

PUBLIC LIGHTING STRATEGY 2013

9 April 2013

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Purpose and background

1. The purpose of this report is to present the Draft Public Lighting Strategy 2013 (Draft PLS) and to seek approval from the Future Melbourne Committee to release the Draft PLS for a period of community and stakeholder engagement.
2. Ironbark Sustainability consultants were engaged to develop the Draft PLS in consultation with the key internal stakeholders. The Draft PLS builds on the previous Public Lighting Strategy 2002 and Sustainable Public Lighting Action Plan 2005-2010.

Key issues

3. The primary objective of the Draft PLS is to improve sustainability outcomes through improved quality, consistency and efficiency of public lighting in streets and other public spaces across the municipality.
4. The Draft PLS (Attachment 2) identifies the following strategic objectives, based on the outcomes of the consultation process with the key stakeholders:
 - 4.1. Reinforcing perceptions of Melbourne's physical form - aiming to ensure a consistent, attractive and balanced approach to the design of lighting throughout the City.
 - 4.2. Providing the required levels of lighting to support appropriate and safe use of the City environment.
 - 4.3. Supporting and promoting the use of Melbourne as a 24 hour City. A vibrant, interesting and eventful City can be enhanced and supported by innovative and successful programs of selective lighting.
 - 4.4. Promoting efficient technology, responsible management practices and other forms of energy conservation.
 - 4.5. Proactive maintenance program for all lighting assets to reduce maintenance costs.
5. External community and stakeholder feedback is required prior to the finalisation of the Council's PLS 2013. A stakeholder engagement plan has been developed and a four week consultation / feedback period has been allowed for until 8 May 2013.

Recommendation from management

6. That the Future Melbourne Committee:
 - 6.1 endorse the Draft Public Lighting Strategy 2013 for community consultation until 8 May 2013; and
 - 6.2 note that the final Public Lighting Strategy 2013 will be presented for adoption by the Future Melbourne Committee in July 2013.

Attachments:

1. Supporting Attachment
2. Draft Public Lighting Strategy

SUPPORTING ATTACHMENT

Legal

1. No direct legal issues arise from the recommendation from management.

Finance

2. There are no financial implications associated with the release of the Draft PLS for a period of community engagement. Costs associated with the engagement process will be met through the existing budget.
3. The current 2012-13 budget includes the provision of \$24,300 for the development of the Draft PLS. This figure includes the necessary funding for Community engagement.
4. The draft strategy identifies the cost of implementation. This cost will be subject to annual budget approval process.

Conflict of interest

5. No member of Council staff, or other person engaged under a contract, involved in advising on or preparing this report has declared a direct or indirect interest in relation to the matter of the report.

Stakeholder consultation

6. It is proposed that the Draft PLS is released for public comment and external consultation till 8 May 2013.

Relation to Council policy

7. The Draft PLS supports the Council's broader strategic objectives and responds to many of the issues and aims identified in the following documents:
 - 7.1. Strategy for a Safer City 2011-2013
 - 7.2. Docklands Public Realm Plan 2012
 - 7.3. Greenhouse Action Plan 2006-2010 (Council Operations)
 - 7.4. Carlton Gardens Master Plan (2005)
 - 7.5. Open Space Strategy (2012)
 - 7.6. Southbank Structure Plan 2010
 - 7.7. Urban Forest Strategy 2012-2032
 - 7.8. Zero Net Emissions by 2020
 - 7.9. Zero Net Emissions by 2020 (2008 update)
 - 7.10. Park Master plans (various)

Environmental sustainability

8. Street lights account for more than half of the City of Melbourne's electricity use. Furthermore, the public lighting system is a particularly conspicuous form of energy consumption that can send positive or negative messages about Council's commitment to environmental sustainability. The Draft PLS reflects this commitment by addressing the following aims and objectives:
 - 8.1. Encourage the use of natural light for lighting in daylight hours
 - 8.2. Promote and apply energy conservation practices.
 - 8.3. Reduce the amount of power consumed by public lighting.
 - 8.4. Consider and reduce impacts on Biodiversity from the use of artificial lighting.
 - 8.5. Evaluate all new public lighting projects in terms of environmental sustainability criteria.
 - 8.6. Introduce a waste management plan for Melbourne's public lighting system.
 - 8.7. Remove old assets when new ones are installed

March 2013

City of Melbourne

Public Lighting Strategy 2013

DRAFT

Version	Date	Author/Reviewer	Changes
1	10/1/2013	Paul Brown	
2	6-14/2/2013	Paul Brown/Zhanna Sichivitsa/CoM Project Steering group	Addition of Action Plan. Thorough revision of document
3	28/2/2013	Michael Cann/ Paul Brown	Final review and incorporation of comments from Parks and Recreation
4	6/3/2013	Paul Brown	Further comments from parks team and steering committee
5	7/3/2013	Paul Brown	Further comments from parks team

DRAFT

City of Melbourne Lighting Strategy

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1. Executive Summary

1.1 Origin and Justification

The Lighting Strategy is an outcome of City Plan 1999. Clause 5.1.6 of this document calls for a comprehensive and integrated urban lighting strategy for all streets.

In turn, this objective is part of a broader commitment to make Melbourne an even more liveable and attractive city. The original Strategy was adopted in 2002. This revision was completed in 2013.

1.2 Scope and Purpose

The primary objective of the Lighting Strategy is to improve the quality, consistency and efficiency of night lighting in streets and other public spaces. In general terms, the strategy aims for responsible use of energy to enhance people's experience of the city after dark.

The strategy promotes improvements to safety and amenity, especially for pedestrians. In doing this, the strategy recognises that people's sense of wellbeing results from a complex amalgam of factors. At night, these include way-finding and visual comfort, as well as road safety and personal security.

However, the Lighting Strategy recognises that brighter is not always better, as far as outdoor lighting is concerned. Over-lighting buildings or spaces dilutes dramatic effects, contributes to "sky glow" and can result in other negative outcomes. For these reasons, many of the strategies aim to limit the extent or intensity of external illumination.

The Lighting Strategy acknowledges Melbourne's characteristic brand of urban design. This has produced a public realm that is simple and low-key, but also elegant and clearly structured. Accordingly, the strategy emphasises good "functional" lighting rather than elaborate decorative installations or ostentatious special effects. This approach is also consistent with the City's commitment to environmental sustainability.

The Lighting Strategy consolidates the experience gained from two decades of successful public lighting projects in the City of Melbourne. The document provides direction for public and private external lighting throughout the municipality. It covers a full range of outdoor illumination, from streetlights to lighting on individual sites and buildings. However, the strategy's primary focus is on areas intended for public use and access.

The document defines issues, identifies objectives, and helps to set priorities for lighting initiatives until a review recommended in 2023. In addition, the Action Plan provides an outline of specific actions to be implemented before a review in 2018.

1.3 Audience

The Strategy has been written with a broad audience in mind. It is intended to be used by designers, developers, building owners and their agents (such as architects and lighting designers). In addition this Strategy will be used by planners and other staff within the City to ensure proposed lighting meets the requirements of this Strategy.

1.4 Major Themes

The strategy discusses in detail five major themes:

- Designing the Luminous City reinforces perceptions of Melbourne's physical form. Aiming to ensure a consistent, attractive and balanced approach to the design of lighting throughout the City.
- Safety and Amenity aims to ensure that public lighting provides the required levels of illumination to ensure the use of the City environment is appropriate and safe.

- Attracting the Evening Crowd aims at supporting and promoting the use of Melbourne as a 24 hour City. A vibrant, interesting and eventful City can be enhanced by innovative and successful programs of selective lighting.
- Designing the Sustainable City promotes efficient technology, responsible management practices and other forms of energy conservation. This group of strategies proposes a large scale replacement of inefficient mercury vapour lighting with more efficient and longer lasting technologies.
- Keeping the Lights Shining calls for a proactive maintenance program for all lighting assets. This aims to ensure all other strategies are maintained in a manner that delivers quality light and safety outcomes whilst managing operating costs and energy use.

Although these themes describe linked actions, priorities and design and project preferences, the contents of the Lighting Strategy are interconnected and therefore the document should be read and applied as a whole.

As a whole, the Lighting Strategy promotes selective extensions and improvements to Melbourne's public lighting system. Recommended outcomes include better illumination along waterways, within parks and throughout neighbourhood shopping precincts. Special emphasis is given to upgrading lighting at the edges of streets, where most people walk. In addition, the strategy advocates better visibility within ancillary spaces along major streets. These tributary spaces include laneways, car parks, forecourts and recessed building entrances.

1.5 Financial Implications

The Lighting Strategy describes a wide range of objectives, outcomes and performance criteria. Individual strategies are usually presented at a high level. So, the costs and benefits of improved outdoor lighting often cannot be quantified until particular projects are proposed within the context of detailed implementation plans.

However, there are some important exceptions to the above statement. The actions include some that can be managed with existing resources and funding. In addition, a number of new activities are planned. The estimated cost to implement the Strategy is approximately \$20.3m. Savings of around \$1.8m per year and over 8,000 tonnes of greenhouse emissions could be expected.

The majority of these costs relate to two specific items within the Designing a Sustainable City theme: the replacement of mercury vapour lights (\$3.6m cost and \$400,000 savings) and the replacement of high pressure sodium and metal halide lights (\$13m cost and \$1.5m savings).

2 Introduction

2.1 Main Objectives

The primary objective of the Lighting Strategy is to improve the quality, consistency and efficiency of night lighting in streets and other public spaces. If the strategy is successful, places that are attractive by day will remain safe, comfortable and engaging after dark. Energy will be used responsibly and “sky glow”, glare and other nuisances associated with outdoor lighting will be minimised.

