

Placemaking NSW



The Rocks | Tallawoladah Lighting Strategy

JANUARY 2025



Acknowledgment of Country

We acknowledge Gadi Country, her lands, sea and sky, we acknowledge her custodians, the people of the Grass tree, their kin the Wangal, Bidjigal, Cabrogal and Cammeraygal who often visited this Country to connect and share. We offer our respect to their Elders both past and present.

We advise that this resource may contain images, or names of deceased persons in photographs of historical content.

It should be noted that the precinct names selected and applied for this document are known as The Sydney Language, names so for the purposes of Placemaking NSW's Reconciliation Action Plan. We acknowledge that there are numerous Aboriginal language place names, including Gadigal, Wangal, Cammeraygal and Dharawal, connected with these precincts.

The Rocks | Tallawoladah Lighting Strategy

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More Information

The Rocks | Tallawoladah Lighting Strategy has been prepared by FPOV in collaboration with Placemaking NSW

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Cover photo by FPOV

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Executive Summary

What is The Rocks | Tallawoladah Lighting Strategy?

This strategy has been prepared to guide the strategic and considered design, delivery, maintenance and renewal of lighting across The Rocks.

Why is it useful?

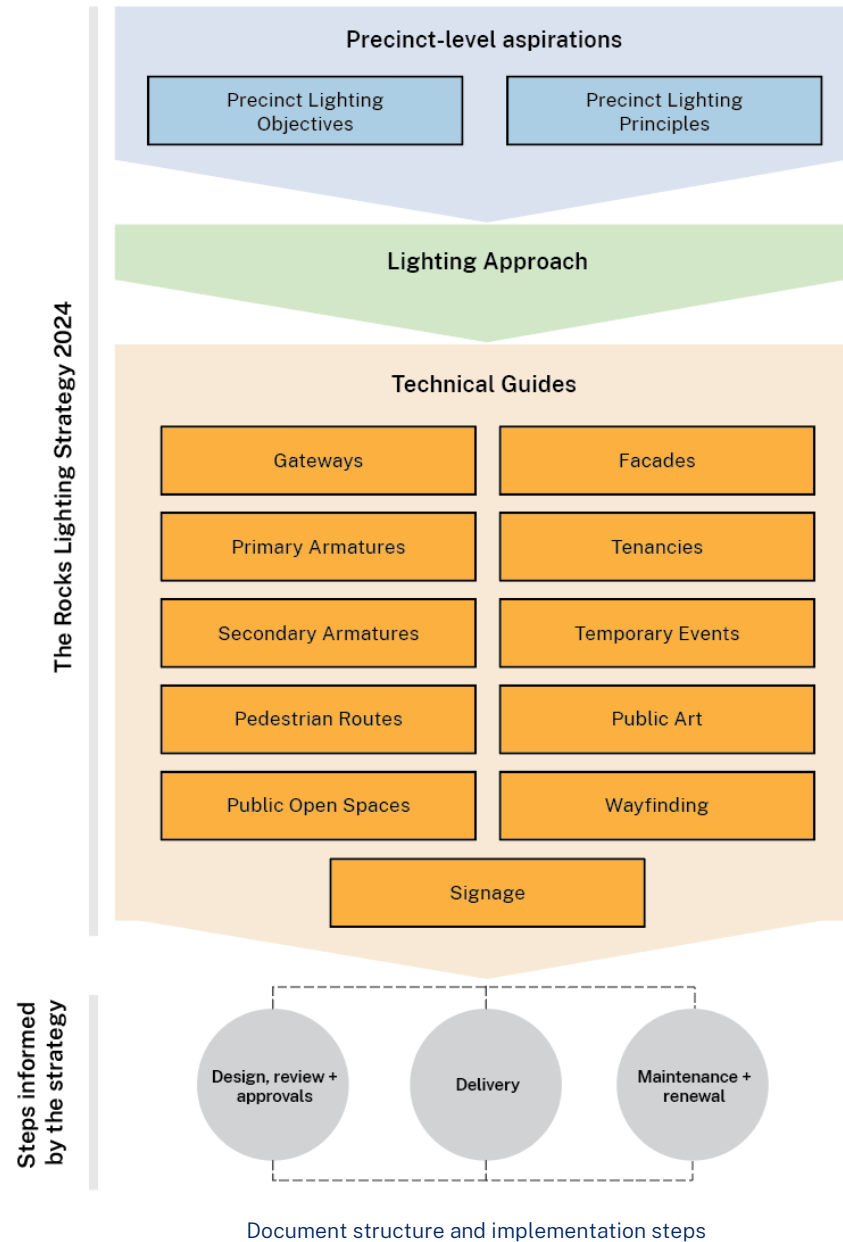
Consistent and coordinated public domain and external lighting is key in supporting the safe and inclusive use and activation of The Rocks. Lighting plays a crucial role in distinguishing the character of The Rocks from Sydney CBD and highlighting the unique stories of this place.

Who is this strategy for and when should it be used?

The strategy is to guide the development and delivery of lighting proposals for The Rocks, whether led by Placemaking NSW or partner organisations.

The objectives and recommendations of this strategy should be considered (but not limited to) when the following works are undertaken:

- Upgrade or refurbishment of existing buildings (internal and external facades)
- Significant building works to tenancies
- New building development
- Upgrades to the public domain including wayfinding
- Lighting renewal and upgrades including major maintenance.



1

Introduction

1.1 The Character of The Rocks

The Rocks | Tallawoladah (The Rocks) is a distinctive and diverse precinct in the heart of Sydney, exemplified by its physical form as well as its dynamic community. It features a vibrant tourist profile, retail and cultural offerings, dining, recreation spaces and a lively night-time scene centred around food and beverage premises.

The precinct is steeped in a heritage context that is celebrated through architecture, tours, interpretation, and museum displays. The character of The Rocks is not a nostalgic pastiche, but rather a living and changing Australian place that bears unique marks of history and topography, including its Aboriginal and environmental heritage.

Its unique landforms, relationship to the harbour and urban fabric contribute to a visually rich visual and historic character. Due to its location and relationship to Sydney Harbour, Sydney Opera House, Sydney Harbour Bridge, and CBD, the precinct is a highly visited destination for regional and international tourists alike.

The Rocks is in a period of transition. While historically, the precinct has been known as a tourist destination, the future vision for The Rocks is focused on the creation of a

cohesive and place-specific identity that attracts locals and regional visitors and drives repeat visitation. This is being facilitated through greater embedding stories of Country, renewal of the public domain, care of our heritage assets and environment and ongoing curation of retail and events.

The Rocks | Tallawoladah Lighting Strategy provides the opportunity to support and underpin this evolution with a coordinated and cohesive lighting approach, and robust infrastructure that provides the best opportunity to put on show the unique and historic characteristics of this place.

Events and activations within The Rocks are a key part of driving ongoing interest and visitation to the precinct. Amongst a weekly program of local events, key attractors to The Rocks also include some of Australia's most significant and iconic events including New Years Eve, Australia Day celebrations, and Vivid. This strategy acknowledges that these create temporary shifts in the character of the precinct and highlights opportunities to balance the vitality that these events bring, with a respect for the existing environment.



Figure 1.1 (top) The Rocks - Street view down George Street, Anna Kucera



Figure 1.2 The Rocks at Night, Anna Kucera

1.2 Overview

This document has been developed by Firefly Point Of View (FPOV) in collaboration with Placemaking NSW (PMNSW). This document identifies and defines exterior lighting objectives and strategies for The Rocks | Tallawoladah, with the aim of improving the public domain and the night-time illumination of The Rocks.

The strategy provides best practice guidelines, aspiring to:

- **Enhance the unique architectural and heritage character** of The Rocks at night-time to create an inviting and engaging destination that is **distinctly softer and warmer** than the surrounding CBD area.
- Provide **sufficient illumination** for public safety and amenity.
- Create a **cohesive public domain** using light and luminaires.
- Use **layers of light** for functional (task, ambient) and feature (accent, wayfinding) lighting to resolve current issues of uneven lighting and areas of high contrast that lead to feelings of poor safety.
- **Minimise glare** throughout the precinct.
- **Enable efficiency in management** and maintenance through rationalisation of luminaires and infrastructure.

- **Minimise environmental impacts** such as reducing sky glow through control of artificial lighting and keep energy usage to a minimum using efficient and latest lighting technology.

The guidance within this strategy establishes a clear lighting hierarchy to support a cohesive precinct identity. The strategy also intends to provide flexibility that allows design interpretation to suit the diverse character, conditions, and experiences within the precinct.

This strategy applies to those parts within the study area (shown to the right), including buildings, streets, and public open space.

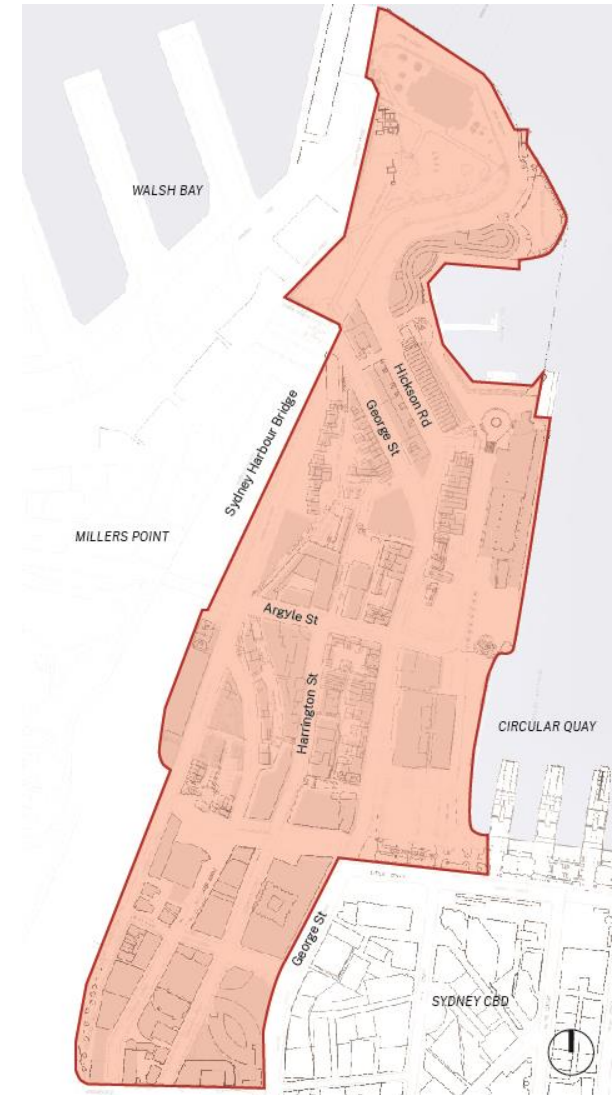


Figure 1.3: The Rocks Lighting Strategy Area.

1.3 Connecting with Country

Placemaking NSW is committed to the Government Architect's Connecting with Country Framework, which provides guidance on how to respond to Country in the planning, design, and delivery of built environment projects in NSW. It states:

'Healthy Country describes healthy, interconnected natural ecosystems, supported by regenerative and sustainable environmental practices.'

Our commitment to designing with Country is guided by the voices of First Nations people and an understanding and appreciation that Country should be at the heart of planning and placemaking.

Understanding the unique aspects and qualities of Country enables a deeper understanding of the landscape and natural processes, allowing us to plan to work with the land and climate, not against them, which leads to more sustainable outcomes.

This principle of regeneration and caring for Country is at the heart of how we approach the design and management of our places and guides the desire for a place that is resilient and integrated into the local and broader community in a meaningful way.

It also provides a richer narrative and understanding of specific places, reinforcing our role as caretakers of the land for future generations.

Lighting-related considerations should include:

- Selection of luminaires that are fit for purpose to ensure longevity of use, energy efficient and can be re-used or re-cycled at the end of its life.
- Consideration for locally sourced material or locally made luminaires to minimise environmental impact and support local economies.
- Minimise impact on the natural environment by minimising light spill into the sky or onto waterbodies.
- Highlighting and celebrating natural site features and heritage fabric to interpret stories of the past and its ongoing connection to the present.

Integration of lighting design as a core part of public domain projects that ensures Connecting with Country principles are embedded across all project disciplines.

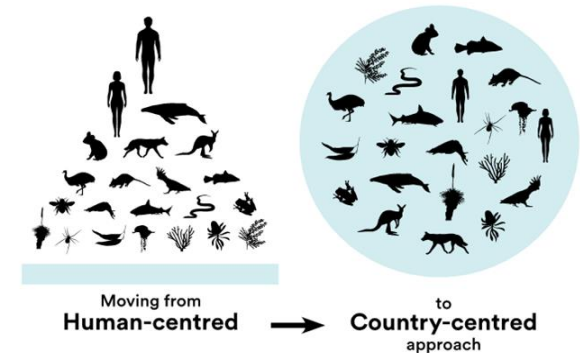


Figure 1.4 Taking a Country-centred approach; Connecting with Country Framework, GANSW

1.4 The Rocks | Tallawoladah Women's Safety Strategy (2024)

The Rocks | Tallawoladah Women's Safety Strategy (Women's Safety Strategy), created as part of NSW Government's Safer Cities Program, aims to:

- Improve real and perceived safety for women, girls, and gender-diverse people enhancing their ability to move freely within The Rocks.
- Revitalise the precinct as an engaging destination to explore.

Studies show that women prioritise safety over convenience when moving through and within public spaces. They feel safest in activated public spaces, where there are people around no matter what time of day. Good lighting, along with ease of navigation and public space that looks cared for, are the other major contributors to what makes public space feel safer for women.

