CITY OF MARION

Public Lighting Guidelines

City of Marion

2019

Prepared for
City of Marion

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V0b	Alexi Lynch	26/5/2019	Review / QA internal
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About Ironbark Sustainability
Ironbark Sustainability is a specialist consultancy that works with government and business around Australia by assisting them to reduce energy and water usage through sustainable asset and data management and on-the-ground implementation.

Ironbark has been operating since 2005 and brings together a wealth of technical and financial analysis, maintenance and implementation experience in the areas of building energy and water efficiency, public lighting and data management. We pride ourselves on supporting our clients to achieve real action regarding the sustainable management of their operations.

Our Mission
The Ironbark mission is to achieve real action on sustainability for councils and their communities.

Ironbark are a certified B Corporation. We have been independently assessed as meeting the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose.

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1. Glossary

Term	Definition
CCT and D_{uv}	CCT and D_{uv} together provide objective specification of the quality of a color regardless of its luminance (also known as chromaticity). Correlated colour temperature (CCT) describes the colour of a light source and is measured in degrees Kelvin (K). Blue-white lamps have a high colour temperature (e.g. 4000K). Yellow lamps have a low colour temperature, (e.g. 2000K).
CLER	Customer Lighting Equipment Rate (SAPN tariff)
CRI	Colour rendering describes the degree to which natural colours can be perceived under different kinds of artificial light. It is measured on a colour rendering index (CRI). A CRI of 100 indicates that colours are depicted accurately. A CRI of less than 30 indicates colours are distorted and difficult to recognise. A CRI of 80 or above provides an acceptable standard for outdoor lighting.
DNSP	Distribution Network Service Provider, also known as Energy Distribution Business (EDB), also known as distributor.
EO	Energy Only (SAPN tariff)
Feature Lighting	Refer to 'non-standard'
HPS	High pressure sodium lamps or luminaires
IK rating	Measure of protection against mechanical impact (vandalism)
IP rating	Measure of protection against ingress by water and solid objects
Lamp	The light bulb in a luminaire
LED	Light emitting diode
Luminaire	The light source (lamp or LED module), fitting and control gear of the light
LER	The luminaire efficacy rating (LER) is a measure of the efficiency with which a luminaire converts electrical energy into light, measured in lumens per watt
MAC	Metropolitan Activity Centre
MH	Metal halide lamps or luminaires
Non-standard lighting	Lighting that is typically not held in stock by DNSPs, sometimes also referred to as 'decorative' (typically found in Underground Residential Developments (URD) areas)
Photoelectric (PE) Cell	Commonly referred to as a PE cell, a device that is normally incorporated in a luminaire that detects outside light levels to automatically switch the luminaire on and off as required. May be a "smart" cell with other capabilities.

Term	Definition
PLC	Public Lighting Customer Funded (new SAPN tariff for LED lights)
Public lighting	Public lighting describes assets that provide night-time lighting of the public realm including in reserves, car parks, external to buildings and lit features, outdoor sporting facilities and streets. Refer to Section 3.
SLUoS	Street Lighting Use of System (SAPN tariff)
Standard lighting	Lighting that is typically held in stock by DNSPs, and is found on their list of products approved for use
Street lighting	Street lighting found in residential streets and main roads
URD	Underground Residential Developments
UWLR	Upward waste light ratio (UWLR) is a measure of the light output of the luminaire that is emitted above the horizontal

2. Introduction

Public lighting Guidelines helps provide safe, active and vibrant neighbourhoods, open spaces and playgrounds making it easier to enjoy and move around our city.

City of Marion is committed to operating more efficiently and sustainably in terms of energy, using the best technologies and methods to be as self-sufficient as possible and has developed these Public Lighting Guidelines to guide new installations, replacements, and upgrade programs.

2.1 Guiding Principles for Public Lighting

The provision of public lighting in the City of Marion will support:

- Safe movement and wayfinding at all times, and in all weather conditions, of people and vehicles on roads, footpaths, and pedestrian/cycle/shared-use pathways
- Functionality and attractiveness of places where people gather
- Use of smart technology and innovation opportunities where they will benefit the community
- The character of streetscapes and neighbourhoods, and showcasing of urban features of significance
- Energy efficiency and use of renewable energy
- Minimisation of harmful impacts to biodiversity in natural habitats
- Natural surveillance for crime prevention
- Sustainable asset and financial management

2.2 Key Objectives of the Public Lighting Guidelines

The key objectives of the Public Lighting Guidelines are to:

- Provide a consistent framework for the provision, design, installation and management of public lighting that aligns with Council's policies
- Provide a framework that enables provision of a network of public lighting that is fit for purpose and meets the needs of people who live, work and visit the City of Marion
- Guide the use of smart technologies in public lighting infrastructure
- Provide requests and complaints procedures

2.3 Policy Context

These guidelines have been designed to comply with all relevant Australian laws and legislation, and to comply with and complement the following standards, policies, codes and strategies.

External references:

AS/NZS 1158 Lighting for roads and public spaces

AS 4100 Steel Structures

AS 4282 Control of the Obtrusive Effects of Outdoor Lighting

ANSI C136.41-2013 (Dimming receptacles)

Crime Prevention Through Environmental Design Guidelines1

ATIA Taxi Rank Design Specification (April 2012)

City of Marion plans, policies and strategies:

City of Marion Strategic Plan 2017-2027

Climate Change Policy

Streetscape Policy

Energy Efficiency and Renewable Energy Plan

Open Space Standards for Ovals

Streetscape Guidelines

Walking and Cycling Guidelines

2.4 Who Should Use These Guidelines

These guidelines should be used by internal Council staff, any external contractors and developers with a formal role in the planning, design and management of public lighting in the City of Marion, including:

- asset planners and managers
- developers
- engineers
- landscape architects
- lighting designers
- maintenance staff and contractors
- urban designers

All public lighting in Marion must follow these guidelines.

2.5 Using These Guidelines

Internal Use

City of Marion staff should use these guidelines to inform briefs for lighting design when:

- installing new lighting in a previously unlit area
- replacing/upgrading existing lighting in an area

[1] https://bit.ly/2WA6ACE

- considering the potential removal of existing lighting
- undertaking procurement activities associated with the design, or supply and installation of any form of Public Lighting (to ensure our requirements are well defined and submissions received are diligently assessed to ensure they meet the required minimum Australian standards for lighting in different circumstances and meet the City of Marion's style and technical specifications)

The appropriate completed checklists (refer to Section 13) should be included as part of requested proposals, and information assessed.

External Use

The guidelines are to be provided to external lighting design contractors, developers, urban designers and engineers as part of brief documents, to guide their tender submissions for public lighting design and installation.

3. Definition of Public Lighting

Public lighting in the City of Marion is used to describe assets that provide night-time lighting of the public realm including in reserves, car parks, external to buildings and lit features, outdoor sporting facilities and streets.

3.1 Council Facility Lighting

A range of Council facilities require public lighting including:

- Council car park lighting
    - standalone car parks
    - public facility car parks
- external building lighting
    - perimeter lighting
    - external entrance lighting
    - building façade lighting
    - external public toilet lighting

3.2 Open Space Lighting

Open space lighting includes a wide variety of outdoor lighting assets including:

- pedestrian and shared path lighting
- wayfinding lighting (e.g. bollards and in-ground path markers)
- reserves where lighting improves safety of users i.e. regional dog parks
- youth facilities (e.g. skate parks)
- recreation reserve car parks
- solar lighting (e.g. Sturt River Linear Park Shared Path)
- feature lighting:
    - up-lighting
    - lighting related to sculptures and public art
    - flag poles

Examples of open space lighting used in the City of Marion are shown in Figure 1.

Figure 1: Examples of open space lighting in the City of Marion

3.3 Sports Lighting

Sports lighting includes lighting of fields and public spaces for professional and amateur sporting activities including tennis, football (AFL, rugby, soccer etc.), outdoor basketball, netball, and a wide range of other sporting activities. Required lighting (lux) levels vary greatly between sporting codes with Council adhering to the relevant peak sporting body guidelines to determine lighting levels for its sporting grounds.

Examples of sports lighting used in the City of Marion are shown in Figure 2.

Figure 2: Examples of sports lighting in City of Marion

3.4 Street lighting

Street lighting can be found in residential streets, laneways and main roads and has a variety of pole types, each containing the same basic parts.

Typical infrastructure that is required for street lighting includes the following:

Luminaire (lantern) – A device that distributes, filters or transforms the light given by a light source and which includes all the items necessary protecting the light source and connecting it to the pole, bracket or other structure.

