

Public Domain Design Codes

P 2 10 AN I II 1

	Part One			Part Two		F	Part Thre
	Introduction			∟ighting Strategy		FL	Functiona ighting Requirem
1.1	Purpose	06	2.1	Vision and Focus	06	3.1	Strategic A
1.2	Why update this Code?	06	2.2	Lighting Principles	14	3.2	Standard I
1.3	Scope	06	2.3	Public Domain Lighting	-19		Ownership
1.4	Reading the Code	07		Design Considerations		3.3	Selecting I
1.5	User	07				3.4	Tool kit - S
1.6	Public Domain Framework	07					Lighting Pa Levels
17		00				3.4.1	Streets an
1.7	Application of the Code	00				3.4.2	Heritage A
1.0	Application of the Code	09				3.4.3	Pedestriar

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CITY DESIGN City of Sydney

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Strategic Approach	26
Standard Palette - Ownership and Range	28
Selecting Lighting Levels	28
Tool kit - Standard Lighting Palette and Levels	29
Streets and footways	30
Heritage Areas	36
Pedestrian Connections	37
Public Space Lighting	38
The Public / Private Domain Interface	43
Standard Lighting Palette	46
Smartpoles and Lumianires	46
AUSGRID Lighting Poles	52
Heritage poles and luminaires	53
Wall Mounted luminaires	54
Pedestrian Pole Top Luminaires	55
Pedestrain Connecting Spaces Luminaires	57
	Strategic Approach Standard Palette - Ownership and Range Selecting Lighting Levels Tool kit - Standard Lighting Palette and Levels Streets and footways Heritage Areas Pedestrian Connections Public Space Lighting The Public / Private Domain Interface Standard Lighting Palette Smartpoles and Lumianires AUSGRID Lighting Poles Heritage poles and luminaires Wall Mounted Iuminaires Pedestrian Pole Top Luminaires Pedestrain Connecting Spaces Luminaires

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Acknowledgements

All images and photographs shown and not labelled are City of Sydney photography.

Part Four

Creative Lighting Masterplan

4.1	Introduction	60
4.2	Strategic Approach	60
4.3	City Structure and Precincts	60
4.3.1	City Centre Skyline	60
4.3.2	Harbour Foreshore	62
4.3.3	Precincts & Village Main Streets	62
4.3.4	City Centre	69
4.4	Distinctive Accents	74
4.4.1	Approach	74
4.5	Special Lighting Elements	82
4.5.1	Non Standard Poles and Fixtures	82
4.5.2	Catenary Lighting	82
4.5.3	Bollards	83
4.5.4	Furniture Lighting	83

4.6 Creative Lighting 84 Implementation

Part Five

Maintenance and Asset Management

5.1	Asset Management
5.2	Maintenance
5.3	Waste Management Plan and Recycling

Part Six

88

88

89

Appendices

6.1	Appendix 1: Glossary	92
6.2	Appendix 2: Background- City of Sydney Initiatives	93
6.2.1	Sustainable Sydney 2030	93
6.2.2	City Public Domain Plans	93
6.2.3	Open Sydney	93
6.2.4	Liveable Green Network	94
6.2.5	Safe City	94
6.2.6	Public Art Masterplans	94
6.3	Appendix 3: International Benchmarking and Positioning Study	95
6.4	Appendix 4: Pedestrian Lighting Improvement Plan	97

Sydney Lights Part One Introduction

city of Villages



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 nighttime 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

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 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 Lighting Strategy

city of Villages



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

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 Sydney Lights Public Domain Design Code



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 will 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 save 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 nighttime 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 temperate (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

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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 luminaries.
- 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

ССТУ

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 Functional Lighting Requirements

city of Villages



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.

3.2 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:

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).



< 1 lux P4-P5



1-10 lux P1-P3, P8, P11^{b/c} V3-V5



10-30 lux P6, P7, P11^a, P12 V1-V2



50 lux P10 SPORTSFIELD

Photographs by Stensen Varming

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

City Centre Streets and Footways map

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



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	Light Quality
			Lighting Level**	
Gateway Streets	Providing primary access into and out of the City Centre for both vehicles and pedestrians and in- clude 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
City Centre Streets	City Centre Streets form the key vehicular and pedestrian network within the CBD. These streets have high pedestrian, cy- cle 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
George Street	George Street provides the main spine of the City along which light rail will travel. Some sections of the street will only ac- commodate 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
Light Rail Streets	Comprises of city centre streets that will accommo- date light rail in addition to George Street.	S3 General Use Cate- nary Smartpole Range City of Sydney Pedes- trian 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
Laneway	Includes traditional lanes service functions and new revitalised activated public spaces with shared zone pedestrian priority func- tions	City of Sydney Wall Mount Range City of Sydney Stand- ard 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 Pedes- trian: 3000K-4000K Min Ra85
Shared and Pedestrian Priority Zones	Shared zones are a dedi- cated shared traffic envi- ronment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Ar- eas of pedestrian priority may be closed to vehicu- lar traffic.	S1 Smartpole Range City Standard Pedes- trian Pole Top Lighting Range	Vehicle and Pedestrian: P7	Vehicle and Pedes- trian: 3000K-4000K Min Ra85
Cycleway Applications	Dedicated cycle zone that may be part of any of the above street typologies requiring additional spe- cific 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.
Sydney Lights Public Domain Design Code

