

# **ATTACHMENT B**

**SYDNEY LIGHTS DESIGN CODE  
(WITH AMENDMENTS)**



# Sydney Lights



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### Acknowledgements

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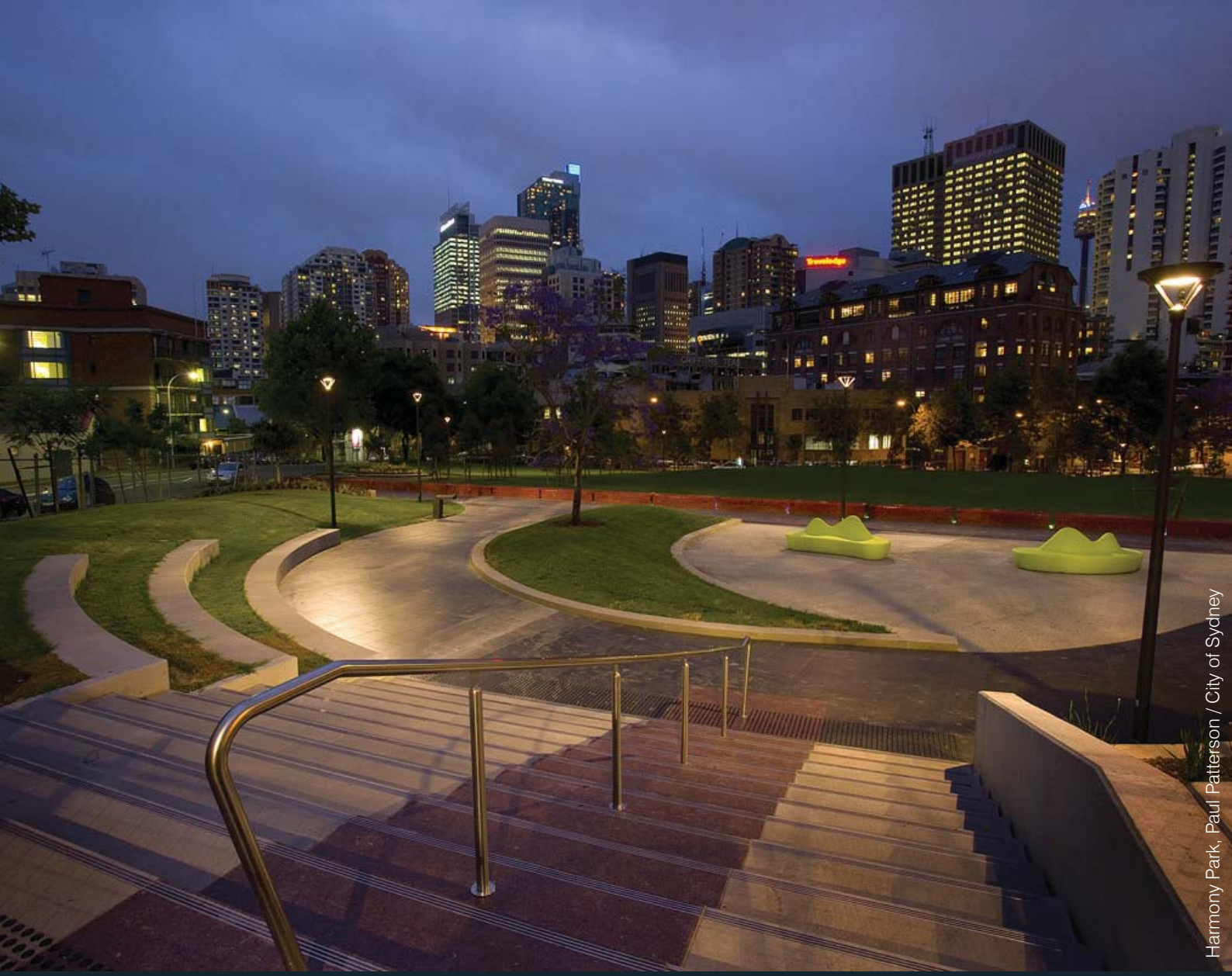
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# Sydney Lights Part One

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## Introduction





Harmony Park, Paul Patterson / City of Sydney

## Introduction

Public lighting is an essential community service that aims to provide pedestrians, cyclists and vehicles with a safe and comfortable visual environment at night. Lighting is also a contributing factor in reducing people's perception and fear of crime and can have a significant influence on the aesthetics of streetscapes and other public spaces.

Sydney Lights is a design code that aims to provide an integrated approach to lighting for the City's public domain.

The City has over 400km of state and local roads, over 400 parks and open spaces, numerous steps, pedestrian tunnels, significant buildings, public artworks and monuments, all of which require a considered lighting approach to provide a safe, enlivened and active city that is legible and easy to navigate.

In addition to fulfilling functional lighting requirements this Code recognises the importance of sustainability, energy efficiency, greenhouse gas reduction and the role lighting can play to reinforce a sense of place and be a mode for creative and artistic expression.

Public lighting, guided by a coherent strategy, will contribute to the identity of the City and serve as a vehicle for promotion, for attracting tourism and increasing night-time patronage.

### 1.1 Purpose

The primary purpose of the Sydney Lights (the Code) is to outline the City's approach to public domain lighting through design principles, palette selection, technical requirements, and performance standards to guide public domain exterior lighting works and upgrades within the City of Sydney Local Government Area.

### 1.2 Why update this Code ?

Since the preparation of the 2006 Interim Sydney Lights Design Code, a significant shift in thinking for the role of lighting in the public domain has occurred.

This updated Code aligns the City's public domain vision with the principles of sustainability, active transport (pedestrian and cycling), accessibility, crime prevention through environmental design (CPTED) principles and public domain quality established by Sustainable Sydney 2030 and subsequent strategic planning and project initiatives such as the Liveable Green Network and the City's current LED lighting replacement program.

The City has also adopted "Open Sydney" which sets a clear vision and direction for the development of Sydney's night time economy over the next 20 years. This Code will contribute to promoting a connected, inviting and safe night time environment.

The Interim Code focused primarily on functional lighting applications. As well as the functional approach to lighting, this updated Code recognises light as a significant contributor to city quality and as a means of artistic expression and contributor to the identity and legibility of the City.

This Code supersedes previous City documents relating to public domain lighting including the Draft Interim Sydney Lights Design Code 2006 and Exterior Lighting Strategy 2000 (repealed).

### 1.3 Scope

The Code applies to exterior lighting of all streets, public spaces and public areas within the City of Sydney Local Government Area (LGA) that are under the City's control.

The Code also provides direction for external lighting schemes for private development that have implications on the public domain.

The City of Sydney also encourages the use of the Code in areas within its boundary that are not in its control, in order to achieve a coordinated and consistent lighting palette to create a coherent city image at night, support long term maintenance benefits and consistent lighting standards for the public domain.



The Code does not apply to advertising and illuminated signage. These areas are addressed in separate planning controls. Contact the City of Sydney for the latest information.

### 1.4 Reading the Code

The Code comprises of the following sections:

#### Part One: Introduction

This section provides an overview of how the code is set out, its use and relation to the City’s public domain framework.

#### Part Two: Lighting Strategy

This section outlines the overall lighting strategy and key lighting considerations for public domain lighting

#### Part Three: Functional Lighting Requirements

This section provides information and requirements for lighting levels and functional lighting palettes.

#### Part Four: Creative Lighting Overlay

This section identifies areas and precincts for creative lighting and sets guidelines for their application.

#### Part Five: Maintenance and Asset Management

This section of the Code provides guidance on lighting maintenance and asset management for lighting equipment used under this Code.

### Part Six: Appendices

#### Appendix 1: Glossary

#### Appendix 2: Background-City of Sydney Initiatives

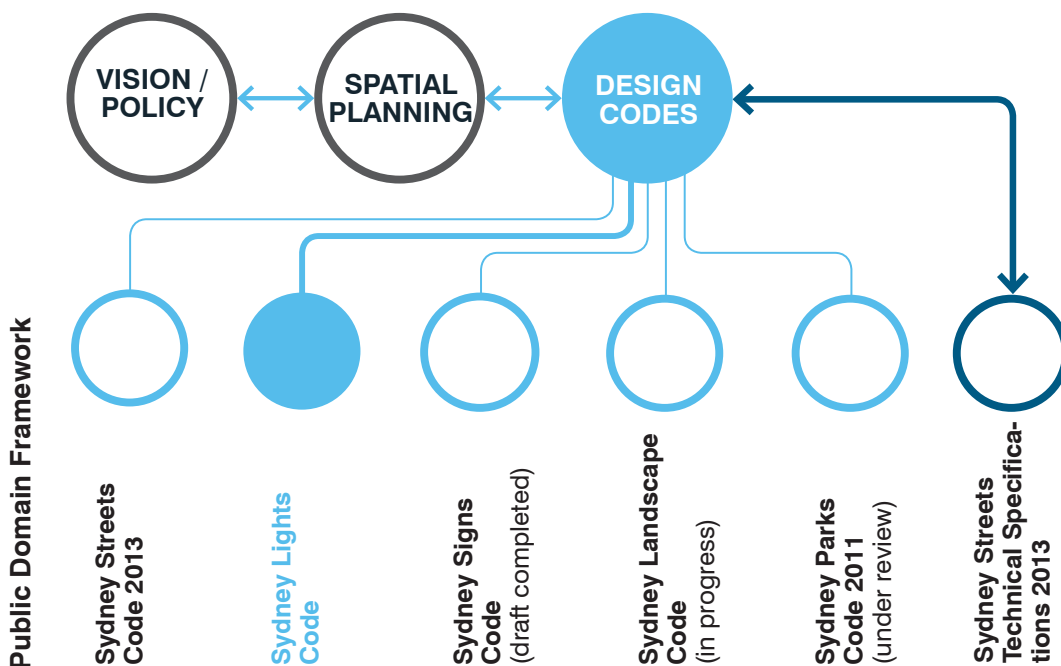
#### Appendix 3: International Benchmarking and Positioning Study

### 1.5 User

The Code provides a set of specific design objectives and technical information for the lighting of public areas and features within the City’s Local Government Area, enabling the City, its community, designers, consultants and contractors to understand and deliver on the City’s objectives. The Code should be used by all stakeholders involved with planning, design and approval of public lighting works for the City.

### 1.6 Public Domain Framework

The City’s public domain planning framework includes a number of strategic plans, planning controls, policy codes and technical specifications that together form a holistic vision for the City’s public domain (refer to figure below). This Code forms part of the family of Design Codes that provide key design guidelines and principles for all parts of the public domain.



For access to other documents that are part of the planning framework refer to the City of Sydney website: [www.cityofsydney.nsw.gov.au](http://www.cityofsydney.nsw.gov.au)

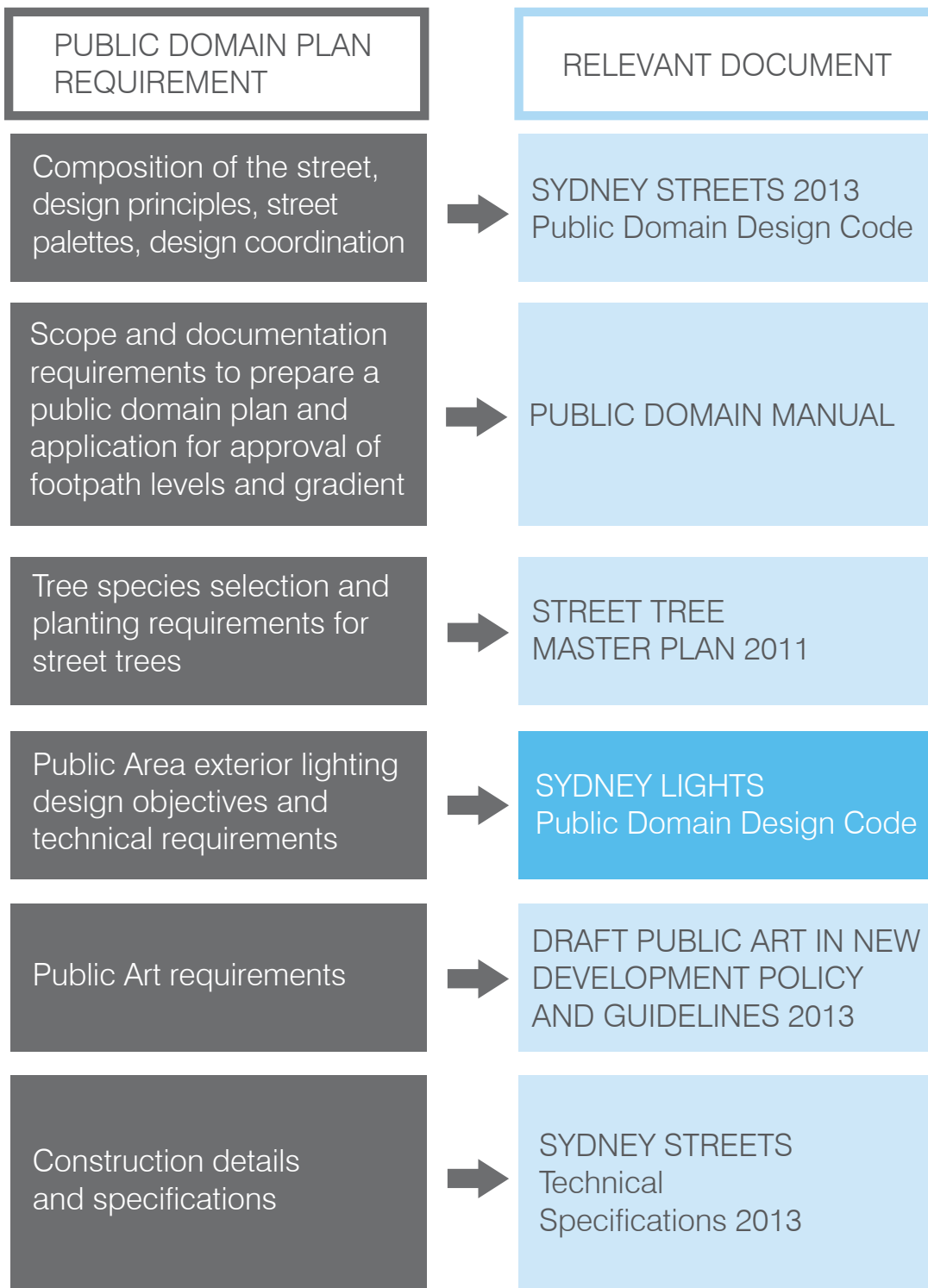
### 1.7 Approval process

Public Domain approval is required to carry out works on land that is owned or managed by the City of Sydney, and land that will be dedicated to the City.

