where white light is required the HPS lamp is best replaced with the metal halide lamp.

For residential lighting fluorescent (low pressure mercury) lamps and high-pressure mercury are in general use. These lamps emit white light.

Colour rendering – The colour of the light emitted from lamps has two attributes. One is the how well the light renders colours faithfully and is given by the colour rendering index (CRI), a rating of excellent is CRI of 80 or above.

The other attribute is the whiteness of the light, ie. how yellowish, neutral or bluish, and is given by the correlated colour temperature (CCT). White light for public space lighting should be as neutral as possible, ie. CCT ~ 4000.

Efficacy – The amount of light emitted for the electrical energy used by the lamp, expressed in lumens per watt. Note that all discharge lamps need electrical control gear which may consume significant energy but which is not included in the evaluation of efficacy.

Operational characteristics – The attributes of the lamp such as efficacy, maintenance of light output with time, life as well as cost.

Luminaires and columns

Luminaire – The lighting fitting, housing a lamp, which directs the light down in a required distribution onto the relevant area of the roadway. In the case of Category V this is the carriageway and immediate verge and for Category P it is the road reserve width from property boundary across to property boundary. Electrical and constructional requirements are given in AS/NZS 1158.6

Aeroscreen luminaires – A luminaire with a flat light emitting face which is designed to be mounted horizontally so no light is emitted upwards.

Decorative luminaires – Luminaires that are chosen particularly for their aesthetic and prestige appearance attributes, often with an associated column. These luminaires may have poor lighting performance, for example high ULOR. Subsequent to installation they may be costly to maintain, therefore they need specific endorsement by Council lighting service provider.

Floodlights – Luminaires used to light large areas which normally have to be individually aimed and the mounting of which allows the floodlight to rotate in both vertical and horizontal planes. Some floodlights are similar to aeroscreen luminaires, sometimes referred to as 'environmental' floodlights.

Ingress protection rating (IP) – An international standard method for rating the resistance to the penetration of solid matter, here dust, and water. The better the rating the less the need for maintenance.

Light output ratio (LOR) - LOR is the percentage of the light from the lamp which is emitted by the luminaire. There are two components, downward (DLOR) and upward (ULOR). For example, a well engineered conventional traffic route luminaire will have a LOR of about 80%, of which the ULOR is only a few per cent.

Lighting column – The luminaires will be mounted on dedicated columns, normally rigid, where the electricity reticulation is underground. Where decorative luminaires are used, the luminaires may be installed in combination with an associated column. In older sub-divisions luminaires will be mounted on the reticulation poles.

The luminaires may be mounted on the top of the column (post-top) or more generally on the end of a bracket arm (side-entry) attached to the column or pole. In road lighting a bracket arm allows the luminaire to overhang the carriageway from the kerb and for the column to be set back from the road edge.

Frangible column – A non-rigid lighting column that is designed to minimise the adverse consequences to vehicle occupants in the event of a collision. The types and deployment of these columns are given in AS/NZS 1158.1.3.

APPENDIX 5

BIBLIOGRAPHY

Standards

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1158.1.1 *Vehicular traffic (Category V) lighting – Performance and installation design requirements*
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1158.2 *Computer procedures for the calculation of light technical parameters for Category A lighting*
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1158.4 *Supplementary lighting at pedestrian crossings*

AS 3771 *Road lighting luminaires with integral control gear*

AS 4282 *Control of the obtrusive effects of outdoor lighting*

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