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

Village Centre and Activity Strips Map

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



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	Light Quality
			Lighting Level**	
Village Main Street	These streets are charac- terised by areas of retail, business and entertain- ment and encompass not only footpaths/pedestrian walkways, but also shop fronts and awnings ¹ .	S2 Smartpole ¹ or Ausgrid City Standard Pedestrian Pole Lighting Range	Vehicle and pedes- trian: P2	Vehicle and Pedestrian: 3000K-4000K Min Ra85
Light Rail Streets	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
Village Centre Laneway	Includes traditional lanes service functions and new revitalised activated public spaces with shared zone pedestrian priority func- tions	City of Sydney Wall Mount Range	Vehicle and Pedestrian: P1-P3 Note: Lighting level requirements are to consider smart light- ing control	Vehicle and Pedestrian: 3000K-4000K Min Ra85
Village Centre Shared and Pedestrian Priority Zones	Shared zones are a dedi- cated shared traffic envi- ronment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Ar- eas of pedestrian priority may be closed to vehicu- lar traffic.	S2 Smartpole Range City Standard Pedestrian Pole Top Lighting Range	Vehicle and Pedestrian: P7	Vehicle and Pedestrian: 3000K-4000K Min Ra85
Cycleway Applications	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. ¹Smartpole Type S2 are to replace Ausgrid poles for Village Main Streets as part of a comprehensive streetscape upgrade. Replacement of poles it 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	Light Quality
			Lighting Level**	
Local Street- Low Activity	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
Local Street- Medium to High Activ- ity (including Liveable Green Network Prior- ity Routes)	Local streets identified by Liveable Green Network masterplan that provide pedestrian and/or cycle priority - Refer to Appen- dix 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
Local Street- State Classi- fied Roads	Local Streets that connect main roads may form part of the RTA State Classi- fied Road network	AusGrid Pole	Vehicle and Pedes- trian: V1- V3	
Local Laneway	Local Laneways essen- tially 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
Local Shared and Pedestrian Priority Zones	Shared zones are a dedi- cated shared traffic envi- ronment for pedestrians, cyclists and slow vehicle movement with specific lighting requirements. Ar- eas of pedestrian priority may be closed to vehicu- lar traffic	AusGrid Pole City of Sydney Standard Pedestrian Pole	Vehicle and pedes- trian: P2	Vehicle and Pedestrian: 3000K-4000K Min Ra85
Cycleway Applications	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. 1In 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	Light Quality
		Lighting Level**	
Local	The Rocks style column or CoS Wall Lights	Refer to individual street ty- pology lighting level require- ments for specific applica- tions.	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
3.4.3 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	Light Quality
			Lighting Level**	
Underpasses/ Pedestrian Tunnels	Underpasses serve both pedestrian and vehicular access with some specifi- cally dedicated to pedes- trian priority. Pedestrian underpasses provide a connecting service func- tion for pedestrians only.	City of Sydney Wall Mount Range*** City Standard Pedes- trian Pole Top Lighting Range***	Vehicle Underpasses: P9 Pedestrian Underpasses: P9	Vehicle: 3000K- 4000K Min Ra80 Pedestrian: 3000K-4000K Min Ra85
Pedestrian Crossings	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	AusGrid Pole Lighting Range*** S1 Smartpole Range*** S2 Smartpole Range*** City of Sydney Pedestrain Connect- ing Luminaire Range (Floodlight)***	Local or arterial road PSL ³ <= 60km/h: PX 1 Local ² or arterial road PSL ³ <= 50km/h: PX 2 Local Road ¹ : PX 3 Refer to AS/NZS 1158.4 for further information	Pedestrian: 3000K-4000K to suit surrounding lighting CCT Min Ra85
Stairs/ramps/ footbridges	Stairs, ramps and foot- bridges act as connecting elements for pedestrians throughout the City of Sydney	City of Sydney Stand- ard Pedestrian Pole / Wall Mounted Lighting Range	Pedestrian: P9 Note: Stairs/ramps leading into un- derground trains stations are to be lit to a P10 category	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 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.

¹Local Road- Traffic Deterred (See Glossary) ²Local Road- Traffic Slowed (See Glossary)

³Speed Limit

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.

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.



Prince Alfred Park, Paul Patterson / City of Sydney

Toolkit Lighting Palette - Parks

Street Type		Lighting Type*	Recommended	Light Quality
			Lighting Level**	
City Centre Park	Usually experience high pedestrian activity over a longer span of hours. Pathway networks usually provide direct connec- tions to city streets. Park may include activity areas that accommodate night time use.	City Standard Pe- destrian Pole Top Lighting Range	Major Pathways: P1-P2 Minor Pathways: P3 Path Edges ¹ : P5 Activity Area: P8	Pedestrian pathways and Activity Areas: 3000K- 4000K Min Ra85
Village Centre and Local Area Park	Usually surrounded by residential zones, they provide through site ac- cess to local streets or vil- lage centre streets and of- ten include programmed activity areas. Larger parks may have distinct/ recreational amenities with use by those from a wide catchment area.	City Standard Pe- destrian Pole Top Lighting Range	Major Pathways: P2 Minor Pathways: P3 Path Edges ¹ : P5 Activity Area: P8	Pedestrian pathways and Activity Areas: 3000K- 4000K Min Ra85
Small Local Parks (No through Site Access)	Usually surrounded by residential zones and do not provide any through site access. In many instances they are ad- equately lit by street light- ing and additional lighting is not required.	City Standard Pe- destrian Pole Top Lighting Range If sufficient light levels are pro- vided by exist- ing surrounding street lighting then further lighting types may not be required. Consult with the City of Sydney	Pathways: P3 Path Edges1: P5	Pedestrian: 3000K- 4000K Min Ra85
Small Local Parks (Through Site Access Pathway)		City Standard Pe- destrian Pole Top Lighting Range	Pathways: P3 Path Edges ¹ : 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.

¹Path 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 hightlighted.
- 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 accrodance 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.

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

Toolkit Lighting Palette - Plazas

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

3.4.5 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-domainworks/da-associated-works/sydney-streets-technicalspecifications

3.5.1 Smartpoles and Lumianires

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 net work 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 caseby-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
•								







9.6m S1Type B

7.2m 4.8m S1Type C S1Type D



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; Manufac- turer: GE Lighting		S1, S2, S3 General Use (Catenary)	City Centre, Village Centre and Activity Strips, Light Rail, Shared and Pe- destrian Priority Zones, Cycleway Application, Pe- destrian cross- ings, Plazas	Asymmetric Medium or Wide Beam light distribu- tion. Selection to be based on application requirements.	LED lamp life L80 @ 50,000 hours, light source efficacy 85lumens/W, CRI 70
1 Module Fitting					1 Module Available Packages in 4300K:
					39W wide distribution = 2960lm 59W medium distribution = 4560lm 59W wide distribution = 4440lm
2 Module Fitting					2 Module Available Packages in 4300K:
					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					3 Module Available Packages in 4300K:
	and and a second second				138W medium distribution = 10,600lm 138W wide distribution = 10,370lm 158W medium distribution = 12,140lmlm 158W wide distribution = 11,850lm 178W medium distribution = 13,680lm 178W wide distribution = 13,330lm
4 Module Fitting					4 Module Available Packages in 4300K:
					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	\bigcirc	S3 George Street	George Street	Diffused even lighting	LED module within diffused (UV resistant) cylinder.
Street Bea- con Com- ponent Manufac- turer: TBC		Smartpole		with colour changing possibility	LED with RGBA/RGBW ability.

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Luminaire: George Street Area Lighting Component Manufac- turer: 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 2 Module Package (max 12m spacing) 82.8W @ 6,000lm (lumen package of modules excluding reflector losses) 3 Module Package (max 15m spacing) 124.2W = 9,000lm (lumen package of modules excluding reflector losses)
Luminaire: George Street Pedestrian Lighting Component Manufac- turer: 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 Manufac- turer: 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.