When a development application involves an impact upon the surrounding public domain, a condition may be applied to the development consent requiring the submission of a Public Domain Plan which usually includes the need for a lighting plan.

The Code is one of a number of documents to guide applicants in the preparation of a Public Domain Plan that includes exterior lighting proposals. Shown below are the most relevant reference documents.

Refer to [www.cityofsydney.nsw.gov.au/development](http://www.cityofsydney.nsw.gov.au/development) for full details of the approval process.



## **1.8 Application of the Code**

The Code outlines the overall lighting strategy which encompasses the functional standard lighting palette and creative lighting overlay.

Refer to the maps and standard lighting toolkit for the majority of areas. Prior to applying the Code, confirm the applicable lighting palette with the City of Sydney. If the standard lighting palette applies, the standard luminaire suite is to be used.

For creative lighting applications, consult with the City of Sydney. A proposal should outline reasons for a creative lighting application. Consideration will be given to spatial hierarchy within the overall lighting masterplan, the level and quantity of creative lighting overlay proposed, perceived benefit to the project and the impact on asset management.

Once the lighting palette and relevant lighting categories are established, refer to the relevant guidelines in the Code.

Engagement of an independent, professional and qualified lighting designer is essential.

Refer to Streets Code Technical Specifications for lighting installation details.

## **1.9 Code Review and Update**

The Code recognises that lighting technology is rapidly changing particularly in the realm of sustainability.

It is intended the Code will be regularly updated and reviewed to ensure consideration of technology changes and product developments that could deliver sustainability gains or improved public domain outcomes.

# Sydney Lights Part Two

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## Lighting Strategy



Surry Hills Library, Paul Patterson / City of Sydney



## Lighting Strategy

### 2.1 Vision and Focus

The key aim of Sydney Lights is to develop a coordinated approach to the lighting of the City's public domain that contributes to a safe, active and sustainable City, reinforces a sense of place and encourages creative and artistic expression.

Underwriting this overall lighting vision, the Code sets out two strategic directions for the provision of public domain lighting:

**Functional Use** – provide a co-ordinated and sustainable approach to the lighting of streets and public spaces and setting of lighting levels and standards to provide pedestrians, cyclists and vehicles with a safe and comfortable visual environment at night.

This component is achieved through the application of a Standard Lighting Toolkit Palette, including technical requirements and standard City of Sydney luminaires.

(Refer to Part 3)

**Creative Lighting Overlay** – promote sustainable and energy efficient urban design lighting applications to enhance and define the city structure and its legibility at night time, improve the city image and make it an attractive place to visit.

This component is achieved through the application of creative lighting solutions for targeted specialised lighting applications.

(Refer to Part 4)

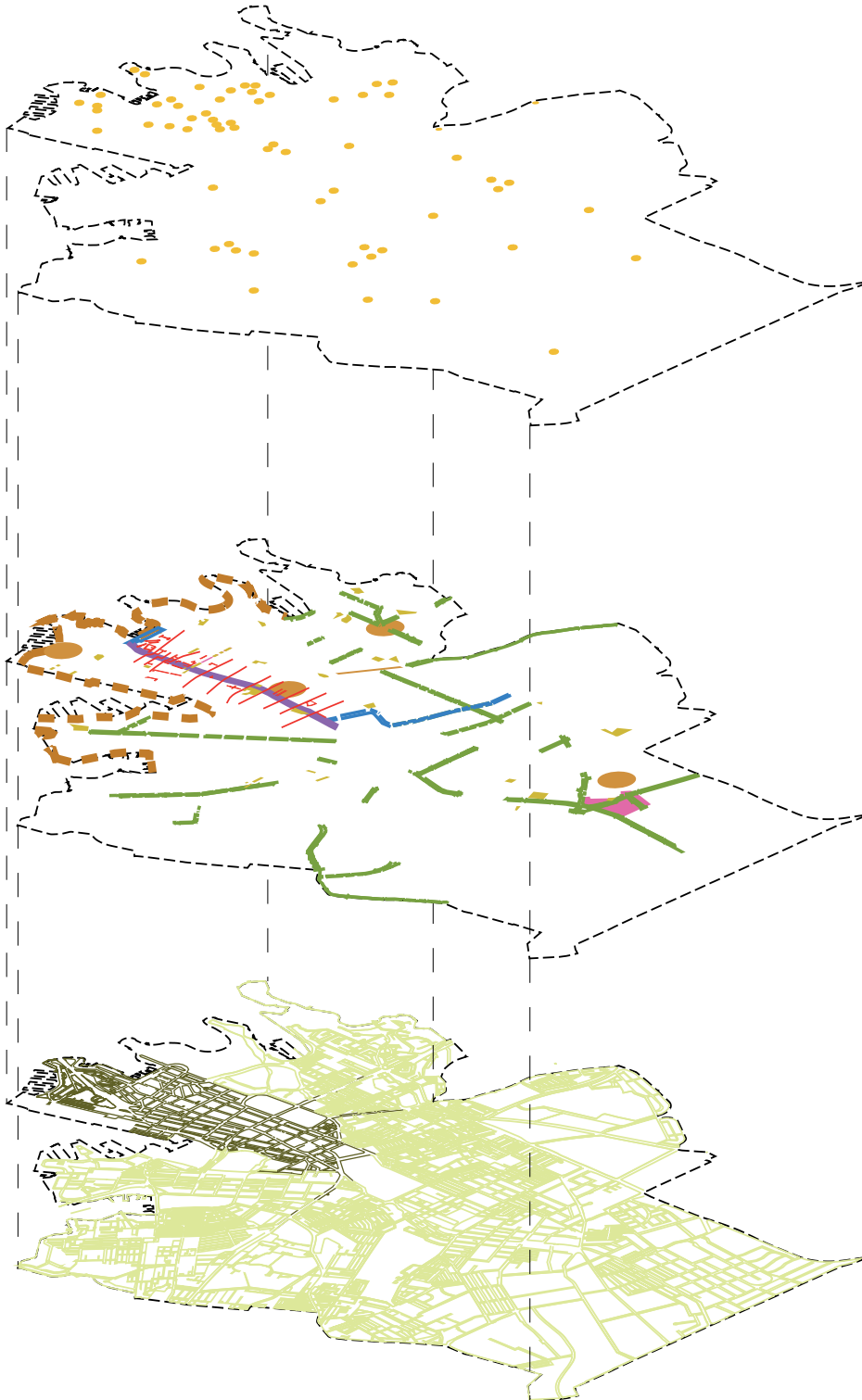


Bourke Street, Surry Hills, Paul Patterson / City of Sydney



Jason Wing, *In Between Two Worlds*, 2011 Kimber Lane, Chinatown

## Key components of lighting strategy



**CREATIVE LIGHTING OVERLAY:**  
DISTINCTIVE ACCENTS  
(refer to section 4.4)

**CREATIVE LIGHTING OVERLAY:**  
CITY STRUCTURE AND PRECINCTS  
(refer to section 4.3)

**FUNCTIONAL USE:**  
STANDARD LIGHTING PALETTES  
AND LEVELS  
(refer to section 3)

## 2.2 Lighting Principles

To articulate the Code's strategic directions and reinforce the public domain directions described in Sustainable Sydney 2030, the following five principles guide the development of public domain lighting provision across the City.

### Principle 1: Promote Safety and Inclusive Design

This principle supports the Sustainable Sydney 2030 Direction 4; A City for Pedestrians and Cyclists. Direction 5; A Lively, Engaging City Centre.

Direction 4 sets a key objective to enhance the City's night time accessibility through the development of a safe pedestrian and cycle network. Pedestrian and cyclist focused lighting is important in supporting safety and in identifying key legible cycleway routes for night time journeys. Establishing integrated and appropriate lighting applications can assist in making sure people of all abilities and ages can enjoy public spaces during the day and night.



Redfern Park / City of Sydney



## Principle 2: Enhance Public Spaces, Public Life

The Code promotes the following directions:

- Establish appropriate lighting levels, standards and luminaire criteria that promotes a safe public domain;
- Illuminate public and pedestrian areas to a level that will reduce the risk of crime to people and property;
- Provide a level of illumination which is adequate for operation of CCTV camera surveillance;
- Allow lighting to facilitate orientation and wayfinding to assist in creating a legible night time environment;
- Create an enjoyable night-scape and feeling of comfort by improving the aesthetic quality of the environment at night time;

This principle supports the Sustainable Sydney 2030, Direction 5; A Lively, Engaging City Centre.

Direction 5 sets a key objective to strengthen the City's public domain identity and create more places for meeting, rest and leisure and to assist with the growth of a diverse night time economy;

The Code promotes the following directions:

- Establish appropriate lighting levels, standards and luminaire criteria to create an enjoyable night-scape and feeling of comfort to attract and encourage people to stay and enjoy the City at night;
- Create a unique environment and recognisable identity for Sydney;
- Create and enhance the night time experience and vibrancy of the cityscape that generates increased visitation;
- Deliver high quality lighting, considering lighting colour, rendering and distribution.



Hyde Park (featuring *Emergence Art and About 2012*), Paul Patterson / City of Sydney

### Principle 3: Promote Sustainability

This principle supports Sustainable Sydney 2030, Target 1; By 2030, the City will reduce greenhouse gas emissions by 50 per cent compared to the 1990 levels, and by 70 per cent compared to 1990 levels by 2050, and Direction 9: Sustainable Development Renewal and Design.

Current public domain lighting is a significant contributor of energy consumption with 40% City's emissions coming from public lighting and accounting for more than one third of the City's electricity bill. Street lighting therefore provides a significant opportunity to contribute to achieving this target through the use of technology that provides a decrease of energy use a reduction of CO2 emissions, energy costs and minimisation of light pollution.

The City of Sydney's LED project is replacing "conventional" street lights with LED luminaires with the aim to significantly reduce electricity bills and maintenance costs. The NSW Government is following the City's lead by encouraging 41 councils across Sydney, the Central Coast and the Hunter regions to work with Ausgrid to implement similar LED lighting projects. New York, London and Hong Kong joined Sydney in another LED trial arranged by the international environment collective, the Climate Group.

The Code promotes the following directions:

- Achieve a reduction in greenhouse gas emissions
- Replace inefficient equipment with more efficient longer lasting technologies. (This Code provides a range of LED luminaires as part of the City of Sydney Standard Luminaire Suite)
- Establish appropriate lighting levels, standards and luminaire criteria to minimise energy consumption and potential adverse environmental effects including sky glow
- Establish efficient and cost effective standards for asset management and ongoing maintenance



Martin Place, Paul Patterson / City of Sydney



#### Principle 4: Promote Active Transport

This principle supports the Sustainable Sydney 2030, Direction 4; A City for Pedestrians and Cyclists.

Conventional lighting layouts, in many cases, focus largely on the needs of the motorist; however lighting for pedestrians and cyclists at night is vital to encourage greater public use of the City by providing a feeling of safety and reinforcing wayfinding and legibility.

Providing legible and well lit public domain creates comfortable and safe environments for people to move around the City and within their local neighbourhoods. Lighting applications should support the well-travelled pedestrian pathways and include major cycle pathways.

The Code promotes the following directions:

- Establish appropriate lighting levels, standards and luminaire criteria for pedestrians and cyclists.
- Encourage active transport at night through appropriate applications of lighting that facilitate clear safe wayfinding and orientation.



Bourke Street, Surry Hills, Paul Patterson / City of Sydney



Bourke Street, Surry Hills, Paul Patterson / City of Sydney

## Principle 5: Respect Distinctiveness and Place

This principle supports the Sustainable Sydney 2030 Direction 7; A Cultural and Creative City.

As an intrinsic part of a city's day and night-scape, lighting is used to shape life, place and identity in a city.

Used in the right way, lighting can facilitate a unique identity and recognisable night time environment by providing a clear and structured nightscape, emphasising landmarks, defining spatial boundaries and increasing the legibility of the urban night scape.

Whilst a coherent solution will enhance the overall city identity, it is also important to recognise and embrace the diversity and local character of individual precincts and to allow for natural and individual developments to enhance specific precinct identities.

The Code promotes the following directions:

- Develop a strategic framework for targeted creative lighting applications to express distinctiveness of place;
- Ensure lighting is integrated as part of urban design, streets and public art strategies.
- **Ensure that heritage context is respected and considered when developing lighting schemes, strategies and design proposals.**



Dixon Street, Chinatown, Paul Patterson / City of Sydney

## 2.3 Public Domain Lighting – Design Considerations

### Integrated approach

Lighting is one component that needs to be considered as part of an overall streetscape and public space upgrade project. Within the urban context, lighting should not be considered in isolation and needs to be co-ordinated with other elements such as street trees, furniture and signage. All street lighting applications for a specific project are ideally to be designed at the same time and where possible should be designed in conjunction with the urban / landscape design of the street. Consideration should be given to the spacing between street trees and furniture and the reduction of visual clutter including the concealment of luminaire control gear. When introducing lighting to an existing street / site, considerations must be given to the conditions of the street / site.