The Lighting Strategy augments existing codes of practice for outdoor illumination, including all relevant Australian Standards.

There is an implicit tension between some of these objectives. Providing lighting whilst also aiming to reduce greenhouse emissions can often mean compromises are required. The Strategy seeks to balance the objectives and to explicitly state these multiple desired outcomes. Resolution of these conflicts needs to be considered on a case-by-case basis during the design and development of new lighting projects.

The Lighting Strategy helps to reconcile competing aims by applying Melbourne’s characteristic brand of urban design. This has produced a public realm that is simple and low-key, but also elegant and clearly structured. Accordingly, the Lighting Strategy emphasises good “functional” lighting rather than decorative installations or special effects. However, event lighting and temporary illuminated displays are encouraged, especially when they are linked to Melbourne’s busy calendar of festivals and other events.

Due to the number of public lighting assets, the humble streetlight ultimately has the biggest impact on environmental sustainability and the appearance or amenity of public spaces. Therefore, this element of the city’s infrastructure receives significant attention.

2.2 Scope

The Lighting Strategy provides direction for public and private external lighting throughout the City of Melbourne. The strategy defines issues, identifies objectives, and helps to set priorities for lighting initiatives. It helps to brief designers, but it does not prescribe specific projects or outcomes. It indicates general performance standards, but avoids precise measurements and technical details. Instead, the strategy focuses on a coordinated response to all Melbourne’s outdoor lighting, while performance standards and detailed applications remain to be addressed as part of design standards, implementation plans and specific project proposals.

The Action Plan (found in Section 9) provides a summary of the activities within the Strategy that require specific funding and responsibility to be delivered. This Action Plan is a supporting document to the Strategy and in contrast to the Strategy is specific and measurable and defines cost, responsibility and the priority for the different actions.

The Lighting Strategy has a ten-year lifespan with a 5-year Action Plan. Although Melbourne’s physical character evolves slowly, the aspirations of its people change more rapidly. For this reason, the Action Plan component of the strategy should only remain current until the 2017/2018 financial year. At that time, the document should be reviewed, and updated for a further five years.

2.3 Format

The strategy is organised hierarchically, using an indexing system. Major themes divide the document into five main sections:

- Section 4 Designing the Luminous City: reinforcing perceptions of Melbourne's physical form
- Section 5 Safety and Amenity: improving pedestrian safety and amenity
- Section 6 Attracting the Evening Crowd: bringing more activity into Melbourne's public places
- Section 7 Designing the Sustainable City: minimising the negative environmental impact of outdoor lighting
- Section 8 Keeping the Lights Shining: Actively maintaining quality lighting assets

These themes introduce eighteen separate lighting issues. Each issue is addressed by a set of lighting strategies that are presented in a standard format. First, a concise statement of the strategy is given, emphasised with bold type. This is followed by a paragraph containing more precise directions. These supplement the strategy, expand its meaning, and suggest means for implementation. Finally, bullet points in italic type provide explanations and comments on each of the strategies. The strategy includes several maps and diagrams. These are referred to in the text, and are attached to the end of the document. Although each lighting issue can be read independently, strategies under different headings are often related. For this reason, the document should be applied and understood as a whole.

Finally, putting the Lighting Strategy into effect requires a detailed Action Plan. Section 9 of the Strategy consists of this Action Plan and aims to translate the general objectives of the strategy into a set of specific lighting projects that are realisable within a fixed time frame.

3 Background to the Lighting Strategy

3.1 Changes to the 2002 Lighting Strategy

The Lighting Strategy was originally written in 2002. The original document was used extensively by Council staff, developers and other government organisations with an interest in the City. The original strategy was strongly supported and this revision maintains its integrity whilst ensuring current priorities and themes are included.

The 2002 Lighting Strategy has influenced every major precinct development and plan since it was written. The Strategy has been used to assist in the design of developments at Federation Square, Docklands and the QV site and the conversion of the Hoddle Grid and St Kilda Road Boulevard to white light.

Areas where significant updates were implemented include:

- Updating all dates, strategies, costs and savings estimates
- Including the “Keeping the Lights Shining” section
- Significant rewrite of the “Designing the Sustainable City” major theme
- Refocus and reprioritisation for the coming five year period

3.2 Other Council Strategies

The Strategy responds to an initiative in the Council's Municipal Strategic Statement and the City Plan 1999 that identifies the need for a comprehensive and integrated urban Lighting Strategy for all streets (see clause 5.1.6). This objective is part of a broader commitment to make Melbourne an even more liveable and attractive city. The Lighting Strategy supports the Council's broader strategic objectives and responds to many of the issues and aims identified in the following documents:

- Policy for the 24 Hour City (2009)
- Strategy for a Safer City 2011-2013
- Bicycle Plan 2012-2016
- Tree Policy
- Parks Policy
- Melbourne's Parks and Gardens Lighting Strategy (1995)
- JJ Holland Park Concept Plan 2008
- Docklands Public Realm Plan 2012
- Fitzroy Garden Master Plan Review Discussion Paper April 2010
- Greenhouse Action Plan 2006-2010 (Council Operations)
- Princes Park Master Plan (2012)
- Carlton Gardens Master Plan (2005)
- Fawkner Park Master Plan (2006)
- Flagstaff Gardens Master Plan (2000)
- Princes Park Ten Year Plan (1998)
- Royal Park Master Plan (1998)
- Newmarket Reserve Master Plan (2010)
- Open Space Strategy (2012)
- Southbank Structure Plan 2010
- Urban Forest Strategy 2012-2032
- Zero Net Emissions by 2020
- Zero Net Emissions by 2020 (2008 update)

3.3 Codes of Practice

The Lighting Strategy augments existing codes of practice for outdoor illumination. The following Australian Standards set minimum requirements for lighting in streets and other public places. All exterior lighting in the City of Melbourne should meet or exceed these standards:

- AS/NZS 1158 Set:2010 Lighting for roads and public spaces
- AS 4282:1997 Control of Obtrusive Effects of Outdoor Lighting

Unmetered lighting is managed under the requirements of the relevant Distribution Network Service Provider (DNSPs, Citipower and Jemena). As well as those requirements set out by the DNSPs, the following relevant Acts, Regulations and Codes need to be adhered to when maintenance of lighting unmetered assets is undertaken:

- Electricity Safety (Network Assets) Regulations (Vic) 1999 (Version No 002 Amended as at 7 December 2005)
- Electricity Safety (Network Assets) Code 1997
- Electricity Safety Act 1998 (Amended as at 21 October 2010)
- Planning and Environment Act 1987 (Vic) (Amended as at 30 June 2011)
- Environmental Protection Act 1970 (Vic) (Amended as at 1 July 2011)
- Code of Practice of electrical safety for work on or near high voltage electrical apparatus (the blue book) Victoria 2005
- Electricity Distribution Code, January 2006, Essential Services Commission
- Road Management Act (Vic) 2004 (Amended as at June 2011)
- Occupational Health and Safety Act 2004 (Vic) (Incl. duty of employers to consult employees who are directly affected by proposed changes to the workplace that may affect their health or safety. 1 January 2006)
- Occupational Health & Safety (Plant) Regulations 1995 (Amended as at 15 June 2001)
- Road Safety Act 1986
- Australian Standard AS1742.3 – 2009, Traffic control for Works on Roads, and
- Road Management Act 2004, Worksite Safety – Traffic Management code of practice

3.4 Outdoor Lighting

Users of the Lighting Strategy should also refer to the Civil Aviation Authority's Manual of Operational Standards. This document provides safety criteria for searchlights, lasers and other powerful light sources that might affect aircraft operation.

3.5 Recent Projects

The Lighting Strategy consolidates the experience gained from a decade of successful public lighting projects. However, the strategy addresses a wider range of issues and applications than any single project. These concerns include technical, environmental and urban design objectives which affect public and private lighting throughout the municipality.

Melbourne already has many fine examples of outdoor lighting. The Lighting Strategy identifies a number of innovative or exemplary projects. The following provides examples of this work carried out by the City of Melbourne:

- Swanston Walk: Installation of plasma lighting
- Upgrading of the Cultural Precincts (covering Lygon, Lonsdale Streets and Chinatown)
- Energy Efficient lighting installations in the following locations:
 - Southgate, Lygon St and Carlton (LED)
 - Southbank (induction)
 - Collins St (active reactor)
 - Royal Park (solar powered LED)

3.6 Stakeholders and communication

The City of Melbourne's Lighting Strategy was commissioned by the Engineering Services branch. The strategy was produced with the support of a range of Council stakeholders.

Engineering Services branch has the primary responsibility for managing metered public lighting in streets and parks, with Parks Services as a major stakeholder in lighting the municipality's large public open spaces. In addition, City Design implements street improvements, and initiates policies and designs for other public places.

The night appearance of the city is the product of public and private lighting. The Council can influence private outdoor illumination through the development planning process. However, a wider range of communication and collaboration is necessary if the strategy is to achieve complete synergy between public and private initiatives. For this reason, the Council should consult with other public authorities and key stakeholders in the private sector. The following organisations should be included in this dialogue:

- Residents and facility owners
- CitiPower
- Jemena
- Neighbouring municipalities
- Yarra Trams
- Taxi Directorate
- Metropolitan Fire Brigade
- Astronomical Society of Australia
- Victorian State Government
 - Victoria Police
 - Department of Infrastructure
 - Department of Planning and Community Development
 - Places Victoria
 - VicRoads
 - VicTrack
- Lighting contractors who provides services in
 - Design
 - Maintenance and services
 - Product supply

Communicating this Strategy and the successes that come from it are important to assist others to improve lighting. Communicate success stories and innovation to the broader community as they occur. Develop support for strategy with surrounding municipalities and the state government. Make use of live customer feedback (i.e. social media and web based feedback sourcing).