Luminaire	Luminaire Image	Pole	Application	Lighting Distribution	Light Source
Refer to Ausgrid Standard Luminaire Suite		Ausgrid Galvansied Steel Pole for streets with under- ground 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 con- sists 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

Ausgrid Lighting Poles Palette

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 occaisions 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 advise	CoS to advise

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:		n/a outreach arm may be applicable	laneways / narrow streets	Asymmetric Forward or wide light distribution	Small (single) Module Available packages for 4000K:
GE Lighting					50W = 3130lm 63W = 4050lm 76W = 4970lm 89W = 5890lm 101W = 6810lm
Small (single) Module					General: Lamp Life L85 at 50,000H, CRI70, light source efficacy 67lumens/W
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 Con- temporary, Tiered Circular Manufac- turer: 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 lifeL85 at 50,000H CRI 65 4,630lm @ 86W 2,380lm @ 49W
Luminaire: Evolve LED Post Top Twin Con- temporary, Tiered Cone Manufac- turer: 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 lumi- naire.	Asymmetric or symmetric	LED, 4100K Min. light source efficiency 65 lumens/watt LED lamp lifeL85 at 50,000H CRI 65 4,630lm @ 86W 2,380lm @ 49W
Luminaire: Evolve Duna Manufac- turer: GE Lighting	V	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/ Asym- metric Forward/ Symmetric	LED 4100K Min. light source efficiency 65 lumens/watt LED lamp life L85 @ 50,000H
Luminaire: Odyssey LED Manufac- turer: GE Lighting	The second secon	City Standard tapered steel pole. Micaceous Iron Oxide Grey/ Metropolis Bronze Pearl/ Black colour finish* Pole Height: 4.5m-6m	Laneway/ Narrow Local Streets.	CoS to advise	CoS to advise

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.

Luminaire:		Custom Pole Design	City Centre	TBC by CoS	TBC by CoS
ney Custom			This fitting is		
Pole Light*	Π		to be used in high profile/		
Manufac- turer: GE			high activity areas as		
Lighting			directed by the		
			with the City		
	0		application		
			confirmation.		
	dang tina nga				

* Currently under development

3.5.6 Pedestrain 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
CoS to advise (Sylvania)		CoS to advise	Pedestrian Crossings	CoS to advise	CoS to advise

Sydney Lights Part Four Creative Lighting Masterplan

city of Villages



Creative Lighting Masterplan

4.1 Introduction

In addition to fulfilling functional lighting requirements this Code recognises the importance of lighting to reinforce a sense of place, influence the appearance and character of streetscapes, buildings, and public spaces, and contribute to a lively engaging city experience for people to enjoy.

Proposals for creative lighting applications are assessed by the City of Sydney on a case-by-case basis, taking into consideration the overall design, the site context, and compliance with the requirements of this Code.

4.2 Strategic Approach

To be energy efficient and visually effective the Code advocates a targeted use of creative lighting applications with the city's fabric appearing as a backdrop to selected highlighted places, precincts and elements. The Creative lighting applications comprise of three components:

City Structure and Precincts

- lighting applications to reinforce the legibility of the city structure or highlight key city precincts;

Distinctive accents

 lighting applications to individual elements across the city such as monuments, trees and landmark buildings

Special Lighting Elements

 use of special non- standard lighting elements for functional lighting applications as a means to reinforce a distinctive sense of place and character;

4.3 City Structure and Precincts

The overarching lighting strategy considers the pedestrian experience within the context of the night time environment. The following elements collectively facilitate the legibility of the city through illumination and navigation which can be read from afar, looking in, as well as at a pedestrian level.

4.3.1 City Centre Skyline

Major towers in the City Centre contribute to the identity of the City by providing a unique profile and expression of the skyline. Attention to building capitals and capping buildings with light has the most impact on the development of a strong night time skyline. The relationship between functional lighting applications, creative lighting applications and lighting for private developments needs to be considered and balanced to re-enforce the overall legibility of the city structure.

Roof Top Illumination

- Care is to be taken in the methods of illumination to ensure that the City does not become over illuminated. The illumination of City buildings must be rationalised to effect a stronger, tidier appearance and in doing so create striking longdistance vistas of the City.
- Close attention is to be paid to building capitals, as 'capping' the building with light creates a strong night-time skyline.
- Techniques and fixtures that minimise upward spill light and energy consumption are to be employed.
- Development Applications are to demonstrate, by photomontage, the effect in the field of view from distant vantage points.
- Where uplighting is proposed evidence must be provided to demonstrate that no waste spill light or obtrusive effects will result and that downlighting is not possible in the circumstances.



4.3.2 Harbour Foreshore

Approach

Δ

Sydney's beauty is often defined by its harbour and foreshore. Lighting applications can reinforce important aspects of the city's relationship to the Harbour edge as well as promote the foreshore walk which acts as a linking element between existing and growing destinations such as Pyrmont, Darling Harbour, Barangaroo, Walsh Bay, The Rocks/Harbour Village North and Circular Quay.

Direction

The lighting strategy to the Foreshore walk should create an overall and consistent experience. Lighting should allow for experiencing the harbour at night-time in a safe and guided way, whilst allowing view across and to the water. Considerations shall be given to the use of low level pedestrian or furniture lighting to mark the water's edge whilst maintaining vistas.

The lighting scheme must acknowledge that the Foreshore walk land is not solely owned by the City of Sydney. The City of Sydney encourages the lighting strategy in this area to be adopted by other landowners to create consistency in the public domain.

4.3.3 Precincts & Village Main Streets

Primarily, the 'Lighting Overlay' strategy recognises Sydney as a network of distinctive precincts; each with their own unique program and identity. Together they provide a diverse range of attractions across the City.

These precincts are known as:

- Chinatown
- Harbour Village NorthOxford Street
- Kings Cross
- Greensquare Town Centre

The lighting strategy in each precinct should be tailored to express the identity of the area. The full project scope and lighting applications will be subject to the preparation of individual lighting master plans for each distinctive City precinct.



Circular Quay Panorama, Vivid 2010, Paul Patterson / City of Sydney

Chinatown

Approach

Chinatown has a unique identity expressing the vibrancy of Asian Culture and street life in Sydney. Focused on the pedestrianised Dixon Street, small businesses from all over Asia owners populate the area in restaurants, food halls, stores, karaoke venues, bars and markets. This vibrant destination appeals to all age groups, residents and visitors during the day and in the evening.

Direction

The significance of this dense community in the City provides the opportunity to allow for the layered growth of the illuminated advertising which has become a hallmark of the contemporary Asian metropolis.

The area will offer a lighting destination, distinct in that it is not controlled design but ordered chaos. This allows the community and businesses to help define the development of their own unique precinct. The Hong Kong or Shibuja experience being brought to Sydney.



Chinatown, google search, photographer unknown

Harbour Village North

Approach

The Harbour Village North and surrounding areas, offer a precinct rich with architectural history, typologies closely weaved in together expressing the city's past in a dense, reminiscent spatial environment unlike any other in Sydney. The opulence of history witnessed in this built environment is prevalent in buildings, ground treatment and even immense infrastructural feats. Coupled with its harbour side location and the precincts role as portal for international visitors, the Harbour Village North has a purely distinct character. This area provides an unparalleled opportunity to celebrate heritage through lighting in a means that can tell a story and enhance Sydney's historical narrative from the very origin point of its development. Curated by the City and characterised by the warmth of illuminated Australian sandstone, this controlled environment provides a place in the urban strategy, which can become an evening destination appealing to a variety of age groups.

Direction

The lighting strategy in this area is focussing on subtle and warm building façade lighting to enhance heritage features of the built and landscaped environment. The façade lighting needs to consider and respect the heritage fabric of the buildings, and will be supplemented by street and pathway lighting.