The character of The Rocks (that is, heritage fabric, views to the water, and a sense of discovery) is a key attractor to women and girls in the daytime but the visibility of these features is lost at night.

For lighting to enhance the safety and mobility for women and girls in The Rocks, more needs to be done than simply meeting minimum functional lighting requirements or standards. Higher levels of illumination does not equate to an increased perception of safety. A consistent and layered lighting approach with multiple light sources and

where surfaces with different reflective values, makes women feel most safe. Spaces with warmer colour temperatures and high-quality light that enables shapes and colours to be distinguished help to create a sense of safety.

Informed by workshops and technical assessments of 10 sites across The Rocks, The Women's Safety Strategy identifies these lighting-related actions to positively contribute to perceived safety:

- Highlighting the architectural features of the built heritage of The Rocks.
- A consistent lighting approach, reduced contrast between illuminated and non-illuminated areas.
- Improved accent and wayfinding illumination to support navigation and enable greater predictability when moving through the precinct e.g., task lighting towards stairs.
- Implementation of warmer and consistent colour temperatures.
- Replacement of faulty lights.
- Removal of harsh lighting (glare).
- Provision of tenancy lighting guidelines to include after-hours lighting.



Figure 1.5 Women at an event in The Rocks, Anna Kucera

1.5 Compliance with Environmental Guidelines

Urban 'sky glow' is the result of stray light, both direct and reflected, being scattered in the atmosphere, brightening the natural sky background level. It is in the national interest that no further degradation of the night sky over Sydney occurs.

In recent years, the City of Sydney has been active in trying to reduce sky glow with its *Exterior Lighting Strategy (2000)* and through the installation of full cut-off light fittings on major streets and many public spaces. Any significant increase in light pollution in the CBD and The Rocks will affect the operation of the Sydney Observatory.

A key objective of this strategy is to minimise light spilling into the night sky, whilst recognising the fact that the urban environment of a large city has competing interests in creating an inviting night-time environment for its residents, tenants, and visitors.

Much of the precinct sits within the Sydney Opera House Buffer Zone, as outlined in *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*. All lighting must be designed to avoid detracting from the views and vistas to the Sydney Opera House to preserve its visual prominence.

All lighting must respond to the relevant Conservation Management Plans to preserve and enhance The Rocks' unique heritage character.



Figure 1.6 Light pollution of Sydney as seen from Hawkesbury Lookout at Hawkesbury Heights, Wolter Peeters

1.6 Compliance with Australian Standards

All public lighting must facilitate safe use of the precinct at night through the application of appropriate light levels which includes vertical and horizontal illumination and lighting appropriate for CCTV.

All luminaires must adhere to the relevant Australian Standards for construction and safety. All installations, including street lighting for vehicles and pedestrians, feature lighting such as façade, signage illumination, and any decorative lighting, are to comply with:

- Australian Standard AS/NZS 1158.1.1: 2022 Lighting for Roads and Public Spaces
- Australian Standard AS/NZS 4282: 2019 Control of the Obtrusive Effects of Outdoor Lighting
- Australian Standard AS 1428.2-1992 Design for access and mobility

Lighting designers, engineers, and local authorities must follow these standards to ensure outdoor lighting meets safety and environmental requirements, delivering adequate illumination without causing excessive light pollution or discomfort to residents and the surrounding ecosystem.

The design process, including methods of calculation and software used, should be fully described and all information supplied with the development application. This includes copies of approved test reports by the National Association of Testing Authorities (N.A.T.A.) certified photometric laboratories.

Placemaking NSW may request the photometric data from the test reports for independent appraisals as well as a demonstration of the appropriate IP rating (for the proposed locations) to ensure appropriate durability, safety, and lifecycle efficiency.

1.7 Approval Procedures

The planning and approval pathway for lighting works will depend on their location, scale, type, and impact on heritage or archaeological fabric. All lighting works require the landowner's consent from Placemaking NSW.

The Rocks is an area of national heritage significance, with over 100 state and locally listed heritage assets. These assets are protected under the *NSW Heritage Act 1977*. Any work to historically significant fabric or proposed impacts to key views to or from a heritage site may be subject to the relevant heritage approval process under Section 60 (as an application) or Section 57 (as an exemption). If a Section 60 application is required, a Development Application must also be lodged with the relevant consent authority for assessment in accordance with the *Environmental Planning and Assessment Act 1979*.

State Environmental Planning Policy (Planning Systems) 2021 sets out that the City of Sydney will be the consent authority for development valued under \$10 million that complies with the *Sydney Cove Redevelopment Authority Scheme*. The City of Sydney will therefore be the consent authority for most lighting works.

Applicants should seek advice from their property manager and a qualified urban planner to determine the appropriate planning and approval pathway for the proposed works.

1.8 Need for Specialist Design Advice

Applicants should engage qualified independent lighting designers, architects, urban designers, heritage consultants and planning consultants, as required, to assist in the preparation of their application for lighting. This should include a pre-lodgement discussion with the relevant landowner.

As well as considerations for the items outlined in this lighting strategy, the application is to specifically address the following:

- Building character
- Urban design context
- Ambient lighting levels
- Visibility from external vantage points
- Energy efficiency

In addition, a lighting study and lighting simulation will also be required to demonstrate that relevant Australian Standards have been achieved, and that light spill has been mitigated.

Photomontages of light fittings may also be required, to ensure that visual impacts in relation to historic facades and streetscapes are minimised, and that urban design objectives are achieved.

Specialist lighting advice should also be sought for upgrade or modification of existing lighting schemes to ensure that appropriate lighting levels and safety is maintained.

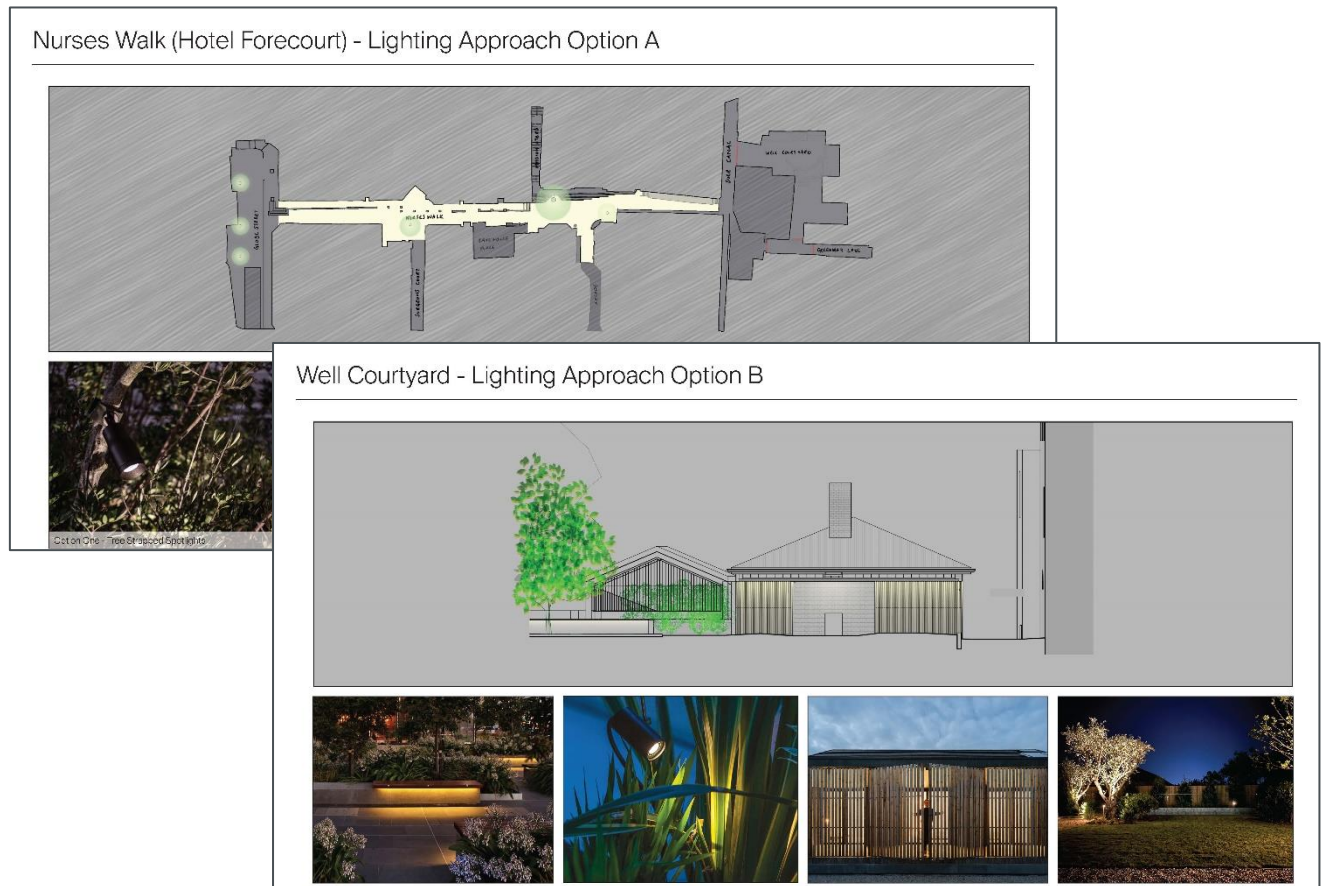


Figure 1.7 Example of specialist concept design advice, Light Practice

2

Glossary of Terms

The following terms are used regularly across this document.

Correlated colour temperature (CCT)

To identify where the perceived colour of a light source lies in the range from cool (bluish) to warm (yellowish), it is usual to quote its correlated colour temperature (CCT) in degrees kelvin, with the symbol K. A low CCT such as 2700K will have a warm appearance (yellowish) whilst 6500K will appear quite cold (bluish).

Colour rendering index (CRI)

The colour rendering index (CRI) relates to how accurately colours are revealed for any given light source. It is completely independent of the colour appearance of the light source. The CRI is generally quoted as Ra, where 100 is perfect and over 80 is very good.

Floodlight

A floodlight is a specific form of luminaire that emits light for widespread, general illumination over large areas.

Spotlight

A spotlight is intended for focused, controlled lighting on specific area, objects or features.

Glare

Glare is the sensation of discomfort or impairment of vision experienced when parts of the visual field (such as poorly or unshielded bright lamps or luminaires) are excessively bright in relation to the general surroundings. The extent or severity of this sensation can be classified as follows:

- Disability glare: glare that impairs the ability to see detail.
- Discomfort glare: glare that causes visual discomfort without necessarily impairing the ability to see detail.

Illuminance

Illuminance is the amount of light arriving on a surface and is measured with the unit lux (lx).

Illumination

Illumination is the result of throwing light onto a surface.

Ingress protection rating (IP)

Ingress protection ratings (IP) are used to define levels of sealing effectiveness of electrical enclosures against intrusion from foreign bodies (tools, dirt, etc.) and moisture.

Light spill (stray light)

Light spill is the light emitted by a lighting installation that falls outside the boundaries of a property or object to be lit and serves no purpose. If directed above the horizontal, light spill contributes directly to artificial sky glow.

Luminance

Luminance is the result of making a surface bright. This is measured in candela per square metre (abbrev. Cd/m²). The same illuminance falling on a light-coloured surface will appear brighter than an identical amount of light falling on a dark surface.

Luminaire

The luminaire is the apparatus that distributes, filters or transforms the light transmitted from one or more lamps, including all the parts necessary for fixing and protecting the lamps (as well as the circuit auxiliaries for connecting to the electricity supply).

Lux

Lux is a unit of illumination, measured as lumen per square metre. The higher the lux, the brighter the perceived environment, however a uniformity of lux within an area or between areas is perceptually more important than the absolute level of lux.

Obtrusive light

Obtrusive light is light that, because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction, or a reduction in the ability to see essential information such as signs and traffic signals.

Sky glow

Sky glow is the brightening of the night sky that results from the reflection of radiation (visible and non-visible) in the direction of observation. It is scattered from the constituents of the atmosphere (gaseous, molecules, aerosols, land particulate matter).

It comprises two separate components:

- Natural sky glow – the part of the sky glow that is attributable to radiation from celestial sources and luminescent processes in the earth's upper atmosphere.
- Artificial sky glow – the part of the sky glow that is attributable to man-made sources of radiation (e.g. outdoor electric lighting), including radiation that is emitted directly upwards and radiation that is reflected from the surface of the earth.

3

Existing Lighting

3.1 Overview

The existing lighting across the precinct of The Rocks is inconsistent in approach, luminaire typology, colour rendering, colour temperature, and distribution. As the lighting approach across the precinct has developed over time, incrementally dealing with luminaire failures and dark areas, lighting has also been delivered layer by layer, resulting in a cluttered public realm.

Some of the existing luminaires create glare, are inefficient, display significant colour shifts, or have failed without being replaced. This exacerbates the overall inconsistency and the contrast between the bright and dark areas.

The precinct's unique and special attributes such as heritage facades, and architectural and natural features are not well-illuminated. The lack of ambient lighting, viewed against the high brightness of functional lighting emphasises contrasts and creates an unbalanced visual landscape.

The Rocks' heritage spaces are out scaled by the size of some of the luminaires, creating a dissonant contrast. This leads to visual clutter and diversion of attention away from the heritage facades and local architecture. Festoon lighting is used quite extensively, further contributing to visual chaos and distraction from the precinct's historical elements.

The wide variation of luminaires adds to the difficulty in management and maintenance.

The lack of tenancy guidance and management is enabling tenants to install and operate lighting as they wish. This has a significant effect on the night-time appearance and experience of the precinct.