3.7 Further Work

The Lighting Strategy is the main document that outlines the public lighting approach for the City of Melbourne. It focuses on general responses to strategic issues, and avoids technical information or detailed design prescriptions. This approach helps to limit jargon and ensures that the document is compact, yet relevant to a wide range of conditions. Precise specifications are also inappropriate because the technology of lighting is evolving rapidly. Reference to specific dimensions, products and applications could soon become obsolete. Council is very specific on requirements for actual projects, so as this Strategy is long term, these specifications sit outside the Strategy but are crucial for it to work.

As a result, the Lighting Strategy needs to be supplemented by technical information. Engineering Services have already prepared performance specifications for street lighting in the municipality. Together with the Lighting Strategy, Design Standards provide precise design guidelines for lighting that affects the public realm. Design Standards have already been produced for the following lighting topics:

- F310 Street Lighting, Street Set
- F340 Street Lighting, Parkville Set
- F350 Park Lighting, Regular Set
- F360 Street Lighting, Swanston Street Set

New Design Standards should be produced to establish good lighting practice in specific situations. Each note should address energy conservation, and provide advice on how to prevent nuisance from intrusive or waste light. Priority topics are as follows:

- Contemporary architecture
- Heritage architecture
- Public art
- Shop window displays
- Security lighting
- Landscape features and large sites
- Outdoor public events

The management of private lighting is a critical component of ensuring the objectives of this Strategy are implemented. Further work in ensuring planning schemes cater for the requirements of the Strategy are needed. Specific areas to consider include:

- Establish planning requirements for the use of lighting on awnings and verandas which exceed a certain width e.g. greater than 3m (in places such as Elizabeth Street between Flinders St and Flinders Lane).
- Ensure that planning schemes adequately manage the use of reflective glass in order to reduce glare to neighbouring properties.

4 Designing the Luminous City

Reinforcing perceptions of Melbourne's physical form

Outdoor lighting should enhance perceptions of Melbourne's urban form, and promote appreciation of individual works of architecture. To meet these objectives, lighting concepts should encompass the entire city, focus on each of its neighbourhoods and be fully integrated with the form and character of individual buildings or spaces. Consequently, lighting designers need to address a broad range of issues. Traditional concerns such as road safety and personal security remain fundamental. However, emphasis should also be given to the expressive potential of light and the contribution it makes to Melbourne's night image and identity.

4.1 Night and Day

Familiarity and Surprise in the City after Dark

Melbourne is a different place after dark. Good lighting should amplify the transformation from day to night. In doing so, it should produce positive changes that enrich people's experiences and enhance their understanding of the city. To achieve this, lighting should call attention to shifts in use and meaning that follow the end of the working day. After dark, the night image of Melbourne should be cohesive and familiar. Important paths, nodes and markers should remain legible and recognisable to people.

Outdoor illumination should also produce some surprises. It may reveal elements and relationships that are recessive by day. It may manipulate the appearance of spaces or objects, either playfully or provocatively. However, the combined effect of these transformations must be engaging rather than alienating. For this to occur, changes should be set within the same basic framework of paths, precincts and landmarks that organise Melbourne during the day.

4.1.1 Reinforce perceptions of Melbourne's physical identity and characteristic urban structure.

Ensure that defining elements of Melbourne's physical character are legible after dark.

4.1.2 Balance opportunities to transform places with light against the need to present a coherent city image.

Compare people's daytime perception of the city with their experience after dark. Ensure that the dominant impression is that of continuity between day and night. Against this framework of familiarity, use illumination to manipulate the appearance and importance of objects. Highlight buildings, infrastructure and other elements of urban fabric in areas of the city that lack distinctive daytime features. Apply these transformations selectively to delight and surprise viewers, and also to express changes in use and status that accompany the transition from day to night.

4.1.3 Call attention to the distinctive patterns of activity that animate the city at night.

Use night lighting to orient people, and help them find their way around the city. Ensure that the city's network of paths, nodes, edges and landmarks is clearly visible, especially in areas that attract large numbers of pedestrians after dark.

4.1.4 Extend Melbourne's distinctive "brand" of urban design to the city's public lighting system.

Adopt a simple low-key approach to lighting in the public realm. Rely on functional lighting to express urban form and identity. Produce elegant designs of consistently high quality. Avoid attracting undue attention to light fittings, either by day or by night. Ensure that the collective effect of lighting installations is to enhance the structure of public space.

4.2 Navigation Lights

Lighting Melbourne's Landmarks

Not every building can be a landmark. Though skilful illumination can enhance the most banal object, having too many points of emphasis dilutes their impact. It can also be a nuisance, and set a poor example for responsible energy use. For these reasons, most of the city's fabric should appear as a backdrop to a few special buildings and places. In most cases, the features that stand out should match key reference points in people's mental image of the city. To achieve this, landmarks do not have to be large, conspicuous or concentrated in Melbourne's busiest locations.

Every part of the city should have its own markers, and these should be chosen in relation to local patterns of form and use that may not extend further than a few blocks. By the same token, landmarks do not have to be "public" in the full sense of this word. Many privately owned buildings also help to articulate the city's form and its functions. Nevertheless, when sites for feature lighting are assessed, it is important to distinguish between displays that promote private interests and those that make a genuine contribution to the city's legibility.

4.2.1 Restrict permanent feature lighting to buildings, landscapes and other artefacts that have special public significance.

To receive landmark status, these elements should have one or more of the following attributes or functions:

- (a) Express important historic associations or symbolic values.
- (b) Accommodate major public institutions or events.
- (c) Attract large numbers of visitors.
- (d) Occupy prominent locations with obvious connections to other important elements of urban structure.
- (e) Display exceptional size, or unique shape, or materials and details of unusually high quality.

A building's importance is a function of its use, appearance and location. Highlighting too many buildings undermines the status of genuine landmarks. Unrestricted flood lighting of buildings wastes energy, and can create nuisance.

4.2.2 Illuminate significant buildings and other landmarks on the edge of the Hoddle Grid and around the Central City

Today the Central City encompasses the Hoddle Grid, Southbank and Docklands. Examples of this type of landmark include the following structures and spaces:

- Bridges across the Yarra River
- Federation Square
- Flinders Street Station
- Forum Theatre
- Grand Hotel
- Queen Victoria Market
- Spencer Street power station
- St. Patricks Cathedral

For a good example of this work refer to Council's lighting scheme for Parliament, Spencer Street Station and the Treasury Building

A number of open spaces occur around the perimeter of the Central City. These include waterways, parkland, rail yards, and the "left over" spaces that form where different street patterns meet. Such places provide unrestricted views of adjacent city buildings.

The edge of the Hoddle Grid defines the threshold of the CBD. In this location, landmarks signal arrival or departure to people entering or leaving the Central City.

4.2.3 Within the Central City, illuminate significant buildings in settings that allow good visibility.

Consider the following situations:

- (a) Buildings set back from the street edge
- (b) Buildings that sit within their own grounds
- (c) Buildings that occupy major street corners or entire city blocks
- (d) Buildings at the ends of major street corridors
- (e) Buildings that face parks, gardens and other public reserves

Examples of this type of landmark include the following buildings:

- Royal Mint
- State Library
- St. Pauls Cathedral
- Supreme Court
- Town Hall

For a good example of this approach refer to Council's recent lighting scheme for the Old General Post Office. The Hoddle Grid defines Melbourne's cultural and commercial heart. Because of its importance, this area should have more landmarks than other parts of the city.

Central City sites are often hemmed in by neighbouring development. A foreground space gives prominence, and allows large buildings to be viewed comfortably. High ambient light levels in city streets can diminish the impact of illuminated landmarks.

By comparison, parks and other dark spaces provide ideal foregrounds for feature lighting.

4.2.4 Illuminate buildings and structures that are seen from major circulation routes or distant vantage points.

Examples of this type of landmark include the following buildings and structures:

- Docklands Stadium
- Government House
- No.2 Treasury Place
- Yarra Bridges
- North bank of the Yarra (Princes Bridge to the Docklands)

For a good example of this type of landmark lighting refer to a lighting scheme for the Shrine of Remembrance, Museum of Victoria and Royal Exhibition Building and the Southbank Arts Centre

4.2.5 Draw attention to local landmarks in areas outside the Central City.

Identify the local landmarks that articulate individual neighbourhoods. Match the extent and intensity of feature lighting to the significance of each subject.

- Landmark status needs to be judged in relative terms.
- Clear reference points help way-finding.
- Melbourne's neighbourhoods contain prominent buildings with special architectural character or community significance.
- Many neighbourhoods attract large numbers of evening visitors.

4.2.6 Target illumination carefully to highlight form and detail.

Avoid excessive illumination. Instead, rely on the quality and distribution of light to make an impact. Enhance forms and materials. Emphasise the three dimensional character of objects and surfaces. Accent construction details or decoration. Avoid up-lighting wherever possible, and mask light sources to prevent glare or overspill.