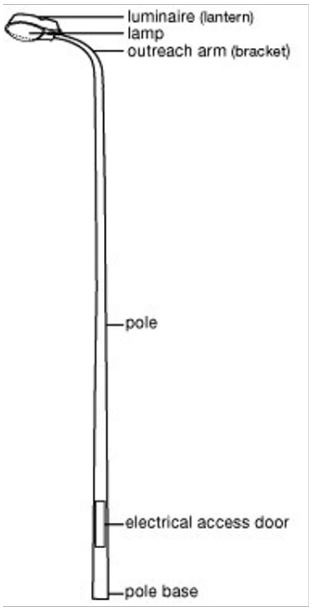
Light source – The light source (a lamp or globe in a traditional luminaire, or LED chips) emits light and is located within the luminaire (lantern). Examples of light sources include high pressure sodium (HPS), metal halide (MH) and light emitting diode (LED).

Photoelectric (PE) Cell – A device that is normally incorporated in a luminaire that detects outside light levels to automatically switch the luminaire on and off as required. Other control devices including timers and switches can also be used.

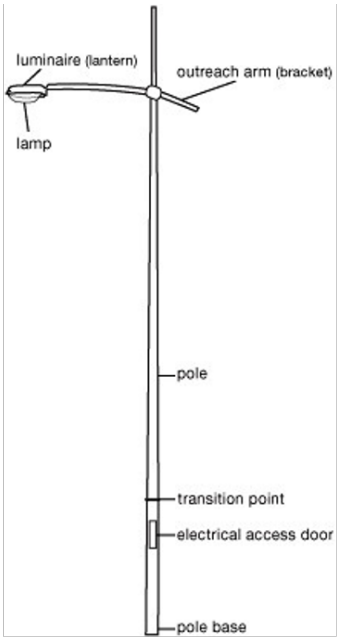
Pole - Used to elevate the luminaires, poles are typically made of steel, aluminium, wood or concrete. Components of a pole include:

- Base – the lower section of the pole that is secured to the ground
- Bracket (outreach arm) – the supporting connection from the pole to the luminaire (this can also be used in other mounting arrangements such as wall mounted luminaires)
- Electrical access door – provides access to internal wiring and fuses

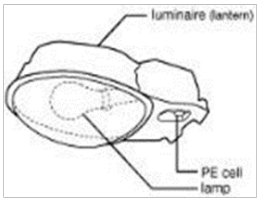
Figure 3 presents some example images of street lighting.



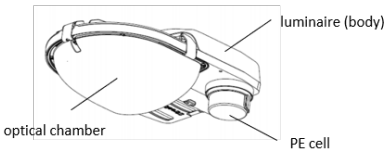
Standard URD pole



Non-standard URD pole



Traditional (lamp-based) street light



LED street light

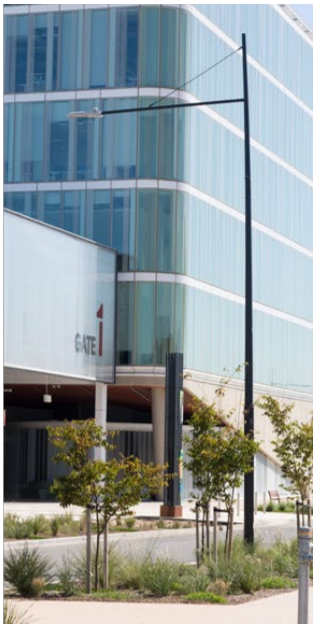


Figure 3: Examples of street lighting in City of Marion

3.4.1 SAPN Street Lighting Tariffs

There are 5 LED tariffs that were released by SAPN in July 2016. These are in addition to existing tariffs that apply to existing non-LED technology. Figure 4 summarises the components of street lighting operation, maintenance and replacement that each tariff covers.

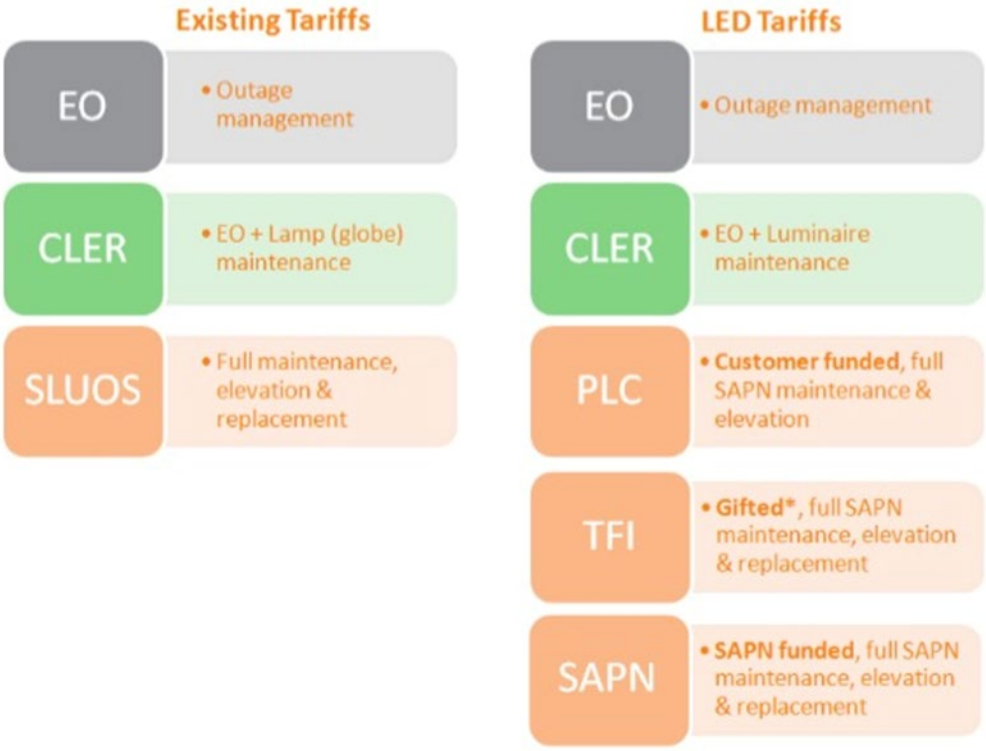


Figure 4: Existing and new SAPN tariffs

The exact tariff that applies to a given street light depends on a range of factors including who funded up-front capital for the installation of the luminaire, who is responsible for replacing the luminaire (e.g. upon failure), for more information refer to SAPN website.

4. Responsibility for Public Lighting

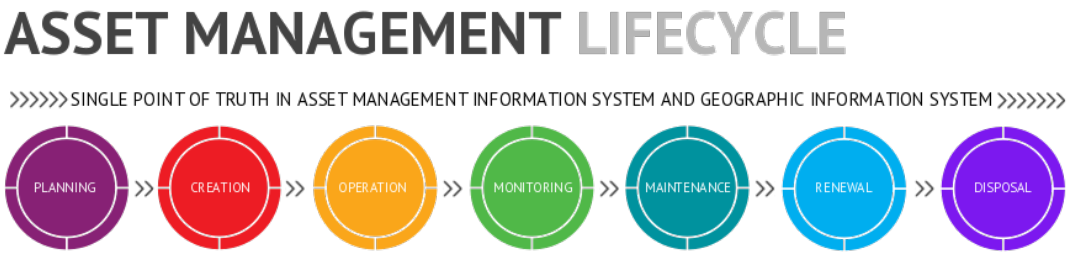
Responsibility for the management, maintenance and capital projects related to public lighting in the City of Marion is split between different departments.

Table 1: Responsibility for public lighting as at July 2019

Type of Lighting	Strategic Planning	Operation and Maintenance	Asset Renewal	Capital Works	Pole & Light Ownership
Reserves and open space lighting	Open Space and Recreation Planning	Open Space Operations	Open Space and Recreation Planning	Contractor	Open Space and Recreation Planning
Street lighting – standard unmetered	Engineering	SAPN	SAPN Or Council (tariff dependent)	SAPN Or Council (tariff dependent)	SAPN *PLC tariff CoM owns luminaire
Street lighting – non - standard unmetered	Engineering	SAPN	Council	SAPN Or Council (tariff dependent)	Engineering and Field Services
Car park lighting	Land and Property	Land and Property	Land and Property	Contractor	City Property
Sports Lighting	Sport and Recreation Facilities	Land and Property	Land and Property	Contractor	City Property
Public Recreation (walking tracks, skate parks etc.)	Open Space and Recreation Planning Engineering	Open Space Operations	Land and Property	Contractor	Open Space and Recreation Planning Engineering and Field Services
External building lighting	City Activation Land and Property	Land and Property	Land and Property	Contractor	City Property
Feature lighting	City Activation Open Space and Recreation Planning	Open Space Operations	Land and Property	Contractor	City Property
Lighting of shared public-private spaces	Open Space and Recreation Planning	Open Space Operations	Open Space and Recreation Planning	Contractor	City Property

5. Responsibility for Approving New Public Lighting

As with all asset creation within the City of Marion approval and management follows the asset lifecycle process.