The lack of 'feature' lighting in The Rocks means that landmarks, gateway points, or other significant features are 'hidden' after dark, which is detrimental to visitor orientation, wayfinding and reduces feelings of safety at night, especially for women, girls, and gender-diverse people.

In summary, these issues culminate in an inconsistent lighting experience that fulfills basic functional requirements but falls short of highlighting and harnessing The Rocks' unique attributes to their full potential. This inadequacy diminishes the creation of a welcoming and vibrant destination.

It is important that a multi-layered lighting approach is delivered that considers its surroundings. This will create an inviting, engaging, and safe environment. Rather than focusing solely on functional light and regarding feature lighting as less significant or optional, the approach should consider both equally from design through to delivery.

For more detailed information on the site audit, please refer to Appendix 9.4.

Existing Lighting



Figure 3.1 (top left) Unaccentuated "gateway "to the precinct under Sydney Harbour Bridge



Figure 3.2 (middle left) Cambridge Street - Colour temperature inconsistency



Figure 3.3 (bottom left) George Street – Variation in brightness and colour temperatures to tenancies



Figure 3.4 (centre top) Playfair Street – Festoon lighting wrapped around trees causes visual clutter

Figure 3.5 (centre middle) Suez Canal – Out of scale luminaires for size of the passageway



Figure 3.6 (centre bottom) Hickson Road, Metcalfe Bond – Unlit heritage façade

Figure 3.7 (above) Multi-coloured festoon lights distract from the heritage character and rock face behind

3.2 Existing Streetlights



Figure 3.8 Selection of existing streetlights

Several existing streetlights in The Rocks require careful consideration.

- **Historically significant luminaires** are to be retained and integrated into the overall lighting strategy. These include:
 - Reproduction lights along George Street, that are to be retained in their current locations and sympathetically upgraded to a modern standard.

- Gas lights in several locations should be retained at their current locations and, if needed, restored to be functional. There are more gas lamps in storage which could potentially be reinstated in their original locations if considered appropriate.
- **Socially valued luminaires** : may be removed, or retained and upgraded to a modern standard, depending on the context. These include:

- the “railway standard lights”, as seen in different locations in the precinct, e.g. along Longs Lane and off Gloucester Street.

Existing fittings with no historic significance or social value are to be assessed and, if unsuitable, removed and replaced with new luminaires.

4

Lighting Objectives

This chapter outlines design objectives for lighting within The Rocks. These establish the priorities and key aims for lighting the precinct, which should be considered at all stages from master planning, design, delivery and through to ongoing maintenance.

These objectives provide opportunities to support spaces both functionally and aesthetically by enhancing the distinct character and identity of The Rocks through lighting. It highlights the key design moves which will contribute to a visually coherent, welcoming and safe environment, responsive to the nuances of this place.

L

4.1 Enhance Public Space



Figure 4.1 Well-lit public domain, Marcos Azambuja

Lighting should enrich the experience of the public spaces within The Rocks by inviting visitors to engage with the night-time environment by encouraging people to dwell.

Rather than solely focusing on functional needs or relying on prescribed illumination levels, lighting is to have a multi-layered approach that considers function and feature in equal importance.

Feature lighting that complements the surroundings is key in creating a welcoming ambience and enhancing the feeling of safety. These elements will break up the existing monotonous approach, and establish a hierarchy of visible elements.

4.2 Enhance Unique Character

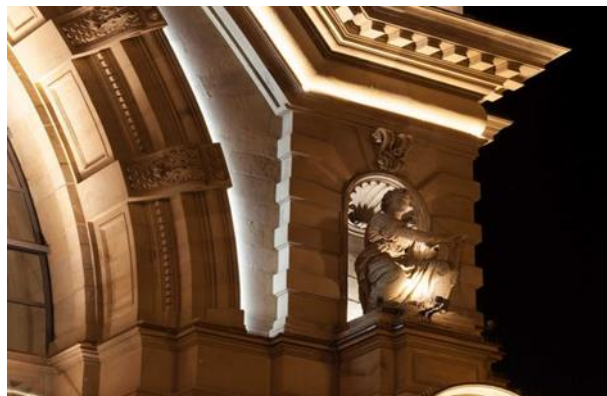


Figure 4.2 Highlighting heritage façade elements, IGuzzini

Lighting should enhance unique characteristics, diversity and richness in the architecture and natural features of The Rocks.

The intricate nature of the precinct calls for more finely scaled luminaires and a softer approach compared to the surrounding CBD area.

Lighting should increase the legibility of the precinct's thresholds, enhancing entries and connections between the precinct and adjoining areas.

4.3 Create a Cohesive Identity

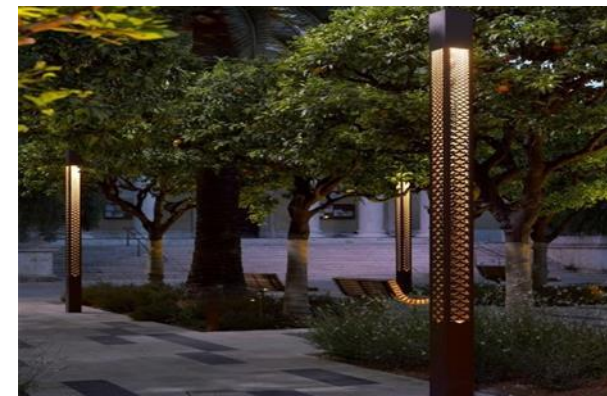


Figure 4.3 Cohesive lighting design, Technilum

A coordinated approach to the lighting of The Rocks is critical in creating a clear, cohesive identity for the precinct.

This approach should be delivered through consideration of lighting attributes, rationalisation of luminaire selection, as well as a conscious effort to minimise visual clutter. The idea is to blend the infrastructure into the context, thereby the historical elements retain visual presence.

Moreover, rationalisation of luminaire types throughout the precinct will enable efficiency in management and maintenance.

Lighting also serves to enhance the hierarchy of public places across the precinct.

4.4 Reinforce Human Scale



Figure 4.4 Human-scaled luminaire placement, IGuzzini

The architecture in The Rocks is low in profile. This, coupled with the narrow lanes and passageways, creates an intimate, human scale to the precinct.

This scale should be reinforced through lighting equipment of an appropriate scale and light distribution.

4.5 Promote Intuitive Wayfinding



Figure 4.5 Façade light promoting wayfinding, Jonathan Maus

In addition to the primary and secondary armatures and thoroughfares, The Rocks has a complex network of courtyards and laneways. The lighting should encourage intuitive wayfinding and promote exploration of spaces within the precinct.

To support visitor orientation and movement, suitable illumination must be provided to signage or wayfinding elements as well as in accenting natural elements and select landmarks.

4.6 Minimise Glare and Visual Distraction

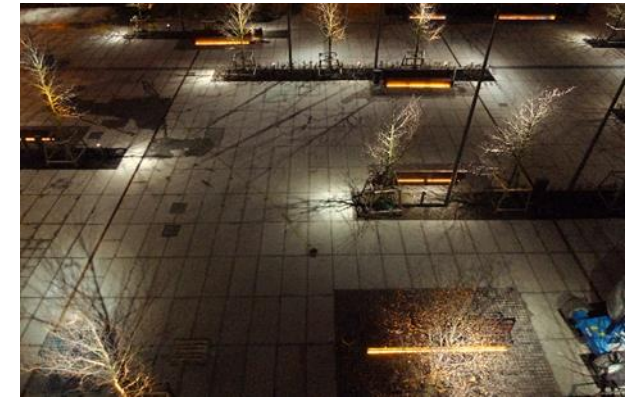


Figure 4.6 Lighting with good glare control, Sweco Architect

Glare from light sources prevents visitors from experiencing details of spaces, and harsh glare can also cause safety issues.

Glare from lighting is to be minimised in all applications through appropriate luminaire selection and positioning.

Lighting across The Rocks should be integrated into architecture and structures where possible to minimise visual distraction and obstructions both day and night.

To minimise visual distraction and reduce clutter across the public domain, existing redundant lighting is to be removed.

4.7 Sustainable in design and operation



Figure 4.7 Just enough light for adequate functionality, James Newton

Designs should only be implemented after a rigorous selection of fit-for-purpose luminaires that will result in well-performing lighting. This will reduce excess and waste of energy, minimising the need for maintenance or replacements.

Future lighting solutions should preserve and protect the night-time environment by minimising upward light pollution which contributes to the sky glow.

Lighting design and control will contribute to the sustainable use of energy through appropriate lighting technologies, dimming and switching to minimise energy use, and directing light to select objects of interest rather than a blanket approach.

The luminaires must feature proper optical controls and be precisely aimed at their intended targets.

5

Lighting Principles

This chapter intends to define the technical parameters that will govern the right lighting system for The Rocks.

These parameters must be considered during the selection of the luminaire and hardware to ensure a cohesive and optimal solution that is aligned with the character and historic elements of the precinct.

This chapter outlines lighting fundamentals. These elements will contribute to the quality of the lighting, and the efficiency of the luminaires, determine the longevity of the hardware, and contribute to the sustainability of the design.

The Lighting Principles include:

- Colour Temperature
- Colour Rendering
- Lighting Distribution
- Scale and Integration
- Luminaire Protection
- Safety and Amenity
- Maintenance
- Lighting Control
- Sustainability

5.1 Colour Temperature

Colour temperature (CCT) is a measure of the colour of light produced by a light source. It is usually expressed in degrees Kelvin (K) and describes the colour appearance of the light emitted by the source. Colour temperature serves as a visual tool for signaling the use of space.

Warmer temperatures have a cozy, yellowish, or reddish appearance, which is often associated with a comfortable and inviting atmosphere. Conversely, cooler temperatures have a brighter, bluish appearance and are often associated with alertness and productivity.

The colour temperature of lighting in The Rocks is to be applied through a consistent strategy appropriate to the usage of the space, materiality, and visual hierarchy.

- **Warmer colour temperature:** The precinct is to have a distinctively warmer colour temperature than the surrounding CBD area, ranging from 2700-3000K. This range is suitable for areas where a welcoming ambience and a sense of history are desired.
- **Highlighting features:** Carefully designed variations in colour temperature can be used to highlight features. A 3500K-4000K neutral white should be used only for accent or feature lighting to create visual interest and enhance specific elements within the space.

By following these colour guidelines, the lighting design in The Rocks will effectively create an inviting, historically resonant environment while maintaining functional and aesthetic balance.



Figure 5.1 Demonstration of different colour temperatures, ECOLORLED

5.2 Colour Rendering

Colour rendering, often referred to as CRI (Colour Rendering Index), is a metric that measures the ability of a light source to accurately reproduce the colours of objects compared to sunlight. It quantifies how well a light source reveals the true colours of objects and is an essential consideration in lighting design.

The Rocks is known for its rich historical significance and unique architecture. Accurate colour rendering ensures that the lighting does not distort or compromise the visual appearance of historical buildings, artefacts, and materials. It helps maintain the authenticity of the area. It also improves visibility thereby helping in easy navigation and better safety to the users. Thus, the colour rendering characteristics of light sources throughout the precinct should be appropriate to the application.

Where enhancement of materiality is required, for example, illumination of building facades, sculptures and public plaza, higher colour rendering (CRI>90) should be used to reveal vibrancy and colours. In areas, such as car parking and loading zones, etc, where illumination levels are more critical than accurate colour rendition, lower colour rendering values are acceptable (CRI>80).

High CRI light sources have high longevity when compared to conventional solutions.

This will significantly reduce the need for maintenance and replacement of luminaires.

Using high CRI luminaires not only enhances the visual appeal but also improves safety, experience and sustainability.

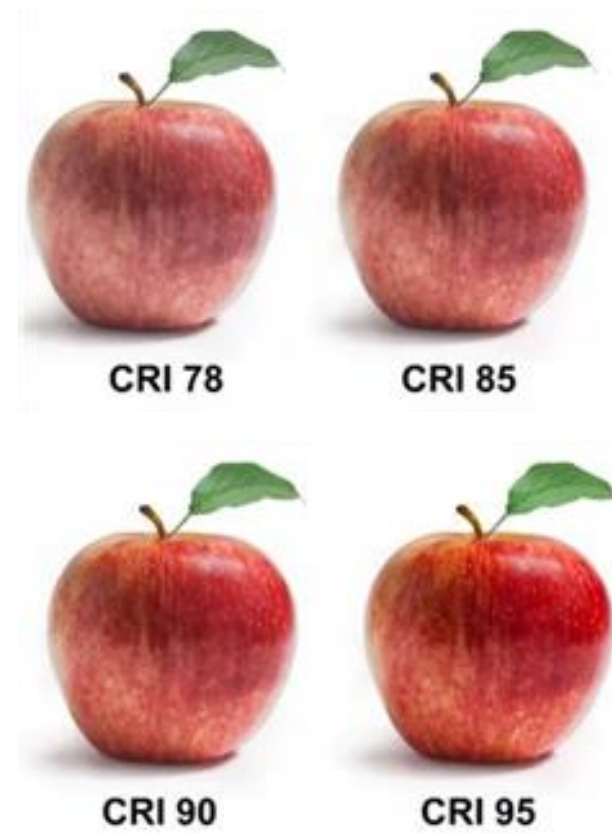


Figure 5.2 Demonstration of different colour rendering, Benel.eu

5.3 Light Distribution

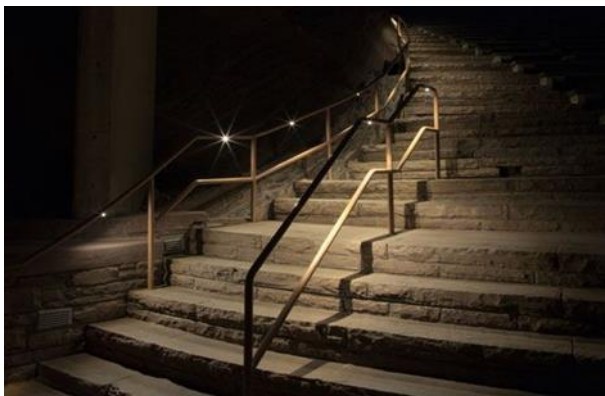


Figure 5.3: Controlled lighting distribution for targeted area, Red Rocks Park

Lighting distribution refers to how light is spread or dispersed in a given space. The optical distribution of the luminaire controls the direction of the light emitting from the hardware. An ideal luminaire will shine a light on the desired area without any spills into the surroundings, thereby achieving maximum efficiency. Lighting distribution plays a crucial role in achieving the desired illumination levels, uniformity and ambiance within a space.