### Trees

Existing trees should be considered at their mature height / canopy spread to ensure minimal disruption to the lighting without excessive or repetitive pruning. The appropriate infrastructure should be selected to provide adequate lighting whilst minimising impact on canopy cover. Trees can interfere with the efficient operation of street lighting, no one technical solution will be appropriate for streets with heavy tree canopies. The geometry of the street, canopy shape, tree management plan for the street and other factors will determine the appropriate approach on a case by case basis

Design considerations to reduce need for excessive trimming include:

- Lengthen brackets
- Options for lower level lighting
- Trimming clearance

Refer to Sydney Streets Design Code 2013

### Engagement of a Qualified Lighting Designer

A qualified and independent lighting designer is essential to each lighting project to assist with the development of a lighting scheme that complies with this Code's requirements and reflects current thinking on lighting design and technological advancements.

The brief for the lighting designer should encompass and satisfy the following aspects:

- to assist with the development of creative lighting applications;
- to provide a cohesive design schema that reflects the vision of the lighting masterplan;
- to ensure and demonstrate compliance with the code requirements

### Safety and Amenity

Setting lighting levels will require the undertaking of a detailed review of crime statistics, consultation with NSW Police/ LAC and review of other crime issues.

When there are concerns about safety, there is a tendency to over-light; however too much light can be as detrimental as too little lighting. To assist in the creation of a safe night-time environment, the atmosphere that needs to be created should be one of welcome, warmth and safety. People need to be able to move within the precinct with ease and confidence. This can be achieved in part by a successful lighting design that illuminates the designated areas correctly and in part by the overall urban context, place management and area policing.

Safety is not guaranteed by the achievement of a particular illuminance requirement. People's perceptions of safety are much more governed by overall design, management and maintenance of an area, night-time population and activity of an area as well as issues such as facial recognition, contrast ratio, glare and colour discrimination as well as the overall atmosphere created.

The City of Sydney Lighting Code considers holistic use of light and other aspects rather than solely light levels on the walking surface to aid in reducing the fear of crime and increasing the perception of safety. By good design that embraces light and shade and subtle contrasts, it is more likely to achieve a safe design solution than the mere distribution of light across the ground.

The following principles should be applied to maintain and enhance security within the LGA:

- In order to feed a sense of safety and security people need to both see and be seen in line with CPTED (**Crime Prevention Through Environmental Design**) principles.
- The minimising of glare is a major priority.
- Concealment and integration of lighting is critical.
- The video camera performance needs to be investigated; lighting should enable satisfactory CCTV/ camera performance. It is noted that new digital imaging technologies can function at relatively low light levels. However higher levels provide clearer, higher resolution pictures.
- Luminaires should not provide opportunities for vandalism. The luminaire mounting heights and equipment quality need to be considered in this regard.
- Provision of light sources with good colour rendition is vital.
- Directional signage and maps need to be adequately illuminated to assist in way-finding and orientation.



- Regular maintenance is to be ensured (e.g. that broken light sources/luminaires are replaced quickly).
- Regular consultation with NSW Police in monitoring and improving any identified crime hot spots.

It should not be assumed that improved lighting alone makes an area safe. All issues concerning integration between security and the lighting design must be coordinated in close collaboration with the main stakeholders and local authorities; it needs to be considered that lighting design is only one part of a larger security strategy.

### **Legibility and Wayfinding – Pedestrians and Cyclists**

Conventional lighting layouts, in many cases, focus largely on the needs of the motorist; however lighting for pedestrians and cyclists at night is vital to reinforce wayfinding and legibility, therefore encouraging greater public use of the City, and an increased feeling of safety.

To guide movement and assist in wayfinding, light is to be used for highlighting landmarks, defining and outlining edges and site boundaries, as marker or beacon and with increased focus on pedestrian scale and traffic, to increase the overall legibility of the cityscape. Visual links can be created and areas of darkness removed by indicating pedestrian underpasses and passages through lighting.



Bourke Street, Surry Hills, Paul Patterson / City of Sydney

Whilst it is of key importance to consider illuminance for safe movement and visual performance, it is also important to consider factors that influence people's perception of brightness and quality of the space, including surface properties, lighting of vertical elements (such as architecture or urban structures), the architectural or urban design intent and luminaire selection.

Lighting alone cannot create a safe area, and will need to be part of a range of measures to increase safety. The perception and feeling of safety and comfort can be increased through higher pedestrian activity and night-time use.

### **Identity**

As an intrinsic part of a city's day and night-scape, lighting is used to shape life, place and identity in a city.

Used in the right way, lighting facilitates a unique identity and recognisable night time environment by providing a clear and structured nightscape, emphasising landmarks, defining spatial boundaries and increasing the legibility of the urban night scape.

Whilst a coherent solution will enhance the overall city identity, lighting also needs to recognise and embrace the diversity and local character of individual precincts and allow for natural and individual developments to enhance specific precinct identities.

### **Quality of Light**

Consideration of light quality is an important consideration in the perception of the public domain at night. This includes the consideration of the correlated colour temperature of light sources, its consistency, colour rendering and light direction.

White light (in hues between 2500 and 4500K), compared to previous traditional yellow light of sodium lamps and bluish tones of mercury vapour lamps, is the preferred light colour for urban lighting applications due to it providing a more natural ambience and improved visibility. Colour Rendering is a key consideration in regards to legibility, comfort and safety.

The direction of lighting in relation to the activity and background environment impacts on the night-time environment and needs to be considered as part of the design.

### **Colour Temperature and Colour Rendering**

LED light sources provide a wide range of colour options from warm and cool white through to RGB options. White light, in the appropriate colour temperature (warm or

cool), is preferred as it reveals more 'natural' colours of the surrounding. The correlated colour temperature (CCT) of a light source, as a measure of the hue of the white light output, influences people's impressions of their surroundings and should be considered for any lighting project.

Colour rendering measures (such as Colour Rendering Index or Colour Quality Scale) provide an indication how colours will appear under different light sources and are an important consideration in public domain lighting.

### Lighting Distribution

A cohesive lighting hierarchy is to be implemented to ensure that darker spaces of the streetscape do not appear unsafe or dimly lit when contrasted with adjacent brightly lit areas. Over-lit spaces can create high contrast with others and is to be avoided.

Awnings, verandas and trees may block street lighting and cast shadows. Lighting to these elements should be considered in the overall design and lighting scheme.

### Luminaires and Vandalism

Vandalism is a key consideration in the selection and mounting of a luminaire. Considerations for luminaire selection include:

- IK Rating: The IK rating of a luminaire refers

to the degree of protection by enclosures for electrical equipment against external mechanical impacts in accordance with IEC 62262:2002 and IEC 60068-2-75:1997.

- The IK Rating ranges from IK00 for luminaires not protected to a rating of IK10 that protects a luminaire against 20 joules impact.
- Materiality and design of luminaires and brackets should be able to withstand environmental conditions of the site.
- Fixings to be concealed and tamper proof where required.
- Mounting height to be considered for public access.

### Minimisation of Adverse Lighting Impacts

If used inappropriately, lighting can cause adverse impacts on the environment and spatial quality of an area. Luminaires can cause light pollution and spill light which can affect local biodiversity and clarity of astronomical observations. Luminaires can also cause discomfort glare if not used correctly, which can affect adjacent residences, reduce visibility and cause distractions to both pedestrians and vehicle drivers.

### Sky Glow

Urban 'sky glow' is the result of stray light, both direct and reflected, being scattered in the atmosphere and brightening the natural sky background level. This has the effect of concealing the stars in the spectacular Southern night skies in a haze of waste light.



Nicole Foreshew, *Born in darkness before dawn*, 2013, William Street, Sydney, City of Sydney, Place Projections, Eora Journey Public Art Project



The City recognises that the urban environment of a large city has competing interests in creating an inviting night time environment for its residents whilst also minimising the sky glow effect. The lighting principles in the Code are designed to achieve the following environmental standards:

- to minimise the escape of waste light into the night sky
- to minimise unnecessary energy consumption
- to promote a glare free environment for traffic and pedestrians
- to utilise the latest technology for effective conversion of light into illumination
- to create an aesthetic appearance for night-time illumination and lighting infrastructure during daylight hours.

Techniques to minimise adverse impacts of light:

- Luminaires should be directed to focus light as required for specific applications.
- Luminaires should only be turned on when required to conserve energy and minimise the unnecessary emission of greenhouse gases.
- Masking techniques are to be used where required to minimise stray light into the sky including baffles and glare shields. Lens selection should also be considered when selecting luminaires.
- Where possible, luminaires are to be full cut off fittings. Up light floodlighting of buildings not recommended
- Consideration is to be given to reduce the impacts on local biodiversity from every lighting scheme.

### **Sustainability - New Initiatives and future design considerations**

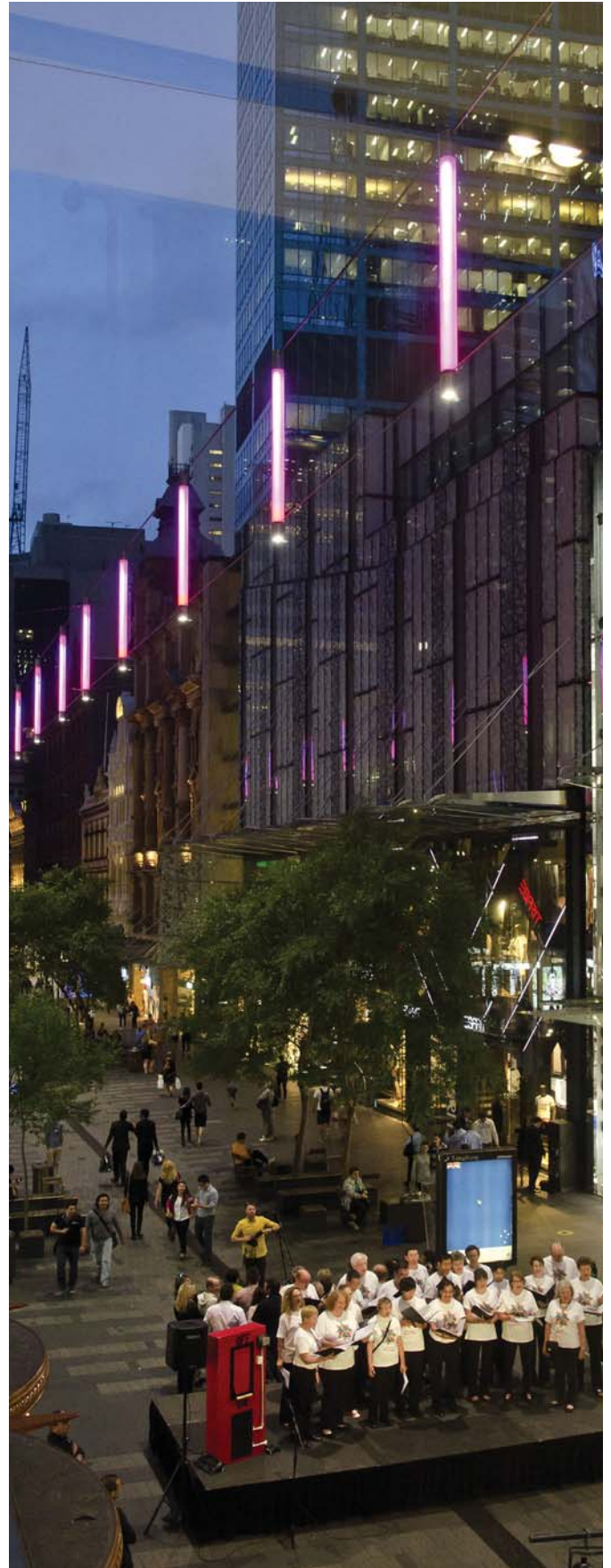
Energy for public lighting is one of the largest causes of greenhouse gas emissions from the City's activities. The reduction of the energy consumption of the City's lighting infrastructure involves not only the implementation of new initiatives by the City of Sydney, but also the consideration of future luminaire specification, maintenance and lighting control.

Public domain lighting is a significant contributor of energy consumption with 40% of the City's emissions coming from public lighting. Public lighting accounts for more than one third of the City's electricity bill and a large part of its greenhouse gas emissions. The City recognises that the most cost effective emissions reduction opportunity lies with public lighting.

Sydney 2030 includes a target to achieve a 70% reduction in greenhouse gas emissions from the 2006 levels by 2030.

### **LED- Changing Technology and Future Trends**

The City LED rollout initiative within the public domain aims to reduce energy consumption and greenhouse



Pitt Street Mall, Paul Patterson / City of Sydney

gas emissions. Luminaires retrofitting existing City fittings incur a saving of at least 40% from existing wattage levels to achieve lighting requirements. Ausgrid have now included LEDs to their standard range and is now the default light for P category lighting.

Within the last decade, there have been significant developments in lighting technologies, which has shifted the focus of key lighting manufacturers into new areas of research and development. These developments support many of the City of Sydney's initiatives in the field of lighting in particular in energy and cost savings.

Light Emitting Diodes (LEDs) have developed over the last years into viable Light sources that have a number of environmental benefits, including increasing efficacy, prolonged life time and low mercury content. It is predicted that LED products will consistently improve and mature over the coming decade improving in efficacy, colour rendering, colour consistency and in overall quality.

Consistent monitoring and reviewing of the City of Sydney's Standard LED luminaire suite should be undertaken to ensure that the suite reflects the most efficient lighting solution and that the City of Sydney remains at the forefront of urban lighting and environmentally sensitive design.

## Lighting Control

As technology improves, the City aims to implement Smart Technology to enable flexibility for lighting level adjustments. Automating lighting control and considering switching groups, allows the reduction of energy consumption when specific lighting elements may not be required.