Non heritage buildings may be lit from within to distinguish these from heritage buildings.

The lighting in this area must consider SHFA guidelines for the adjacent Rocks area.



Harbour Village North, Paul Patterson / City of Sydney

Oxford Street

Approach

Oxford Street describes the rich development of culture capable within a progressive and active city. This distinct night oriented corridor is home to a highly expressive and celebrated gay community who alongside the many other locals generate a hive of evening activity. The mood of this region is distinct within Australian nightlife populated by a huge diversity of characters growing particularly towards later hours of the evening. This segment of the urban strategy looks at a curated, controlled yet highly expressive and changeable lighting environment. The environment would be distinct, channelling the vibrancy and uniqueness inherent in the local community. The dynamic nature of this region would be further expressed though changing curatorial roles and a lighting scheme which is able to respond to the mood of streetscape across different times of the day/ year.

Direction

The lighting strategy in this area is to consider and include the following elements

- Ability to change lighting scheme or certain features of scheme on a regular (yearly) basis
- Use of catenary lighting which includes a curated light art element
- Consideration of lighting projections if suitable to the curated installation



Oxford Street, artist's impression, McGregor Coxall



Claire Scoville *Dancer.Jordan*, 2010,NYC, google search, photographer unknown



Karim Rashid *Dnarim, 2010, Milan,* google search, photographer unknown

Kings Cross

Approach

Kings cross is Sydney's home of illuminated icons. From known landmarks such as the CocaCola Sign and the El Alamein Fountain to neon signage, exaggeration dominates the senses. This highly accessible, night oriented area while being known as Sydney's Red light districts is also the location of countless of evening destinations which provide an attraction for locals all over Sydney.

Direction

The lighting strategy for Kings Cross is to respond to the tone of the night's activity cycle, helping facilitate active hours and soften the mood of the area outside these periods.

The lighting strategy in this area is to combine various lighting elements into a holistic strategy, and should consider and integrate the use of catenary lighting installations in specific circumstances, façade lighting and coloured illuminated signage. The focus of the overlay should be concentrated along Darlinghurst Road / Bayswater Road entertainment precincts.

Peter McGregor Llankelly Place Lights, 2001, Kings Cross

<image><image><image>

Kings Cross, artist's impression, McGregor Coxall

2001, Kings Cross

Newell Harry *Circles in the Round,* 2010, Temperance Lane

Green Square Town Centre

Approach

Green Centre Town Centre will be the focal point of the Green Square Urban Renewal area.

The Civic Place (Green Square Plaza) will form the heart of the Green Square Town Centre. It will provide a grand civic space offering as the location of the library, communal space for play, learning, and cultural events. Surrounding the civic place is an offer of retail and restaurants.

Direction

The Green Square Town Centre public domain strategy provides directions to creative a distinctive character and memorable place that will be achieved through elements such as iconic built form features, landscape, special street feature and creative lighting applications that could include use of catenary as well as special pole elements.



Green Square photomontage, Stewart Hollenstein, City of Sydney

Village Main Streets

Approach

Creative lighting applications may also be limited to a Village Main street context rather than a broader precinct approach. These streets include:

- King Street, Newtown;
- Crown Street, Surry Hills;
- Glebe Point Road, Glebe;
- Redfern Street, Redfern;
- Darlinghurst Road, Kings Cross
- Oxford Street, Darlinghurst
- Harris Street, Pyrmont
- Botany Road

Village Main Street creative lighting applications will further reinforce street hierarchy and contribute to an enhanced retail and night time experience.

Strategic Direction

- The functional lighting, in line with the functional lighting palette of this code, is to be supplemented and enhanced with an additional layer of engaging, and pedestrian focussed lighting.
- Lighting is to respond to the unique character of the street.
- Lighting should be appropriate for human scale and human activity, and focus on pedestrian movement through the area.
- The lighting strategies in these areas should utilise lighting treatments such as tree lighting, façade lighting, relevant sculpture/feature lighting and/or integrated furniture lighting.
- To achieve the above directions, special lighting elements and luminaires outside the standard functional lighting palette can be used.



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



George Street

Approach

George Street is the City's central spine, with priority for public transport and pedestrians. This central boulevard connects the major city squares and is to provide a unique experience, differing to the other areas within the city centre.

Direction

A specific lighting strategy and masterplan has been developed in 2013. Key aspects include:

- Consistent lighting techniques along the length of the street, incorporating a custom and unique lighting structure to create a strong and recognisable identity
- Curated architectural lighting/ façade lighting as background for the night- time environment and as a contributor to perceived brightness
- Tree lighting to enhance landscaped elements and the streetscape
- A dynamic lighting layer the follows the movement of the light rail, contributing to safety and creating a dimensions of spectacle and engagement

Refer to the George Street Lighting Master Plan 2013 for further information.



George Street Lighting Concept by Stensen Varming for George Street Lighting Master Plan

Martin Place

Approach

Martin Place is a key City Centre Plaza and shared zone for pedestrians and cyclists. The Martin Place Lighting Masterplan is currently being developed to provide lighting principles to inform future lighting renovations and development in the precinct. These principles are to act as benchmark project for future city centre plaza/square lighting masterplans.

Strategic Direction

In order to create the conditions for unique and specific responses within a harmonious context, the following design strategies have been developed:

- Enhancement of the continuity of the pedestrian zones spanning the length of the precinct
- Conceptualising of the precinct as a collage of 'moments'
- Specification of unique lighting treatments, appropriate to the style and scale, to individual buildings and objects
- Establishment of a luminance hierarchy to promote way-finding and legibility, and avoid visual fatigue
- Use of lighting features such as façade lighting and lighting of monuments and also different light levels to articulate that the character of Martin Place is different from the vehicular cross streets in lighting ambiance.



Martin Place, Paul Patterson / City of Sydney

City Centre East West Connections

Approach

East-West Pedestrian Connections: Six key city

centre east-west connectors have been identified as playing a significant role in the pedestrian experience and wayfinding ability. These include:

- Hay Street
- Park Street- Druitt Street
- Market Street
- King Street
- Hunter Street- Curtin Place- Margaret Street-Wynyard Walk
- Bridge Street- Grosvenor Street- Kent Street Underpass

Strategic Direction

In order to create the conditions for unique and specific responses within a harmonious context, the following design strategies have been developed:

- Enhancement of the continuity of the pedestrian zones spanning the length of the precinct
- Conceptualising of the precinct as a collage of 'moments'
- Specification of unique lighting treatments, appropriate to the style and scale, to individual buildings and objects
- Establishment of a luminance hierarchy to promote way-finding and legibility, and avoid visual fatigue
- Use of lighting features such as façade lighting and lighting of monuments and also different light levels to articulate that the character of Martin Place is different from the vehicular cross streets in lighting ambiance.
Laneways

Approach

The City Centre laneway revitalisation program provides the opportunity for special lighting applications to reinforce legibility of the city and create laneways as a destination.