Public lighting in City of Marion is generally owned and managed by Council and/or the Distribution Network Service Provider (DNSP) that operates in the municipality – SA Power Networks (SAPN). There are three different management structures for this public lighting, which are discussed in Sections 5.1 to 5.3.

Council may also consider feature lighting under special circumstances, as discussed in Section 5.4.

5.1 Standard Unmetered Lighting

Most street lighting within the City of Marion is standard unmetered lighting. Most unmetered standard lighting is owned and managed by SAPN and Council pays a service charge to SAPN to maintain the light and pole over its life. For the majority of these lights, these are on SAPN's Street Lighting Use of System (SLUoS) tariff for older inefficient lights (predominantly mercury vapour lights) and Public Lighting Customer Funded (PLC) tariff for new LEDs.

Figure 5 describes the process whereby Council has oversight of the design/preparation phase and SAPN has control of the installation, commissioning and ongoing management of the asset.

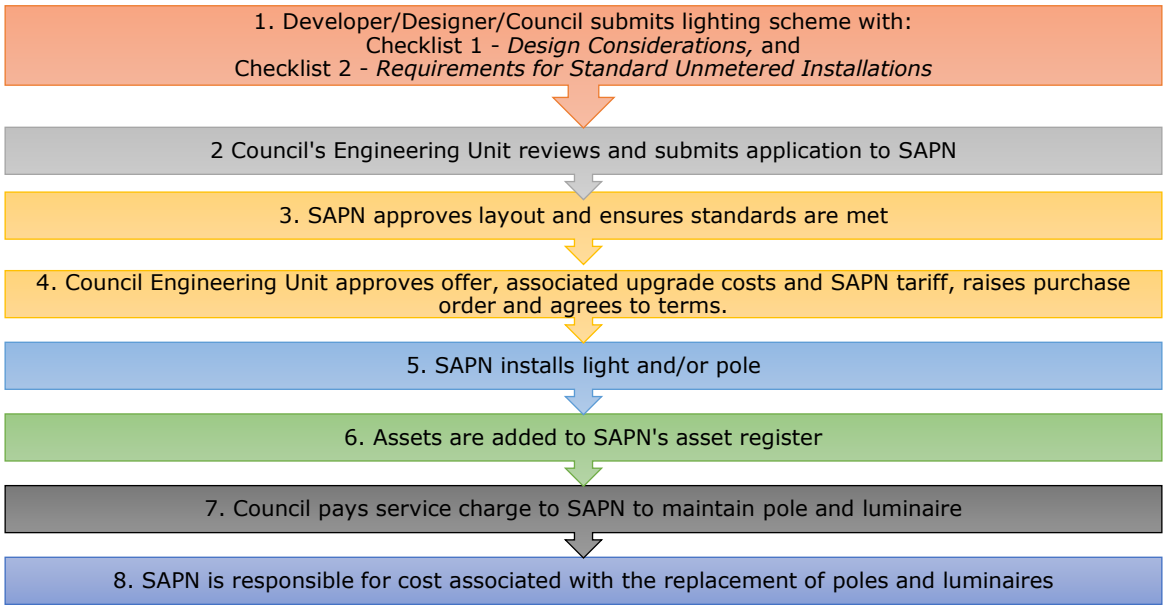


Figure 5: Approval process for standard unmetered SAPN lighting installations

The Checklists referenced in Figure 5 are found in Section 13.

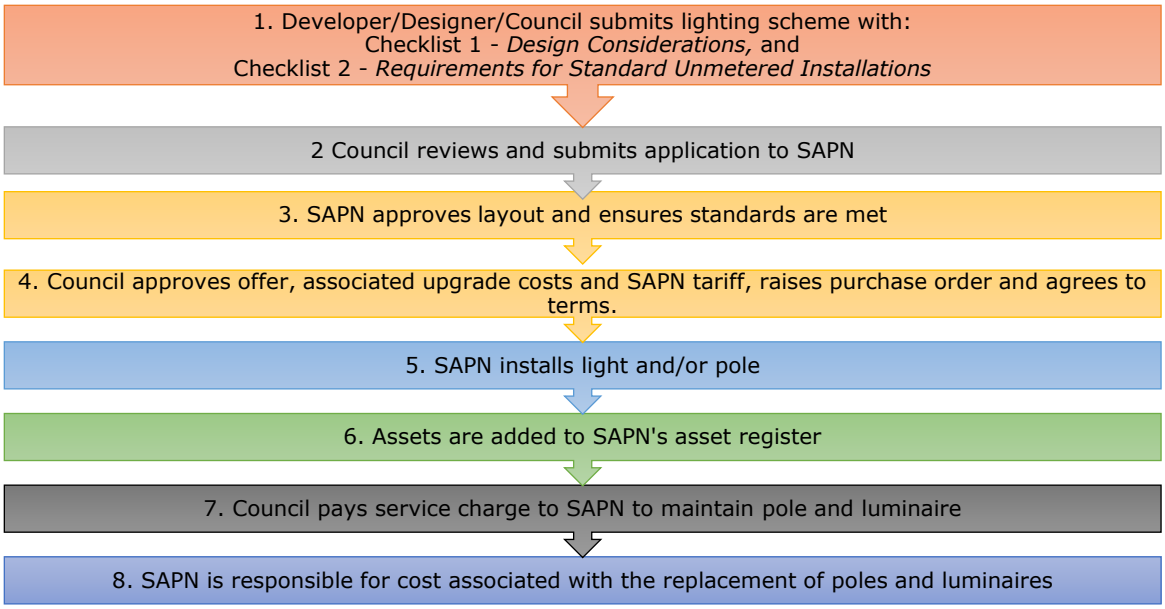


Figure 6: Approval process for standard unmetered Private Developer lighting installations

5.2 Non-standard Unmetered Lighting

Non-standard unmetered lighting is owned by Council and managed by SAPN. The majority of these lights are on the Customer Lighting Equipment Rate (CLER) tariff which covers warranty management and basic maintenance of the luminaire (for example cleaning). Council is also responsible for maintenance of the supporting infrastructure (for example poles and brackets) and for purchasing replacement poles and lights.

Council may also have residual lights on the Energy Only (EO) tariff, which means that Council is responsible for all maintenance and only pays energy charges and a small SAPN tariff to cover outage management.

Council does not currently allow the installation of new non-standard street lighting assets. Exceptions may only apply in key precincts or activity centres within the community where place-making is of a high priority, and only at metered supply points.

5.3 Metered Lighting

Metered lighting is owned and managed by Council. Commonly sports facilities, car parks and open space reserves are connected to a meter to measure energy taken from the electricity network. These lights can have their own meter or be connected to a building, BBQ or other electrical load (which has its own meter).

Figure 7 describes the process whereby Council has oversight of the design/preparation phase as well as the installation, commissioning and ongoing management of the asset.

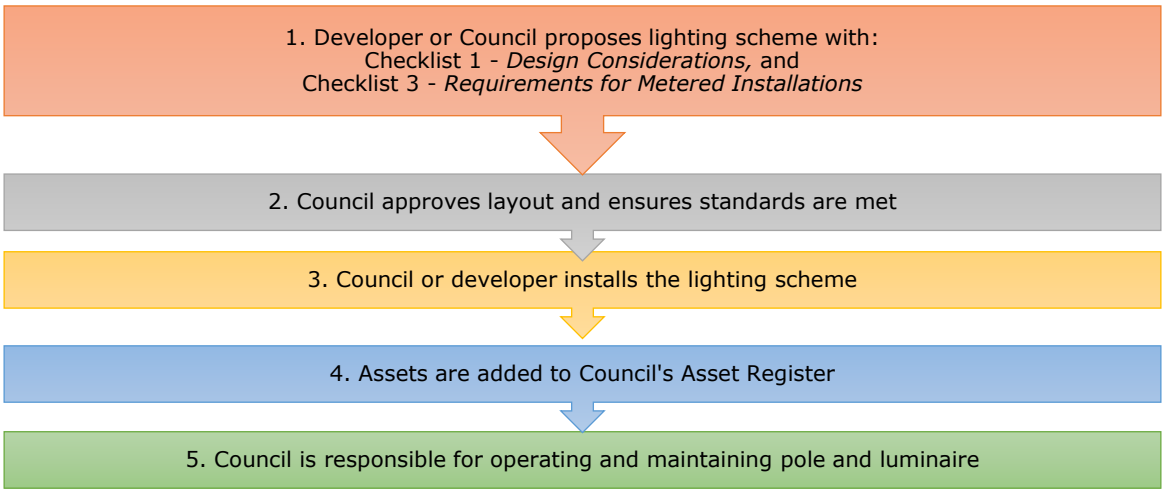


Figure 7: Approval process for metered lighting installations

The Checklists referenced in Figure 7 are found in Section 13.