- Indiscriminate flood lighting of buildings, landscape features or other objects can cause a nuisance. Up-lighting is particularly troublesome, because it contributes directly to sky glow.
- Subtle illumination can produce interesting and attractive effects. It can emphasise an object without overwhelming the ambient lighting conditions in surrounding streets or open spaces.

4.2.7 Limit the duration of feature lighting on landmark buildings.

Place feature illumination on timer controls. Adjust operating hours to suit the seasons. Switch off installations after 1:00 am.

- Few people are outside during the early hours of the morning.
- Timer controls help to reduce energy consumption.

4.3 Grids and Lux Lighting Streets and Lanes

Lighting should express the two hierarchies that organise Melbourne's streets.

The first is based on formal composition. It is evident in the widths of streets and the geometry of grids. This formal hierarchy is a given. It is a legacy of the city's foundation, and it is most evident within the Central City where settlement first occurred.

The second ranking is based on use. It assigns principal importance to the busiest and most prestigious thoroughfares. This order can be difficult to pin down. Individual locations gain or lose popularity, and one activity may succeed another in the process of social, economic or technical evolution. Often, the clearest expression of a functional hierarchy is the city's network of "arterial", "collector" and "local" streets. Many of these routes are already marked by different levels of illumination. However, Melbourne's street hierarchy also needs to include tram lines and "soft" structures such as pedestrian pathways and different intensities of street activity.

In some parts of the city, such as the Hoddle Grid, geometry provides the dominant order. In other locations, such as the centres of Melbourne's neighbourhoods, patterns of use offer a more obvious starting point for lighting design (See Map 1).

4.3.1 Develop a suite of standard streetlights for use throughout the municipality.

Build on the existing collection of prototypes. Develop designs for every level in the city's two street hierarchies. Create simple elegant fittings that seem appropriate in a wide range of contexts. For use on the unmetered road lighting network technical approval will be required.

- Lighting should generally be a background element in the streetscape. Standard designs assist this role, and help to focus attention on the surrounding architecture and landscape.
- Consistent use of a limited number of fittings helps to create more coherent streetscape. Standard fittings also express large-scale street patterns that extend beyond individual precincts or neighbourhoods.
- Standard designs help to reduce capital and maintenance costs.

4.3.2 Treat Melbourne's main boulevards as primary traffic routes and major landscape features.

Use illumination to enhance the experience of entering and leaving the city. Recognise the distinct scale and function assigned to different parts of a boulevard's cross section. Illuminate each zone in response to its specific purpose. Emphasise pedestrian amenity along the edges of the boulevard and at tram stops located in the centre of the right-of-way. Emphasise motorists' perceptions where lanes of fast through traffic dominate. Ensure that lighting layouts in each of these locations combine to form a single cohesive image.

- Some boulevards are more than 100 metres wide. Medians and avenues of trees split the right-of-way into as many as five separate corridors.
- Boulevards have a grandeur based on their width, length and the continuity of their landscape.
- The boulevards are essential components of Melbourne's urban form and character. Large numbers of people enter and leave the city along these routes. Elizabeth Street provides an axial extension to Central City, and St. Kilda Road locates the city's main ceremonial space.
- Pedestrian routes are contained within modestly scaled spaces at the edges of the boulevards.

4.3.3 Emphasise the geometrical hierarchy of streets within the Central City.

Use the type, number and location of lights to identify the relative importance of street. Treat the wider streets with greater formality. Treat the narrower streets with greater flexibility with regard to type and design. Within road reserves of the same width, match lighting layouts to the dimensions of footpaths. Assign importance in the following order (Map 1 provides detail of the relevant streets in each category):

- (a) 30 metre streets with wide footpaths, e.g. Swanston Street
- (b) 30 metre streets with medium width footpaths, e.g. Collins Street
- (c) 30 metre streets with narrow footpaths, e.g. La Trobe Street
- (d) 10 metre streets
- (e) Laneways

The Hoddle Grid is a primary element in Melbourne's urban structure. It defines the origin and centre of Melbourne. It locates many of the city's most important pedestrian routes and destinations. For these reasons, it is appropriate to differentiate the Hoddle Grid from the rest of the city's street system.

Continuity and completeness are characteristic features of the Central City. Its uniform structure helps to organise buildings and orient pedestrians. Street lighting should enhance this formality.

Activities change rapidly, especially within the Central City. By giving the whole of the Central City a uniform lighting treatment, the flexibility of the grid and its receptiveness to change is maximised. Compared with these shifting patterns of use, the geometry of the grid is relatively permanent. Furthermore, the dimensions of a street often correlate with its importance. This is especially true for footpath widths. Footpaths have been extended in those parts of the retail core where pedestrian numbers are highest. For these reasons, street widths and the dimensions of footpaths or carriageways provide the basis for a robust street lighting policy.

Street widths also have practical implications for the layout of lamps and poles. So, it makes good sense to match standard lighting designs to the most common dimensions for road reserves and footpaths.

On broad streets, lamps may need to be higher or positioned closer to the centre of the right-of-way. Alternatively, several rows of lights may be necessary. Along narrow streets and lanes, wall brackets or a single row of poles may be adequate, and greater variety is possible.

Some footpaths have been widened to cope with large numbers of pedestrians. In these locations, lights can be placed closer to the centre of the street, and shorter poles at more frequent intervals are possible. This type of layout has a better relationship to human scale.

Central City streets are either 30 metres or 10 metres across. The busiest sections of Bourke Street and Swanston Street have 8.5 metre wide footpaths. Footpaths are 5.4 metres wide along Collins Street, Elizabeth Street and most of the remaining blocks of Bourke Street. Elsewhere, Central City footpaths are a standard 3.6 metres in width.

4.3.4 Emphasise the functional hierarchy of streets within Melbourne's neighbourhoods.

Use the number, type and location of lights to identify the relative importance of local streets. Increase the intensity and uniformity of illumination on major routes. Assign importance to streets in the following order:

- (a) Local retail strips
- (b) Tram routes connecting neighbourhoods with the Central City
- (c) Streets in commercial or mixed-use areas
- (d) Residential streets

4.3.5 Limit unique light fittings and installations to lanes and arcades.

Take a site-by-site approach to design in the Central City. Adopt a unifying lighting theme for all the lanes within a single neighbourhood centre.

- Laneways are a distinctive feature of Melbourne. However, they are always incidental to the surrounding street pattern.
- For safety reasons, the Council is committed to improving illumination in laneways, especially in the CBD.
- Unique lighting installations have been successfully completed in several Central City lanes.

4.4 Local Colours Lighting Melbourne's Neighbourhoods

Lighting should reinforce the separate identities of Melbourne's neighbourhoods. The CBD is surrounded by residential areas that provide important frames of reference for local communities. Many neighbourhoods also perform specialised roles for the whole metropolitan region. The urban form of these places is complicated by their location on the edge of the Central City. Different street patterns collide, and the mix of commercial and residential buildings can produce sudden fluctuations in scale. Sometimes, links between the neighbourhoods and the CBD are also unclear. During the day, these intricate patterns and unexpected relationships often appear charming. However, the complexity can become confusing after dark. Night lighting should improve the legibility of these areas. It should clarify the layout of each locality, giving emphasis to centres of activity, points of reference and key connections to the Central City.

4.4.1 Identify local shopping strips as centres of community life.

Increase the intensity of illumination within community retail areas. These areas are mixed use and as such lighting levels should be brighter in times where pedestrian use of the strip is of primary importance and reduced where residential use of the strip is the dominant factor. Locate streetlights where they will benefit pedestrians, and provide illumination to building frontages. Improve the quality and consistency of lighting beneath verandahs. Supplement street lighting with interior illumination from the ground floors of buildings. But discourage over-illumination of business premises, especially when this is done for promotional purposes.

- Neighbourhood shopping streets contain restaurants, cultural facilities and other popular night destinations.
- Brighter lighting helps to differentiate retail precincts from surrounding residential or mixed-use areas.
- The use of dimming and time of use should be tied to the needs of pedestrian shoppers and then altered to cater for residential use after business hours
- The edges of shopping streets should be well lit, because this is where visual interest and pedestrian activity is concentrated.
- Shopfronts provide additional light on retail streets. They can be an important light source along footpaths, when verandahs or trees block the illumination from street lamps.

4.4.2 Treat lighting as a background element within neighbourhood streetscapes.

The priority for lighting in neighbourhood streetscapes is to meet the required standards, but beyond that to focus on energy efficiency and long life.

Choose lanterns and poles from the City's suite of standard fittings. If necessary, adapt these designs to fit local conditions. Ensure that the layout and appearance of the streetlights complements other elements of street furniture. Schedule lighting upgrades to coincide with other street improvements.

- Different lighting designs in every neighbourhood would detract from the unity of the public lighting system.
- The identity of each neighbourhood derives from the layout of its streets and the character of its buildings. It does not depend on idiosyncratic street furniture.

4.4.3 Call attention to distinctive buildings.

Illuminate suburban town halls and other local landmarks. Adopt a comprehensive approach to lighting facades within neighbourhood shopping precincts. But avoid excessive illumination, especially where this wastes energy or causes a nuisance. Place feature lighting on timer controls, and turn off installations after 1:00 am.

- Landmarks provide part of the character of a place. They also help people to orient themselves.
- Every neighbourhood has its own landmarks. Although, sometimes the significance of a place or structure is evident only to the local residents.
- Where reference points are scarce or difficult to identify, night lighting can help. It can add emphasis, or transform an apparently ordinary building into an effective marker.
- Contiguous two and three storey facades help to identify the centres of most neighbourhood shopping precincts. The appropriateness of lighting these facades needs to be judged on a case by case basis. A common approach should be taken to all frontages along a single retail strip, because isolated or intermittent illumination detracts from the unity of a streetscape.
- The desire to mark special places with stronger illumination must be considered together with the need to conserve energy and avoid nuisance.