Lighting control generally consists of two elements. The first element is the physical lighting control equipment that switches the appropriate lighting on at the relevant times. The second element is the personnel management control that ensures the lighting systems are fully maintained and operational in accordance with the objectives of the lighting master plan and the resulting procedures.

To assist in the maintenance and control of the lighting and allow for adjustment to various lighting levels and the level of interaction required, advanced control technology should be used to automate the control and help to establish maintenance requirements.

The following is a list of items to be considered in the lighting control strategy;

- Level of technology required.
- Light level alterations of fittings, both static 'set and forget' and dynamic for special occasions
- Flexibility to enable isolation and stage switching of certain elements
- Energy & environmental considerations

- Timer and Photo Electric Cell (sunset switching).
- Provisions and Procedures for temporary special event lighting (colour change)
- Smart lighting - Ability to adjust lighting levels where appropriate

The implementation of smart lighting control allows the lighting level to be increased when required, resulting in running cost saving and a more comfortable night time environment.

The new cabling requirements for each area shall be studied holistically so that a master cabling and control strategy is implemented. The cabling and control system shall address current and future control requirements and most importantly possible reuse of the existing electrical infrastructure. The electrical infrastructure needs to be fully utilised and expanded to accommodate the level of control required.

## Other Future Design Considerations

### CCTV

Currently the City of Sydney recommends that in areas of CCTV, 4 Lux vertical illumination is to be provided in alignment with AS 4806. With constantly changing technological developments in CCTV cameras, the light required to create a legible image has significantly reduced and is infinitesimal. Future lighting upgrades with CCTV requirements should provide a lighting level suitable to the proposed equipment.

The video camera performance needs to be investigated for each project to ensure required lighting level is provided. Whilst lighting should enable satisfactory CCTV performance it should be considered that new digital imaging technologies can function at relatively low light levels.

# Sydney Lights Part Three

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## Functional Lighting Requirements





Hills Reserve, Surry Hills, Paul Patterson / City of Sydney

## Functional Lighting Requirements

Exterior lighting of public spaces and streets plays a vital role in providing for a city that is accessible and safe for pedestrians, cyclists and vehicles. This section defines the City's standard set of lighting palettes, levels and performance standards for functional lighting in the public domain including lighting and equipment technical specifications.

The Private – Public Domain interface is also considered in section 3.4.6 The Public/Private Domain Interface.

### 3.1 Strategic Approach

The key strategic direction of the Lighting Code is to set the range of required base lighting parameters for public/pedestrian areas and roadways across the LGA, including illuminance levels and technical guidelines. For pedestrian priority and cycle network routes, additional functional lighting requirements are provided to support the City's objective of creating a city for pedestrians and cyclists.

### Components

The Functional Lighting section consists of the following components;

#### **Standard Lighting Palettes and Levels:**

Toolkit of standard palette selection and technical requirements for functional lighting to all streets, parks and plazas within the City of Sydney LGA

In most instances site specific adaptation will be required. The City of Sydney will include Ausgrid and Roads and Maritime Services (RMS) in its liaison with public and private sector organisations particularly in respect to delivery, operation and maintenance issues.

#### **Standard Luminaire Index:**

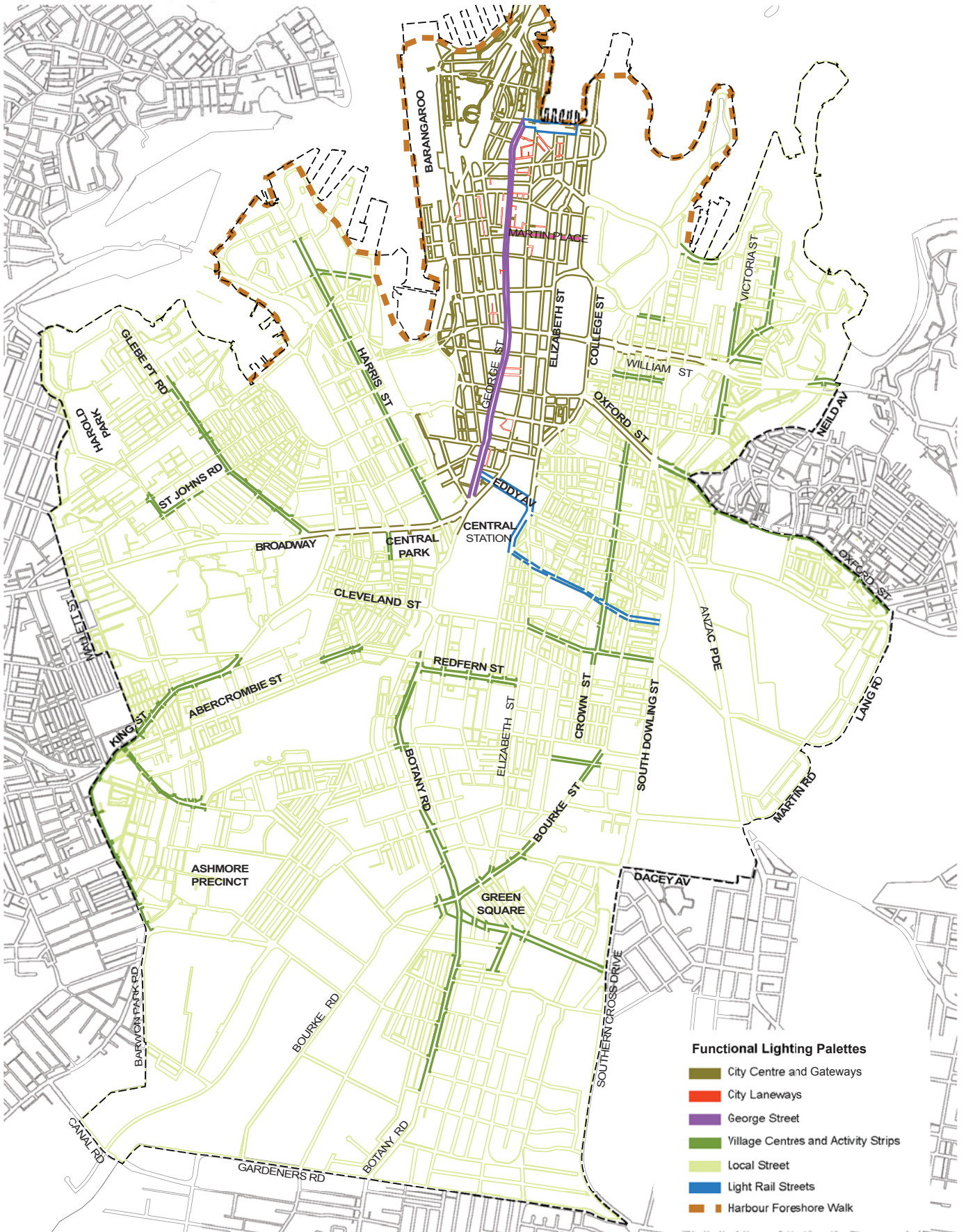
An index of standard lighting fixtures, fittings and luminaires for functional lighting requirements



Foley Park, Glebe, Paul Patterson / City of Sydney



# Lighting Hierarchy Map



Note: This diagram is indicative only. Confirmation of the appropriate lighting palette area is to be decided in consultation with the City of Sydney on a project by project basis.

# 3

## 3.2 Standard Palette - Ownership and Range

Sydney is one of the largest users of street lighting in NSW with 22,000 luminaires at the time of writing the Code. Of these, 13,500 are maintained by Ausgrid and 8,500 by the City.

The Code encourages the consistent use of a limited number of fittings to help create a more coherent public domain and reduce asset management and maintenance costs. For functional standard lighting applications, luminaires are to be selected from the City of Sydney Standard Luminaire Index.

Ausgrid are a significant stakeholder within the City of Sydney Local Government Area, owning a large number of lighting poles installed largely in the local areas. Ausgrid maintain ownership over the luminaires installed on these poles. Refer to the Ausgrid standard luminaire suite web link <http://www.ausgrid.com.au/> for further information.

## 3.3 Selecting Lighting Levels

Lighting levels set the base requirements, however lighting quality considerations are important for the overall perception of space and pedestrian comfort.

These guidelines include quality considerations such as correlated colour temperature of light sources, colour rendering and light distribution.

Setting quantitative lighting requirements ('lighting levels') for the functional lighting applications, include consideration of a range of factors including pedestrian and vehicle number, crime statistics and the importance of enhancing the area.

The below diagram provides reference for comparative illuminance levels:



**< 1 lux**  
P4-P5



**1-10 lux**  
P1-P3, P8, P11<sup>b/c</sup>  
V3-V5



**10-30 lux**  
P6, P7, P11<sup>a</sup>, P12  
V1-V2



**50 lux**  
P10  
SPORTSFIELD

Photographs by Stensen Varming

## Lighting Levels – Standard applications

The Code references the Australian Standards, setting the base minimum requirements for lighting in streets and other public spaces.

AS/NZS 1158 Lighting for Roads and Public Spaces, provides quantitative guidelines on illuminance for exterior applications which are referred to in this Code; lighting categories consist of 'Category V Lighting' and 'Category P Lighting'.

Category V Lighting: Lighting which is applicable to roads on which the visual requirements of motorists are dominant, e.g. traffic routes. Subcategories range from V1 to V5.

Category P Lighting: Lighting which is applicable to roads on which the visual requirements of pedestrians are dominant e.g. local roads or outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant e.g. parks and plazas. Subcategories range from P1 to P12.

Based on the relevant standards, this Code provides a range of lighting levels and requirements applicable to a range of contexts and situations across the City.

## Lighting Levels - State Classified Roads

Within the City of Sydney there are streets that are Roads and Maritime Services (RMS) Classified State Roads which are managed and partially funded by the NSW State Government under the RMS. These streets generally have high vehicular traffic and have specific lighting requirements as outlined by the State Government 'Roads and Maritime Services'.

For State Classified Roads, refer to RMS specific lighting requirements for carriageway lighting: <http://www.rms.nsw.gov.au/> (Street Lighting R72).



### **3.4 Tool kit - Standard Lighting Palette and Levels**

#### **City of Sydney Lighting Palette**

Palette selections and lighting levels are based on the following contexts and settings:

##### **Streets and Footways**

- City Centre
- Village Centres and Activity Strips Areas
- Local Areas
- Heritage Areas
- Urban Renewal Areas

##### **Pedestrian Connections**

- Pedestrian Underpasses/Tunnels
- Pedestrian Crossings
- Stairs/Ramps/Footbridges

##### **Parks**

##### **Plazas**



RMS classified State Road - Eastern Distributor, google search, photographer unknown

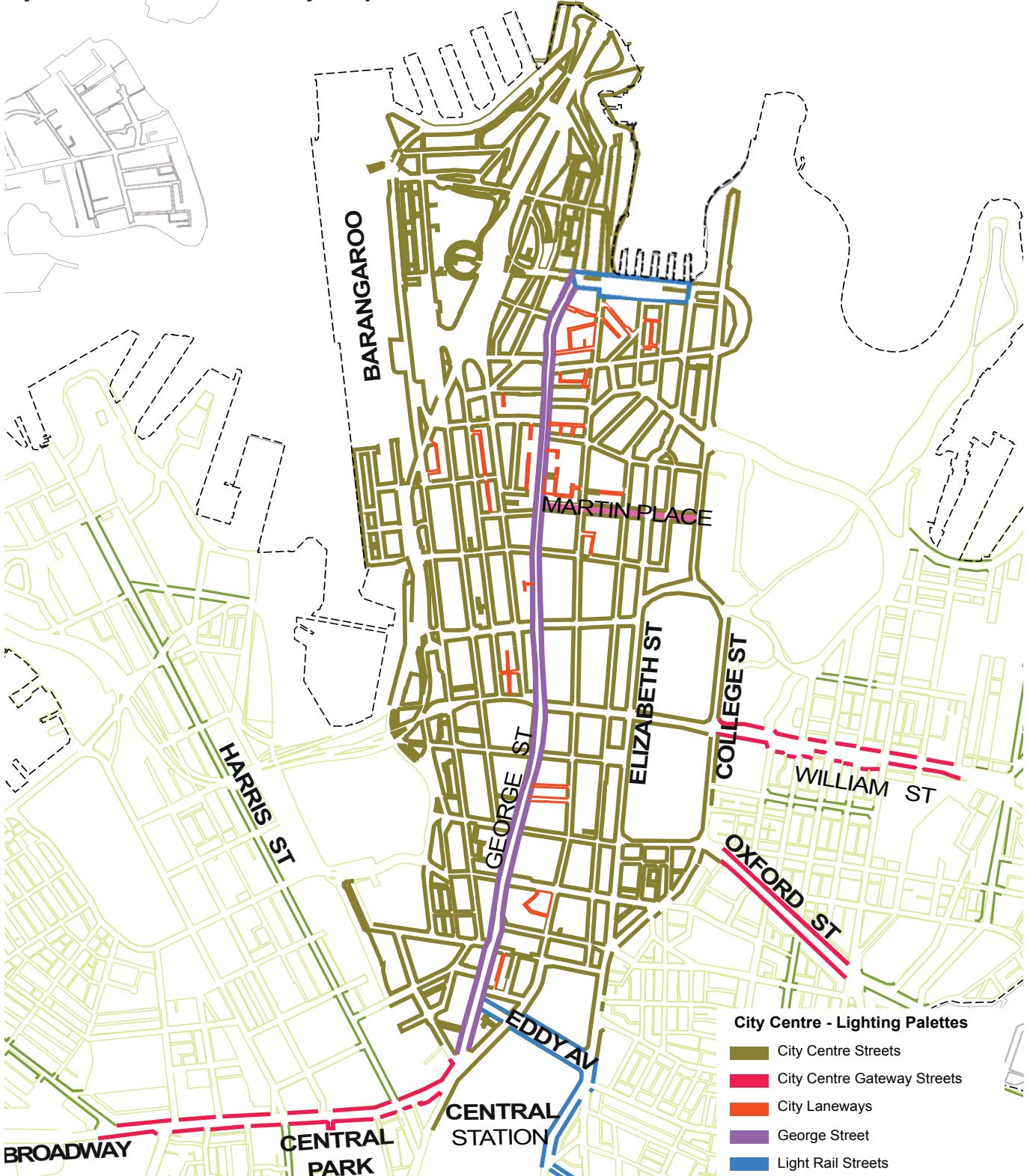
3.4.1 Streets and footways

City Centre Streets and Footways

As the primary destination of locals and visitors, the City Centre is the focal point of the City of Sydney Local Council Area. The lighting strategy aligns with the Sydney

2030 Vision, creating a unique, safe and interesting night time environment that contributes to an increase in the night time economy.