<image>

Light Breezes, ARUP, VIVID installation 2012, Cambridge Street, The Rocks, City of Sydney

Strategic Direction

- Lighting is to respond to the unique character, history and features of each laneway.
- The lighting strategy in these areas should utilise light art, catenary lighting, façade lighting and/or integrated furniture lighting to revitalise these underused spaces and create a 'laneway' culture.
- Lighting should be appropriate for human scale and human activity.
- Lighting should engage the public and activate the space.
- Lighting is to provide minimum requirements for both pedestrians and vehicles. If light art is used for functional lighting requirements, the installation is to be approved by a lighting designer to ensure minimum requirements have been met.
- Lighting design may utilise a range of different colour temperatures as long as the base lighting requirements are met. Coloured lighting is to be devised in consultation with the City of Sydney.

- Street Lighting types
- General floodlight applications
- Festoon type lighting



Sydney Forgotten Songs, Michael Thomas Hill, Angel Place, Sydney, City of Sydney

4.4 Distinctive Accents

4.4.1 Approach

Distinctive Accents are considered as unique elements within the city, which do not qualify as precincts themselves but are integral to the overall legibility of the city and enhance the perception of urban form.

Distinctive Accents work to provide an active lighting environment across the city without disrupting the dominant impact and key identities of the precincts. Distinctive Accents hold their own unique identity and may take on varied roles though such as artistic interventions and landmarks.

The classification and application of Distinctive Accents will be assessed individually on a case by case basis by the City of Sydney and can include the following:

- Civic buildings
- Monuments
- Civil Infrastructure including underpasses and pedestrian tunnels
- Parks
- Plazas
- Tree lighting
- Temporary Events
- Public Art

Distinctive accents can be temporary, permanent or dynamic and can include a variety of lighting techniques such as:

- Strategically selected façade lighting, using colour and media façade techniques where appropriate only;
- Concealed and integrated architectural lighting (e.g. lighting of heritage buildings or features)
- Lighting of public art, or creation of decorative lighting sculptures to enhance streetscapes and laneways;
- Projected images, which are capable of being choreographed to create changing effects;
- Temporary decorative lighting, associated with special events, cultural and civic festivities.

If applied selectively, distinctive accent lighting responsibly addresses energy consumption, sky glow and other environmental impacts.

Civic Buildings

Lighting applications can call attention to distinctive civic buildings and other landmarks that are worthy of accentuation to help create reference points and aid in way-finding, particularly in areas outside the city centre.

Strategic Directions

- Buildings with distinctive lighting applications are to be chosen selectively and in consultation with the City of Sydney. Most of the city should appear as a backdrop to a few special buildings and places that have distinctive lighting.
- Timer controls are to be used to limit the duration of distinctive lighting applications. All distinctive lighting is to be non-operable after 2am to reduce energy consumption and excessive light pollution.
- Light sources to light heritage building are to be incandescent in appearance with a colour temperature range of 2500K – 3200K to give a warm glow to historic architecture. Refer to 3.4.2 Heritage Areas for further information. All other light source colour temperatures are to be selected to enhance the architectural quality, colour and texture of the building.

- Lighting on buildings which can detract from the architectural qualities (e.g. festoon lighting on architecturally expressive façade)
- Broad indiscriminate floodlighting of facades from large light sources located remotely from the building. These significantly impact on glare and sky glow. Floodlighting should be directed to enhance building architecture and detailing.
- Coloured lighting is only to be used in specific circumstances in consultation with the City of Sydney.



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

Monuments

Lighting of selected public monuments within the City of Sydney can create a sense of prominence and express the history of an area.

Strategic Directions

- Monuments are to be selected for significant public merit and to establish recognisable night time landmarks.
- Timer controls are to be used to limit the duration of distinctive lighting applications. All distinctive lighting is to be non-operable after 2am to reduce energy consumption and excessive light pollution.
- Light sources are to be of appropriate colour temperature to enhance the natural colour, materiality and texture of the monument. Consult with the City of Sydney for specific requirements.
- The lighting design is to accentuate specific features of interest and is not to floodlight.
- Luminaires should be located so they do not visually interfere with viewing the monument.

- Broad indiscriminate floodlighting of monuments from large light sources located remotely from the building.
- Coloured lighting is only to be used in specific circumstances in consultation with the City of Sydney.



Glebe War Memorial, Paul Patterson / City of Sydney

Plazas

City Centre public plazas and squares, act as recognisable meeting places and spaces to sit and relax within the urban context of the City. Plazas provide opportunity for community activities, voicing opinions, sitting areas and meeting areas. They provide a pocket of space allowing reprieve from the busy main city streets. Lighting should therefore reflect a more subtle, integrated approach, with pedestrian focus.

A distinctive and creative approach may be taken for specific plazas in consultation with the City of Sydney



Strategic Direction

- Plaza lighting should be designed and integrated into the urban fabric and landscape design of the space.
- Lighting should respond to and highlight the uniqueness and character of each plaza.
- Luminaires should be concealed from view wherever possible and the day- time view of the fittings should be considered and minimised.
- 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.
- Vertical façade lighting unique and appropriate to the style and scale of individual buildings and objects. In some instances façade lighting to contribute to pedestrian pathway lighting, if controlled and maintained by CoS.
- Street level lighting to be relative to façade brightness rather than uniform throughout.
- Tree lighting to enhance landscaped elements amongst the paved experience
- Lighting to provide a series of pedestrian 'moments' throughout the site.

- Flood-lit spaces with uniform brightness across the entire park
- Use of solely pole lighting applications.
- Lighting that focusses on ground illumination only

Parks

Parks that have a unique character or are a night time destination have potential to include a creative lighting overlay. Parks provide an important social function within the City both during the day and in enhancing the night time economy. These areas require an individual lighting strategy that is to be developed to align with the parameters set out for general parks.

Strategic Direction

- Meet the basic lighting requirements as defined in the functional lighting palette for a general park. The lighting types used to achieve these levels are open to the designer in conjunction with CoS. Luminaires must comply with the technical requirements outlined in Section Two.
- Heritage parks need to be considered taking into account existing heritage elements and in line with relevant heritage conservation plans and plans of management.
- A creative lighting overlay is encouraged through use of tree lighting, catenary lighting or furniture lighting.
- The design of up-light for trees and landscaping should consider existing site conditions to ensure limited impact on tree root zones.
- Provision should be made to implement a holistic lighting strategy for both general use and 'event' use. This may be the case for a park used for monthly markets. The 'creative' lighting overlay may be turned on for a specific period each month.
- The lighting scheme for all parks should consider lighting of the following elements; Main park entries, park perimeter, main pedestrian and cycle through pathways and surrounding areas, selected landscaped areas i.e. trees, furniture or public art/architectural elements.
- The lighting strategy should utilise both shadow and light to distinguish the park from the general streetscape and to provide direction and focus at night-time.