4.5 Parks after Dark Lighting Parks and Gardens

Melbourne's parks and gardens are world famous. They provide major recreational assets, and they act as counterpoints to the regularity of the city's grids. By day, the relationship between built form and open space is one of positive contrast. However, by night, the parks often "disappear". They can become islands of darkness within a network of brightly lit streets. Despite the gloom, Melbourne's parks and gardens remain open after dark. Casual use declines. But, sporting events and organised entertainment may attract large evening crowds. The open spaces also contain important pedestrian routes that link the Central City with surrounding neighbourhoods.

These paths remain in use until late at night. Furthermore, parkland borders many of Melbourne's main thoroughfares. In daylight, these streets benefit greatly from the adjacent landscape. However, when night falls, the foliage and the attractive views may be replaced with a menacing void. For all these reasons, Melbourne's parks and gardens are an important part of the city's public lighting system. It is neither practical nor desirable to illuminate large areas of landscape in their entirety. Limiting lighting in parks provides benefits in reducing cost and energy consumption as well as to provide for biodiversity in the city (e.g. bats are sensitive to lighting and other nocturnal species that rely on dark for foraging and locating homes). However, it is possible to light gates, paths, focal points and edges selectively, so that the city's major open spaces remain a positive part of Melbourne's night character.

Melbourne's parks are categorised by size, location and use. Map 3 provides detail of the location and category of each of Melbourne's parks. Map 2 provides a summary of all metered lighting assets, including lighting in parks, as well as car parks, sporting facilities and around some parts of the built environment.

4.5.1 Manage the use of lighting in different park categories

Melbourne's parks are categorised by size, location and use. Map 3 provides detail of the location and describes the category of each of Melbourne's parks. Although each park needs to be considered based on the needs of the local users and the other criteria within this Strategy, in general the lighting of these parks can be implemented to reflect these categories. Below is a summary of the general requirements of each category and covers all lighting within the park (pathway, entrance, feature, event, etc. unless otherwise stated).

Local and Small Local Open Space and Small Local Link

Generally, these parks would be adequately lit by street lighting and additional lighting is not provided. If this is not adequate, any lighting must be minimal and used only during the time they are required. Any lighting should be turned off after 10:00pm unless a case can be made to extend or limit the hours.

Neighbourhood Open Space

Lighting may be used and turned off at 10:00pm unless a case can be made to extend or limit the hours.

Capital City, State, Regional and Municipal Open Spaces

Lighting may be used and turned off at 1:00am unless a case can be made to extend or limit the hours. A skeletal path layout for major pedestrian routes through the parks and building security lighting may be lit all night.

Royal Park

Car park lighting (including near zoo) should be turned off at 1:00am.

4.5.2 Reinforce the distinct characters of Melbourne's large parks and gardens.

The City's main parks and gardens are large enough to be experienced as distinct spatial entities. In these situations, street lighting and park lighting should operate as independent systems. Lighting strategies already exist for most of Melbourne's large parks and gardens (including Melbourne's Parks and Gardens Lighting Strategy (1995)).

Continue to implement individual lighting plans for each of the major parks and gardens:

- Carlton Gardens
- The Domain (including Alexandra Gardens, Queen Victoria Gardens, King's Domain, and Shrine Gardens)
- Fawkner Park
- Fitzroy Gardens
- Flagstaff Gardens
- J.J.Holland Park
- Princes Park
- Royal Park
- Treasury Gardens
- Yarra River Banks (from Princes Bridge to Hoddle Bridge, including Birrarung Marr)

Assess need for lighting plans for the following large open spaces:

- Kensington Banks (Kensington)
- Docklands Park (Docklands)
- Riverside Park (Kensington)
- Newmarket Reserve (Kensington)
- North Melbourne Community Centre (North Melbourne)
- Warun Biik Park and Galada Avenue Reserve (Parkville)

4.5.3 Base the layout of park lighting on patterns of circulation.

Provide good illumination to the most popular walking routes. Ensure that these pathways are well connected with each other, and with surrounding city streets. Do not light cul-de-sacs or routes that are seldom used. Introduce timers or energy-efficient dimmers to lamps along infrequently used pathways. Use these controls to reduce illumination during the early hours of the morning.

- Parks provide important pedestrian connections between the Central City and the surrounding neighbourhoods
- Selective lighting can help to direct pedestrians to the safest, most frequently used thoroughfares
- It is neither practical nor desirable to comprehensively light large areas of parkland. Some of the city's public open spaces should remain dark at night

4.5.4 Accent park edges and main entrances.

Provide a higher illumination level around main entrances. Create a sense of depth among landscape elements that are viewed from surrounding streets. Illuminate elements at the terminations of view shafts.

- Conspicuous park entrances help to identify safe walking routes.
- Open spaces should provide positive street edges after dark.
- View shafts down city streets often provide organising axes within park landscapes.

4.5.5 Punctuate dark areas by feature lighting buildings and landscape elements.

Locate feature lighting conspicuously. Choose sites that can be seen from entrances, pathways and other frequently used viewpoints.

- Feature lighting helps to convey the scale and depth of spaces, and supports the perception that dark areas are not empty
- Illuminated landmarks help people to orient themselves
- Parks are ideal settings for illuminated landmarks, because the dark surroundings allow accent lighting to produce a dramatic effect
- Not all features need to be lit
- A skeletal path layout for major pedestrian routes through the parks and building security lighting may be lit all night

4.5.6 Lighting of open space for organised night activities.

Do not light large areas of open space unless these are used for organised night activities. Locate illuminated activity zones along major pathways and at the edges of parks. Timing relates to the category of park (see 4.5.1).

- It is impractical to light large areas of parkland
- Activity areas are safer if they are alongside well-used thoroughfares

4.5.7 Treat Royal Park as a “dark” space that offers relatively unobstructed views of the city skyline and the night sky.

The benefits of a dark park should be promoted. Light only the major pathways. Reduce the extent of illumination after 1:00 am. Avoid feature lighting of buildings or landscape. In Royal Park, organise “Starlight Nights” when all sports lighting is turned off. Minimise stray light from surrounding streets and buildings. Cooperate with neighbouring municipalities to extend these controls to a broader geographic area.

- Royal Park is the city’s “wild” park. It contains large areas of landscape that approximate a natural condition
- The park’s raised ground and wide-open spaces allow expansive views of the sky and the CBD skyline
- Royal Park is home to Melbourne’s Zoo. Intrusive outdoor lighting can have a negative effect on animals
- Sports facilities in Royal Park can be lit only when activities are occurring. But must be turned off at 10:00pm
- Lighting to support active transport modes (bicycles, walking, tram) should be lit where and when there is heavy use and generally turned off after 1:00am
- A skeletal path layout for major pedestrian routes through the parks and building security lighting may be lit all night. Options to remotely turn these off for Starlight nights should be installed

4.5.8 Maintain a suite of standard lanterns and poles for use in major parks and gardens.

Design light fittings to allow flexibility. Avoid making non-standard variations, and rigorously limit the use of special designs. Adopt simple elegant fittings that will be relatively inconspicuous, and will not date rapidly.

- Distinctive light fittings help to distinguish park lighting from street lighting. However, designing different light fittings for every large park would be expensive, and would reduce cohesion in public lighting system
- Unobtrusive standard fittings become background elements within the landscapes of large parks and gardens

4.5.9 Maintain permanent purpose-built services for temporary lighting installations.

Provide single and three-phase power. At popular venues, consider including video and computer lines as well. Conceal outlets and cables, or design these to be unobtrusive.

- Melbourne's parks and gardens host evening events that depend on sophisticated lighting and projection systems
- Services for temporary lighting installations can be unsightly and unsafe. They may also cause damage to trees and other landscape features
- Permanent infrastructure could cut production costs and reduce turn-around times for outdoor public events

4.5.10 Where large open spaces are concerned, ensure that park lighting and street lighting operate separately.

Provide separate power supplies for lighting in streets and large public open spaces. Introduce flexible monitoring and control systems for parks that have their own independent lighting layouts.

- Different divisions of Melbourne City Council are responsible for park lighting and street lighting
- Lighting in large parks needs to operate independently from the adjacent street lighting. For example, some path lighting and feature lighting may be turned off during the early hours of the morning
- Parks contain a wide variety of lighting installations. Precise, versatile controls that have the ability to be altered onsite or remotely are necessary for the whole system to function effectively
- Lighting needs to be able to be varied in time, and lighting level, and in some locations by colour and effect
- Feature lighting of landscape elements has more impact if it operates intermittently, or alters its appearance over time. This capacity depends on sophisticated operating mechanisms

4.6 The Big Splash Lighting Melbourne's Waterways

Three major waterways are central to Melbourne's identity. The Yarra River, the Maribyrnong River and Victoria Harbour account for many of the city's basic physical attributes. Although the original shorelines vanished long ago, these bodies of water still provide a dramatic reminder of the natural features and forces that have helped to shape the city.

The water edge also records human intervention in this landscape. During its first century of development, Melbourne's industry exploited these waterways for transport, water supplies and the removal of waste.

The rivers and their estuaries gradually became lined with docks, piers and railway embankments. Factories and warehouses occupied many prime waterfront locations. As the city grew, it effectively turned its back on the water.