City Centre Streets and Footways map



Note: This diagram is indicative only. Confirmation of the appropriate lighting palette area is to be decided in consultation with the City of Sydney on a project by project basis.

## Toolkit Lighting Palette - City Centre Streets and Footways

	Street Type		Lighting Type*	Recommended Lighting Level**	Light Quality
	<b>Gateway Streets</b>	Providing primary access into and out of the City Centre for both vehicles and pedestrians and include sections of William Street, Oxford Street and Broadway.	S1 Smartpole Range	Vehicle: V1 Pedestrian: P1 Note: Must meet RMS Standard	Vehicle: 3000K-4000K Min Ra80 Pedestrian: 3000K-4000K Min Ra85
	<b>City Centre Streets</b>	City Centre Streets form the key vehicular and pedestrian network within the CBD. These streets have high pedestrian, cycle and vehicular activity.	S1 Smartpole Range	Vehicle: V1-V3 Pedestrian: P1 Note: Lighting level requirements are to consider smart lighting control	Vehicle: 3000K-4000K Min Ra80 Pedestrian: 3000K-4000K Min Ra85
	<b>George Street</b>	George Street provides the main spine of the City along which light rail will travel. Some sections of the street will only accommodate light rail and pedestrian access.	S3 George Street Pedestrian Smartpole Range	Vehicle: V1 Pedestrian/Light Rail Stops: P6 + 30% Note: Lighting level requirements are to consider smart lighting control	Vehicle: 3000K-4000K Min Ra80 Pedestrian/Light rail stops: 3000K-4000K Min Ra85
	<b>Light Rail Streets</b>	Comprises of city centre streets that will accommodate light rail in addition to George Street.	S3 General Use Category Smartpole Range City of Sydney Pedestrian Pole Top Lighting Range	Vehicle: V1 Pedestrian/Light Rail Stops: P6 + 30%	Vehicle: 3000K-4000K Min Ra80 Pedestrian/Light rail stops: 3000K-4000K Min Ra85
	<b>Laneway</b>	Includes traditional lanes service functions and new revitalised activated public spaces with shared zone pedestrian priority functions	City of Sydney Wall Mount Range City of Sydney Standard Palette selection determined on a case by case basis	Vehicle and Pedestrian: P1-P3 Note: Lighting level requirements are to consider smart lighting control	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Shared and Pedestrian Priority Zones</b>	Shared zones are a dedicated shared traffic environment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Areas of pedestrian priority may be closed to vehicular traffic.	S1 Smartpole Range City Standard Pedestrian Pole Top Lighting Range	Vehicle and Pedestrian: P7	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Cycleway Applications</b>	Dedicated cycle zone that may be part of any of the above street typologies requiring additional specific lighting requirements.	S1 Smartpole Range or CoS PED Pole or AusGrid Standards	Cycleway: P2 or nominated pedestrian P level if higher	Cycleway: 3000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and traffic levels and are to be confirmed in consultation with the City of Sydney. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.



### Village Centres and Activity Strips

Located outside the City Centre, village Centres and Activity Strips are characterised by high pedestrian activity and mixed land use of retail, local business and

residential use. Some of these streets will be defined by the light rail network that extends outside the City Centre.

### Village Centre and Activity Strips Map



Note: This diagram is indicative only. Confirmation of the appropriate lighting palette area is to be decided in consultation with the City of Sydney on a project by project basis.

## Toolkit Lighting Palette - Village Centres and Activity Strips

	Street Type		Lighting Type*	Recommended Lighting Level**	Light Quality
	<b>Village Main Street</b>	These streets are characterised by areas of retail, business and entertainment and encompass not only footpaths/pedestrian walkways, but also shop fronts and awnings <sup>1</sup> .	S2 Smartpole <sup>1</sup> or Ausgrid  City Standard Pedestrian Pole Lighting Range	Vehicle and pedestrian: P2	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Light Rail Streets</b>	The Light rail network will extend along some streets outside the City Centre, i.e. Devonshire Street, Surry Hills.	S3 General Use Catenary Smartpole Range  City Standard Pedestrian Pole Lighting Range	Vehicle: V1 Pedestrian/Light rail Stops: P7	Vehicle: 3000K-4000K Min Ra80 Pedestrian/Light rail stops: 3000K-4000K Min Ra85
	<b>Village Centre Laneway</b>	Includes traditional lanes service functions and new revitalised activated public spaces with shared zone pedestrian priority functions	City of Sydney Wall Mount Range	Vehicle and Pedestrian: P1-P3 Note: Lighting level requirements are to consider smart lighting control	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Village Centre Shared and Pedestrian Priority Zones</b>	Shared zones are a dedicated shared traffic environment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Areas of pedestrian priority may be closed to vehicular traffic.	S2 Smartpole Range  City Standard Pedestrian Pole Top Lighting Range	Vehicle and Pedestrian: P7	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Cycleway Applications</b>	Dedicated cycle zone that may be part of any of the above street typologies that may require specific lighting requirements.	S2 Smartpole Range or COS PED Pole or Ausgrid	Cycleway: P2	Cycleway: 3000K-4000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and traffic levels and are to be confirmed in consultation with the City of Sydney. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.

<sup>1</sup>Smartpole Type S2 are to replace Ausgrid poles for Village Main Streets as part of a comprehensive streetscape upgrade. Replacement of poles is subject to assessment and approval by the City of Sydney. In situations requiring ongoing maintenance and renewal, the use of the standard AusGrid lighting palette may still be applicable. Consult with the City of Sydney.

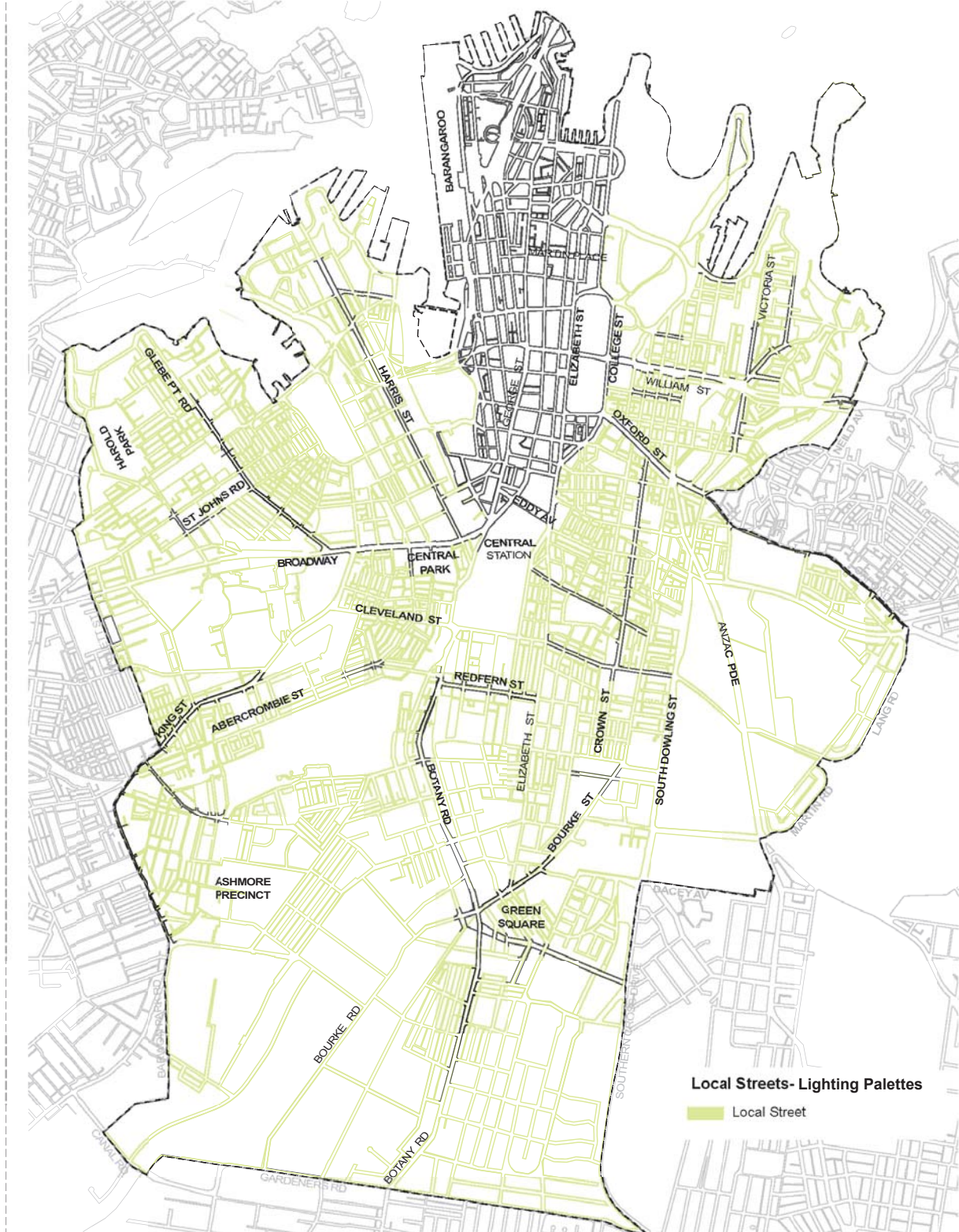


### Local Streets and Footways

Local streets consist predominately of residential and industrial areas that accommodate different levels of

pedestrian and vehicular activity. Lighting is to provide a safe night time environment to suit assessed conditions.

### Local Streets and Footways Map



Note: This diagram is indicative only. Confirmation of the appropriate lighting palette area is to be decided in consultation with the City of Sydney on a project by project basis.

## Toolkit Lighting Palette - Local Streets and Footways

	Street Type		Lighting Type*	Recommended Lighting Level**	Light Quality
	<b>Local Street-Low Activity</b>	Local Streets form the key network outside of the City Centre in a residential or industrial area.	AusGrid Pole Range	Vehicle and Pedestrian: P3	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Local Street-Medium to High Activity (including Liveable Green Network Priority Routes)</b>	Local streets identified by Liveable Green Network masterplan that provide pedestrian and/or cycle priority - Refer to Appendix 4 for LGN Pedestrian Lighting Improvement Plan	AusGrid Pole and Back of Pole range  City of Sydney Standard Pedestrian Pole Range***	Vehicle and Pedestrian: P1-P2	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Local Street-State Classified Roads</b>	Local Streets that connect main roads may form part of the RTA State Classified Road network	AusGrid Pole	Vehicle and Pedestrian: V1- V3	
	<b>Local Laneway</b>	Local Laneways essentially provide service lane functions however many of these lanes may be converted to dedicated pedestrian shared zones.	AusGrid Pole or CoS Wall Lights	Vehicle and Pedestrian: P2-P3	Vehicle and Pedestrian: 3000K Min Ra85
	<b>Local Shared and Pedestrian Priority Zones</b>	Shared zones are a dedicated shared traffic environment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Areas of pedestrian priority may be closed to vehicular traffic	AusGrid Pole  City of Sydney Standard Pedestrian Pole	Vehicle and pedestrian: P2	Vehicle and Pedestrian: 3000K-4000K Min Ra85
	<b>Cycleway Applications</b>	Dedicated cycle zone that may be part of any of the above street typologies that may require specific lighting requirements	AusGrid Pole  City of Sydney Standard Pedestrian Pole Range	Cycleway: P2	Cycleway: 3000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and traffic levels and are to be confirmed in consultation with the City of Sydney. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.

\*\*\*Use of additional pole subject to direction by the City for Liveable Green Network Priority Routes.

<sup>1</sup>In areas with an elevated risk of crime a higher lighting category may be required. Consult with the City of Sydney for specific street applications and requirements.



### 3.4.2 Heritage Areas

Within the City are areas of important heritage value in terms of Australia’s historical and social development. **Heritage context need to be respected and considered, taking into account existing lighting type and any relevant heritage conservation plans.**

These areas require a specific toolkit to align with the heritage character of the built and landscaped environments. Application and use of the heritage area lighting palette is limited to particular areas and is to be assessed by the City of Sydney on a case by case basis.

#### Toolkit Lighting Palette - Heritage Areas

	Street Type	Lighting Type*	Recommended Lighting Level**	Light Quality
	<b>Local</b>	The Rocks style column or CoS Wall Lights	Refer to individual street typology lighting level requirements for specific applications.	Vehicle: 3000K Min Ra80 Pedestrian: 3000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and traffic levels and are to be confirmed in consultation with the City of Sydney. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.






Caraher's Lane, The Rocks, Paul Patterson / City of Sydney

### 3.4.4-3 Pedestrian Connections

Various situations in the public domain require additional assessment for lighting provision. Elements including underpasses, pedestrian tunnels, pedestrian crossings, stairs, ramps and footbridges, act as connecting elements for pedestrians throughout the City of Sydney.