- Flood-lit spaces with uniform brightness across the entire park
- Lighting limited to the main pathways only, with dark trees or bushes surrounding the pathway, without extending the light into the surrounding areas.
- Fairy / Festoon type lighting



The Highline New York, google web search, photographer unknown



The Highline New York, google web search, photographer unknown

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Within the City of Sydney there is an opportunity for the mundane and often non- attractive civil infrastructure, such as road viaducts, underpasses and pedestrian tunnels, to be subject to distinctive lighting interventions to create unexpected delight not evident during the day without impacting on the strength and identity of the distinctive precinct lighting schemes.



University of Sydney Public Domain, Lighting Design Steensen Varming, Cavanagh Photography

Strategic Directions

- General lighting to utilise wall mount, catenary, furniture and light art lighting typologies rather than pole mounted luminaires.
- Light Art installations must meet functional lighting requirements as outlined in the Standard Lighting Palette.
- Lighting should be create a feeling of safety and enhance the night time pedestrian experience.
- Minimum lighting requirements are to be sustained from dusk until dawn. If distinctive lighting is used in conjunction with general lighting, then timer controls are to be used to limit the duration of distinctive lighting elements. All distinctive lighting is to be non-operable after 2am to reduce energy consumption and excessive light pollution.
- Lighting elements should provide guidance to pedestrian users.
- General lighting is to be provided for vehicular use if required.
- Consideration of transition and visual adaptation between daytime environment and underpass/ tunnel lighting is required. Surface brightness is encouraged.

- Strobe or flickering lighting
 - Glare sources or visible luminous surfaces



Warren Langley, Aspire, 2009, Harris Street, Ultimo

Tree Lighting

Tree lighting is to be utilised in particular parks and along priority pedestrian routes to enhance pedestrian amenity, the perception of safety and overall feel of brightness. Tree lighting can facilitate and contribute to way finding and important vistas, and where appropriate, can add a more dramatic effect or background.

Strategic Direction

- Use of white light, with a colour temperature suitable to the tree type.
- Luminaires are generally to be located on adjacent poles or in ground. In ground lighting should be directed towards the tree trunk and underside of the canopy to minimise upward spill light.
- Consultation with arborist where lighting positioning affects tree roots or branches.
- Lighting to deciduous trees must be controlled via a seasonal timer to turn lights off when the tree is bare.
- Tree lighting is not to contribute to overall lighting levels. Surrounding
- lighting must comply with relevant standards when tree lighting is turned off.
- Control timers to turn off late at night for energy efficiency, adjust to any seasonal variation of foliage and avoid disruption to fauna;

- Coloured lighting (unless specifically agreed with the City of Sydney or provided for a temporary event only)
- Fairy / Festoon type lighting



Glebe Foreshore, Paul Patterson / City of Sydney

Public Art

Public Art provides distinctive elements within the city. In some instances these are accentuated by lighting and in other instances, they are lighting elements in their own right. The City's Public Art Strategy, 2011 and the following Green Square Public Art Strategy 2012, provide further strategic directions for both temporary and permanent public art installations.



Janet Echelman, Tsunami 1.26, 2011, Town Hall, Sydney

Strategic Direction

- Light art is to be used in specific areas as designated by the CoS to activate a space such as a laneway and create a unique atmosphere.
- Where possible light art should provide sufficient lighting to comply with the recommended AS1158 lighting levels as designated in the above character areas and pallets. This should be confirmed by a lighting designer. If compliance is not achieved other lighting elements must be considered as part of the overall lighting scheme.
- Light art will be reviewed on a case by case basis for specific locations in line with the specific intent of the artist
- Minimisation of glare and glare sources are paramount; lighting is not to distract but enhance the artwork.
- Mounting of luminaires is not to affect viewing of the artwork during the day time or the night time.
- Collaboration and dialogue with the artist is encouraged to ensure the lighting design is appropriate to the artwork and artist's intent
- Light art to comply with OH&S issues of public safety

- General floodlighting without focus
- Artwork mounted luminaires, unless luminaires form part of or form the artwork
- Strobing or flashing light art

Temporary Events

Permanent lighting installations can be complemented by temporary lighting events. Temporary lighting events can create theatrical displays for cultural and civic festivities such as Art and About and Sydney Vivid Festival.

Strategic Direction

- Lighting is to be designed specifically for an event and to be temporary in nature
- OH&S and safety requirements are to be considered and included in the design, despite the temporary nature of the installation
- Integrated into lighting structures where practical to do so
- Consideration and planning of power cable runs and access points is required
- Use of permanent infrastructure (for mounting etc) is encouraged, but is to be coordinated with the City of Sydney.

Lighting not considered appropriate:

Lasers



Richard Goodwin, Russell Lowe, Adrian McGregor, Seven Metre Bar, 2009, Underwood Street, Sydney, Jamie Williams / City of Sydney

4.5 Special Lighting Elements

This section outlines basic outlines technical parameters for use of special lighting elements, providing benchmarked examples and project references.

4.5.1 Non Standard Poles and Fixtures

Use of special non-standard poles and lighting fixtures to provide functional lighting provision may be appropriate in certain contexts to reinforce sense of place or character.

The use of these special non- standard elements is subject to approval by the City of Sydney. Unless a specific project warrants a custom designed luminaire element, the general preference and direction is the use of an existing and available product with local support, to reduce maintenance costs and streamline City lighting assets management procedures. Both instances offer the opportunity for a custom designed pole or lighting structure.

The luminaire in both instances outlined above must comply with the requirements below:

- Luminaire should shield light source to prevent upward spill light and direct all light downwards. If otherwise, consult with the City of Sydney.
- Light source to be LED 3000K/4000K, min 65 lumens/watt with lamp LED life min 80% at 50,000H
- Light distribution to be rotationally symmetrical, asymmetric forward throwing or longitudinal (side throwing), dependant on site location and lighting requirements. Above 0° horizontal, the light output ratio is to be $\leq 3\%$ of lamp lumens.
- Luminaire to have min IP65 rating and min IK04 rating
- For mounting detail information refer to the City of Sydney Streets Code 2013

4.5.2 Catenary Lighting

Catenary lighting is a high tension suspended cable lighting system that is to be used in plazas, laneways, underpasses, pedestrian tunnels and pedestrian priority areas in order to differentiate the space from the surrounding environment and create a more intimate and informal atmosphere. This lighting application is generally not supported by CoS, but may be approved in certain circumstances.

- Light source to be LED, min 65 lumens/watt with lamp LED life min 80% at 50,000H. LED CCT may be selected for sight specific applications. Consult with the City of Sydney for approval.
- Light Distribution is to be asymmetric or symmetric. Above 0° horizontal, the light output ratio is to be \leq 10% of lamp lumens (TBC).
- Catenary luminaire to have min IP65 rating, and min IK04 rating
- Mounting to be concealed and respective of building fabric. Refer to Streets Code.



Prince Alfred Park, Paul Patterson / City of Sydney

Pitt Street Mall, Paul Patterson / City of Sydney

4.5.3 Bollards

Bollard lighting is generally not supported by the City for use in the public domain. In some cases a bollard may be considered, where a particular effect is required or where views and certain proportions need to be maintained. The use is subject to City of Sydney approval.