Today, these waterways remain catalysts for development. The river corridors still concentrate lines of travel, and Victoria Harbour is the focus of a new city district. The greatest assets of these locations are the visual amenities and recreational opportunities offered by water. Water holds a special attraction for people. Moreover, because of their natural form and historic functions, the waterways are ideally placed to connect Melbourne's major parks and gardens with each other, and with areas of significant urban renewal.

Melbourne's waterways are finally being fully integrated with the rest of the city's public open spaces. Effective public lighting can assist this transformation. It can support pedestrian access to the water, and enhance the views that make these places memorable.

4.6.1 Emphasise the Yarra River as the centre of Melbourne.

Ensure that the quality, intensity and eventfulness of illumination identify this river as Melbourne's pre-eminent public space. Orchestrate public and private lighting to create cohesive large-scale effects. Emphasise the bridges as thresholds to the Central City. Install distinctive light fittings that announce the special status of the river precinct. Ensure that permanent riverside lighting does not impair views of the water and the city skyline.

- Southbank Promenade is the city's most popular night destination
- The Yarra provides the foreground for many representative views of the CBD
- The Yarra helps to orient visitors to the city, and connects many of the city's major visitor destinations
- The Yarra and its banks provide important venues for public events

4.6.2 Reinforce continuity along the banks of the Yarra and Maribyrnong rivers.

Support public access to the water edge. Extend safe legible pathways along the full length of each waterway. Enhance visual links and pedestrian connections among riverside amenities. Use light to bridge gaps between activity nodes, and articulate changes in the level or alignment of esplanades.

- The Yarra's banks provide a continuous east-west pathway across the city
- The two river corridors provide convenient and attractive routes for pedestrians and cyclists
- The waterways connect many of the city's major cultural and recreational facilities

4.6.3 Reinforce cross-river connections along the Yarra and the Maribyrnong.

Treat bridges as sculptural objects. Illuminate buildings, infrastructure and landscape features that can serve as beacons along dark sections of the rivers. Ensure that major paths and destinations are visible to observers on the opposite bank.

- Historically, rivers have been barriers to development. Independent districts have evolved on opposite banks of the Yarra and, to a lesser extent, along each side of the Maribyrnong. In their new role as recreational spaces and venues for public events, the rivers need to function as "centres" rather than boundaries. Good cross-river connections support this change.
- Presently, pedestrian activity and public amenities are concentrated on the southern bank of the Yarra. However, in future, the north bank will also accommodate major visitor destinations.
- Parts of the Yarra's north bank are still under-utilised. Nevertheless, this area provides crucial connections to the Central City and contains new public spaces at Docklands, Federation Square and Birrarung Marr. The north bank is also a conspicuous foreground to important views of the CBD.

4.6.4 Express the dynamic character of the rivers.

Exploit the dynamic combination of water and light. Use reflections to amplify and enliven the effects of illumination. Direct attention to boats, to adjacent roads and rail lines, and to the movement of the water itself. Give priority to temporary illumination or changing lighting effects, especially installations that are associated with events along the rivers. Lighting should aim to assist and not impeded safe navigation.

- By its very nature, a river involves movement. Its direction of flow provides a basic frame of reference for people and places along its banks. Its sinuous form facilitates travel. These qualities are all the more remarkable in a gridded city, because the fluid lines of the Yarra and the Maribyrnong contrast with the rigorously orthogonal layout of streets.

4.6.5 Enhance the accessibility and appearance of Victoria Harbour, Fisherman's Bend and E gate (Docklands)

Victoria Harbour, Fisherman's Bend and E Gate have quite a different character from Melbourne's other major waterways. Unlike the two rivers, these are static centred spaces. They have developed as a destination, rather than a thoroughfare. In many respects, these are analogous to one of Melbourne's large parks. As such, they provide missing links in the chain of major public open spaces that encompasses the Central City.

- Express the area's origin as a working port and support its new function as an aquatic "park"
- Light pathways and landmarks
- Emphasise public access to the water and a continuous pedestrian promenade along the water edge
- Connect centres of activity with a choice of routes that are safe and legible after dark
- Use feature lighting to punctuate dark spaces, and assist orientation

4.7 The Active Community Lighting Melbourne's Sports Facilities

Council provides venues for recreation activities throughout the year for many different sporting and community organisations. There are over 50 sports grounds, tennis and bowls facilities, many of which have lighting so the courts can be used in the evenings. In addition many open space areas are used for activities such as jogging, rowing and other sports.

The need for lighting needs to be consistent with relevant master plans for the location.

The demand for evening use of these venues is high and the current lit venues are over capacity. More facilities will require lighting over the coming years to meet this demand. Council has a small (but growing) number of synthetic sports fields. These fields save a significant amount of water and are all lit.

Encouraging active recreation of these fields is an important way of promoting health and community connectedness and lighting venues allows for greater community benefit.

It is not desirable to light all sports fields. Consideration of the use of lighting in these areas need to be carefully balanced with the needs of the wider community, wear and tear on the facilities and care to manage energy use and costs.

4.7.1 Create effective sports lighting only where it is required

Ensure the lighting is used only when and where needed to provide a safe venue for the users. The use of the AS 2560 Sport Lighting is required, and where relevant the use of the Community Sporting Facility Lighting Guide for Australian Rules Football, Football (Soccer) and Netball compiled by the Department of Planning and Community Development.

Relevant lighting can be applied to a variety of organised sports as well as to high use locations for jogging (such as around the Tan and the Prices Park Jogging Track).

In order to manage the environmental and community impact of sports lighting the following will be implemented for all new lighting designs:

- Lighting levels are to meet training standards and not higher
- Remote monitoring and switching of the lighting to be installed
- The demand for lighting
- Careful consideration of spill lighting is critical due to the strength of sports lighting

For all new and existing lighting installations the following is required:

- Automatic timers are to be installed with timers aligned to the lease or permit conditions of the venue
- Multiple switching to allow for the choice of some or all of the venue to be lit
- Timers are to turn off sports lights at 10:00pm (with a 15 minute grace if required)

5 Safety and Amenity

Improving pedestrian safety and amenity

The two issues of safety and amenity cannot be separated from one another. People's perceptions of safety are influenced by factors such as visual comfort, way-finding, and the ease with which objects and places can be recognised. At night, the presence of artificial light affects all these responses. It determines our ability to negotiate the city and perform tasks comfortably, efficiently and safely. Ironically, good ambient illumination is hardly noticeable. It merely provides the background to people's activities. We probably become aware of lighting conditions when they are dysfunctional or intrusive. Most people know instinctively if a place is poorly lit. However, the causes of bad lighting are complex, and often escape our attention.

The amount of light is only one factor to be considered. Frequently, the distribution, direction and even the colour of light are more important variables. Impressions are also formed comparatively. Dimly lit areas will appear darker if they are contrasted with patches of bright light. For these reasons, it is helpful to take an inclusive approach to lighting issues. The needs of different user groups need to be acknowledged, multiple parameters should be examined, and each initiative should be placed within a wider physical context.

5.1 Good Measures Performance Criteria For Lighting In Public Places

Council aims to improve amenity and access in public places. In particular, it wishes to produce high-quality streetscapes and improve pedestrians' experience of the city. The attributes of attractive streets and squares are already well understood. However, these qualities also need to be evident after dark, when lighting becomes an essential component of good urban space. Whereas conventional lighting layouts focus largely on the needs of motorists, council's public space objectives place an equally strong emphasis on pedestrian amenity. They require streets that are safe, comfortable and interesting to walk along, and they depend on a legible network of pathways between important night destinations.

All public lighting must satisfy the basic requirements of road safety and personal security. Compliance with Australian standards and other established codes of practice helps to meet this requirement. At the same time, outdoor illumination should respond to a wider range of performance criteria, including those factors that enhance our use and enjoyment of urban places after dark.

5.1.1 Ensure that all new outdoor lighting designs meet recommended codes of practice for traffic safety and pedestrian amenity.

Comply with the relevant Australian Standards listed in Section 2.2 and be guided by the following:

Lighting for streets (See also Map 1)

- Category V3 to be used for Boulevards, major roads and Neighbourhood retail strips
- Up to Category V2 to be used for King St
- Up to Category V1 to be used for targeted areas (e.g. tram stops, ingress and egress of train stations), freeway connections and very high use roads may be higher
- Category P3 to be used for parks
- Category P4 to be used for residential streets
- Category P3 to be used for the Central City
- Category P8 to be used for 10 metre CBD Streets

Dimming may be used to reduce lighting levels from one category to another and levels can be identified based on traffic (vehicular or pedestrian) volumes, timing (where high use areas such as tram stops are not in use after hours) or where lighting is higher for specific events.

5.1.2 Provide enough light for pedestrian comfort and safety.

Within the Central City and neighbourhood retail areas, illumination levels should be sufficient to produce the following effects:

- (a) Ensure the edges of streets and other public spaces are well lit
- (b) Reveal changes in level and other potential hazards
- (c) Assist way-finding
- (d) Allow a person's features to be recognised at a distance of 10 to 15 metres
- (e) Facilitate video surveillance for public safety

Road lighting standards do not guarantee high quality illumination of buildings and pedestrian spaces. The use of tools like lux plots allows a greater understanding of the location, evenness and strength of lighting. In city streets and other public gathering places, better lighting is warranted because of the range and intensity of activities.

Perceptions of safety are just as important as practical effects. Care should be given before lighting an area as good lighting will attract more people. Better lighting means more people and thus more safety, however, care should be taken in implicitly encouraging greater use of locations that may be unsafe.