These connecting elements are often associated with a high risk of crime and require specific lighting applications to ensure a safe night time environment that allows for free pedestrian movement.

#### Toolkit Lighting Palette - Connecting Lighting Applications

Street Type		Lighting Type*	Recommended Lighting Level**	Light Quality
<b>Underpasses/ Pedestrian Tunnels</b> 	<p>Underpasses serve both pedestrian and vehicular access with some specifically dedicated to pedestrian priority. Pedestrian underpasses provide a connecting service function for pedestrians only.</p>	<p>City of Sydney Wall Mount Range***</p> <p>City Standard Pedestrian Pole Top Lighting Range***</p>	<p>Vehicle Underpasses: P9 Pedestrian Underpasses: P9</p>	<p>Vehicle: 3000K-4000K Min Ra80 Pedestrian: 3000K-4000K Min Ra85</p>
<b>Pedestrian Crossings</b> 	<p>Pedestrian crossings recognise the need for pedestrian safety and the relationship of pedestrians and vehicles. Vertical illuminance is paramount for pedestrian safety in these areas</p>	<p>AusGrid Pole Lighting Range***</p> <p>S1 Smartpole Range***</p> <p>S2 Smartpole Range***</p> <p>City of Sydney Pedestrian Connecting Luminaire Range (Floodlight)***</p>	<p>Local or arterial road PSL<sup>3</sup> &lt;= 60km/h: PX 1</p> <p>Local<sup>2</sup> or arterial road PSL<sup>3</sup> &lt;= 50km/h: PX 2</p> <p>Local Road<sup>1</sup>: PX 3</p> <p>Refer to AS/NZS 1158.4 for further information</p>	<p>Pedestrian: 3000K-4000K to suit surrounding lighting CCT Min Ra85</p>
<b>Stairs/ramps/ footbridges</b> 	<p>Stairs, ramps and footbridges act as connecting elements for pedestrians throughout the City of Sydney</p>	<p>City of Sydney Standard Pedestrian Pole / Wall Mounted Lighting Range</p>	<p>Pedestrian: P9 Note: Stairs/ramps leading into underground trains stations are to be lit to a P10 category</p>	<p>Pedestrian: 3000K-4000K Min Ra85</p>

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and traffic levels and are to be confirmed in consultation with the City of Sydney. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.

\*\*\*Lighting Type Selection to be based on street context and is to be confirmed by the City of Sydney on a case by case basis.

<sup>1</sup>Local Road- Traffic Deterred (See Glossary)

<sup>2</sup>Local Road- Traffic Slowed (See Glossary)

<sup>3</sup>Speed Limit

### 3.4.5-4 Public Space Lighting

#### Public Space Lighting Objectives

The objectives for public space lighting are:

- To illuminate pedestrian and park areas in the City to a standard that provides a safe and comfortable visual environment for pedestrians at night by the installation of appropriate lighting technologies that allow people to see and be seen
- To provide a level of illumination in high risk areas which is adequate for video surveillance
- To enhance the aesthetic quality of pedestrian spaces and parks through skilful design and location of the pedestrian lighting network
- To provide light sources that give a natural appearance to people and surroundings, with good colour rendition
- To utilise the latest technology in the design of luminaires to ensure:
  - Maximised efficiency
  - Prevention of glare, blind spots and excessive spill light and light pollution
  - Minimisation of greenhouse gas emissions
- To ensure upgrades by the City of Sydney or Ausgrid in public areas use the identified infrastructure
- To establish a manageable portfolio of lighting infrastructure for the City
- To minimise urban street clutter by the coordination of lighting with other lighting elements.
- To create consistency and a recognisable identity for the City using the standard City luminaire suite. Opportunities may exist to introduce a bespoke creative 'Special Lighting Element' in line with the creative lighting overlay strategy.



Prince Alfred Park, Paul Patterson / City of Sydney

#### Parks

The City has over 400 parks and public spaces under its care, control and management. These are located in a variety of contexts and perform numerous functions which require individual assessment to fully determine appropriate performance standards.

#### Approach to Park Lighting

A consistently bright lighting strategy should not be used; large areas of open space should not be lit to a high level unless used for programmed/ organised activities at night.

Instead, a varied lighting approach is to be applied, resulting in a more comfortable user environment as well as providing energy savings. The lighting scheme for a park should consider the following elements: Main park entries, park perimeter, main pedestrian and cycle through pathways and path surrounds, selected landscaped areas i.e. trees, furniture or public art/ architectural elements.

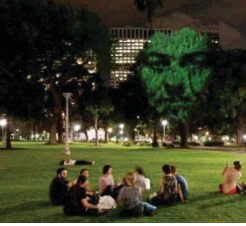



The size, location, circulation patterns / access and use of City's parks will determine the lighting design which is to consider the following:

- Consider the visibility the pedestrian has of the surrounding environment
- Extend park lighting off the main pathway, providing greater visual depth and comfort.
- Reduce glare sources
- Investigate the application of additional lighting applications such as tree lighting and integrated furniture lighting which can contribute to the overall pedestrian experience and perception of safety, mainly by increasing the use of the park and pedestrian activity.
- Provide sufficient light to the main park pathways and the park perimeter to aid in navigation and way-finding

Higher levels of lighting may be required to parks that are designated to act as a major pedestrian passageway, or parks that are deemed as a high crime risk area. Where the Code Toolkit provides a range of lighting requirement, consult with the City of Sydney to determine which level of lighting is deemed appropriate for a specific park project.



## Toolkit Lighting Palette - Parks

Street Type		Lighting Type*	Recommended Lighting Level**	Light Quality
<b>City Centre Park</b> 	<p>Usually experience high pedestrian activity over a longer span of hours. Pathway networks usually provide direct connections to city streets. Park may include activity areas that accommodate night time use.</p>	City Standard Pedestrian Pole Top Lighting Range	Major Pathways: P1-P2 Minor Pathways: P3 Path Edges <sup>1</sup> : P5 Activity Area: P8	Pedestrian pathways and Activity Areas: 3000K-4000K Min Ra85
<b>Village Centre and Local Area Park</b> 	<p>Usually surrounded by residential zones, they provide through site access to local streets or village centre streets and often include programmed activity areas. Larger parks may have distinct/recreational amenities with use by those from a wide catchment area.</p>	City Standard Pedestrian Pole Top Lighting Range	Major Pathways: P2 Minor Pathways: P3 Path Edges <sup>1</sup> : P5 Activity Area: P8	Pedestrian pathways and Activity Areas: 3000K-4000K Min Ra85
<b>Small Local Parks</b> (No through Site Access) 	<p>Usually surrounded by residential zones and do not provide any through site access. In many instances they are adequately lit by street lighting and additional lighting is not required.</p>	City Standard Pedestrian Pole Top Lighting Range  If sufficient light levels are provided by existing surrounding street lighting then further lighting types may not be required. Consult with the City of Sydney	Pathways: P3 Path Edges <sup>1</sup> : P5	Pedestrian: 3000K-4000K Min Ra85
<b>Small Local Parks</b> (Through Site Access Pathway) 		City Standard Pedestrian Pole Top Lighting Range	Pathways: P3 Path Edges <sup>1</sup> : P5	Pedestrian: 3000K-4000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and can be confirmed by advice from the City of Sydney. In all locations lighting levels are subject to consideration of the surrounding lighting levels. In areas of CCTV locations, 4 lux vertical illumination is to be provided. Consult with the City of Sydney for the latest requirements.

<sup>1</sup>Path edges are defined as the area on either side of a major or minor pathway that is the same width as the path itself.



## Sports Field Lighting

Some of the City's parks accommodate active recreation night time use for training, hard court sports and other activities such as jogging and walking around perimeter pathways.

## Approach to Sports Field Lighting

Lighting is to be in line with the requirements of AS 2560 Sports Lighting which is also to be used to determine the appropriate training standard and sporting code. In addition, the following is to be considered:

- Lighting levels are generally to meet training standard (not above)
- Consider amenity impacts and include measures to reduce spill light to neighbouring areas
- Include sustainability provisions in the lighting control strategy, including:
  - The use of automatic timers and light adjustment timers;
  - Multiple switching to allow only required areas to be on;
  - Ensure the lighting is used only when sport is prearranged with the City and where needed to ensure a safe venue for users



## Plazas




Plazas are characterised by pedestrian only activity and are mainly located in areas with a focus on night time activities. They are categorised as:

- City Centre Plazas
- Village Main Street/ Activity Strip Plazas
- Plazas in Urban Renewal Areas

Plazas provide a community meeting zone and a space to sit and relax within the urban context of the City. The lighting schemes for such areas need to reflect the higher night-time pedestrian activity and use, and use particular lighting treatments to distinguish the plazas from the streetscape and main pedestrian routes at night-time. The following is to be considered:

- Lighting should not be uniform across the site but should utilise shadow and light to create focal points and engage the users.
- Sculptures or public art within the plaza may be highlighted.
- Light level requirements for plazas are based on the level of pedestrian activity, levels of crime and CCTV requirements. Where a range of levels is provided in the Toolkit, the appropriate level is to be determined in consultation with the City.
- The main thoroughfare and through passages are to be lit in accordance with the light level requirements listed below. Lighting should allow for modulation in perimeter zones and pocket areas.
- Lighting levels should give consideration to amenity impacts relating to groups of people consuming alcohol including in Alcohol Free Zones.

## Toolkit Lighting Palette - Plazas

	Street Type	Lighting Type*	Recommended Lighting Level**	Light Quality
	<b>City Centre Plaza</b> 	S1 Smartpole Range  City Standard Pedestrian Pole Top Lighting Range	P6/P7/P8 Main thoroughfare lit in accordance with P category requirements, allowing for modulation for other areas and perimeter.	Pedestrian: 3000K-4000K Min Ra85
	<b>Village Centre and Activity Strip Plaza</b> 	S2 Smartpole Range  City Standard Pedestrian Pole Top Lighting Range	P7/P8 Main thoroughfare P7 allowing for modulation for other areas and perimeter	Pedestrian: 3000K-4000K Min Ra85
	<b>Urban Renewal Standard</b> 	S2 Smartpole Range  City Standard Pedestrian Pole Top Lighting Range	P7/P8 Main thoroughfare P7 allowing for modulation for other areas and perimeter	Pedestrian: 3000K-4000K Min Ra85

\*For Luminaire Type Performance Specifications and Information, refer to Part 3. Section 3.5 Standard Lighting Palette

\*\* Refer to AS1158 for lighting category requirements. Specific lighting levels are subject to evaluation of specific site conditions, risk of crime and can be confirmed by advice from the City of Sydney. In areas of CCTV locations, adequate vertical 4 lux is to be provided. Consult with the City of Sydney for the latest requirements.



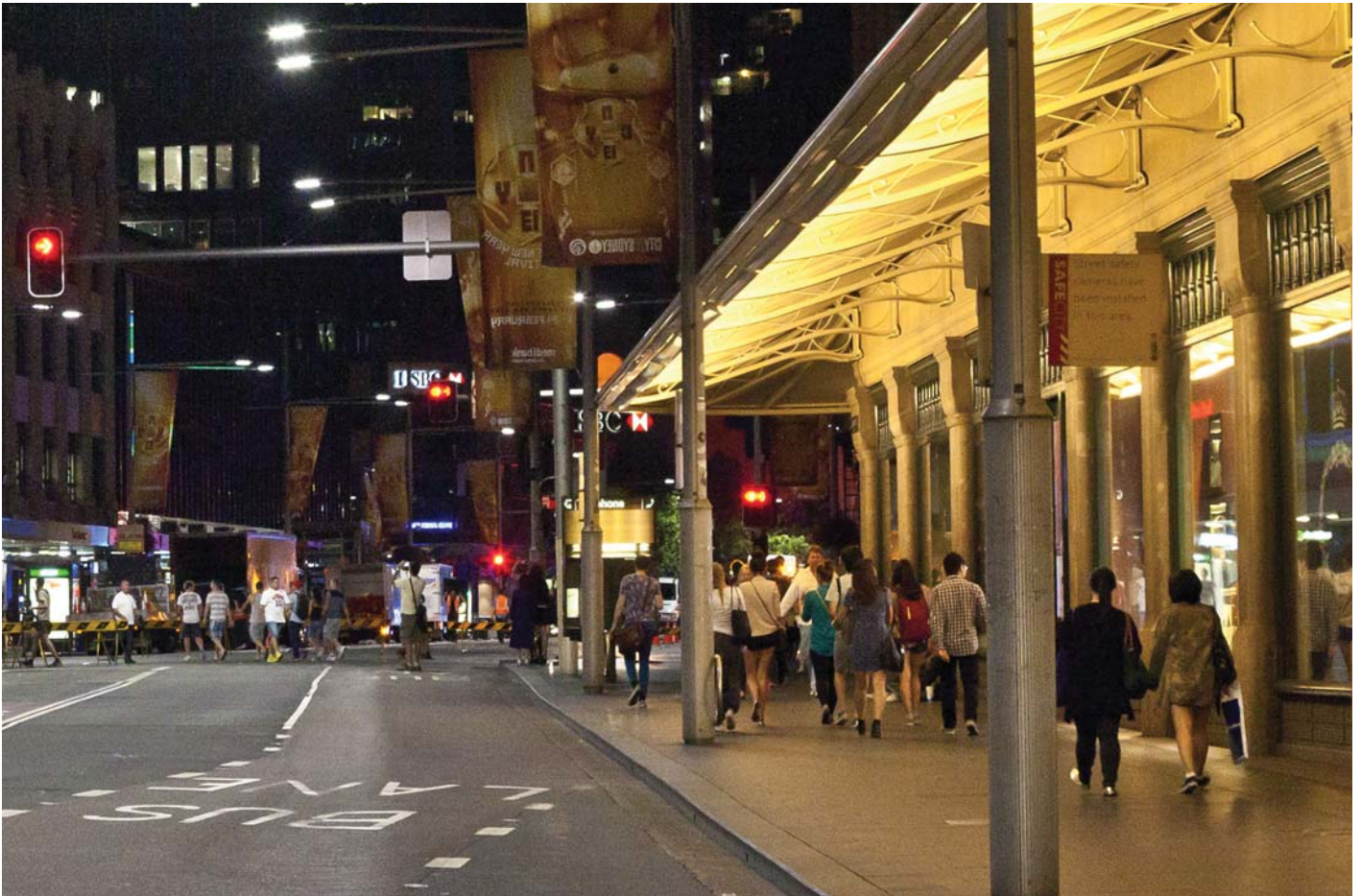
### Under Awning Lighting

Awnings provide a transition from the private to the public domain and vice versa. Despite being attached to private buildings they extend into and affect the public domain. Under Awning Lighting applications have specific requirements as outlined below:

- Lighting may be required below awnings to supplement existing street lighting and 'spill' lighting from shopfronts and other ground floor uses to achieve the required lighting level.
- Lighting is to be in line with the requirements outlined in the functional lighting palette, and to comply with the same light level requirements as the street or pedestrian area the awning is covering; however, with a minimum P3 category to be achieved. Spill lighting from streetlights and other City of Sydney infrastructure is to be considered. Consult with the City of Sydney for additional lighting level requirements.
- Lighting must be recessed into the awning and be integral to the awning's structure and form
- All associated wiring and conduits are to be completely concealed
- Lighting fittings should be readily accessible to support their regular maintenance

- The City may impose conditions on any awning lighting requiring it to be switched on or off between certain hours.
- Consideration should be given to control via photoelectric cell (with manual over-ride switch)
- Avoid uplighting of glazing elements

Consult with the City of Sydney for requirements.