4.5.4 Furniture Lighting

Integrated lighting in furniture is to be used in parks, plazas, pedestrian priority areas and village centre and activity strips. Integrated furniture lighting provides an informal, playful lighting element within a community area.

- Lighting integration is to be seamless
- Light source to be LED, min 65 lumens/watt with lamp life min 80% at 50,000H. LED CCT may be selected for site specific application. Consult with the City of Sydney for approval.
- Light distribution to be appropriate for context and installation so as to not cause glare or upward spill light.
- Luminaires to have min IP65 rating and min IK04 rating.



Jubilee Square, Glebe Point Road, City of Sydney

4.6 Creative Lighting – Implementation

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Priority Implementation Plan

It is recommended that a stage approach to implementation be undertaken. Staging and timing will involve identifying project priorities based on:

- Available resources allocated in the City's capital works program.
- Strategic opportunities to link with other existing public domain projects and programs such as George Street light rail. In general it will be more cost effective to implement lighting masterplans in conjunction with other projects to achieve efficiencies by co-ordinating with other civil works.
- Contribution a creative lighting application can make to achieve City's strategic objectives in Open Sydney, Retail Action Plan, and Tourism Action Plan.
- Private sector interest to contribute and partner with the City to deliver a creative lighting application.
- Capacity to maintain the system to a high level quality over time.

Creative Lighting Masterplans

For each identified precinct the preparation of a creative lighting masterplan that fully scopes the opportunities and proposed lighting scheme is vital to ensure co- ordination with broader public domain proposals for an area.

A masterplan will also allow the private sector to progress the development of a lighting scheme for their buildings in a consistent and co-ordinated manner.

Ideally the lighting masterplan should be considered as part of an overall Public Domain Plan for a precinct / place.

The lighting masterplan should include:

- Specific creative lighting masterplan objectives
- Co-ordination with required functional lighting requirements and public domain proposals
 Quidelines for recommended colour
- Guidelines for recommended colour temperature, and approach and directions for fixtures on buildings and public domain
- Implementation strategy
- Energy efficiency considerations

Creative Lighting Masterplans will form the basis for developing detailed lighting designs and specifications to allow scheme implementation.



Wynyard Park

Sydney Lights Part Five

Maintenance and Asset Management

city of Villages



5.0 Maintenance and Asset Management Procedures

5.1 Asset Management

The City's Asset Management Policy is to ensure that the City has information knowledge and understanding about the long-term and the cumulative consequences of being the custodian of public infrastructure.

Public lighting asset management is based on the following principles to guide sustainable management of infrastructure assets. They are:

- Take a lifecycle approach apply a whole of life methodology for managing infrastructure assets including planning, acquisition, operation, maintenance, renewal and disposal
- A manageable portfolio of lighting technologies to minimise lighting maintenance response times
- Sustainable environmental performance
- Best value balance financial, environmental and social aspects to achieve best value
- Decision support systems and knowledge such as GIS mapping of lighting assets
 – core systems will include up to date infrastructure asset information to inform decisions
- Service levels infrastructure asset service levels will be clearly defined
- Long-term financial plans asset practices, plans and systems will enable the development of long term financial plans for asset classes
- Manage risks associated with infrastructure assets; and
- Continuous improvement of asset management practices

5.2 Maintenance

Properly maintained equipment is an essential prerequisite of all approved lighting installations. It not only is important from a civic appearance aspect but in many cases from public safety and security aspects.

All installations will decrease in effectiveness over time due to aging lamps and the soiling of the exterior of luminaires and reflectors. Aiming suffers due to factors such as vibration and poor adjustment after lamp replacement. These characteristics not only spoil the designed appearance but also waste energy.

The proposed practice for the maintenance of public lighting is to carry out a bulk replacement of lamps at the end of the effective lamp lifetime, taking into account the economic and operational characteristics of the lamps. Alternatively the preference is to replace defective lamps upon notification of faults.

It is recommended to initiate a new maintenance regime for City owned lights. To control total lighting maintenance costs, the City will adopt a preventive and predictive maintenance regime for all City owned lights. The City will conduct or contract to have conducted a regular inspection, cleaning and maintenance (including bulk lamp replacement as appropriate) of all decorative lights.

The inspection, cleaning and maintenance cycle should be driven primarily by the bulk lamp replacement and cleaning requirements for the installations (24 or 36 months depending on lamp technology and location). The tasks should include the following:

- 1. Verification of existing inventory data and corrections as needed
- 2. External visual condition assessment of luminaire and pole/bracket
 - Missing, damaged or defective components
 - Tree or other interference
 - Verify night-time operation
- 3. Replace any readily replaceable defective or broken components
- 4. Determine if current/imminent major repair or replacement is required and record
- 5. Cleaning of luminaire lens and refl ectors and, bulk lamp replacement
- 6. Coat visible corrosion with rust protection and toughup paint as required
- 7. Re-coat base of pole with rust protection or paint as appropriate
- 8. Return recovered components for recycle or appropriate disposal. Failed lamps should be sent to an appropriate recycling facility

The City may also pursue night patrols 3-4 times per year in areas where there are no natural reporting parties

(eg park safe city staff or security personnel). Lamp replacements could then be conducted in bulk following a patrol.

In addition, development applications that cover the illumination of of the public domain must include maintenance plans for approval.

In regard to lamp/ light source maintenance it is recommended that bulk lamp replacement be carried out within sections of the precinct according to the lamp type. Most luminaires will use LED sources: LED's generally have a service life in excess of 50,000 hours at which point the luminous flux drops below 70% of its original output. The LEDs will then slowly continue to degrade and need replacement.

It is recommended that a luminaire maintenance and lamp replacement schedule be incorporated within documentation provided by the lighting designer for each specific project.

Education of staff plays an important part in a well maintained lighting installation. Not only to fully understand the technical aspects but to also be informed of the lighting design principles and objectives.

5.3 Waste Management Plan and Recycling

Public lighting produces a number of waste and recyclable streams.

Waste management planning involves recycling of as many materials and components as possible and responsible disposal of the balance.

Systematic maintenance using bulk replacement of lamps at end of design life rather than failure allows for better and more effective management of lamp waste and maintenance of luminaire performance.