Luminaires with suitable optical or beam distribution should be specified throughout the precinct and mounted appropriately to ensure light is directed only to where it is required, minimising any spill light, and maximising efficiency.

Luminaires will have the capability to incorporate glare control devices such as shields, and internal louvers as required. Whenever feasible, promote the use of luminaires featuring adjustable heads that can be flexibly repositioned to provide illumination to different areas.

5.4 Scale and Integration

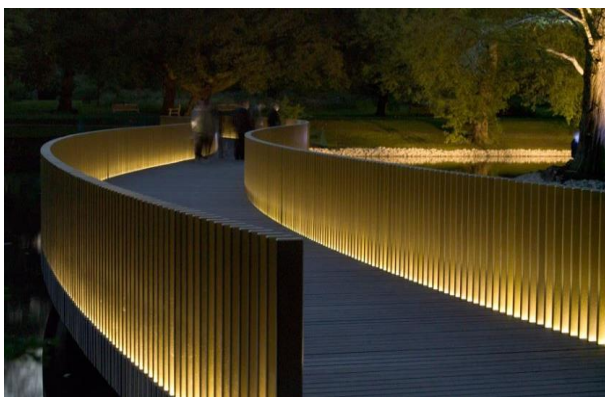


Figure 5.4 Well integrated human-scale lighting design, Dezeen

An ideal luminaire should blend into its context without attracting attention to itself. It is important to balance the need for adequate illuminance and the character of the space. The luminaire should be proportional to the street width and height of the buildings, ensuring luminaires don't dominate the landscape or architecture.

In general, all luminaires should be of minimal size, as compact and unobtrusive as possible, allowing the heritage architecture and features of the precinct to be enjoyed without clutter or distraction.

5.6 Safety and Amenity

5.5 Luminaire Protection



Figure 5.5 Robust outdoor step lighting, Bega

Luminaire protection refers to the measures and components used to safeguard luminaires from various environmental and physical factors that could damage or compromise their functionality.

Lighting throughout the precinct must be appropriately protected against weather, vandalism, and impact for the relevant mounting location.

Refer to **Appendix 9.3** for ingress protection rating information.

Luminaires within reach of the public must be safe to touch and should have an adequate heat system. Luminaires installed in the high-traffic area must be IK08 or more to prevent damage. Refer to **Appendix 9.4** for more information on IK rating. Special consideration must be taken for luminaires recessed into the ground plane with appropriate weight loadings for pedestrians and vehicles.



Figure 5.6 Adequate outdoor lighting level for safe activity, Brett Boardman

Lighting safety and amenity are two important aspects of lighting design that focus on ensuring the well-being and comfort of people. This is particularly crucial in outdoor and public spaces where lighting plays a vital role in enhancing safety and the overall quality of life.

Lighting must facilitate safe use of the precinct at night, through the application of appropriate light levels and uniformity. This includes vertical and horizontal illumination and lighting appropriate for CCTV. Where street safety cameras are to be installed, all luminaires shall have a cut-off light distribution. Luminance levels are to be verified for camera operation requirements prior to the design and installation of lighting.

All the functional and feature lighting must comply with the required light levels for the relevant P (Pedestrian) or V (Vehicular) category as noted in AS 1158.v1.1:2022. It

provides guidelines and requirements for the performance and design of lighting systems used on roads and public spaces. The standard ensures that these lighting systems meet safety, efficiency, and reliability criteria to enhance visibility and security for users.

Category V

- Purpose: Designed for vehicular traffic.
- Application: Major roads and highways where traffic volume and speed are high.
- Requirements: High levels of illumination, uniformity, and glare control to ensure safe driving conditions. These lighting systems are meant to enhance visibility for drivers and reduce the risk of accidents.

Category P

- Purpose: Designed for pedestrian traffic.
- Application: Residential streets, footpaths, cycle paths, and other public spaces where pedestrian activity is prominent.
- Requirements: Adequate lighting to ensure pedestrian safety and security, focusing on visibility for walking and other non-vehicular activities. These lighting systems often prioritize energy efficiency and environmental considerations while providing sufficient illumination for safety.

Classifications applied to The Rocks are outlined on the following page. These should be considered as a starting point for the basis of design with careful consideration given to the overall experience and impact of lighting elements as a whole. Design must recognise that the total illumination and light levels of a place are comprised of many integral components such as roads, footpaths and façade lighting.

Excerpts of AS1158 are included in the Appendix.

Table 5.1 AS1158 Lighting for Roads and Public Spaces - Categories for The Rocks

AS1158 – Lighting for Roads and Public Spaces			
Vehicular Categories – Lighting which is applied to roads on which the visual requirements of motorists are dominant			
Lighting Strategy Typology	Recommended Lighting Level	Assumptions	
Primary Armatures – Roadways	V1	Based on high traffic	
Secondary Armatures – Roadways	V3	Based on medium traffic	
Pedestrian crossings	PX2	Lighting for crossings, assuming posted speed limit (PSL) <=50km/h	
PP Categories - Pedestrian or cycle-oriented pathway e.g. footpaths, including those along local roads, and arterial roads, walkways, lanes, park paths, cycle paths			
Lighting Strategy Typology	Recommended lighting level	Nighttime movements	Fear of crime
Primary Armatures – Footpaths	PP2	High (pedestrian/cycle activity)	Medium
Foreshore walkways	PP2	High	Medium
Secondary Armatures – Footpaths	PP3	Medium	Medium
Major laneways	PP3	Medium	Medium
Parks	PP3	Medium	Medium
Awnings	PP3	Medium	Medium
Minor laneways	PP4	Medium	Low

Public Activity Areas (excluding car parks)				
		Assumptions		
Lighting Strategy Typology	Recommended lighting level	Night-time movements	Fear of Crime	Need to enhance amenity
First Fleet Park	PA2	Medium	Medium	Medium
Plazas	PA1-PA2	Medium	High/Medium	High/Medium
Courtyards	PA1-PA2	Medium	High/Medium	High/Medium
Other Elements				
Stairs	PE2	Lighting for outdoor connecting elements – stairs, ramps, footbridge, and subway		

Note: Recommended lighting levels should be considered as a starting point for the basis of design with careful consideration given to the overall experience and impact of lighting elements as a whole. Design must recognise that the total illumination and light levels of a place are comprised of many integral components such as roads, footpaths and façade lighting.

5.7 Maintenance



Figure 5.7 Street light maintenance, The Times

In the planning of lighting infrastructure, it is important to consider access to power, installation requirements, and maintenance needs.

Both the specification and mounting of luminaires are to be designed to ensure easy access for maintenance and replacement, with readily available components. Additionally, lighting components should prioritise characteristics such as ease of replacement, off-the-shelf availability, interchangeability, and modularity.

When considering maintenance programs, preference bulk replacement of lamps, necessary luminaire repairs, adjustments at the end of the effective lamp lifetime or adopting a case-by-case replacement approach.

This strategy is considered the most cost-effective approach, acknowledging the variability in light types and fittings within The Rocks.

Placemaking NSW's maintenance regime should include the following:

- Regular night-time inspections of the infrastructure across the precinct to proactively identify defects, in lieu of ad hoc notification of faults. This includes within the public domain, building facades and awnings.
- Tree and plant growth is to be monitored to ensure it is not affecting lighting output.
- Where there are defective or vandalised fittings, the equipment is to be made safe and repaired as soon as possible (this requirement is to apply to all private and public sector lighting installations).
- All upgrade works should be complemented by maintenance plans and regular audits that ensure lights are functional.

Proactive maintenance ensures the longevity of lighting installations and contributes to a consistently appealing and functional lighting environment.

5.8 Lighting Control

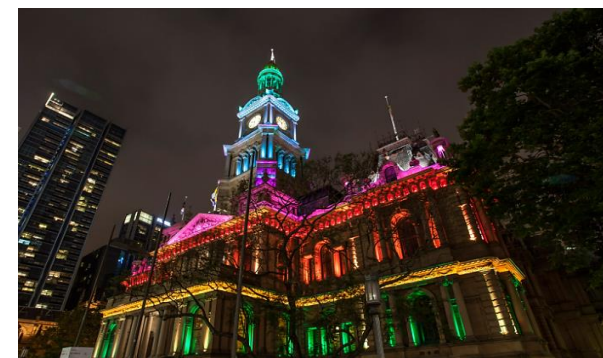


Figure 5.8 Sydney Town Hall pre-programmed RGB façade lighting, City of Sydney

Lighting control refers to the management and regulation of lighting systems to optimise and monitor their functionality, energy efficiency, and user comfort.

The lighting system should have appropriate controls to allow for automatic dimming according to different times of the day or be switched off when not needed. This is crucial to ensure efficient energy usage and minimise light pollution.

All public domain lighting should be connected back to the PMNSW central Zencontrol DALI lighting control system.

Lighting controls should also incorporate pre-programmed modes that allow for appropriate elevation of lighting such as use of prescribed RGB colours. These modes are to be programmed to a PMNSW-endorsed calendar to always ensure consistently high-quality lighting outcomes.

5.9 Sustainability



Figure 5.9 Public domain lighting should be focussed on the ground. Up spill into the sky must be controlled using specific optics, Roman Rember

Carbon Zero: PMNSW is committed to best practice sustainability and minimisation of any impacts on the surrounding environment and community.

In designing, installing and maintaining lighting within the precinct, the following principles should be adhered to:

- Electrical consumption: All lighting systems are to minimise electricity consumption to deliver on the *NSW Government Net Zero Targets* including:
 - i. 50% reduction in greenhouse gas (scope 1 and 2) emissions by 2030.
 - ii. Net zero (scope 1 and 2) emissions by 2035.

- Light Source: LED lighting sources are preferred for their sustainability owing to their energy efficiency, extended lifespan, diminished carbon footprint, dimmability, and durability. Alongside the efficient use of energy, opportunities to engage with the circular economy should be sought as part of luminaire selection.
- Supply: Preference locally made luminaires whenever possible, to minimise environmental impact. Local production often involves shorter supply chains, reducing transportation-related carbon emissions.
- Lighting Control: Appropriate dimming controls must be installed to identify the needs of the space. Smart lighting control is recommended to control the intensity and colour temperature based on real-time data based on traffic and seasons.
- Lifecycle & Maintenance: Priority should be given to luminaires with longer life, available spare parts and those that are fully repairable. It shall be possible to recycle a luminaire that reaches end of life and return the materials to reservoir. The aim is that materials have a longer life and re-enter the cycle when no longer needed, to minimise consumption of natural resources.
- Light Pollution: Special consideration must be taken to prevent light pollution. Artificial lights will impact nocturnal activities, migration, reproduction and habitat of animals. Studies have proved that artificial lights will influence the leafing and flowering timing of plants. Light pollution can be prevented by making sure no light spills into the sky and water body. Regulations must be implemented to control lighting installed near natural waterbodies.
- Environmental impact: To preserve the environmental balance without impacting functional needs, all outdoor general lighting must be warm ($\leq 3000\text{K}$).
- Furthermore, the lighting infrastructure should be supported by metering capabilities, enabling cost tracking back to Placemaking NSW or the tenant.

5.10 Hardware typologies

Different types of hardware may be used across The Rocks to provide functional and feature lighting.

These should be selected with consideration of the desired effect, its appropriateness for the location including visibility and scale, and ease of maintenance.

This section provides an overview of the hardware typologies which include:

- Pole-mounted lighting
- Wall-mounted lighting
- Catenary lighting
- Low-level and integrated lighting, and
- Inground lighting



Figure 5.10 Lighting at Campbell's Cove showcasing a mix of lighting types including in-ground and integrated lighting, pole lighting and backlit signage, Brett Boardman

5.10.1 Pole-Mounted Lighting

Pole-mounted lighting is a type of light fixture installed on poles, typically used to illuminate outdoor areas such as streets, parking lots, parks, and large open spaces.

Multiple sources may be employed from a single pole, minimising the infrastructure required and decluttering the landscape.

As well as conventional area lighting, poles provide the opportunity to use projected light to create visually interesting and evocative patterns such as dappled light through trees and accentuate architectural elements.

The poles themselves can be used as a feature element in their form, colour, texture, and arrangement.

Before proposing the installation of new poles, it is essential to evaluate the feasibility of using the existing lighting poles and consolidating infrastructure, which will help to minimise potential visual clutter.

The use of poles should also consider the ability for other required infrastructure to be seamlessly incorporated such as CCTV and 5G.



Figure 5.11 Examples of pole-mounted lighting, Light Zoom Lumiere - Signify – Structura

5.10.2 Wall-Mounted Lighting

Wall-mounted lighting is a type of lighting fixture that is attached to a wall, providing illumination for a specific area or accent to a facade.

Wall-mounted luminaires may be used to light facades, narrow laneways, stairs, or areas adjacent to buildings. Luminaires may be focusable for accenting or fixed to provide general circulation lighting.