Queen Victoria Building, George Street, Paul Patterson / City of Sydney



### 3.4.6-5 The Public /Private Domain Interface

Private development lighting schemes often have implications on the public domain particularly proposals for:

- Building Façade Lighting
- Retail Frontages
- Roof Top illumination
- Illuminated advertising signage
- Through site links

Exterior lighting schemes for buildings will require Development consent. The City will welcome discussions at the early stage of design development in order to achieve the delivery of effective, safe and efficient exterior lighting schemes.

Illuminated Advertising and signage are subject to separate development assessment processes and are not considered in this Code.

Key planning controls to be referenced include:

- Sydney DCP 2012
- Central Sydney DCP

All private lighting related designs that interface with the public domain are to be submitted to the City of Sydney for review. Liaise with the City of Sydney to confirm project specific lighting requirements.

### Key considerations

#### General

General key considerations for the public private interface include the following:

- AS4282 'Control of the Obtrusive Effects of Outdoor Lighting' addresses the minimisation of light spill and light pollution into the night sky
- All external lighting systems must be energy efficient and subject to appropriate times of operation unless they form part of the City's lighting strategy.
- LED downlighting is preferred over up lighting to minimise light pollution
- Extreme contrasts brightness is to be avoided
- Publicly accessible privately owned open spaces to adhere to AS/NZ 1158 to "P" levels directed by City staff.

### Building Façade Lighting

It is generally not considered appropriate and it is discouraged to light all building facades, in order to avoid light pollution and the unnecessary consumption of energy and generation of greenhouse gas emissions. However, subtle and well-considered architectural façade lighting applications - where the building architecture is contributing to the overall strategy and legibility of the city fabric.

The following is to be considered:

- Over illumination of business premises especially for promotional purposes is to be avoided and discouraged
- Lighting is to be appropriate to highlight certain architectural features of a building. Floodlighting entire facades not supported.
- Ordinary buildings are to have low key approach to lighting so as not to compete with civic landmarks and distinctive accents.
- External lighting fixtures are to be integrated with the architecture of the building where possible and the daytime appearance of the luminaires is not to be visually imposing.
- Dark recesses in building facades affect the perception of safety within the streetscape of the public domain. Adequate lighting should be provided to these areas as an integrated part of the building façade lighting scheme.

### Retail Frontages

The City encourages retail window displays to promote pedestrian and economic security. When lighting Retail frontages, the following is to be considered:

- Shopfronts provide additional light source on retail streets. This spill light is to be taken into consideration.
- Recesses in ground floor retail frontages are to be considered.
- Ground Floor Interiors have an impact on public domain lighting. Consult with the City of Sydney.
- Attractive retail frontages- The brightness of all light sources, luminous surfaces and lit surfaces that are visible from the street, including digital and internally lit signage and billboards, shall be limited to maximum 300 candelas/ square meters. Evidence shall be produced from a suitably qualified lighting designer or the manufacturer of the signage element; any deviations or areas of higher brightness need to be reviewed by the City of Sydney. (Steensen Varming to confirm wording)
- Where appropriate, consideration of night-time controls to reduce or turn off shopfront lighting after 2am.



Apple Store, George Street, Paul Patterson /City of Sydney

## Through Site Links

Lighting to through site links should provide a seamless extension of adjacent street lighting improving legibility and providing continuity signifying public access.

Lighting should also create an atmosphere that is safe and inviting for users. Appropriate light levels and quality is to be discussed with the City of Sydney.

For many development proposals the planning controls require the provision of through site links to limit the length and size of the street blocks to improve accessibility. The City usually requires that public access be maintained to the through-site link 24 hours a day, 7 days per week.

Lighting provision for through site links is to consider the following:

- Provide a seamless extension of adjacent street lighting.
- Lighting proposals to consider open sightlines which complement observation/lighting from adjacent buildings.



Through site link, Hay/Campbell Street, Haymarket, City of Sydney



## 3.5 Standard Lighting Palette

### Introduction

This section of the Code outlines the technical parameters of the lighting elements as defined in each toolkit. All luminaires implemented in an area under the control of the City of Sydney are to comply with the following technical parameters.

### Installation Requirements

When works are undertaken on local streets and footpaths, the Sydney Streets Technical Specifications provide developers, consultants, service providers and City of Sydney staff with the standards and details for design and construction.

The Sydney Streets Technical Specifications sets out the requirements for the installation of street lighting under the direct control of the City.

The Specifications can be downloaded on: <http://www.cityofsydney.nsw.gov.au/development/public-domain-works/da-associated-works/sydney-streets-technical-specifications>

### 3.5.1 Smartpoles and Luminares

Smartpoles are shared services street poles that support the following services and integrate the following accessories:

- RTA signals and signage
- Street Lighting
- Communications (such as mobile cellular network providers)
- Council requirements (such as CCTV, signage and lighting)

(Source: Smartpole Product Manual)

The required services and accessories for each smart pole are to be reviewed in the context of each application in line with the Smartpole Product Manual.

### Smartpole Types and Applications

The current Smartpole range applicable for use in the City of Sydney includes:

- S1 Smartpole range
- S2 Smartpole range
- S3 Smartpole range

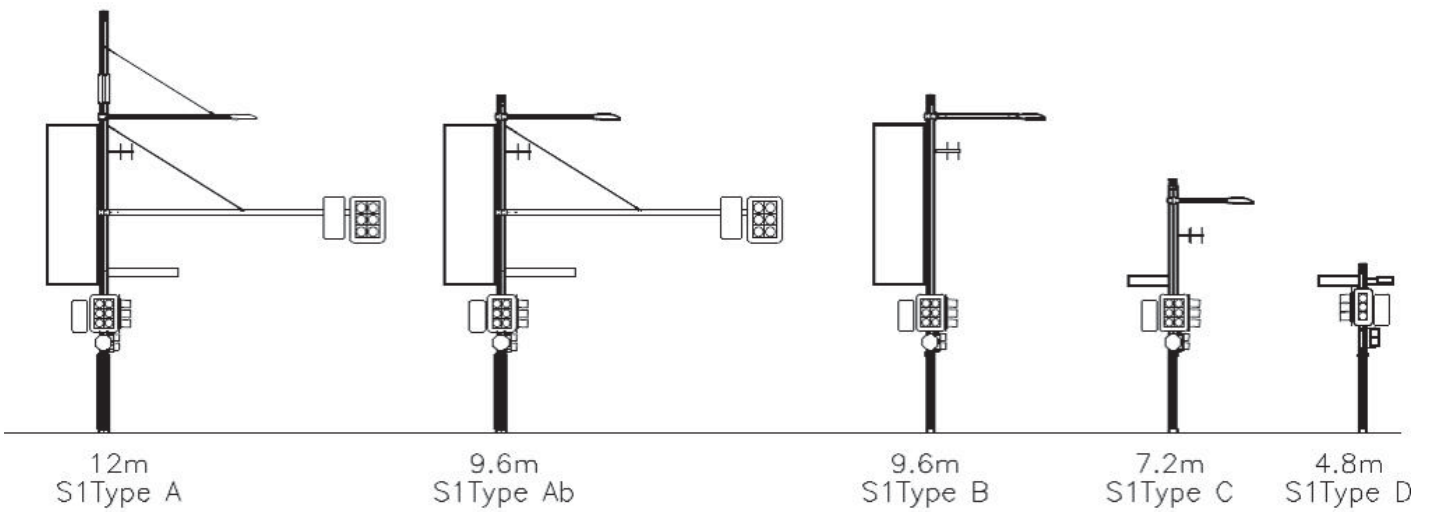
The combination of specific components in each Smartpole application must be investigated on a case-by-case basis to ensure structural and other design parameters are addressed. Each installation and design must be certified in accordance with the current version of the Smartpole Product Manual.

Smartpoles provided through developers' public domain works must comply with City requirements. Where required Smartpoles cannot be installed along a development frontage, they may be required to be installed on the opposite side of the street.

The following sections are intended to illustrate the range and general characteristics of the Smartpole range. Detailed design for each installation may vary, and is subject to specific site conditions and service requirements. Guidance should be sought from the City of Sydney and relevant authorities to confirm the specifications in each location.