Sydney Lights Part Six Appendices

city of Villages



6.0 Appendices

6.1 Appendix 1: Glossary

Accent	Where light is used to emphasise or highlight objects.
Candela (CD)	Unit of luminous intensity equal to one candle power.
Colour rendering	The effect of a light source on the colour appearance of an object.
Correlated colour temperature	The absolute temperature of a black body radiator whose chromaticity most nearly resembles that of the light source being considered. Unit: Kelvin.
Efficacy	A factor which quantifies the effectiveness of a luminaire in converting electrical power to light.
Glare	The discomfort or impairment of vision experienced when parts of the field of view are excessively bright.
Illuminance	The luminous flux arriving at a surface divided by the area of the illuminated surface. Unit: lux
Lamp	Complete light source unit.
Light	Electromagnetic radiation with a wavelength between 380nm to 720nm.
Luminaire	Complete lighting units consisting of lamp, control gear (if required), reflector and housing.
Lumen	Unit of luminous flux used to describe a quantity of light emitted by a source orreceived by a surface. Unit: lumens
Luminance	The physical quantity corresponding to the brightness of a surface in a specified direction. Unit: cd/m2
Sky Glow	Sky glow is the brightening of the night sky that results from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gaseous, molecules, aerosols, land particulate matter), in the direction of observation. It comprises two separate components. Natural sky glow – that part of the sky glow which is attributable to radiation from celestial sources and luminescent processes in the Earth's upper atmosphere. Artificial sky glow – that part of the sky glow which is attributable to manmade 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.
Traffic deterred	As defined under AS/NZS 1158.3.1:2005 Clause 3.2.6.3. "When the purpose of the road is such that the intention of traffic management devices is generally to slow and deter traffic other than vehicles with their origin or destination in that road, the devices shall be identified to drivers using one of two technologies as follows:" (a) Using reflectors (Refer to standard for details) (b) Using roadlighting luminaires including roundabouts and the intended effect of a traffic management device on a vehicle passing through it is to cause the driver to reduce speed and maintain a reduced speed while travelling through the device. (Refer to standard for further details.)
Traffic slowed	As defined under AS/NZS 1158.3.1:2005 Clause 3.2.6.2. "Where the purpose of the road is such that the intention of traffic management devices is generally to slow traffic and regulate its flow at conflict points but not to deter or reduce the volume of through traffic, the intended effect of a traffic management device on a vehicle passing through it is to cause the driver to reduce speed and maintain a reduced speed while travelling through the device." Refer to standard for further details.
Watt 92/97	Unit of electrical power

6.2 Appendix 2: Background-City of Sydney Initiatives

The Sydney Lights Design Code fits under a broader policy and strategic planning directions prepared by City of Sydney. This includes the following:

6.2.1 Sustainable Sydney 2030

Sustainable 2030 Targets that public domain lighting can contribute to include:

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 'A 10 per cent overall reduction in emissions is possible by phasing out incandescent light bulbs with progressively more efficient lighting technologies.'

Direction 4

A City for pedestrians and cyclists **Objective:** 'Develop a network of safe, linked pedestrian and cycle paths integrated with green spaces throughout both the City and Inner Sydney.'

Direction 5

A lively, engaging City Centre **Objective:** 'Strengthen the City's public domain, identify and create more places for meeting, rest and leisure.' **Objective:** 'Support the development of diverse, new bars and restaurants in the City Centre'

Direction 9

Sustainable development renewal and design **Objective:** 'Define and improve the City's streets, squares, parks and open space, and enhance their role for pedestrians and in public life.'

6.2.2 City Public Domain Plans

The City Centre has been divided into precincts for which detailed feasibility and public domain plans will be developed. To date Plans have been prepared for Chinatown, Harbour Village North and George Street. These Plans analyse and recommend the scope, location and extent of public domain improvements including lighting over the short, medium and long term. Recommendations for creative lighting overlays will be further scoped and developed by individual Lighting Masterplans for each precinct.

6.2.3 Open Sydney

Open Sydney provides a vision for the night time economy of the City of Sydney and is a guiding factor in the development of the lighting master plan. Lighting activates the night and is crucial in allowing and supporting night time activities.

The night time vision is based on five goals all of which relate to lighting.

A Global Sydney where Sydney is an internationally recognised night-time city, based on our design, diversity, safety, innovation, creativity, strong economic growth and leadership; where we govern our city well through coordinated action.

A Connected Sydney where businesses connect to events, to each other and to residents, workers and visitors; with hubs that activate different city precincts; where transport links to outer suburbs; where digital access is fast and free.

A Diverse Sydney with later opening hours, and where more no-alcohol activities attract families and older people; where new venues and activities emerge in underused spaces, and where traditional spaces by day take on new uses at night.

An Inviting and Safe Sydney with beautiful design, including lighting, where spaces for pedestrians encourage strolling and exploring; where streets are safe and free of violence, and where there is respect between visitors and residents.

A Responsive Sydney where innovation is encouraged by reducing red tape, and where proactive, problem-solving teamwork with government and industry is the norm, and local solutions reflect local character

6.2.4 Liveable Green Network

The Liveable Green Network is a is a key project idea in Sustainable Sydney 2030 to deliver a pedestrian and cycling network that connects people to the City Centre, Village Centres and neighbourhoods, as well as to public transport, education and cultural precincts and major parks and recreation facilities.

The Liveable Green Network Strategy and Masterplan report 2010 found that to encourage use of pedestrian network will depend on improvements to infrastructure such as footpaths and crossings, wayfinding information and improved public lighting to encourage pedestrian activity at night.

The Liveable Green Network Masterplan provides the means to identify key pedestrian links and destinations across the LGA that may require a review to ascertain if additional lighting provision should be provided.

6.2.5 Safe City

Safe City is a multi-faceted program to address the safety and security issues of people who live work and visit the City.

The City's Safe City Strategy stresses the importance of adequate lighting levels as a key crime prevention measure, contributing to the reduction in crime and the increase in the public's perception of safety. Part of the Safe City program is the undertaking of safety audits in collaboration with police Local Area Commands to identify safety issues and develop rectification plans that may include a review and update of public lighting provision.

6.2.6 Public Art Masterplans

In May 2011, Council endorsed a new Public Art Policy and a new City Art Public Art Strategy as a key action of Sustainable Sydney 2030 in line with its key directions to create a "lively and engaging city" and "a cultural and creative City".

Part of the Strategy directions is the preparation of Public Art Masterplans that will guide the creation of high quality public art projects, including projects by the City of Sydney, projects created in partnership with cultural organisations and other projects created by the private sector.

To date public art masterplans have been developed for the City Centre, Green Square, and Chinatown.

In collaboration with the City's public art curatorial advisors lighting could be a key component of a public art proposal that contributes to the distinctiveness of a location.

6.3 Appendix 3: International Benchmarking and Positioning Study

A benchmarking study of a number of recently completed master plans from different countries and of different scales assisted in the positioning of this masterplan within other cities and similar projects, and indicates the following key principles as best practice design.

Sustainability

A key goal of recent lighting masterplans is to achieve a target of specific sustainable objectives, focussing on a reduction of CO2 emissions, a decrease of energy use, energy costs and minimisation of light pollution. Advancements in technology, including LED colour quality and consistency, efficiency, optics and accessibility provides a viable alternative for City lighting in future upgrades.

The role of lighting in a sustainable city development need to embrace wider aspects of 'urban life', 'identity', 'ideas', 'aesthetics', 'function' and 'technology'.

Safety and wayfinding

A sense of safety for people at night is a vital and needs to be recognised by the lighting masterplan. Most lighting strategies for public spaces emphasise way finding to main streets and key destinations, to encourage greater public use and feeling of safety.

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

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 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, recent masterplanning recognises and embraces the diversity and local character of individual precincts and allows for natural and individual developments to enhance specific precinct identities. This page has been left blank intentionally



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