5.1.3 Minimise the negative effects of glare.

Conceal lamps to reduce glare via the use of full cut-off fittings, baffles, glare shields, reflective lighting and other techniques. Avoid extreme contrasts between light and dark surfaces. Limit variations in brightness to a comfortable range. Match changes in the level of illumination to patterns of use and components of landscape.

- Glare can cause discomfort. The eye takes time to adjust to changes in brightness, especially sudden reductions in the level of illumination
- Glare reduces visibility. Over-lighting in one area creates an impression that other places are under-lit. In the presence of bright lights, or isolated areas of high illumination, background surfaces appear darker and "blind spots" may occur
- Bright spots are distracting: the eye automatically focuses on intensely lit surfaces

5.1.4 Use light to reveal fully rounded three-dimensional forms.

Lighting from only one direction can create silhouettes and distort form and colour. This can lead to a perception that the space is not safe. Avoid this by emphasising and illuminating spaces and objects from more than one angle. Balance the number, location and intensity of light sources. Avoid highly directional lighting, as well as illumination that is "flat" or excessively diffuse. Provide an adequate level of illumination to vertical surfaces.

- Directional lighting can be dramatic. However, it produces deep shadows, and it can distort the appearance of objects
- Outdoor lighting levels are usually measured on the ground. These readings can conceal the fact that upright surfaces are poorly illuminated. Yet, vertical surfaces, such as the walls of buildings and the faces of people, are often the focus of attention

5.1.5 Coordinate public and private lighting at sidewalk bars and restaurants.

Provide a high standard of illumination along streets in popular restaurant districts. Ensure that the colour and intensity of street lighting are compatible with sidewalk activity. Locate light poles where they facilitate flexible use of footpaths.

- The interests of individual businesses should not compromise the layout of street lights. However, where sidewalk cafes and restaurants are common, new public lighting installations should be designed to support this activity

5.1.6 Avoid conflict between lights, trees and other elements of the streetscape.

Wherever possible, design street lighting and other elements of the streetscape at the same time. Coordinate the locations of street trees and light poles. Keep lanterns below the canopies of mature trees. Alternatively, place lanterns nearer the centres of streets, out of reach of foliage. Ensure light reaches the street edge and the perimeter of public open spaces. Provide supplementary lighting where street trees or verandahs would otherwise throw frontages into deep shadows.

- Street trees are a valued part of Melbourne's character. However, they can interfere with street lighting. The problem is more pronounced with immature trees, and species that are small in stature. If the tree canopy is lifted well above the ground, lamps can be located underneath the foliage
- Verandahs can block street lighting and cast deep shadows across footpaths and ground floor frontages

5.1.7 Consider the daytime appearance of Lights.

Design lanterns to catch sunlight and create sparkle. Conceal cables and control gear. Integrate supports for tram lines, traffic signs and other aerial services or decorations.

- Multi-purpose poles help to reduce clutter
- Permanent streetlights can provide the infrastructure for temporary decorative lighting

5.2 Improving the Colour of Street Lighting

Different light sources produce illumination with distinct colours. In simple terms, streetlights can be white, blue-white or yellow. The choice is important, because the colour of artificial light influences people's impressions of their surroundings. Lamp colours are also linked to different lighting technologies. Yellow light is associated with high or low pressure sodium lamps. White and blue-white light typically come from metal halide, mercury vapour and induction lamps whilst LED lighting provides a wide range of colour options.

Some lamps and colours produce more favourable effects than others. In particular, white light (in the range of 3500K to 5000K) performs better than yellow light from sodium lamps (commonly under 3000K). White light reveals the natural colours of surfaces, and it provides a more accurate sense of the size and shape of objects. At low levels of illumination, such as those experienced on a city street at night, the human eye is more sensitive to white light than yellow light. In other words, white light is more useful than yellow light. In practice, this means that less illumination is needed, if white light replaces yellow. This can translate into greater energy efficiency.

Until recently, the full advantages of white light were not widely appreciated. For many years, yellow “sodium” lamps have been the accepted source of night lighting within cities. Today, there is a better understanding of the advantages and disadvantages of each light source. This knowledge supports the widespread conversion of Melbourne’s street lamps from yellow light to white light. This conversion has been ongoing for many years and this Strategy supports the continued conversion. This change will improve energy efficiency, dramatically reduce the waste light that causes sky glow, and produce a more comfortable and attractive environment for pedestrians

(Note: refer to the glossary for precise definitions of “white”, “blue-white” and “yellow” light.)

Yellow light may be used for decorative effect in locations such as façade lighting of Spencer Street Station.

5.2.1 Use white light in those parts of the city that have greatest pedestrian activity.

Replace yellow and blue-white lamps with white lamps. Install advanced technology with energy efficient lamps and full cut-off fittings. Give a high priority to change in the following areas:

- (a) The Central City
- (b) Neighbourhood retail strips
- (c) Mixed-use areas on the fringe of CBD (residential/commercial precincts)

White light provides good colour rendition. White light provides more effective illumination, and produces a perception that spaces are more brightly lit.

The most energy efficient light that can be used for the purpose should be considered. Currently the use of induction lighting in all CBD lanes (such as Flinders Lane, Little Collins and Little Bourke) and the use of plasma lights on main pedestrian roads (such as Elizabeth St.) are recommended. Recommendations around lighting types will vary over time as technology changes and improves.

5.2.2 Use blue-white light in residential areas.

Replace yellow lamps and old mercury vapour light sources with new blue-white lamps (3500-5000K). Install advanced technology with energy efficient lamps and full cut-off fittings.

- Blue-white light is softer and less intrusive than white light
- Residential streets attract fewer pedestrians after dark. Therefore, a lower performance specification is justified
- With present LED, plasma and induction technology, the sources of blue-white light can be more efficient than white light sources. Take care in the selection of these lights as there is a wide variety in quality and efficiency

5.2.3 Use blue-white light in large parks and gardens.

Replace yellow lamps and old mercury vapour light sources with new blue-white lamps. Install advanced technology with energy efficient lamps and full cut-off fittings.

- Blue-white light provides good rendition of greens and browns
- Parks and gardens attract less use after dark, therefore a lower performance specification is justified
- With present LED, plasma and induction technology, the sources of blue-white light can be more efficient than white light sources. Take care in the selection of these lights as there are wide variety in quality and efficiency

5.2.4 Continue the colour of surrounding streetlights into plazas, squares and other small parks or reserves.

Small open spaces should be perceived as an integral part of the local street pattern.

5.2.5 Avoid mixing light of different colours.

Sometimes, different colours can be combined effectively for feature lighting. The colours of building materials and landscape elements should be taken into account, whenever a mixture of light sources is considered.

5.3 Form and Light

Lighting the Exteriors of Buildings

Light is an integral part of contemporary urban architecture. Even modest buildings can be enhanced by skilful illumination. Illumination can reinforce composition, or mask bulk. It can advertise a building's purpose, and celebrate the most prosaic activity. Light may also introduce nuances, so that the form and meaning of a structure appear to alter at the end of each day, or change from one month to the next. For these reasons, light should be considered an essential component of all building design. At a minimum, night lighting should reveal the formal complexity and surface modelling that provide daytime interest to a building's frontages. However, in the best examples of night illumination, lighting will "paint" architecture with new elements and details that only become apparent after dark.

Excessive lighting, or the clash of lighting at different but nearby sites, can result in unfavorable outcomes and negatively affect the desired elegance and interest.

5.3.1 Treat external lighting as an integral aspect of architecture.

Match the quality and distribution of external lighting to form and construction. Consider the daytime appearance of light fittings and associated services.

- Illumination helps to express architectural concepts. Light makes architectural elements and relationships visible after dark. Light can also be treated as an architectural component in its own right
- Night lighting can modify the appearance of buildings. It can add or remove emphasis. It can supplement or substitute details, so that night observers experience variety and a richer visual environment
- Buildings are an important supplementary source of light in public places

5.3.2 Accent selected architectural elements and relationships.

Avoid excessive illumination. Instead, rely on the quality and distribution of light to make an impact. Enhance forms and materials. Emphasise the three dimensional character of objects and surfaces. Accent construction details or decoration. Avoid up-lighting wherever possible, and masque light sources to prevent glare or over spill. Give priority to lighting the following features and locations:

- (a) Building entrances
- (b) Colonnades, alcoves and other recesses
- (c) Undersides of verandahs
- (d) Shop windows and other street frontages
- (e) First floor openings and elevations
- (f) Street corners

Full-facade lighting, or “flood lighting”, should be limited to buildings that have special public significance and those that assist way-finding or an appreciation of urban structure. Ordinary buildings should be treated more modestly so as not to compete with these civic landmarks.

If applied selectively, accent lighting can celebrate the city’s architecture, while providing a responsible approach to energy consumption, sky glow and other environmental issues.

5.3.3 Ensure that external building illumination complements lighting in streets and other public spaces.

Coordinate the colour and intensity of illumination in public and private domains. Avoid extreme contrasts in brightness. Shield lamps and other sources of glare. Consider the reflectivity of surfaces, especially those on the lower levels of buildings.

- Indiscriminate flood lighting of buildings, landscape features or other objects can cause a nuisance. Up-lighting is particularly troublesome, because it contributes directly to sky glow
- Subtle illumination can produce interesting and attractive effects. It can emphasise an object without overwhelming the ambient lighting conditions in surrounding streets or open spaces

5.3.4 Evaluate illuminated signs in relation to their surroundings.

Ensure that illuminated signs on buildings are sympathetic to the architectural composition the host structure. Encourage signs that make a positive contribution to the local streetscape. Give preference to signs that are physically associated with the activities or products they promote. Discourage illuminated signs that are overly conspicuous because of their size, brightness or location. Ensure signage is not overlit.