For facades, preference wall-mounted luminaires to provide opportunities to highlight architectural details. The proximity of the luminaires to the surfaces being lit, rather than remote flood lighting, enables excellent beam control, minimising spill light.

Additionally, wall-mounted lighting can be employed to illuminate adjacent spaces and building facades. For heritage façades, an audit must be conducted with a heritage consultant to ensure feasibility with preference given to utilising existing wall penetrations where possible.



Figure 5.12 Examples of wall-mounted lighting, Ilya Melikhov - Simon Callagan - Steinel

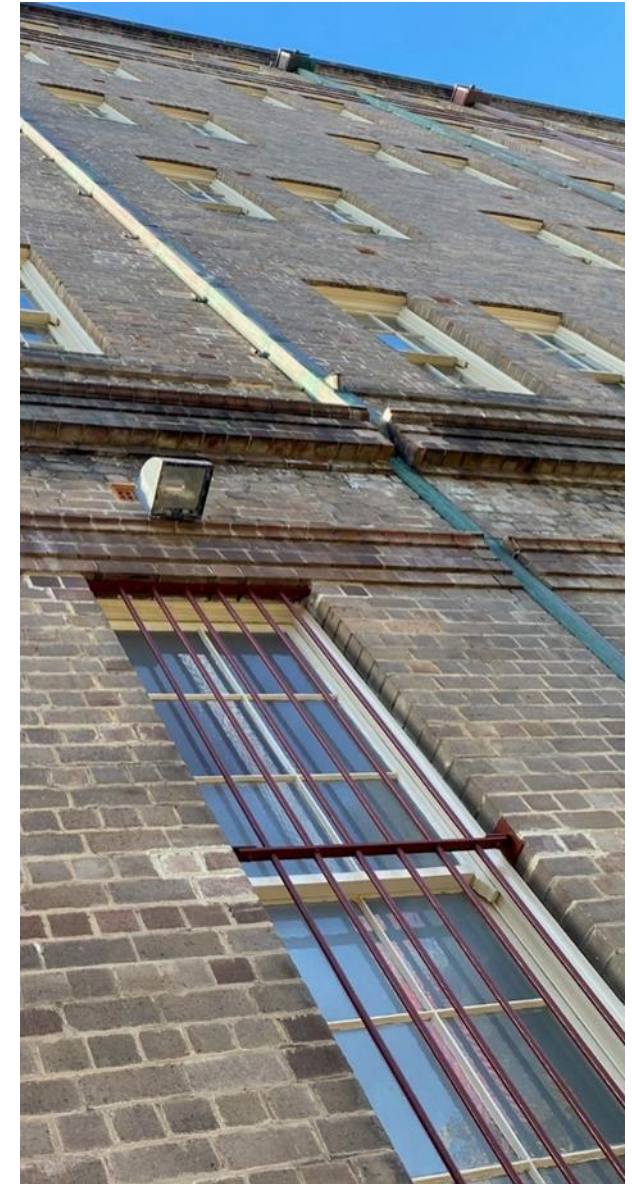


Figure 5.13 Existing wall-mounted lighting on Atherden St

5.10.3 Catenary Lighting

Catenary lighting is a type of lighting where fittings are suspended from a series of cables or wires strung between support structures, such as poles or buildings. This setup creates functional illumination over a given area. This does not include the temporary/casual use of festoon or fairy lights which provides a sparkling effect rather than providing significant illumination.

Catenary lighting provides the opportunity to light spaces without the obstructions of multiple poles, thereby minimising the interruption of the “open space” and reducing visual clutter. The luminaires may vary in form, size, shape, and distribution to suit the application.

A family of luminaires may be used to create a language within the precinct. More decorative fittings, shades, or forms can be used to enhance the identity or narrative of a space.

Catenary lighting should not be overused. Consideration must be given to attaching catenary lighting to buildings and utilising existing hooks and penetrations where available. It is important that catenary lighting does not impede access to roof spaces. To ensure sight lines along streets and heritage facades are preserved, it is important to be conscious that catenary lighting can create visual clutter, and the design approach for the lighting strategy is to minimise this.

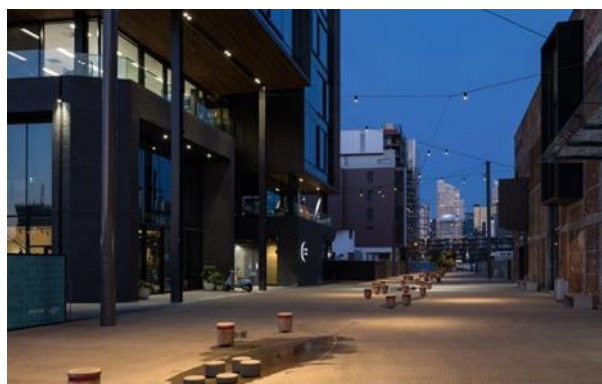


Figure 5.14 Examples of catenary lighting, Mark Scowen - we-ef - Zero Lighting

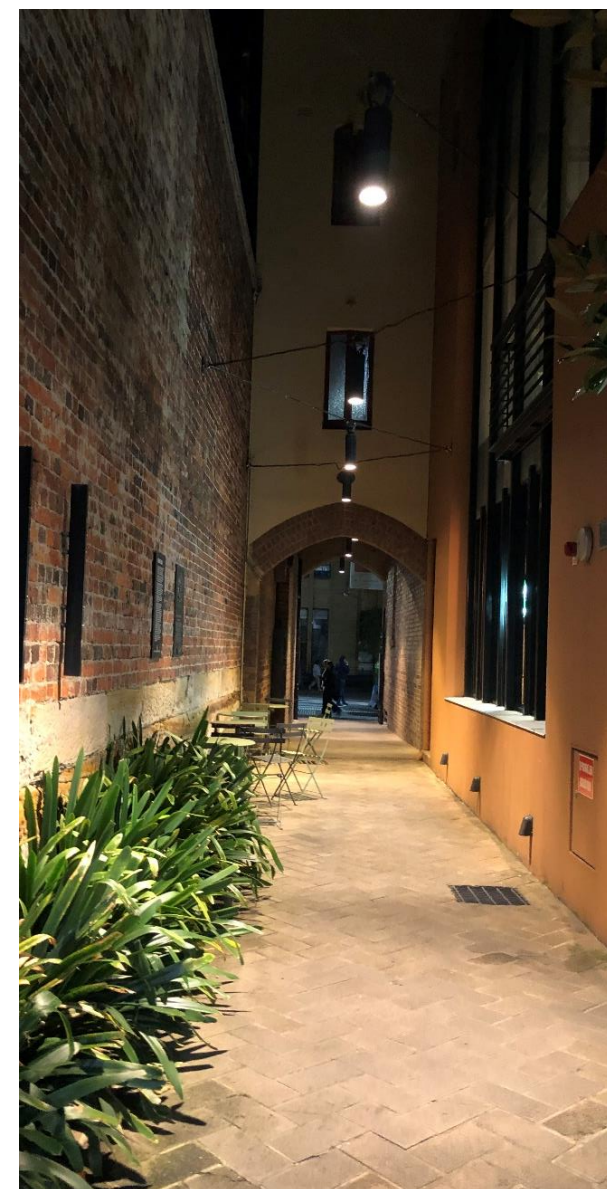


Figure 5.15 Existing Catenary lighting, Nurses Walk

5.10.4 Low-Level and Integrated Lighting

Low-level and integrated lighting is positioned at a low height to provide illumination close to the ground. It is often embedded directly into architectural elements, designed to be an integral part of the overall design.

Low-level and integrated lighting is an important component of lighting as it significantly contributes positively to the pedestrian experience of The Rocks.

As a minimum, low-level integrated lighting should:

- Provide a positive experience for people as they move through and enjoy the public domain.
- Promote intuitive wayfinding
- Provide safe circulation
- Create accents and highlights that enhance the human scale of the environment

Low-level and integrated lighting can be implemented through:

- Integration into street furniture
- Incorporation into stairs to illuminate steps or along handrails to wash ground surfaces
- Wall lights and bollards

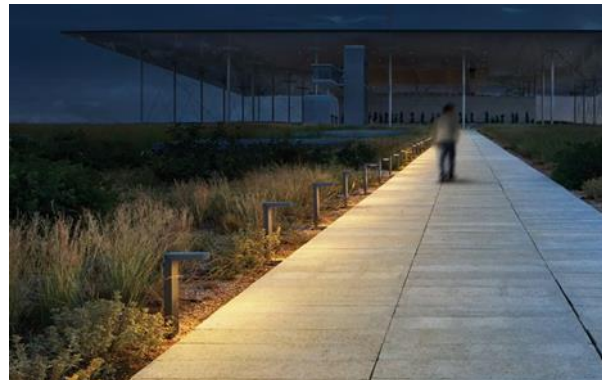


Figure 5.16 Examples of low-level and integrated lighting, Inidital - Halkin Mason- iGuzzini

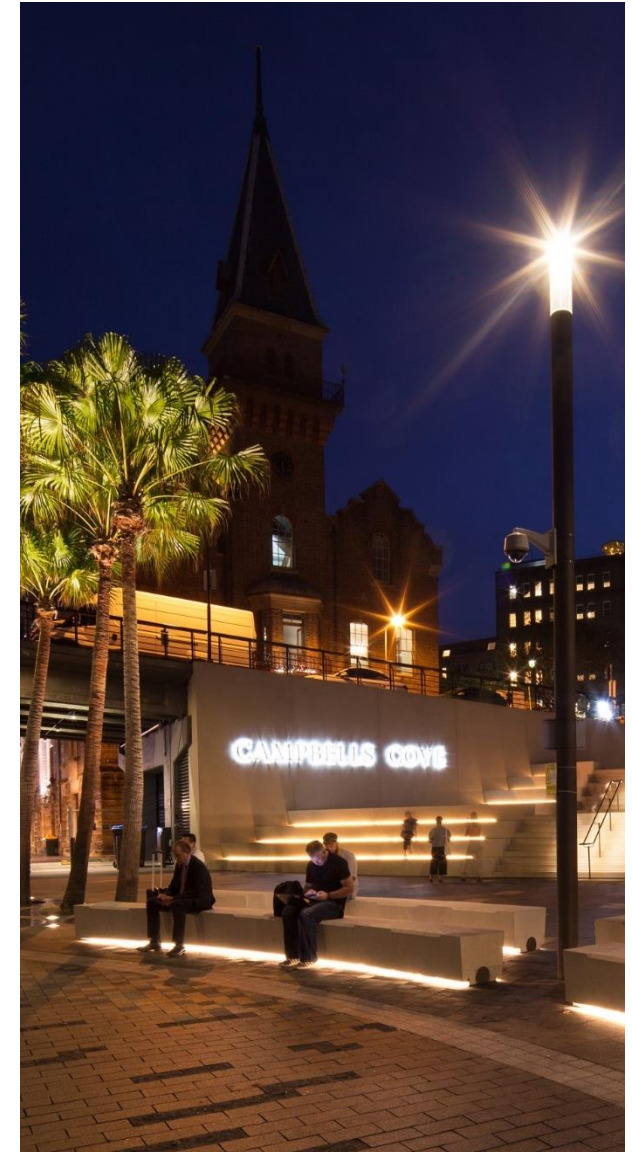


Figure 5.17 Example of low-level and integrated lighting into stairs, Campbell's Cove, Brett Boardman

5.10.5 Inground lighting

Inground luminaires are fixtures designed to be flush with the ground.

Inground lighting has two forms in terms of light distribution: diffuse and focused.

- **Diffused luminaires** are typically lower in output, deliberately visible and used to create a marker or patterns that can promote intuitive wayfinding. Care must be taken in the placement, control and output of luminaires to ensure no discomfort glare.
- **Focusable luminaires** use lenses or reflectors to direct light onto surfaces, structures, or natural features. The appearance of the lit object is more important than the luminaire and the aim is to use low glare or concealed fittings.

Proper installation is crucial for inground lighting, requiring more careful consideration and evaluation compared to other lighting methods in The Rocks. Explore alternative options in cases where inground installations are problematic.

Protecting elements of heritage significance is paramount, and in-ground lighting or conduiting may not be feasible in certain areas due to archaeological considerations.