5.4 Feature Lighting

Council may consider approval of feature lighting. Feature lighting is typically metered and is not installed for the purposes of maintaining functional lighting levels in an area. Examples of feature lighting may include regulated up lighting or building façade lighting insuring light spill is minimised e.g. featured tree up to 11pm.

Where feature lighting is public (i.e. proposed by Council), it may be considered where the installation:

- contributes to place making aligned to our biodiversity objectives
- assists with reducing vandalism and/or increasing public safety

Where feature lighting is private (i.e. proposed by a private entity), it may be considered where the installation:

- is not to be installed on public assets where maintenance of that asset might be affected, however temporary lighting may be permitted on public assets through the special permit process on a case-by-case basis (e.g. bud lighting in trees)
- complimentary to existing functional lighting
- contributes to place making/activation
- is to be installed, operated and maintained by the person/body making the request
- does not require the installation of any permanent supporting infrastructure

Decorative lighting may be considered as delivered through the PLC Project on Finniss Street, Marion.

6. New Public Lighting Process

6.1 Design Process for the Lighting of Public Spaces

When planning for new public lighting in City of Marion, Council staff or any relevant external contractors (refer to Section 2.4) should apply the following principles and process. To ensure that public lighting is designed and installed in compliance with these guidelines designers should use the following step-by-step decision-making process to determine if, when, where, and how lighting should be installed:

1. Establish the need for lighting (Section 7)
2. Determine site type and site-specific considerations (Section 8)
3. Determine the appropriate lighting category (Section 9)
4. Determine the appropriate luminaire and pole type (Section 10)

Each of these steps is described in the relevant sections.

6.2 Smart Lighting

Effective lighting is critical to all modern cities as it provides the ability to find key points of interest within a safe and inviting setting. The City of Marion has a priority to create diverse neighbourhoods, innovative and vibrant community hubs, excellent sporting facilities, open spaces and playgrounds.

The inclusion of technology in public lighting enables increased efficiency in usage and maintenance and reduces carbon emissions. Public lighting can provide the backbone infrastructure for other smart city applications. These include public safety, traffic management, parking and energy efficiency.

Smart Lighting infrastructure:

1. Gathers data from devices and sensors
2. Shares data via LoRaWAN gateways or 4/5G connections to relay information to Arc Group Central Management System and CoM Azure data Platform
3. Data Platform enables aggregating data sets to allow for increased efficiency and maintenance programming

A number of attributes mean that lighting assets are an ideal component within a smart city, these attributes include:

- Its physical location high on a pole means there is good ability for clear communication
- Its presence anywhere that there are reasonable densities of people means the light can reinforce the network where the need for data is greatest.
- The presence of power at the light means that connecting the smart networks communication device to electricity is easy.

A smart light can be used as a relay for other information (in a smart grid network). This increases the effectiveness of the entire network and can reinforce and improve the way the network operates. Alternatively, street lighting communications devices can be part of a standalone street lighting control network, without reference to other smart networks within a city.

Examples of other smart city technologies that can be installed as part of a smart lighting infrastructure include:

i. temperature
ii. pedestrian and traffic counting
iii. CCTV
iv. Connectivity eg Wi-Fi, LoRaWAN, etc
v. voltage

Council's lighting action plan identifies the inclusion of smart lighting in all new lighting infrastructure within the Community. New lighting projects will include the opportunity and enable future proofing to nominate options for smart lighting that aligns with continuously improving the quality and efficiency of services provided to the Community.

7. Establishing the Need for Lighting

The first step of the decision-making process is to establish the need for lighting. Reasons that new lighting may not be required include:

- adequate lighting is already available from an alternate source such as street, public transport zone, car park, building or any other adjacent lighting (in some locations this can reduce the number of new lights installed)
- the area is one where lighting is not recommended (as identified in Table 2)
- Council has identified the lighting purpose as not recommended (e.g. daytime recreation areas)

There may also be safety reasons that new lighting is not needed or recommended. Whilst this may seem contradictory, it is important to not light spaces that may be inherently dangerous with or without lighting. Reasons include:

- an area does not have sufficient natural (passive) surveillance looking into the space from houses facing the space or passing vehicular and pedestrian traffic
- an area/pathway leads to a dead end or otherwise unsafe area with little natural (passive) surveillance

New lighting should also only be considered if one or a combination of the following apply:

- there is a pedestrian path that provides a legitimate shortcut or thoroughfare
- there is a 'critical link' as per the Walking and Cycling Guidelines.
- new lighting allows for increased outdoor activity
- the location allows for passive security

Other consideration should include an assessment of whether:

- activity or traffic will be all night or only for a portion of the night (relevant control methods can be utilised if lighting is for part of the night)
- a new metered supply will be required
- the area/location can support the required infrastructure

8. Determining the Site Type and Site-Specific Considerations

Once the need for public lighting has been established, the second step of the decision-making process should determine the site type and any site-specific considerations such as:

- the aim of lighting in the area: for example, feature lighting, to create atmosphere, for safety or to guide preferred usage patterns
- whether the area is a 'high risk' security area, or vandalism risk area, based on evidence
- the type of users and usage function, as well as usage patterns for the area, as this may indicate particular lighting controls that can be applied

Table 2 provides guidance on how the guiding principles in Section 2.1 can be applied to different lighting sites and applications.

Table 2: Lighting requirements for specific types of locations in City of Marion

Site/Application	Requirements	Controls[2] (e.g. dimming, switching, sensors)

Regional Reserves	• light only paths and thoroughfares through parks, not lawns
	• avoid lighting dead-ended paths, unless the path provides access to a facility within the park that is used during night-time hours
	• lighting should only be considered for large parks under the following circumstances:
	  ○ if there is a thoroughfare for pedestrians/ cyclists
	  ○ if it promotes night-time physical activity (e.g. a running track/skate/bmx)
	  ○ a public benefit or demand exists (e.g. for a dog park)
		Use dimming and timers to turn lights off or down when usage levels drop off or no longer exist, or where activity is no longer desired after certain hours.
		Dim: between 11pm and 4am
		Brighten: 5am

Neighbourhood and Local Reserves	• in general, lighting should not be considered for neighbourhood and local reserves • lighting should only be considered if there is a thoroughfare for pedestrians and/or cyclists	If lighting is installed, use dimming and timers to turn lights off or down when usage levels drop off or no longer exist, or where activity is no longer desired after certain hours.

[2] Where controls such as dimming or switching are implemented, consideration should be given to the need for public signage alerting the public to when lighting will be turned off or dimmed.

Site/Application	Requirements	Controls[2] (e.g. dimming, switching, sensors)
Natural Landscaping	• in general, lighting should not be considered for natural landscaping as it may disrupt local flora and fauna and/or ecosystems • lighting should only be considered if there is a 'critical link' as per Council's Walking and Cycling Guidelines • where lighting is installed, consider (in order of preference): 1. lights with site-specific optics (to minimise light spill) and dimming or switching after hours of use 2. use of a lower CCT (lower impact on local fauna)	If lighting is installed, use dimming and timers to turn lights off or down when usage levels drop off or no longer exist, or where activity is no longer desired after certain hours. Dim: between 11pm and 4am Brighten: 5am
Recreation areas	• for basketball courts lighting should not be installed unless used for organized competitive sporting activities • for skate parks lighting should be considered on an as needs basis • for BBQs, gazebos etc. lighting should be considered on an as needs basis	If lighting is installed, timers must be used, with lighting to be switched off no later than 10 pm and dimmed over a short shoulder period (e.g. 15 min) to allow safe departure from the area.
Train stations	defined areas or routes around or leading to train stations (e.g. Marino Rocks Greenway - Ascot Park, Railway Terrace) shall be lit to a higher level than the surrounding area • lights may be installed with motion sensors, timers and/or dimmers linked to operating hours of public transport	
Bus stops	• currently no lighting is installed or supplied for bus stops other than the light provided by existing street lighting • solar lighting may be considered for specific bus stops	
Bike/shared paths (off-road)	• The provision of lighting should be based on the classification of the path as follows: ○ A commuter path (e.g. the Mike Turtur Bikeway) – lighting required ○ A recreational path (e.g. the Coast to Vines Rail Trail) – lighting is not required	Lights may be installed with timers and/or dimmers Dim: between 11pm and 4am Brighten: 5am
Bike paths (underpass)	• Underpasses should be lit to ensure personal safety for the community.	Lights may be installed with timer controls and/or dimmers Dim: between 11pm and 4am Brighten: 5am