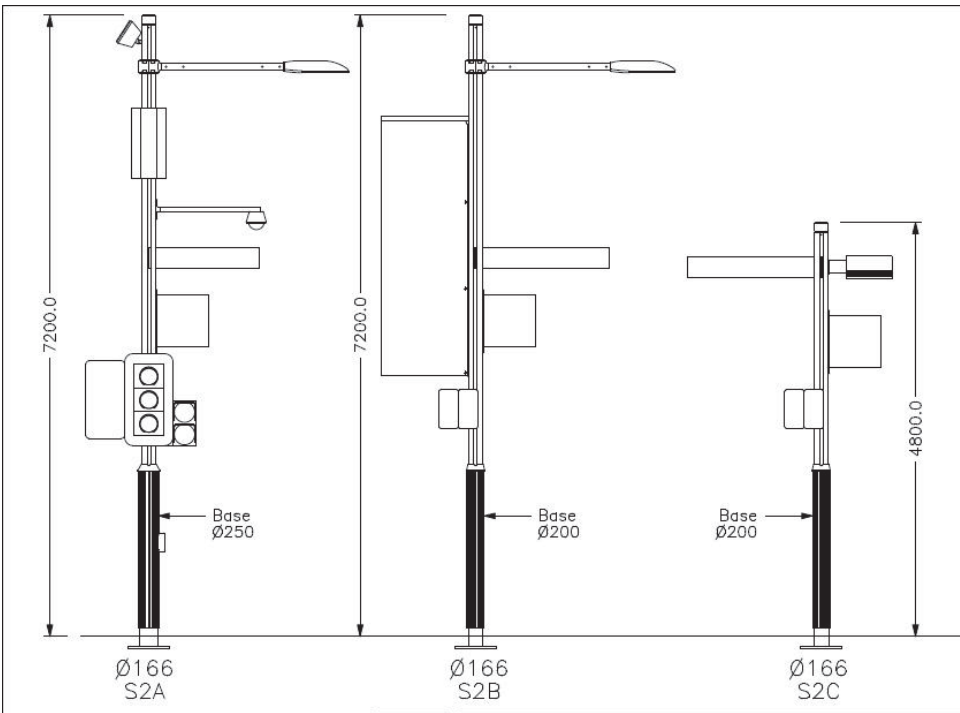
## S1 Smartpole

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
•								



**S2 Smartpole**

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
	•		•					



Glebe Point Road, Glebe, Paul Patterson / City of Sydney



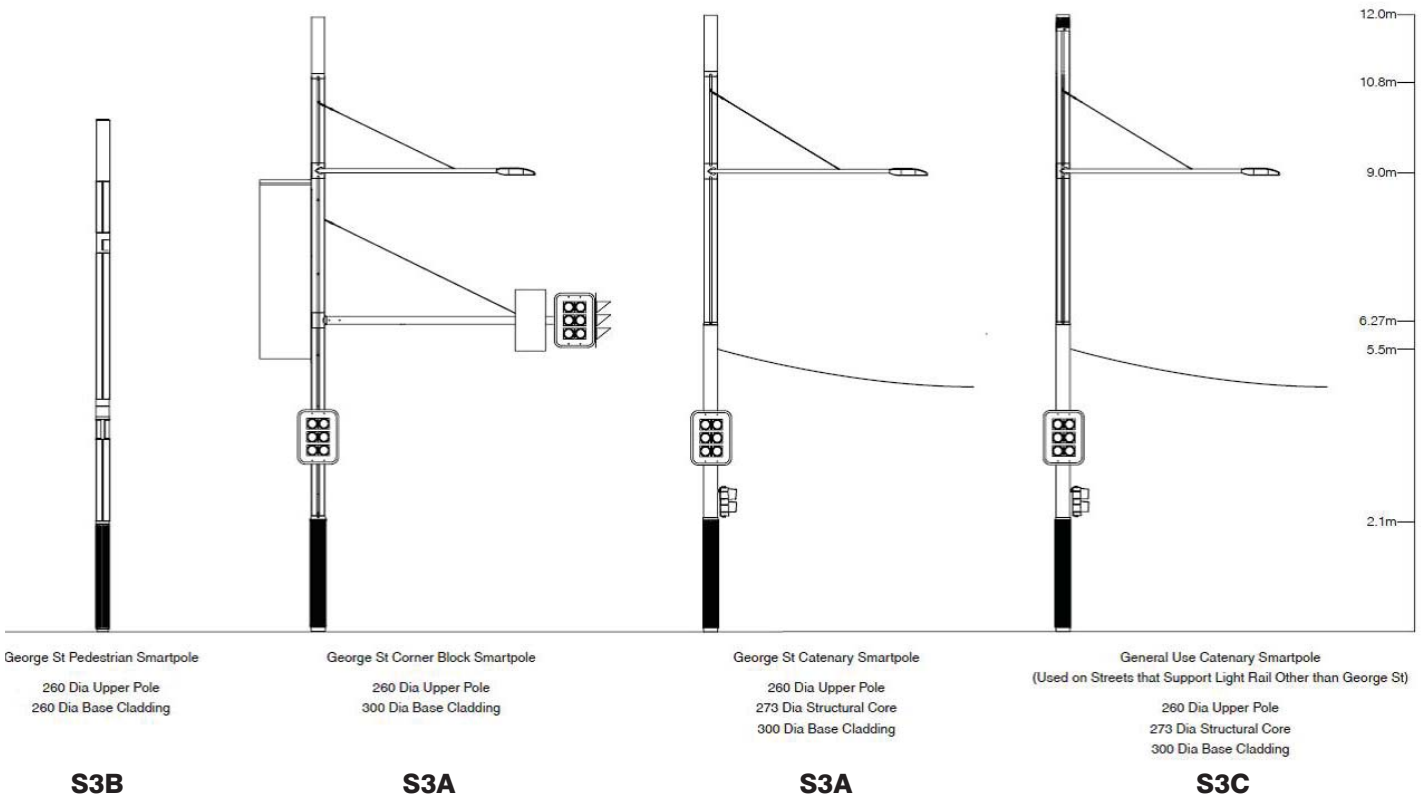
### S3 Smartpole - Light Rail Range

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
								●

The City's existing Smartpoles are not capable of supporting the load of overhead light rail wires. To avoid the need for an intrusive second set of poles in the street, the City and HUB are developing a new, stronger pole which can carry lighting, overhead wires, signage and signalling.



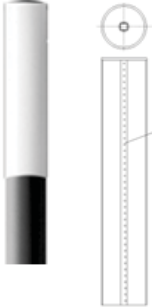
Range includes:

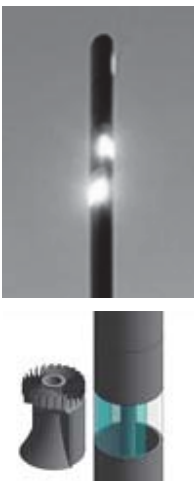

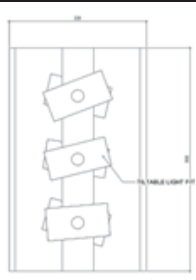
- George Street Light Rail Smartpole Range - George Street as a distinctive street will have its own custom designed S3 Smartpoles
- a General Use Catenary S3 smartpole for streets other than George Street



Concept designs for S3 Smartpole – verify final design and specification with the City of Sydney

## Smartpole Luminaire Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: GE Evolve Modulare Roadway R250; Manufacturer: GE Lighting		S1, S2, S3 General Use (Catenary)	City Centre, Village Centre and Activity Strips, Light Rail, Shared and Pedestrian Priority Zones, Cycleway Application, Pedestrian crossings, Plazas	Asymmetric Medium or Wide Beam light distribution. Selection to be based on application requirements.	LED lamp life L80 @ 50,000 hours, light source efficacy 85lumens/W, CRI 70
1 Module Fitting					<b>1 Module Available Packages in 4300K:</b> 39W medium distribution = 3020lm 39W wide distribution = 2960lm 59W medium distribution = 4560lm 59W wide distribution = 4440lm
2 Module Fitting					<b>2 Module Available Packages in 4300K:</b> 78W medium distribution = 6040lm 78W wide distribution = 5920lm 98W medium distribution = 7580lm 98W wide distribution = 7410lm 118W medium distribution = 9120lm 118W wide distribution = 8890lm
3 Module Fitting					<b>3 Module Available Packages in 4300K:</b> 138W medium distribution = 10,600lm 138W wide distribution = 10,370lm 158W medium distribution = 12,140lm 158W wide distribution = 11,850lm 178W medium distribution = 13,680lm 178W wide distribution = 13,330lm
4 Module Fitting					<b>4 Module Available Packages in 4300K:</b> 197W medium distribution = 15,160lm 197W wide distribution = 14,820lm 217W medium distribution = 16,700lm 217W wide distribution = 16,300lm 237W medium distribution = 18,240lm 237W wide distribution = 17,780lm
Luminaire: George Street Beacon Component  Manufacturer: TBC		S3 George Street Pedestrian Smartpole	George Street	Diffused even lighting with colour changing possibility	LED module within diffused (UV resistant) cylinder.  LED with RGBA/RGBW ability.

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: George Street Area Lighting Component  Manufacturer: TBC		S3 George Street Pedestrian Smartpole	George Street	180 degree sweep asymmetric reflector integrated into pole	LED module, 1050mA, 3000-3200K CCT, LED L70 @ 50,000hrs, Colour Consistency C3 @50,000hrs Luminous Efficacy: 73lumens/W, CRI≥80, 2 step MacAdam Ellipse, IP66 rated module  <b>2 Module Package (max 12m spacing)</b> 82.8W @ 6,000lm (lumen package of modules excluding reflector losses)  <b>3 Module Package (max 15m spacing)</b> 124.2W = 9,000lm (lumen package of modules excluding reflector losses)
Luminaire: George Street Pedestrian Lighting Component  Manufacturer: TBC		S3 George Street Pedestrian Smartpole	George Street	360 degree sweep asymmetric reflector integrated into pole	24 x 2.3W LED modules, Cree, 700mA housed in integrated enclosure 2600-3200K CCT LED L70 @ 60,500hrs Luminous efficacy: 80lumens/W, CRI≥85
Luminaire: George Street Tree Lighting Component  Manufacturer: TBC		S3 George Street Pedestrian Smartpole	George Street	Narrow or Medium beam light distribution (pending final pole and tree locations)	1 x LED module, 700mA, 3000K-3200K, LED L80 @ 50,000hrs, Colour Consistency C3 @50,000hrs, Luminous efficacy: 82lumens/W, CRI≥85  6 housings @ 11.3W per luminaire (Details of housings to be confirmed)



### 3.5.2 Ausgrid Lighting Poles

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
		•	•					

Generally in locations not designated for Smartpoles the street and footpath lighting in the City of Sydney is owned and maintained by the energy supply authority (Ausgrid).

For new streets or streetscape upgrades involving the installation of new poles, the pole, luminaire and lamp types to be used shall be supported by the energy supply authority (Ausgrid), and comply with this Code.



#### Impact on Street Trees

Where possible, upgraded lighting designs should use existing serviceable poles, and avoid trimming of tree canopies.

New pole installations and lighting designs shall be coordinated with street tree locations and other streetscape elements to avoid conflict.

Where power is not to be undergrounded, aerial bundling of cables to minimise impact on street trees is required.

#### Ausgrid Lighting Poles Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Refer to Ausgrid Standard Luminaire Suite		Ausgrid Galvansied Steel Pole for streets with underground power supply.  Range includes poles of various heights and outreach arm lengths	Local Streets, Urban Renewal Areas	Refer to Ausgrid Standard Luminaire Suite	Refer to Ausgrid Standard Luminaire Suite
Refer to Ausgrid Standard Luminaire Suite		Ausgrid Wooden pole consists of lighting outreach arm attached to timber electricity transmission pole.  Range includes various outreach arm lengths in response to street width and tree canopy cover.	Local Streets, Urban Renewal Areas	Refer to Ausgrid Standard Luminaire Suite	Refer to Ausgrid Standard Luminaire Suite

Refer to Ausgrid Standard Luminaire Suite for further information. <http://www.ausgrid.com.au/>

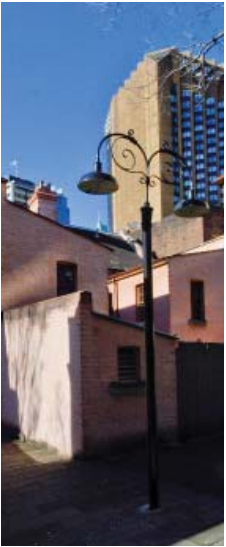
### 3.5.3 Heritage poles and luminaires

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
				●				

The Rocks/ Harbour Village North Precinct of the City of Sydney is an area of heritage character and importance. These lighting poles are used in this area to suit the architectural aesthetic and heritage streetscape and may only be used in rare occasions outside of the Rocks area.

Consult with the City of Sydney for applicable locations.

#### Heritage Lighting Poles Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: Rocks Style Column		Rocks Column	Heritage Areas	CoS to confirm	CoS to confirm

# 3

## 3.5.4 Wall Mounted luminaires



City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
• (laneways only)	• (laneways only)		• (laneways only)					

Wall mounted light installations are most commonly used for laneways or narrow streets for both street and pedestrian lighting where poles cannot be installed. This is usually a result of the absence of adequate footpaths for safe pole installation, the location of major in-ground services that prevent installation of poles and footings, or as a strategy to reduce clutter of pole elements in the public domain.

Application of wall mounted luminaires should consider the urban design impact on the streetscape and mounting surface (including heritage considerations)

All instances of wall-mounted lighting installations are to be determined by the City of Sydney.

### Wall Mounted Lighting Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: Evolve LED Area Light Manufacturer: GE Lighting		n/a outreach arm may be applicable	laneways / narrow streets	Asymmetric Forward or wide light distribution	Small (single) Module Available packages for 4000K:  50W = 3130lm 63W = 4050lm 76W = 4970lm 89W = 5890lm 101W = 6810lm  General: Lamp Life L85 at 50,000H, CRI70, light source efficacy 67lumens/W
Small (single) Module					
Medium (Double) Module					







### 3.5.5 Pedestrian Pole Top Luminaires

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
		•	•		•	•	•	•

The provision of pedestrian pole top lighting is mainly used to provide required lighting levels to public spaces such as plazas and parks.

These lighting elements also have street based applications for situations where additional illumination is required for pedestrian and cycle priority use as well as publicly accessible privately owned spaces that have a similar requirement for provision of adequate pedestrian lighting.

#### Pedestrian Pole Top Lighting Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: Evolve LED Post Top Twin Contemporary, Tiered Circular  Manufacturer: GE Lighting		City Standard tapered steel pole. Micaceous Iron Oxide Grey/ Metropolis Bronze Pearl/ Black colour finish*  Pole Height: 4.5m-6m	Parks, Plazas, Local Streets.  Often used for retrofitting purposes	Asymmetric or symmetric	LED, 4100K  Min. light source efficiency 65 lumens/watt LED lamp life L85 at 50,000H CRI 65  4,630lm @ 86W 2,380lm @ 49W
Luminaire: Evolve LED Post Top Twin Contemporary, Tiered Cone  Manufacturer: GE Lighting		City Standard tapered steel pole. Micaceous Iron Oxide Grey/ Metropolis Bronze Pearl/ Black colour finish*  Pole Height: 4.5m-6m	Parks, Plazas, Local Streets.  Often used for retrofitting purposes  This is the City preferred luminaire.	Asymmetric or symmetric	LED, 4100K  Min. light source efficiency 65 lumens/watt LED lamp life L85 at 50,000H CRI 65  4,630lm @ 86W 2,380lm @ 49W
Luminaire: Evolve Duna  Manufacturer: GE Lighting		City Standard tapered steel pole. Micaceous Iron Oxide Grey/ Metropolis Bronze Pearl/ Black colour finish*  Pole Height: 4.5m-6m	Parks, Plazas, Local Streets.  Often used for retrofitting purposes	Asymmetric Wide/ Asymmetric Forward/ Symmetric	LED 4100K  Min. light source efficiency 65 lumens/watt LED lamp life L85 @ 50,000H
Luminaire: Odyssey LED  Manufacturer: GE Lighting		City Standard tapered steel pole. Micaceous Iron Oxide Grey/ Metropolis Bronze Pearl/ Black colour finish*  Pole Height: 4.5m-6m	Laneway/ Narrow Local Streets.	TBC	TBC

Note: Selection of Luminaire made based on required light distribution / performance and to match existing elements, CoS to confirm.  
\* Selection of pole colour made based to match existing elements / CoS palette, CoS to confirm.

3

<p>Luminaire: City of Sydney Custom Pole Light*</p> <p>Manufacturer: GE Lighting</p>		<p>Custom Pole Design</p>	<p>City Centre</p> <p>This fitting is to be used in high profile/ high activity areas as directed by the City. Consult with the City of Sydney for application confirmation.</p>	<p>TBC by CoS</p>	<p>TBC by CoS</p>
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\* Currently under development

### 3.5.6 Pedestrian Connecting Spaces Luminaires

City Centre and Gateways	Village Centres / Activity Strips	Local Streets	Urban Renewal Areas	Heritage Areas	Pedestrian Connections	Parks	Plazas	Light Rail Streets
					•			

In certain instances, pole lighting may not be a viable lighting solution. In this instance a catenary floodlight option may be viable. Consult with the City for application.

### Pedestrian Connecting Spaces Lighting Palette

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
TBC by CoS (Sylvania)		TBC by CoS	Pedestrian Crossings	TBC by CoS	TBC by CoS- To provide datasheet for technical input