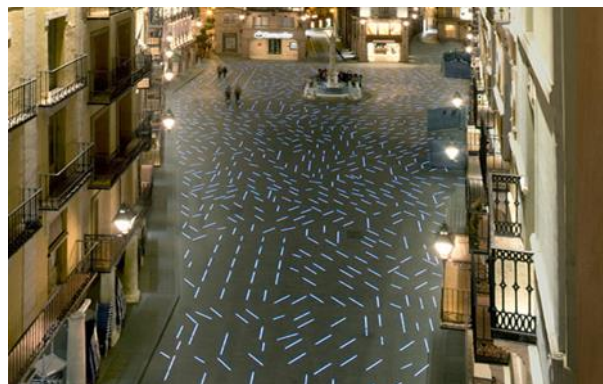
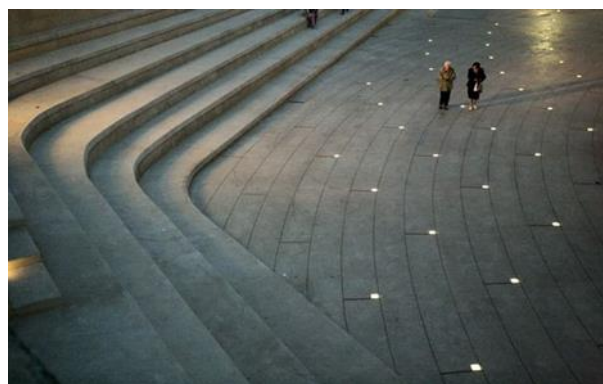


Figure 5.18 Examples of inground lighting, ARQA – Duccio Malagamba - Archello

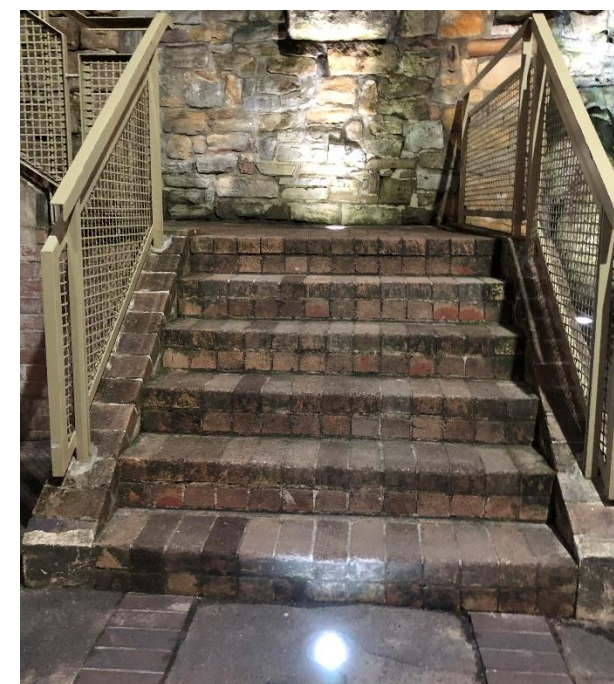


Figure 5.19 Existing inground lighting, Foundation Park

6

Lighting Approach

This chapter outlines different typologies of light that can be used to accentuate the experience of The Rocks. Layers of lighting, diverse scenarios and ambiances can be sculpted within this historic precinct. These can tell stories, encourage people into the precinct and support events and celebrations. These layers can enhance the experience of the spaces and boost functional lighting.

Careful integration of dynamic lighting systems with limited colours will enhance the beauty of the precinct and help engage visitors and encourage them to explore more of The Rocks.

The carefully considered use of colour can define the mood and character of different spaces within The Rocks.

6.1 Lighting Techniques

These lighting techniques are layers of lighting that can be deployed across The Rocks to create a rich and inviting environment

6.1.1 Feature Lighting

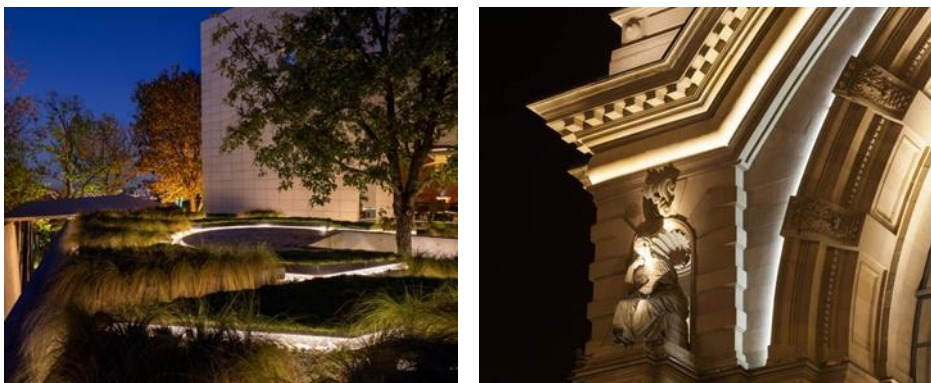


Figure 6.1 Integrated landscape lighting and façade lighting, Cubica - IGuzzini

Feature lighting is used to highlight specific façades, awnings, artworks, or structures. This provides an enhanced and unique night-time effect, contributes to the luminance required for public safety and minimises the need for additional overhead street lighting.

Feature lighting is indispensable in the creation of an inviting environment. Lighting can accent the form, texture, and materiality of selected elements to highlight the precinct's unique characteristics and activate public spaces. Feature lighting can support wayfinding by directing people's attention to signage and landmarks, which aids orientation, enables greater predictability, and increases the feeling of safety for visitors moving through the precinct.

Luminaires used for feature lighting will be concealed and mounted in a way that eliminates glare, responds to the subject to be lit, and has minimal impact on heritage fabric.

6.1.2 Functional Lighting

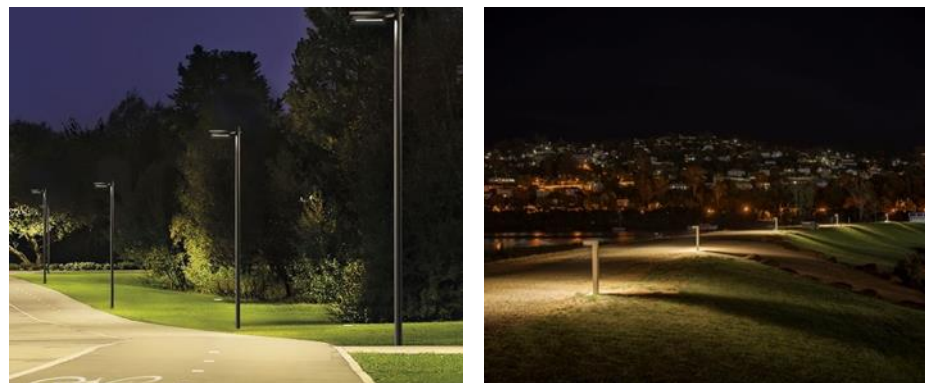


Figure 6.2 Pole lighting and bollard lighting, WE-EF

Functional lighting means the lighting used to comply with minimum luminance requirements for both pedestrians and vehicles.

Functional lighting to all public pathways and activity zones should be provided to the appropriate categories as stated in Australian standards *AS1158* and *AS4282* and support safe movement throughout the precinct. The application of categories must consider adjoining spaces and the provision of a level of consistency and predictability across the precinct.

The selection and mounting arrangements of luminaires needs to consider the size and scale of the area to ensure their harmony within the precinct.

Rather than providing blanket coverage of excessive light, attention needs to be taken to understanding targeted areas and ensuring appropriate lighting is provided.

6.1.3 Light Art as Feature



Figure 6.3 Luminaires as art piece bringing people together, Leo Villareal – Richard Glover

The lit appearance of luminaires and self-luminous objects can create a feature in a space or on the surface of a building or structure. Light artists work with various light sources, such as LEDs, neon, fluorescent bulbs, lasers, and projections, to create artworks that manipulate and harness light to convey artistic expressions.

Light art can cultivate a distinctive identity, tailored to a particular location or moment, and can activate a space by drawing the public together.

However, the installation of permanent light art should be limited to specific and appropriate locations, and not encompass all areas in The Rocks. The Public Art Strategy for The Rocks guides the development of all public art. Any approval for such installations will be guided by this process by PMNSW.

6.1.4 Colour as a Feature



Figure 6.4 Colour-changing lights at Martin Place and Sydney Town Hall, Vivid Sydney – City of Sydney

Coloured lighting may be used as an enhancement to the selected heritage building facades or areas, or to promote seasonal and special events. Coloured lighting should be limited to specific and appropriate locations, and not encompass all areas in The Rocks or all times of the year. Final approval of coloured lighting and colour palette will be finalised in consultation with PMNSW.

Careful consideration needs to be taken in the selection and intensity of colours, as well as the speed and frequency of any kinetic effects, to ensure appropriate application for the heritage and urban context.

As much as possible, colour-changing ability should be incorporated into permanent feature lighting, to avoid the need for additional luminaire or infrastructure for special events.

6.2 New Luminaire Key Considerations

New luminaires specified for the precinct should be consistent with the parameters noted below.

6.2.1 General considerations

The following considerations apply to all luminaires across the precinct. These should not only be considered as part of new work but also as part of ongoing maintenance and renewal of existing exterior and public domain lighting

Appearance

Lighting equipment shall be minimal in its appearance unless intentionally used as a feature. Its form and finish shall be in harmony with the surrounding urban context and of an appropriate scale to its location (scale of building and street/laneway). Where the same applications of light are used across the precinct, the luminaires selected shall be of the same manufacturer and family for uniform appearance and easier maintenance.

Colour Palette

Selecting an appropriate colour palette for luminaires is crucial to complement the historic context while maintaining a visually pleasing atmosphere. The finish of luminaires, poles and accessories shall be in dark non-reflective colours, and should sit within the family of tones as required below:



Black



Charcoal



Bronze

The finish of wall-mounted luminaires must consider the building façade or structure that they are mounted onto. Collaboration with PMNSW and heritage consultants will ensure that the chosen lighting design respects and enhances the unique heritage character of the surrounds.

Materials

Materials must be selected which are fit for purpose for an external environment. Common materials include 316 marine-grade stainless steel, cast aluminum and copper.

Protection

Exterior luminaires shall have a minimum IP rating of:

- IP67 if uplighting,
- IP68 if immersed in water or,
- IP65 if downlighting.

Luminaires shall have an IK rating, against impact (vandalism), appropriate to the mounting location. Refer to **Section 9.4 Protection Against Impact**.

Quality Assurance

Luminaires selected shall be in accordance with AS/NZS 60598, AS1158, and AS4783. Luminaires shall be from reputable manufacturers and practice quality management systems in accordance with ISO standards (ISO 9001-2000).

Accessories and Flexibility

All accessories used shall be from the same manufacturer as the luminaire or as recommended by the manufacturer. Anti-glare accessories, including honeycomb, radial, angled louvres and snoots, shall be applied where appropriate.

Preference should be given to luminaires with the ability to incorporate interchangeable accessories or components (e.g. colour filter, spread lens, optical lens to change beam distribution).

Installation

All recommended installation and maintenance procedures from manufacturers should be adhered to.

Colour Rendering Index

Where enhancement of materiality is required (e.g. illumination of building facades, sculptures and public plazas), higher colour rendering (CRI>90) should be applied to reveal vibrancy and colours.

In areas where illumination levels are more critical than accurate colour rendition, lower colour rendering values are acceptable (CRI>80). This is because the primary focus is on providing sufficient light for visibility and safety rather than the accurate reproduction of colours. For instance, in spaces like parking lots, loading docks, etc, where the goal is to ensure that the area is well-lit to facilitate tasks and enhance safety.

Colour Temperature

The precinct shall have a distinctively warmer colour temperature than the adjacent Sydney CBD, ranging from 2700-3000K, where a welcoming ambiance and a sense of history are desired.

Carefully selected variations in colour temperature can be used to highlight specific features, with 3500K-4000K neutral white reserved for accent or feature lighting, to be considered on a case-by-case basis.

6.2.2 Wall Luminaires

Wall luminaires are light fittings fixed directly into vertical surfaces. The guidance below does not apply to catenary lighting.

Objectives:

Architectural wall lights:

- To satisfy exterior lighting codes stated in AS1158 and AS4828 to pedestrian pathway lighting where space/width is limited.
- To utilise the latest technology to provide maximum efficiency and precise lighting distribution to prevent light spill onto adjacent buildings and glare.

Decorative wall lights:

- Utilise decorative wall lights at entryways or special locations to enhance their prominence and support intuitive wayfinding.

Guidance

- Consider the impact of luminaires on the fabric of buildings both physically and visually. Luminaires should not protrude excessively from the mounting surface.
- Adjustable luminaires should have the ability to be 'locked off' once focused.
- Luminaires are to be located at an appropriate height, out of the reach of the public unless being used as low-level orientation lighting, in which case they shall be recessed or suitably rated against vandalism.
- For heritage buildings, consultation must be undertaken with a suitably qualified heritage consultant and the relevant landowner. Fixture and fixing points shall be carefully considered to minimise adverse impact on heritage fabric, with preference given to existing fixing points and penetrations as much as possible.



Figure 6.5 Examples of wall luminaires, Linea Lighting, McKay Lighting, Yao

6.2.3 Accent Luminaires

Accent luminaires are lighting fixtures specifically designed to highlight or draw attention to particular features, objects, or areas within a space. They are used to create visual interest and emphasise architectural elements, artwork, landscaping, or other focal points.

Objectives:

- To accent the form, texture, and materiality of selected elements to highlight the precinct's characteristics and activate public spaces.
- To use innovative techniques to control the obtrusive effects of exterior lighting and minimise excessive lighting spill into the night sky.

Guidance:

- Accent luminaires (including gobo projectors) include adjustable and directional, surface or spike-mounted luminaires. Once focused, luminaires shall be able to be 'locked off,' via specialist tools, to avoid tampering.
- Fixture and fixing points shall be carefully considered to minimise adverse impact on heritage fabric or natural elements.

- Ground-mounted accent luminaires shall be placed so they do not become a trip hazard and protected in vandal-proof cages for fittings accessible by the public.
- Spike-mounted luminaires shall be mounted to a small concrete plinth or metal bracket buried into the soil/turf to eliminate tampering.



Figure 6.6 Examples of accent luminaires, iGuzzini - Simon Callagan - Linea Lighting

6.2.4 Linear LED Luminaires

Linear LED Luminaires are lighting fixtures that use LED technology in a long, narrow shape, making them ideal for various applications where uniform light distribution is required.

Objectives:

- To achieve a homogeneous wash or grazing lighting effect towards targeted elements to highlight the precinct's characteristics and activate public spaces.
- To utilise the latest technology to provide maximum efficiency and precise lighting distribution to prevent light spill onto adjacent buildings and glare.