Site/Application	Requirements	Controls[2] (e.g. dimming, switching, sensors)
External building lighting	External building lighting may be considered if the building is adjacent to and/or within: 1. a Council car park (e.g. lighting on the building provides light for the car park) 2. a Council reserve (e.g. lighting on the buildings and public toilets provides light for the reserve) 3. a Council footpath or shared path, including a path to a Council building (e.g. lighting on the building provides light for the path that leads to the building entry or lighting on the building provides light for shared path that runs adjacent to the building) 4. a Council public art project For the above scenarios, the following arrangements would occur: 1. any existing lighting on a building shall be included as part of any existing lighting condition assessment (i.e. the external building lighting is contributing to the public lighting) 2. the external building walls may be used to support lighting as part of a new lighting design/scheme for a metered lighting supply	Controls to be applied depending on the nature of the adjacent public space (e.g. car park). Refer to relevant section of this table for controls to be applied.
Car parks (standalone)	• consideration should be given to lighting any pedestrian linkages to the facility that the car park services	Lights may be installed with timers set to the hours of operation of the associated site or building or dimmers set to the usage levels of the car park over the course of the night

Site/Application	Requirements	Controls[2] (e.g. dimming, switching, sensors)
Laneways	• lighting may be installed where the laneway provides a logical shortcut for pedestrians or if it is a key thoroughfare for pedestrians and/or cyclists • lighting should be avoided wherever there is poor passive surveillance • where lighting is installed, the design process should consider the need for light spill control (i.e. the use of glare shields/baffles) and/or site-specific optics • consideration should be given to space constraints such as the ability to install and protect infrastructure whilst maintaining a trafficable laneway, the ability to supply power to this infrastructure, operational and maintenance issues due to the infrastructure being located in the laneway and excessive light spill within the rear of properties that are adjacent to the laneway • if a suitable alternative pedestrian path exists that requires minimal additional travel time and distance, then pedestrians should be encouraged to walk on the existing footpath network where there is sufficient existing street lighting available	For metered connection points, dimming/switching is encouraged where usage patterns allow, or where activity is not desired after certain hours Dim: between 11pm and 4am Brighten: 5am
Feature lighting (e.g. up lighting/feature lighting of signs, flag poles, building façade, monuments, art)	• lighting may be installed with timers based on a needs assessment • in key locations the installation of a lit artwork (contributing modest illumination to the public space) may be considered as a means of addressing public perceptions of safety in places where there is no other justification for lighting • flag poles featuring the Australian flag (if flown at night) must be lit	Timers are to be installed linked to operation hours of the associated site or building. Lighting of flag poles featuring the Australian flag (flown at night) are to be installed with day light-linked control, turning off at midnight expect on April 24th – Anzac Day Eve.
High risk areas – (Skate Parks, Precincts)	• lighting should be provided all night in these locations at an appropriate standard • lighting may be installed with timers and/or dimmers linked to operating hours	Lights are to be installed in these locations. Where risk is specific to hours of operation of a specific site or building, timers are to be installed and linked to the hours of operation of the relevant site.

Site/Application	Requirements	Controls[2] (e.g. dimming, switching, sensors)

Areas of high vandalism	• lighting may be installed, subject to trial in the following order:
	  ○ turning lighting off to deter vandalism
	  ○ using motion sensors
	  ○ CCTV cameras
	  ○ increase lighting in accordance with the Crime Prevention through Environmental Design Guidelines	

Lighting in new streetscapes	• street lighting, trees and other elements of a streetscape should be designed at the same time
	• the design process should consider the following principles:
	  ○ the locations of street trees and light poles should be coordinated to minimise shading (shadowing)
	  ○ where street trees and poles are co-located, luminaires should be located below the canopy (if possible)
	  ○ where necessary, lighting may be placed nearer the centre of streets, out of reach of foliage
	  ○ supplementary lighting may be considered where street trees or verandahs would otherwise produce shadowing
		Relevant controls to minimise environmental impact whilst balancing the need for safety and utilisation or urban spaces needs to be integrated into the design process.

Sports lighting	• Typically manually operated, however curfew timers should be considered to prevent lights being left on inadvertently.	Controls to be installed linked to operation hours of the associated site or building.

9. Determining the Lighting Category

Once the need to light and any site-specific requirements have been established in accordance with Sections 7 and 8, the third step of the decision-making process should determine the required lighting category (light level).

9.1 Assigning Lighting Categories Using the Standard

A framework for selecting the appropriate lighting category for a given type of open space or road is provided in the Australian and New Zealand Standard Lighting for Roads and Public Spaces (AS/NZS 1158).

Figure 2.1 from AS/NZS 1158.3.1 summarises what categories may apply to different space types (copied as Figure 8 below). In most situations, the appropriate lighting category can be determined by application of the following process:

1. Define the function and how busy the road/space is via consultation with relevant Council staff
2. Match the definition of the road/space with the guidance provided by:
    1. City of Marion's Road Hierarchy (refer to Table 3).
    2. the Australian Standard (AS/NZS 1158 series)
    3. lighting schemes in similar roads/spaces in other local government areas
3. Assign the most appropriate lighting subcategory to the road/space

Under certain circumstances a lighting category that differs to that determined by application of AS/NZS 1158 is required. These exceptions are outlined in Section 0.

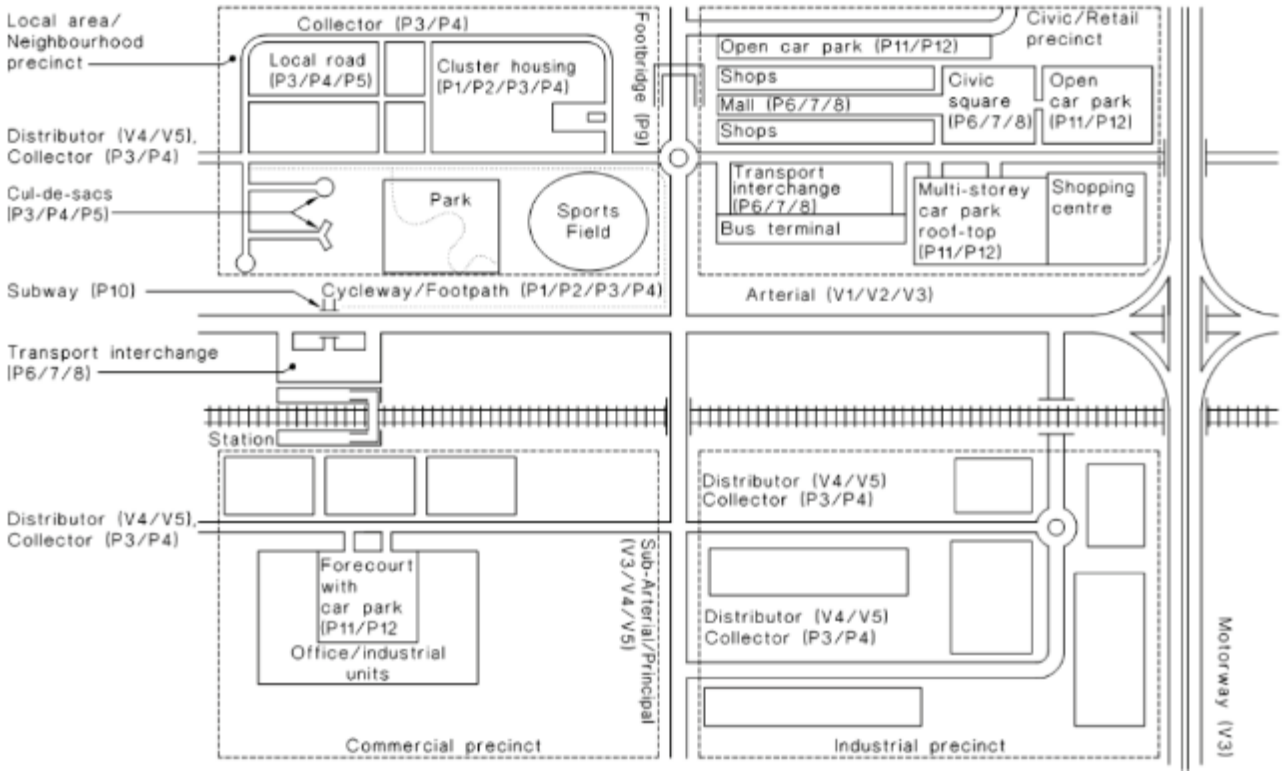
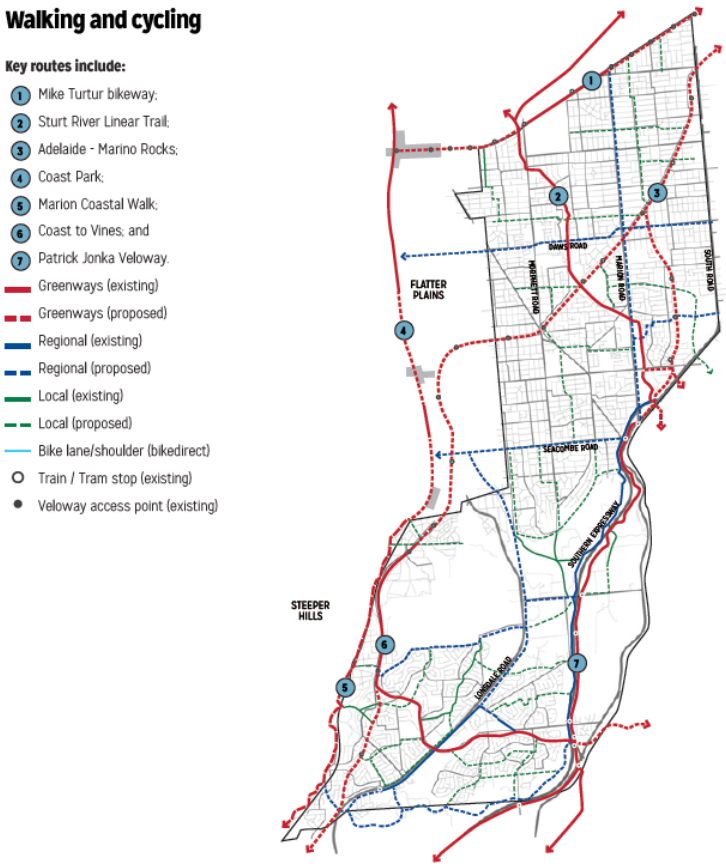


Figure 8: Figure 2.1 from AS/NZS 1158.3.1 2005

9.2 Recommended Lighting Categories for Specific Site Types

The site types or specific locations presented in Table 3 are areas where lighting categories other than those that may be specified by strict application of AS/NZS 1158 shall apply.

Table 3: Site-specific lighting category requirements

Site/Application	Required Lighting Category	Additional Information
Bus routes	Light to P4 category (or a light on every pole)	
Pedestrian and Cycling Networks	Light to P3 (or a light on every pole)	

<table>
<tr><td>Sub-Arterial roads</td><td rowspan="3">Light to P3 (or a light on every pole)</td><td rowspan="3">City of Marion road hierarchy

Key routes include:
Arterial
Arterial roads provide important regional transport corridors that carry through traffic as well as distribute traffic locally.
Sub-arterial
Sub-arterial roads connect arterial roads to areas of development, and carry traffic directly from one local area to another.
Distributor
Distributor roads disperse traffic into or within a local area. These roads consist of one lane in each direction and provide access to residential properties, local centres, schools and open space.
Collector
Collector roads cater for low-moderate volumes of local traffic providing access to private residences and local centres.
Local
Local roads are largely the neighbourhood street system. These roads are relatively free of through traffic and mostly handle local traffic providing access to residential allotments.

 
</td></tr>
<tr><td>Collector roads</td></tr>
<tr><td>Distributor Roads</td></tr>
<tr><td>Local streets and roads</td><td>Where lighting is installed on electricity distribution poles, light to P5

Where lighting is installed in new estates on URD poles, light to P4</td></tr>
<tr><td>Sport lighting</td><td>Refer to relevant peak sporting body guidelines and/or Australian Standards for relevant sports.</td><td></td></tr>
</table>

10. Determining the Luminaire and Pole Type

Once the need for lighting as well as any site-specific requirements and the lighting category have been established in accordance with Sections 7, 8 and 6, the fourth step of the decision-making process should determine the luminaire and pole type.

10.1 Requirements for Unmetered Public Lighting Assets

Unmetered lighting installations must meet the requirements outlined in Table 4.

Table 4: Requirements for unmetered assets

Feature	Requirement
Luminaires	
SAPN approval	Must be approved as a standard fitting by SAPN SAPN approved non-standard or "decorative" fittings are not permitted
CCT and D_{uv}	4000K and must meet relevant tolerances and requirements of SA SNZ TS 1158.6-2015
"Smart City" compatibility	Must include a 7-pin NEMA base wired as per the requirements of ANSI C136.41-2013 to a variable output control gear (for dimming/brightening)
Entry type	Must be side entry
Energy efficiency	Must have a minimum luminaire efficacy rating (LER) of 100 lumens per watt
Poles	
Mounting height	Must have a mounting height of not less than 5.5m
Surface finish	Must be uncoated galvanised steel
Wiring	Wiring would be the responsibility of the SAPN-approved contractor undertaking the installation
Entry type	Must be side entry
SAPN approval	Must be approved as a standard fitting by SAPN SAPN-approved non-standard or "decorative" fittings are not permitted

10.2 Requirements for Metered Public Lighting Assets

Metered lighting installations must meet the requirements outlined in Table 5

Table 5: Requirements for metered assets

Feature	Recommended requirement
Luminaires	
Design	Luminaire design should be contemporary, with clean, minimalist lines and no decorative detailing
Surface finish	A galvanised finish is preferred. If a paint finish is used, then this: • must be black • must use a durable method of coating (e.g. *a heavy-duty zinc protective coating or two pack adhesion promoting primer over a sand blasted, galvanised steel pole to prevent corrosion, followed by two coats of two pack aliphatic polyurethane*)
Protection against dust/water ingress and mechanical impact	Must have minimum IP65 (ingress) and IK06 (mechanical impact) ratings
Energy efficiency	Must have minimum LER of 100 lm/w
Upward Waste Light Ratio (UWLR)	Must have maximum UWLR of less than 1%
Minimisation of glare	Must comply with glare requirements of AS/NZS 1158
CCT and D_{uv}	4000K and must meet relevant tolerances and requirements of SA SNZ TS 1158.6-2015
Colour rendering index (CRI)	Must have minimum CRI = 80
Entry type	Must be side entry
Compliance with relevant standards	Must comply with requirements of SA/SNZ TS 1158.6
"Smart City" compatibility	Must include a 7-pin NEMA base wired as per the requirements of ANSI C136.41-2013 to a variable output control gear (for dimming/brightening)
Design life	Must have minimum design life of 20 years
Poles	
Design	Pole design should be contemporary, with clean, minimalist lines and no decorative detailing
Surface finish	A galvanised finish is preferred. If a paint finish is used, then this: • must be black • must use a durable method of coating (e.g. *a heavy-duty zinc protective coating or two pack adhesion promoting primer over a sand blasted, galvanised steel pole to prevent corrosion, followed by two coats of two pack aliphatic polyurethane*)
Compliance with relevant standards	Must comply with AS 4100
Entry type	Must be side entry
Mounting height	Luminaire mounting height of any pole should be of an appropriate scale for the space it is in, with a minimum height of 5.5m.
Offset from pathways	Where the purpose of lighting is to illuminate a pathway, the minimum offset of the pole from the pathway shall be 0.5m, with a preferred offset of 1m
Design life	Must have minimum design life of 35 years

Sport lighting installations must meet the requirements outlined in Table 6.

Table 6: Requirements for sports lighting assets

Feature	Recommended requirement
Luminaires	
Design	N/A
Surface finish	A galvanised finish is preferred for minimal maintenance.
Protection against dust/water ingress and mechanical impact	Must have minimum IP65 (ingress) and IK06 (mechanical impact) ratings
Technology	Must be LED.
Energy efficiency	Must have minimum LER of 100 lm/w
Upward Waste Light Ratio (UWLR)	Must be Type C or D (shoebox) as per the design guidelines of AS 4282
Minimisation of glare	
CCT and D_{uv}	In the range of 4500-6000K Buy AS2560 Sue
Colour rendering index (CRI)	Must have minimum CRI = 80 Refer to AS2560
Compliance with relevant standards	Must comply with requirements of IEC 60598-2-5 Particular requirements - Floodlights
"Smart City" compatibility	Must include a variable output control gear (for dimming/brightening) and enable curfew switching.
Design life	Must have minimum design life of 20 years
Poles	
Design	Pole design should be contemporary, with clean, minimalist lines and no decorative detailing
Surface finish	A galvanised finish is preferred for minimal maintenance.
Compliance with relevant standards	Must comply with AS 4100
Mounting height	Consideration should be given to the surrounding space to minimise the obtrusive effects of unwanted light spill
Design life	Must have minimum design life of 35 years

10.3 Luminaire and Pole Types in Key Precincts

In key precincts, the requirements outlined in Table 5 shall apply, however Council may consider variation to the following requirements:

- **Colour** – greater variation in luminaire and/or pole colour (other than those specified in Table 5 may be considered to suit the particular site.
- **CCT** - a CCT of less than 4000K may be considered (however consistent CCT throughout a given area must be applied)

Key precincts where this variation to normal requirements may apply include:

- Hallett Cove Precinct (Cove Civic Centre, Cove Sports, Shopping Centre)
- Marion Regional Centre (Marion Cultural Centre, Oaklands Smart Precinct, SAALC, Westfield)
- Oaklands Road Precinct (Skate Park, Wetland, Marion Outdoor Pool, Reserve)
- Tonsley Innovation District (Mix use residential & retail, Education, Industry and Open Space)

- Edwardstown Precinct (Edwardstown Oval, Castle Plaza Shopping Centre, Industry Precinct)
- any additional key precincts (or destinations) identified in Figure 9.