Guidance:

- Linear LED luminaires suitable for use in external environments include rigid extrusions and flexible LED strips, with a minimum IP rating of IP65.
- Linear LED luminaires should be integrated into built elements as much as possible, minimising their visual impact. Where linear luminaires are directly visible, care must be given to minimise glare.

- Linear LED luminaires shall be securely fixed to ensure they cannot be tampered with and any potential for the luminaire to move or fall is negated.
- Fixture and fixing points shall be carefully considered to minimise adverse impact on heritage fabric or natural elements.



Figure 6.7 Examples of linear LED luminaires, Filippo Cannata - Zhen Yan - iGuzzini

6.2.5 Inground Luminaires

Inground Luminaires are lighting fixtures designed to be installed flush with the ground. They provide illumination while blending seamlessly into their surroundings.

Objectives:

- To achieve wash or grazing lighting effect towards targeted elements from ground level to highlight the precinct's characteristics and activate public spaces.
- To utilise the latest technology to provide maximum efficiency and precise lighting distribution to prevent light spill onto adjacent buildings and glare for pedestrians.

Guidance:

- Inground luminaires shall have a minimum IP rating of IP67 or IP68, if immersed in water. Luminaires shall utilise gaskets, cables glands and terminal housings to ensure accessibility for maintenance and installation as per the manufacturer's instruction.
- Luminaires should be fitted with suitable glare control accessories, where possible.
- Luminaires shall be adjustable, where appropriate, to enable precise aiming, minimising wasted light and light pollution.
- In areas of pedestrian traffic, luminaires shall be flush with floor surfaces or have chamfered edges with a maximum height of 5mm above ground. They shall have anti-slip coatings to eliminate trip and slip hazards.
- In areas where vehicular traffic is possible, luminaires shall be suitably rated to be driven over without compromising the luminaire integrity.
- Inground luminaires shall not be used in garden beds or locations where they may get covered in debris.



Figure 6.8 Examples of inground luminaires, Lucie Debelkova - Gavriil Papadiotis - MPLight

6.2.6 Miscellaneous Luminaires

Miscellaneous Luminaires are those that are not explicitly listed earlier in this chapter. They may include miniature frame luminaires, catenary luminaires, festoon lights, and custom luminaires.

Objectives:

- To satisfy exterior pedestrian lighting codes stated in AS1158 and AS4828 if it is considered as functional lighting.
- To achieve special lighting effects towards targeted elements to highlight the precinct's characteristics and activate public spaces.
- To utilise the latest technology to provide maximum efficiency and precise lighting distribution to prevent light spill onto adjacent buildings and glare.

Guidance:

- Miniature LED luminaires include those, such as frame luminaires that may be integrated into windowsills, arched artworks, etc. These shall be fixed securely with minimal impact on any heritage fabric. They shall have a minimum rating of IP66 and IK07. They should be used out of reach of the general public.

- Catenary luminaires and shades shall have an IP rating suited to the environment and application in which they are to be installed. All catenary luminaires and objects shall be securely fixed to the catenary system, mitigating any risk of falling.
- Custom luminaires shall meet all Australian Standards requirements and be suitable for the environment in which they are to be installed. Ease of maintenance shall be considered in the design of any custom luminaires. Fixture and fixing points shall be carefully considered to minimise adverse impact on heritage fabric or natural elements.
- Use of festoon light shall be considered on a case-by-case basis. Whilst its application can add a 'festive' mood to a space, it shall be limited to special events or at areas where its effect is contained and does not detract from the heritage façade. The cabling should be neatly concealed from view.
- Permanent neon light is not permitted for use in the precinct. Limited use may be allowed for signage, but it is subject to PMNSW approval.

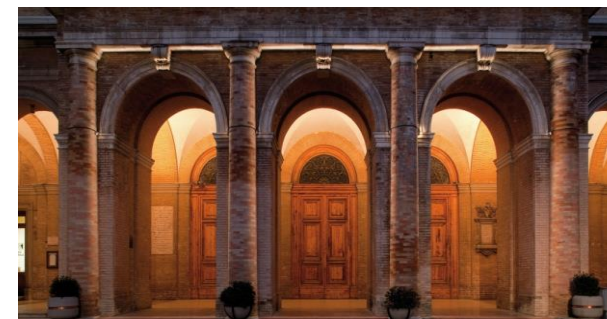


Figure 6.9 Examples of miscellaneous luminaires, iGuzzini - Bega - Florian Groehn

7

Conclusion and next steps

Conclusion and next steps

Placemaking NSW is committed to the delivery of consistent and coordinated public domain and external lighting in The Rocks. This is key to supporting the safe and inclusive use and activation of the precinct. Lighting plays a crucial role in distinguishing the character of The Rocks from Sydney CBD and highlighting the unique stories of this place.

This Strategy functions as a guiding document for all future development, upgrades and activities that occur within the precinct. All public and private sector parties undertaking projects in The Rocks will be required to be consistent with the objectives, principles and guidance of the Strategy.

This includes through stages of design, delivery, maintenance and renewal.

An implementation plan is being prepared by Placemaking NSW to prioritise the delivery of actions against program and other priority projects.

Figure 8.1: The Rocks from the Cahill Expressway



8

Appendix

8.1 V Category Tables From AS1158

AS1158 is an Australian Standard that applies to lighting for roads and public spaces. Specifically, it provides guidelines and requirements for the design, installation, and performance of public lighting. The "V Category" tables within AS1158 refer to lighting categories that are applied to different types of roadways and public areas based on their usage and importance. V1 to V5: These categories applied to roads with varying traffic volumes, speeds, and pedestrian activity. They define specific lighting levels required to ensure safety and visibility.

TABLE 2.2
VALUES OF LIGHT TECHNICAL PARAMETERS FOR CATEGORY V LIGHTING

1	2	3	4	5	6	7	8	9	10
Lighting subcategory	Light technical parameters								
	For straight sections, curves and intersections					For intersections and other specified locations		For all applications	
	Average carriageway luminance ^{c,d} (\bar{L}) cd/m ²	Overall uniformity ^{a,d} (U_o)	Longitudinal uniformity ^d (U_l)		Threshold increment ^e (TI) %	Surround verge illuminance ^d (E_s) %	Point horizontal illuminance ^{c,d} (E_{ph}) lx	Illuminance (horizontal) uniformity ^e Cat V (U_{E1})	Upward waste light ratio ^e ($UWLR$) %
			In Australia	In New Zealand					
V1	1.5	0.33	0.5	0.3	20	50	15	8	3
V2	1.0	0.33	0.5	0.3	20	50	10	8	3
V3	0.75	0.33	0.5	0.3	20	50	7.5	8	3
V4 ^b	0.5	0.33	0.5	0.3	20	50	5	8	3
V5	0.35	0.33	0.5	0.3	20	50	3.5	8	3

Figure 9.1 Values of Light Technical Parameters for Category V Lighting

8.2 PR, PA, PP Category Tables from AS1158

The PR, PA, and PP categories in AS1158 pertain to different classifications of lighting for pedestrian and minor roadways. These categories are detailed in specific tables within the standard and help determine the appropriate lighting levels for different environments. Tables from the standard have been included below for reference.

TABLE 2.2
LIGHTING SUBCATEGORIES FOR PEDESTRIAN AND CYCLIST PATHS

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

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

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

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

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

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

(a) the road is lit to at least the applicable level of Category V lighting conforming to AS/NZS 1158.1.1; and

(b) the footpath is unshaded, e.g. there are no substantially continuous building awnings, trees (refer to AS/NZS 1158.1.2) and the footpath is contiguous with the roadway.

TABLE 3.4
VALUES OF LIGHT TECHNICAL PARAMETERS FOR PATHWAYS AND CYCLIST PATHS

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (E_h) lx	Point horizontal illuminance ^{a,b,d} (E_{ph}) lx	Illuminance (horizontal) uniformity ^a Cat. P (U_{catP})	Point vertical illuminance ^{a,b} (E_{pv}) lx
PP1	10	2	5	1
PP2	7	1	5	0.3
PP3	3	0.5	5	0.1
PP4	1.5	0.25	5	0.05 ^e
PP5	0.85	0.14	5	0.02 ^e

^a These values are maintained. See Clause 3.2 pertaining to lumen derating values for non-white light sources.

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

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

^d Conformance of 50% of E_{ph} shall also be demonstrated over an area of 5 m either side of the pathway—where a verge exists—or up to any structure/fence/property boundary that forms the edge of the pathway, unless deemed otherwise by the relevant authorities (see Clause 3.1.3.5).

^e For luminaires with mounting heights of 1.5 m or less, the E_{pv} values need not be applied.

NOTES:

1 Validation of the values in Columns 2 to 5 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, 3 and 5, which will typically be difficult to validate by field measurements.

2 See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.

TABLE 2.1
LIGHTING SUBCATEGORIES FOR ROAD RESERVES IN LOCAL AREAS

1	2	3	4	5	6
Type of road or pathway		Selection criteria ^{a,b}			
General description	Basic operating characteristics	Pedestrian/cycle activity	Fear of crime	Need to enhance amenity	Applicable lighting subcategory ^{c,d}
Local roads or streets used primarily for access to abutting properties, including residential, commercial and industrial precincts	Mixed vehicle and pedestrian traffic	High	Medium	High	PR2
		Medium	Low	Medium	PR3 ^e or PR4 ^f
		Low	Low	Low	PR5
		N/A	High	Medium	PR1
		High	Medium	High	PR2
Common area, forecourts of cluster housing		Medium	Low	Medium	PR3 ^e or PR4 ^f
		Low	Low	Low	PR5
		N/A	N/A	N/A	PR6 ^g
		High	Medium	High	PR2
		Medium	Low	Medium	PR3 ^e or PR4 ^f
		Low	Low	Low	PR5

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

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

^c All lighting subcategories apply across the whole of the road reserve width, including the footpath.

^d Where there is a significant fear of crime or where required by the relevant authority, then, for enhanced lighting of the formed pathways, see Table 2.2.

^e Use of subcategory PR6 shall be discretionary. Generally, subcategory PR6 is only applied to the replacement of existing luminaires installed on existing electricity distribution poles or for the initial application of a lighting scheme where the cost to reconfigure these poles limits or precludes conformance to subcategory PR1 and PR3 respectively.

TABLE 3.3
VALUES OF LIGHT TECHNICAL PARAMETERS FOR ROADS IN LOCAL AREAS

1	2	3	4
Lighting subcategory	Light technical parameters (LTP)		
	Average horizontal illuminance ^{a,b} (E_h) lx	Point horizontal illuminance ^{a,b} (E_{ph}) lx	Illuminance (horizontal) uniformity ^a Cat. P (U_{catP})
PR1	7	2	8
PR2	3.5	0.7	8
PR3 ^c	1.75	0.3	8
PR4 ^{d,e}	1.3	0.22	8
PR5 ^{d,e}	0.85	0.14	10
PR6 ^f	0.7	0.07	10

^a These values are maintained.

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

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

^d See Clause 3.2 pertaining to lumen derating values for non-white light sources.

^e When the luminaires are to be supported on existing electricity reticulation poles, the subcategories PR3, PR4 and PR5 may be reduced to the next lower subcategory PR4, PR5 and PR6 respectively.

NOTES:

1 Validation of the values in Columns 2 to 4 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, and 3, which will typically be difficult to validate by field measurements.

2 See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.

3 Where there is a significant fear of crime or where required by the relevant authority then for enhanced lighting of the formed pathways, see Table 3.4.

4 The requirements for minimum obtrusive light specified in Clause 3.1.3 apply.

Figure 9.2 Values of light for outdoor areas

TABLE 2.2

LIGHTING SUBCATEGORIES FOR PEDESTRIAN AND CYCLIST PATHS

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

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

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

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

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

^e Footpaths associated with arterial roads are deemed not to require separate lighting provided that—
(a) the road is lit to at least the applicable level of Category V lighting conforming to AS/NZS 1158.1.1; and
(b) the footpath is unshaded, e.g. there are no substantially continuous building awnings, trees (refer to AS/NZS 1158.1.2) and the footpath is contiguous with the roadway.

TABLE 3.4

VALUES OF LIGHT TECHNICAL PARAMETERS FOR PATHWAYS AND CYCLIST PATHS

1	2				3	4	5
	Light technical parameters (LTP)						
Lighting subcategory	Average horizontal illuminance ^{a,b} (E_h)		Point horizontal illuminance ^{a,b} (E_{ph})		Illuminance (horizontal) uniformity ^c Cat. P (U_x)	Point vertical illuminance ^{a,b} (E_{pv})	
	lx		lx				
PP1	10		2		5	1	
PP2	7		1		5	0.3	
PP3	3		0.5		5	0.1	
PP4	1.5		0.25		5	0.05 ^d	
PP5	0.85		0.14		5	0.02 ^d	

^a These values are maintained. See Clause 3.2 pertaining to lumen derating values for non-white light sources.

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

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

^d Conformance of 50% of E_{ph} shall also be demonstrated over an area of 5 m either side of the pathway—where a verge exists—or up to any structure/fence/property boundary that forms the edge of the pathway, unless deemed otherwise by the relevant authorities (see Clause 3.1.3.5).

^e For luminaires with mounting heights of 1.5 m or less, the E_{pv} values need not be applied.

NOTES:

1 Validation of the values in Columns 2 to 5 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, 3 and 5, which will typically be difficult to validate by field measurements.