This acknowledges that lighting can be an effective way to highlight particular spaces and provide contrast to the surrounding "standard" lighting in such a way as to enhance the night-time experience and attract pedestrian activity. This approach also aligns with the broader Council objective of enhancing the night-time economy.

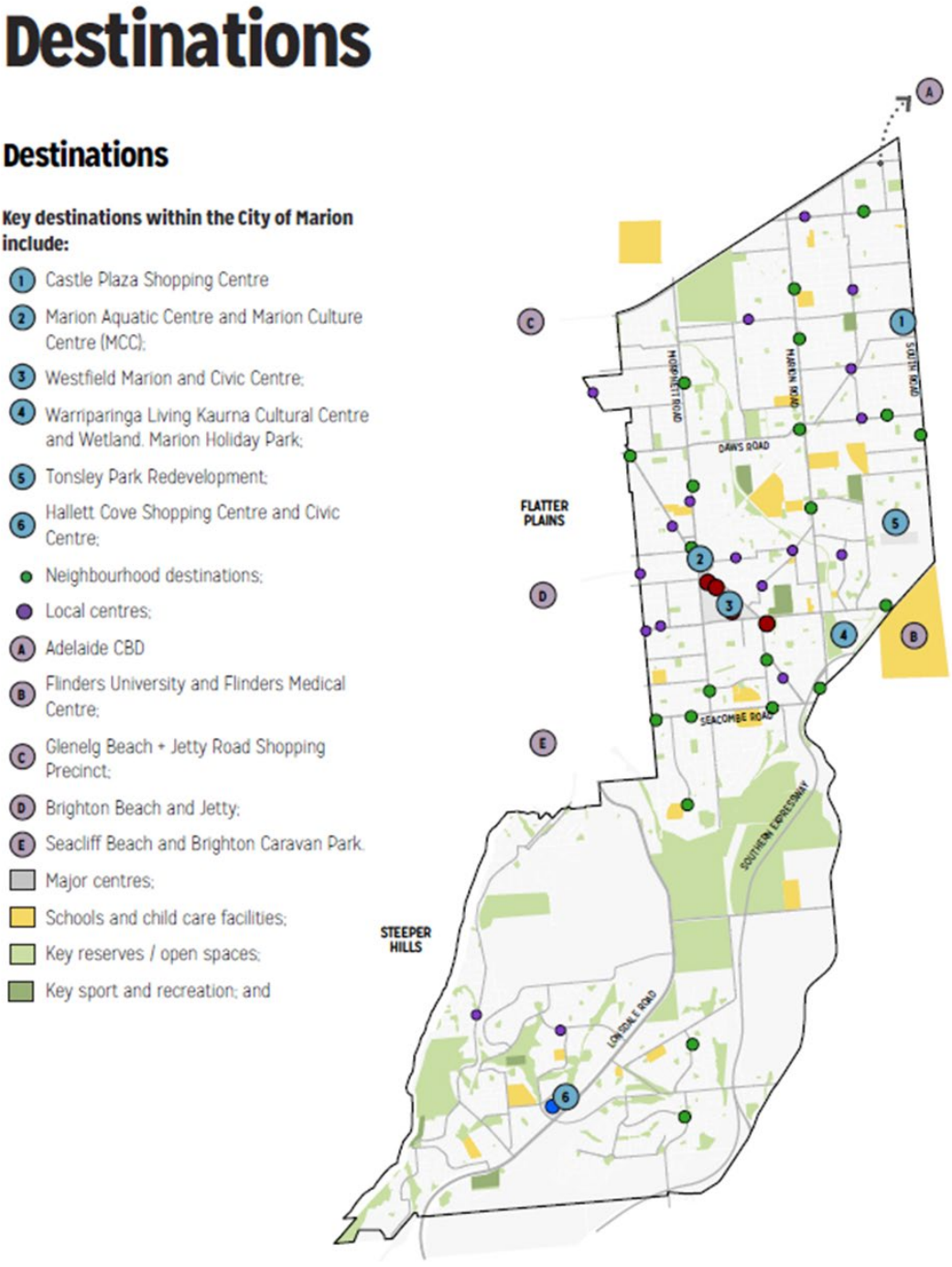


Figure 9: Other key precincts

10.4 Solar Lighting and In-Ground Path Markers

The installation of solar lighting when power isn't possible in certain locations. Solar Lighting, and may be considered as a part of the business case for the project documenting cost benefit analysis for trenching and wiring and environmental benefit advocacy, For example, solar lighting currently installed along some shared use paths e.g. Sturt River Linear Park Shared Path.

In-ground path markers will only be considered where light spill into areas of environmental importance is of concern

11. Complaints/Requests Procedures

The following procedures will be applied to the assessment of complaints and/or requests received by Council in relation to public lighting.

11.1 Requests for New Lighting (Existing Network)

Where Council receives requests for the installation of additional lighting in areas where lighting already exists, the request will be assessed using the following process:

1. on-site light level analysis utilising a high-quality light meter to determine the existing levels of lighting
2. comparison of existing lighting levels against the requirements of the relevant Australian Standard for lighting in the given location
3. report developed detailing the outcomes of the analysis including advice on whether additional lighting is or is not merited

Based on this analysis a final decision will be made as to the merits of the request.

11.2 Requests for New Lighting (No Existing Lighting)

Where Council receive requests for the installation of lighting in locations where there is currently no lighting, such requests will be assessed on a case-by-case basis.

Assessment of requests will consider (but are not limited to) the viability of installing lighting and the existence of a legitimate need for lighting (refer to Sections 2.1 and 7).

Consideration will be given to the level of community support for the installation of a lighting scheme.

Where a genuine need is identified and provision of lighting is considered viable, lighting will be provided in accordance with these guidelines (refer to Sections 8 to 10).

11.3 Requests for Removal of Lighting

Where Council receive requests for the removal of existing lighting, such requests will be assessed on a case-by-case basis.

Assessment of requests will consider (but are not limited to) the legitimate need for lighting (refer to Sections 2.1 and 7).

Consideration will be given to the level of community support for the removal of a lighting scheme.

11.4 Complaints About Over-Lighting or Light Spill

Where Council receives complaints about over lighting or light spill into properties from existing lighting, the request will be assessed using the following process:

1. on-site analysis utilising a high-quality light meter to determine the existing levels of lighting on the window of a habitable room in a dwelling
2. a comparison of existing lighting levels against the requirements of the AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting*
3. report developed detailing the outcomes of the analysis including advice on whether light spill control is or is not merited

Based on this analysis a final decision will be made as to the merits of the complaint. Should a complaint be deemed valid, the issue may be resolved in several ways including those listed below:

- installing shielding within the luminaire
- installing a different luminaire (lower output or more directional photometrics)
- relocating the luminaire
- dimming the luminaire
- removing the luminaire (refer Section 11.3)
- recommending a new window treatment e.g. block out blinds

11.5 Complaints about Shading of Lighting by Trees

Where Council receives complaints about shading of lighting by trees, the complaint will be assessed using the following process:

1. on-site analysis utilising a high-quality light meter to determine the existing levels of lighting 40 metres on either side of the tree
2. comparison of existing lighting levels against the requirements of the AS/NZS 1158
3. report development detailing the outcomes of the analysis including advice on whether tree pruning or tree/light relocation should be investigated further

11.6 Public Lighting Fault Reporting

Where Council receives a report of a fault relating to…

- an unmetered (SAPN-maintained) public lighting asset, then Council requests SA Power Networks to fix the light.
- a metered (Council-owned and maintained) public lighting asset, then Council requests the contractor to fix the light.

12. Light Pollution and Control

Council requires that light sources on new metered and unmetered lighting schemes must have a correlated colour temperature (CCT) at or around 4000K. This is based on a number of factors, including:

- the relevant Australian Standards for luminaires (SA/SNZ TS 1158.6) states a "recommended" colour temperature of 4000K for street lighting
- that previous research has suggested that light sources with a warmer CCT of <3000K result in an increase in vehicle stopping distances when compared to a neutral CCT of 4000K
- that 4000K is a more desirable colour temperature for facial recognition in CCTV camera footage
- Council acknowledges the importance of limiting the effect of all artificial light at night, regardless of CCT, and seeks to manage this within its Policy and Guidelines via:
- lighting to the levels required (not higher)
- reducing light spill through well-designed luminaires and lighting schemes
- only allowing luminaires with upward waste light ratios (UWLR) of less than 1%
- the use of glare shields where appropriate
- the use of timers to switch lighting schemes off when not needed or not appropriate
- the use of smart lighting technology that will allow lighting schemes to be dimmed when patronage drops

Council has also provided scope/flexibility within its Public Lighting Guidelines to deal with unique scenarios that may require special treatment either via modified CCT or general lighting controls.