2 See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.

TABLE 2.1

LIGHTING SUBCATEGORIES FOR ROAD RESERVES IN LOCAL AREAS

1		2		3		4		5		6	
Type of road or pathway		Basic operating characteristics		Pedestrian/cycle activity		Fear of crime		Need to enhance amenity		Applicable lighting subcategory ^a	
Collector roads or non-arterial roads which collect and distribute traffic in an area, as well as serving abutting properties		N/A		High		High		N/A		PR1	
				High		Medium		High		PR2	
				Medium		Low		Medium		PR3 ^b or PR4 ^b	
				Low		Low		Low		PR5	
Local roads or streets used primarily for access to abutting properties, including residential, commercial and industrial precincts		N/A		High		High		N/A		PR1	
				High		Medium		High		PR2	
				Medium		Low		Medium		PR3 ^b or PR4 ^b	
				Low		Low		Low		PR5	
				N/A		N/A		N/A		PR6 ^c	
Common area, forecourts of cluster housing		N/A		High		High		N/A		PR1	
				High		Medium		High		PR2	
				Medium		Low		Medium		PR3 ^b or PR4 ^b	
				Low		Low		Low		PR5	

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

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

^c All lighting subcategories apply across the whole of the road reserve width, including the footpath.

^d Where there is a significant fear of crime or where required by the relevant authority, then, for enhanced lighting of the formed pathways, see Table 2.2.

^e Use of subcategory PR6 shall be discretionary. Generally, subcategory PR6 is only applied to the replacement of existing luminaires installed on existing electricity distribution poles or for the initial application of a lighting scheme where the cost to reconfigure these poles limits or precludes conformance to subcategory PR4 and PR5 respectively.

TABLE 3.3

VALUES OF LIGHT TECHNICAL PARAMETERS FOR ROADS IN LOCAL AREAS

1	2			3	4
	Light technical parameters (LTP)				
Lighting subcategory	Average horizontal illuminance ^{a,b} (E_h)		Point horizontal illuminance ^{a,b} (E_{ph})		Illuminance (horizontal) uniformity ^c Cat. P (U_x)
	lx		lx		
PR1	7		2		8
PR2	3.5		0.7		8
PR3 ^d	1.75		0.3		8
PR4 ^d	1.3		0.22		8
PR5 ^d	0.85		0.14		10
PR6 ^d	0.7		0.07		10

^a These values are maintained.

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

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

^d See Clause 3.2 pertaining to lumen derating values for non-white light sources.

^e When the luminaires are to be supported on existing electricity reticulation poles, the subcategories PR3, PR4 and PR5 may be reduced to the next lower subcategory PR4, PR5 and PR6 respectively.

NOTES:

1 Validation of the values in Columns 2 to 4 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, and 3, which will typically be difficult to validate by field measurements.

2 See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.

3 Where there is a significant fear of crime or where required by the relevant authority then for enhanced lighting of the formed pathways, see Table 3.4.

4 The requirements for minimum obtrusive light specified in Clause 3.1.3 apply.

TABLE 2.3

LIGHTING SUBCATEGORIES FOR PUBLIC ACTIVITY AREAS (EXCLUDING CAR PARKS)

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

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

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

^c See Clause 1.1.1.

TABLE 3.5

VALUES OF LIGHT TECHNICAL PARAMETERS FOR PUBLIC ACTIVITY AREAS (EXCLUDING CAR PARKS)

1	2				3	4	5
	Light technical parameters (LTP)						
Lighting subcategory	Average horizontal illuminance ^{a,b} (E_h)		Point horizontal illuminance ^{a,b} (E_{ph})		Illuminance (horizontal) uniformity ^c Cat. P (U_x)	Point vertical illuminance ^{a,b} (E_{pv})	
	lx		lx				
PA1	21		7		8	7	
PA2	14		4		8	4	
PA3	7		2		8	2	

^a These values are maintained.

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

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

TABLE 2.5

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

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

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

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

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

TABLE 3.7

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

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

^a These values are maintained.

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

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

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

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

Figure 9.3 Values of light for outdoor areas

TABLE 3.3
VALUES OF LIGHT TECHNICAL PARAMETERS
FOR ROADS IN LOCAL AREAS

1	Light technical parameters (LTP)			4
	Average horizontal illuminance ^{a,b} (\bar{E}_h) lx	Point horizontal illuminance ^{a,b} (E_{rh}) lx	Illuminance (horizontal) uniformity ^c Cat. P (U_{xz})	
PR1	7	2	8	
PR2	3.5	0.7	8	
PR3 ^a	1.75	0.3	8	
PR4 ^{a*}	1.3	0.22	8	
PR5 ^{a*}	0.85	0.14	10	
PR6 ^a	0.7	0.07	10	

- ^a These values are maintained.
- ^b Conformance is achieved by being greater than or equal to the applicable table value.
- ^c Conformance is achieved by being less than or equal to the applicable table value.
- ^d See Clause 3.2 pertaining to lumen derating values for non-white light sources.
- ^e When the luminaires are to be supported on existing electricity reticulation poles, the subcategories PR3, PR4 and PR5 may be reduced to the next lower subcategory PR4, PR5 and PR6 respectively.

- NOTES:
- Validation of the values in Columns 2 to 4 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, and 3, which will typically be difficult to validate by field measurements.
 - See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.
 - Where there is a significant fear of crime or where required by the relevant authority then for enhanced lighting of the formed pathways, see Table 3.4.
 - The requirements for minimum obtrusive light specified in Clause 3.1.3 apply.

TABLE 3.6
VALUES OF LIGHT TECHNICAL PARAMETERS
FOR CONNECTING ELEMENTS

1	Light technical parameters (LTP)				5
	Average horizontal illuminance ^{a,b,d} (\bar{E}_h) lx	Point horizontal illuminance ^{a,b} (E_{rh}) lx	Illuminance (horizontal) uniformity ^c Cat. P (U_{xz})	Point vertical illuminance ^{a,b} (E_{rv}) lx	
PE1	35	17.5	8	17.5	
PE2	Same as for highest lighting subcategory applying to areas that about the connecting element but, where forming part of a road or pathway, to be not less than subcategory PA3 in Table 3.5.				
PE3	Same as for highest lighting subcategory applying to areas that about the connecting element but, where forming part of a road or pathway, to be not less than subcategory PP3 in Table 3.4.				

- ^a These values are maintained.
- ^b Conformance is achieved by being greater than or equal to the applicable table value.
- ^c Conformance is achieved by being less than or equal to the applicable value.
- ^d For steps, the requirements assume that the noses of the treads are clearly delineated by a contrasting stripe or other equally effective means. If this does not apply, the illuminance should be at least twice the value specified.

TABLE 3.4
VALUES OF LIGHT TECHNICAL PARAMETERS
FOR PATHWAYS AND CYCLIST PATHS

1	Light technical parameters (LTP)				5
	Average horizontal illuminance ^{a,b} (\bar{E}_h) lx	Point horizontal illuminance ^{a,b,d} (E_{rh}) lx	Illuminance (horizontal) uniformity ^c Cat. P (U_{xz})	Point vertical illuminance ^{a,b} (E_{rv}) lx	
PP1	10	2	5	1	
PP2	7	1	5	0.3	
PP3	3	0.5	5	0.1	
PP4	1.5	0.25	5	0.05 ^e	
PP5	0.85	0.14	5	0.02 ^e	

- ^a These values are maintained. See Clause 3.2 pertaining to lumen derating values for non-white light sources.
- ^b Conformance is achieved by being greater than or equal to the applicable table value.
- ^c Conformance is achieved by being less than or equal to the applicable table value.
- ^d Conformance of 50% of E_{rh} shall also be demonstrated over an area of 5 m either side of the pathway—where a verge exists—or up to any structure/fence/property boundary that forms the edge of the pathway, unless deemed otherwise by the relevant authorities (see Clause 3.1.3.5).
- ^e For luminaires with mounting heights of 1.5 m or less, the E_{rv} values need not be applied.

- NOTES:
- Validation of the values in Columns 2 to 5 is by calculation, not field measurement. This is particularly relevant to small values in Columns 2, 3 and 5, which will typically be difficult to validate by field measurements.
 - See Section 4 for the design methods and requirements for use in assessing conformance to the specified light technical parameters.

TABLE 3.7
VALUES OF LIGHT TECHNICAL PARAMETERS FOR OUTDOOR
CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

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

- ^a These values are maintained.
- ^b Conformance is achieved by being greater than or equal to the applicable table value.
- ^c Conformance is achieved by being less than or equal to the applicable table value.
- ^d E_{rh} shall be determined for each PCD area in the car park and, in each case, it shall be greater than the value stated and greater than the average for the overall car park.
- ^e This level shall be used for any marked areas for pedestrians to cross.

TABLE 3.5
VALUES OF LIGHT TECHNICAL PARAMETERS
FOR PUBLIC ACTIVITY AREAS (EXCLUDING CAR PARKS)

1	Light technical parameters (LTP)				5
	Average horizontal illuminance ^{a,b} (\bar{E}_h) lx	Point horizontal illuminance ^{a,b} (E_{rh}) lx	Illuminance (horizontal) uniformity ^c Cat. P (U_{xz})	Point vertical illuminance ^{a,b,d} (E_{rv}) lx	
PA1	21	7	8	7	
PA2	14	4	8	4	
PA3	7	2	8	2	

- ^a These values are maintained.
- ^b Conformance is achieved by being greater than or equal to the applicable table value.
- ^c Conformance is achieved by being less than or equal to the applicable value.
- ^d Conformance is achieved by being less than or equal to the applicable value.















Figure 9.4 : Values of light for outdoor areas

8.3 Ingress Protection Ratings

Ingress Protection (IP) ratings are used to specify the level of protection provided by an electrical enclosure against the intrusion of solid objects (like dust) and liquids.

An IP rating typically consists of two digits:

- -The first digit indicates protection against solid objects.
- -The second digit indicates protection against liquids.

PROTECTION AGAINST SOLIDS			PROTECTION AGAINST LIQUIDS		
	TEST	PROTECTION		TEST	PROTECTION
X	No test applied.	No specific protection.	X	No test applied.	No specific protection.
0	No test applied.	Inherent degree of protection.	0	No test applied.	Inherent degree of protection.
1		Protected against solid objects larger than 50mm (eg. accidental contact with hand).	1		Protected against drops of water falling vertically.
2		Protected against solid objects larger than 12mm (eg. contact with finger).	2		Protected against drops of water falling at up to 15° from the vertical.
3		Protected against solid objects larger than 2.5mm (eg. tools and wires).	3		Protected against spraying water at up to 60° from the vertical.
4		Protected against solid objects larger than 1mm (eg. fine tools and wires).	4		Protected against splashing water from all directions.
5		Protected against quantities of dust that could interfere with satisfactory operation.	5		Protected against jets of water from all directions.
6		Completely protected against dust.	6		Protected against jets of water of similar force to heavy seas.
			7		Protected against the effects of immersion.
			8		Protected against the effects of submersion.

Defined by IEC 529
DIN 40050 CEI 70-1

**To Australian Standards AS 1939 - 1991
'Classification of degrees of Protection'
Provided by enclosures for electrical
equipment.**

Defined by IEC 529

Figure 9.5: Australian Standards AS 1939-1991 - Classification of degrees of protection

8.4 Protection Against Impact

IK Ratings are an international numeric classification that indicate the degrees of protection provided by enclosures for electrical equipment against external mechanical impacts. It provides a means of specifying the capacity of an enclosure to protect its contents from external impacts in accordance with IEC 62262:2002 and IEC 60068-2-75:1997.

- -IK00 - No Protection
- -IK1 - Protected against 0.14 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 2.2" (56 mm) above the impacted surface
- -IK2 - Protected against 0.2 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 3.2" (80 mm) above the impacted surface
- -IK3 - Protected against 0.35 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 5.5" (140 mm) above the impacted surface
- -IK4 - Protected against 0.5 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 7.9" (200 mm) above the impacted surface
- -IK5 - Protected against 0.7 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 11.0" (280 mm) above the impacted surface
- -IK6 - Protected against 1 joules of impact. Equivalent to the impact of a 0.55 lb (0.25 kg) mass dropped from 15.8" (400 mm) above the impacted surface
- -IK7 - Protected against 2 joules of impact. Equivalent to the impact of a 1.1 lb (0.5 kg) mass dropped from 15.8" (400 mm) above the impacted surface
- -IK8 - Protected against 5 joules of impact. Equivalent to the impact of a 3.75 lb (1.7 kg) mass dropped from 11.8" (300 mm) above the impacted surface

- -IK9 - Protected against 10 joules of impact. Equivalent to the impact of a 11.0 lb (5 kg) mass dropped from 7.9" (200 mm) above the impacted surface
- -IK10 - Protected against 20 joules of impact. Equivalent to the impact of a 11.0 lb (5 kg) mass dropped from 15.8" (400 mm) above the impacted surface

IK RATING CHART 	
IK00	No protection
IK01	Protected against 0.14 joules of impact (equivalent of a 250g object dropped from a height of 56mm)
IK02	Protected against 0.2 joules of impact (equivalent of a 250g object dropped from a height of 80mm)
IK03	Protected against 0.35 joules of impact (equivalent of a 250g object dropped from a height of 140mm)
IK04	Protected against 0.5 joules of impact (equivalent of a 250g object dropped from a height of 200mm)
IK05	Protected against 0.7 joules of impact (equivalent of a 250g object dropped from a height of 280mm)
IK06	Protected against 1 joule of impact (equivalent of a 250g object dropped from a height of 400mm)
IK07	Protected against 2 joules of impact (equivalent of a 500g object dropped from a height of 400mm)
IK08	Protected against 5 joules of impact (equivalent of a 1.7kg object dropped from a height of 300mm)
IK09	Protected against 10 joules of impact (equivalent of a 3kg object dropped from a height of 200mm)
IK10	Protected against 20 joules of impact (equivalent of a 5kg object dropped from a height of 400mm)

Figure 9.6 Protection against impact reference table

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