12.1 Where to Light

Council will only install new lighting where it is required. With this basic first hurdle to pass when considering a new lighting scheme, Council has provided clear guidance on where it considers lighting as necessary and where it considers lighting as inappropriate.

12.2 Light Spill and Lighting Control

Council has addressed the control of light spill via a number of clauses within its Public Lighting Guidelines.

- Reducing light spill through well-designed luminaires and lighting schemes (including consideration of the use of in-ground path markers in areas where light spill is a concern)
- Only allowing luminaires with upward waste light ratios (UWLR) of less than 1%
- The use of glare shields where appropriate.

Council has afforded considerable scope for the use of dimming and timers to ensure Council-owned metered lighting schemes do not over-light a space during times of lower patronage and that lighting can be turned off when the usage of a space is minimal and/or undesired (refer Section 6.2).

13. Checklists and Specific Requirements for New Public Lighting

Council will support lighting installations that meet these guidelines.

When proposing a new public lighting scheme in City of Marion, please submit the relevant checklists as specified in Table 7.

Table 7: Summary of checklists required for submission with lighting proposals

Installation Type	Requirement
Unmetered installation	Submit checklist 1 and 2
Metered installation	Submit checklist 1 and 3

13.1 Checklist 1 – Design Considerations

All new public lighting installations must address the following requirements:

Applicant Name	
Site Name	
Site Details (intended use of site)	

Attachments	
	Has a lighting plan been submitted?

All new lighting installations in City of Marion must address the following requirements:

✓	**Needs assessment, site-specific requirements and lighting category selection**
	Is there a need for lighting according to the AS/NZS 1158 and Section 7 of Marion's Public Lighting Guidelines 2019?
	Does the lighting scheme meet any site-specific requirements outlined in Table 2, Section 8 of Marion's Public Lighting Guidelines 2019 (including application of controls)?
	Has the design used the correct lighting category (i.e. not lighting above the necessary level required for a particular area) as per AS/NZS 1158 and Sections 9.1 and 9.2 (where applicable) of Marion's Public Lighting Guidelines 2019?
✓	**Life cycle considerations**
	Can the proposed materials (luminaires and poles) be recycled or reused at end of life?

Additional Information

If the proposed lighting scheme is not aligned with these guidelines, then an application needs to be made to Council identifying a clear need for the variation.

Submissions will be considered more favourably if the following criteria are addressed:

- best practice energy efficiency
- community need
- potential for generation of onsite renewable energy to match lighting energy needs

Where applications do not follow the requirements set out in these guidelines, applicants may be required to provide

- itemised estimate of annual energy consumption arising from the project
- itemised estimate of annual maintenance costs arising from the project

Comments

✓	**Post-installation**
	Have "as built" drawings including details of make and model numbers of luminaires been submitted (to be submitted upon completion of project)?

Internal Use Only	
Facilities Management Approval	Yes / No
Signed	
Date	
Project Manager Approval	Yes / No
Signed	
Date	

13.2 Checklist 2 – Requirements for Standard Unmetered Installations

All new standard unmetered installations must address the following requirements:

Pole design		**Luminaire requirements**	
☐	**Is the mounting height for bracket installation no less than 5.5m above ground level?** *Increasing the pole heights, increases pole spacing (particularly when road reserve widths are over 18m). Light numbers can be reduced resulting in reduced maintenance costs, energy costs and greenhouse emissions.* *Light spill into areas outside road reserves is undesirable and needs to be evaluated in areas that are sensitive to this, including narrow road reserves or laneways and areas of ecological significance* *Increasing the pole heights also reduces vandalism.*	☐	**Does the lamp provide a colour temperature of 4000K and meet relevant tolerances and requirements of SA SNZ TS 1158.6-2015?** *LEDs above 4000K produce more blue light which is generally seen as undesirable in the night-time environment, while LEDs below 4000K will produce light with a "warmer" tone but are less efficient in terms of light output per unit of energy consumed.*
		☐	**Are the PE cell bases compatible with 7-PIN NEMA PE Cells and are drivers dimmable?** *This ensures future proofing for use of smart lighting controls.*
☐	**Is the pole approved as a standard URD pole by SAPN?**	☐	**Does the luminaire have an efficacy of no less than 100 lumens per watt?**
☐	**Is the pole side entry?**	☐	**Are the luminaires approved as standard fittings by SAPN?** *Proof can include a copy of the approval letter for luminaire.*
Pole coating systems			
☐	**Will the pole be unfinished galvanized steel?** *Uncoated galvanised steel is the only permitted pole finish for standard street lighting installations*		

Internal Use Only

Engineering Department Approval Yes / No

Signed

Date

Project Manager Approval Yes / No

Signed

Date

13.3 Checklist 3 – Requirements for Metered Installations

All new metered installations must meet the following requirements:

Pole design		Luminaire requirements	
☐	**Is the mounting height for brackets at least 5.5m and in keeping with the surrounding environment?** *Consider existing and future tree canopies, building awnings and existing lighting infrastructure.* *Increasing the pole height increases pole spacing and thus reduce the required pole and luminaire quantities. This needs to be balanced, however, with the features of the surrounding environment.* *Light spill into areas the design area is undesirable and needs to be evaluated in areas that are sensitive to this, including narrow road reserves or laneways and areas of ecological significance*	☐	**Does the luminaire comply with the requirements of SA/SNZ TS 1158.6?**
		☐	**Is the luminaire contemporary, with clean, minimalist lines and no decorative detailing?**
		☐	**Has the luminaire been approved by SAPN? (if applicable)** *Proof can include a copy of the approval letter for luminaire.*
☐	**If the pole is adjacent to a pathway, is it offset from the pathway by a minimum of 0.5m?**	☐	**Is the luminaire side entry?**
☐	**Is the pole contemporary, with clean, minimalist lines and no decorative detailing?**	☐	**Does the luminaire have an efficacy of not less than 100 lumens per watt**
☐	**Is the pole modular in construction with at least three main components – the base, straight pole and bracket arm?** *The base and straight pole will be the same across Councils asset base and the bracket can be used to differentiate different design sectors.* *If a section of the pole is damaged, it can easily be replaced, reducing future maintenance costs and material wastage.*	☐	**Does the lamp provide a colour temperature of 4000K and meet relevant tolerances and requirements of SA SNZ TS 1158.6-2015?** *LEDs above 4000K produce more blue light which is generally seen as undesirable in the night-time environment, while LEDs below 4000K will produce light with a "warmer" tone but are less efficient in terms of light output per unit of energy consumed.*
☐	**Does the pole allow compatibility for a side entry installation for the light fitting?** *Side entry poles allow for a wider range of light fittings (luminaires) including fitting standard energy efficient LED luminaires in the future should a move away from non-standard fittings be desired.*	☐	**Does the luminaire have a minimum IK06 rating and minimum IP65 rating?**
		☐	**Does the luminaire have an upwards light spill ratio of no greater than 1%?**
		☐	**A galvanised finish is preferred. However, if a paint finish is desired, is the coating finished with one of Council's approved list of luminaire colours?** *Councils current approved list includes black.*

	Modular poles with removable outreach arms can allow refitting of a top entry arm to allow side-entry lights.		
		☐	**Does the luminaire have a colour rendering index (CRI) of not less than 80?**
		☐	**Does the luminaire feature a 7-pin NEMA base wired as per the requirements of ANSI C136.41-2013 to a variable output control gear?** *This ensures future-proofing for use of smart lighting controls.*
		☐	**Does the luminaire comply with glare limits specified in AS/NZS 1158?**
		Pole Coating systems *A galvanised finish is considered lowest maintenance and is therefore preferred.*	
		☐	**Will the coating system ensure a long service life with reduced maintenance?** *A heavy-duty zinc protective coating or two pack adhesion promoting primer over a sand blasted, galvanised steel pole to prevent corrosion, followed by two coats of two pack aliphatic polyurethane* *Surface scratches can be repainted with the recommended finishing coat. If rust is present, it must be removed and the affected area repainted in accordance with the recommended method for new poles.*
		☐	**If a paint finish is desired, is the coating finished with one of Council's approved list of pole colours?** *Councils current approved list includes black.*
		☐	***Is the pole compliant with AS 4100?***

Internal Use Only

Engineering Department Approval Yes / No

Signed

Date

Project Manager Approval Yes / No

Signed

Date