- In nightlife districts such as lower King Street, Lygon Street and the Chinatown section of Bourke Street, neon signs and other forms of illuminated advertising are an intrinsic feature of the streetscape and are to be encouraged
- In the core retail precinct and along neighbourhood shopping strips, illuminated signs on shopfronts and verandahs add interest to the street and supplement public lighting.
- Audit signs and ensure they do not exceed required illumination levels
- Ensure signs do not exceed maximum signage illumination levels as required by Council

5.3.5 Limit the duration of feature lighting and promotional displays.

Install timer controls on feature lighting and promotional displays, including illuminated billboards. Switch off these installations after 1:00 am. Consider varying the illumination of landmarks, so that some architectural features are revealed only on an intermittent basis.

- Limiting the duration of feature lighting helps to reduce energy consumption, and reduce greenhouse gas emissions
- Because these displays are conspicuous, they have the potential to deliver positive or negative messages about responsible energy use

**5.4 Peripheral Vision
Lighting the Edges of Public Spaces**

Streets are not just simple corridors of space. As functional entities, they extend well beyond the building line to include entrances, display windows, ground floor interiors, laneways, and adjacent car parks. Street lighting usually focuses on the centre of the thoroughfare. However, a street’s layered edges and tributary pathways are often more important to pedestrians. Effective lighting needs to take these peripheral areas into account.

At night, building lighting should help to create a perception that the street space expands to include ground floor interiors. Owners and occupants of ground floor space are encouraged to provide night lighting within the first structural bay or layer of occupied space. To save energy, interior lighting should be reduced or turned off after 1:00 am.

5.4.1 Support pedestrian amenities at the street edge.

Ensure footpaths are well illuminated. Locate streetlights where they provide good light to building frontages. Wherever possible, keep the heights of lanterns low, and dimension light poles in relation to human scale.

- Footpaths, frontages and street furniture define human-scale sub-spaces along the edges of most city streets
- When street lighting is designed primarily for motorists, the centres of rights-of-way are often more brightly lit than the edges
- The edges of the streets are where most pedestrian activity occurs
- Conflict between pedestrians and cars is often most intense at the kerb line
- Visual interest is concentrated at the street edge

5.4.2 Treat a street and its tributary pathways as a single system.

Ensure that new lighting turns the corner into side streets. Resolve the junction between one lighting layout and another at intersections. Upgrade lane lighting at the same time that new street lighting is installed. Ensure that dead-ends and changes in direction within the laneways are well lit.

- Dark peripheral spaces present real and perceived threats to pedestrian safety
- A comprehensive approach to major and minor spaces produces better spatial continuity
- Streets and tributary pathways often belong to a single circulation system
- Because brightness is judged in relative terms, poorly lit peripheral spaces may seem darker after street lighting is upgraded

5.4.3 Illuminate ground-floor interiors.

Light shop windows or the first layer of occupied interior space. Alternatively, illuminate selected elements and surfaces within buildings. Consider the external appearance of indoor lighting as an integral feature of architecture and interior design.

- At night, internal lighting allows views deep inside buildings. These views “expand” the boundaries of the street, and provide insights into the relationship between exterior and interior space
- Buildings’ contents and activities add interest to the streetscape
- Interior illumination supplements street lighting, and counteracts the shadows produced by verandahs
- Good interior lighting contributes to security

The above dot points outline the intent of lighting interiors lighting should be used carefully and with subtlety. Overlighting can be as detrimental as the lack of light, so the focus on the shape and emphasis is the focus – the intent is not to light the entire internal area.

5.4.4 Illuminate unsecured recesses in ground-floor frontages.

Ensure the following spaces are illuminated:

- (a) Recessed entrances
- (b) Alcoves
- (c) Colonnades

Voids in a building frontage should appear as pools of light rather than dark cavities. Dark recesses present real and perceived threats to pedestrian safety.

5.4.5 Integrate street lighting with the illumination of plazas, forecourts, and other publicly accessible privately owned open spaces.

Treat site lighting as a seamless extension of adjacent street lighting. Reduce illumination levels gradually, as distance from the street increases. Make sure the edges of the space are consistently well lit. If non-standard light fittings are used, ensure that these appear as an accent or overlay within a strong framework of public lighting. Match the colour and intensity of site lighting to adjacent streets lights. Avoid glare and other effects that compete with the public lighting system.

Consider how the daytime appearance of site lighting helps to enhance the space and advertise public accessibility.

- When plazas and forecourts open directly onto the footpath, they should be considered as extensions to the street.
- Continuity in lighting signifies public accessibility, and invites passers-by to enter these spaces.
- Poorly lit open spaces on private sites can undermine the effectiveness of public street lighting: no matter how well a street is illuminated, pedestrians will not feel comfortable if dark voids open up along the street's edges.
- Because brightness is judged in relative terms, poorly lit peripheral spaces may seem darker after street lighting is upgraded.
- Dark spots or sudden changes in illumination impair vision, and raise fears about personal safety.
- Uniformly high levels of illumination across large areas of open space may result in over-lighting and glare.
- The security and promotional roles of site lighting should be subordinate to the need to create high quality public and semi-public spaces.

5.4.6 Integrate street lighting with the illumination of housing estates, campuses and other large sites.

Assist large institutions to prepare their own lighting strategies. Create a positive interface between campus lighting and street lighting. Support has been provided for Melbourne and RMIT universities and development sites such as QV, resulting in positive lighting outcomes in these sites and enhanced integration with the wider lighting system.

Treat large campuses as independent entities with distinctive lighting designs. Treat small and medium size campuses as extensions of the surrounding street system. Illuminate major pathways and site entrances to a consistently high standard. Ensure that the colour and intensity of site lighting are compatible with the public lighting system. Avoid sudden reductions in the level of illumination where large sites meet adjoining streets. Alternatively, use walls, railings or other continuous barriers to secure areas that are dark or poorly lit.

- Many of the city's neighbourhoods are host to large institutions.
- Campus lighting should express institutional identity.
- Poorly lit open spaces on private sites can undermine the effectiveness of public street lighting: no matter how well the street is illuminated, pedestrians will not feel comfortable if dark voids open up along the street edge.
- Residents, workers, visitors and other members of the public often need to traverse large sites after dark.

5.4.7 Use lighting to facilitate access to parked cars.

Ensure that public and private parking lots are well lit. Provide good illumination along the pedestrian routes that connect large car parks with commercial streets and other major destinations.

- Many parts of the city depend on off-street parking.
- People who visit the city by car need safe attractive routes to and from their vehicles.

5.4.8 Use lighting to manage the transition to and from train stations.

Public Transport is a key part of the Melbourne transport system. Lighting in and around train stations and bus and tram stops are managed by the relevant authority. In order to create a safe transition from the highly lit stations to the neighbourhoods a transition of lighting levels is recommended.

- Within 1km of train stations a staged transition from the level of lighting from the train station to the neighbouring streets is recommended.

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6 Attracting the Evening Crowd

Bringing more activity into Melbourne's public spaces

The centre of Melbourne has become a vibrant place after dark. During the past decade, new cultural and entertainment facilities have been built, and these attract crowds of visitors into the city at night. Scarcely a week goes by without a festival, a major conference or cultural event, or a big game at one of the city's sports venues. These occasions all contribute to Melbourne's nightlife. There has also been a rapid rise in the city's residential population. With more people living centrally, city streets remain lively for longer. Improvements to the public realm help to sustain this activity. When people feel comfortable in a public place, they are more inclined to linger. They begin to engage in the kinds of casual activity that makes a city truly eventful. So, in urban design terms, the art of attracting an audience has to be understood on two distinct levels. It applies to organised public events that draw large numbers of people to a single location. It also includes countless small incidents that attract fleeting attention and a spontaneous response from passers-by. Night lighting should enhance both types of performance. Moreover, it should leverage organised events into episodes of informal follow-on activity that can animate large sections of the city.

6.1 Making a Spectacle

Defining the Role of Decorative Lighting

Lighting can promote special occasions, and project Melbourne's rich cultural life into the public domain.

To this end, the City should facilitate temporary lighting displays that are associated with festivals and major sporting or cultural events. The limited duration of these spectacles is an advantage, because temporary lightshows have more impact than permanent installations. In a similar fashion, decorative illumination is most effective when it is treated as an accent or incident within a cohesive yet subdued framework of functional lighting. Linking such displays to unique architectural features, landscape elements or public art, enhances the result. In other words, Melbourne's decorative lighting should be episodic: clearly bracketed in time and space. This principle is consistent with the City's identity and aspirations. For many years, Melbourne's characteristic style of urban design has produced a public realm that is distinguished by quality and understated elegance, rather than ostentatious display. This low-key approach is also responsive to environmental issues such as energy consumption, greenhouse gas emissions and "sky glow".

6.1.1 Encourage decorative displays that are limited in scale or duration.

Give priority to the following applications:

- (a) Seasonal decorations
- (b) Temporary installations
- (c) Displays that change their appearance over time
- (d) Lighting that is an integral component of public sculpture or performance art
- (e) Installations that create local incidents along streets and lanes

6.1.2 Link public lighting spectacles to festivals or other special events.

Use light to mark special occasions, and promote public events. Connect lighting to themes and venues. Match the size of the installation and the intensity of the illumination to the significance of the occasion. Select minor festivals with a neighbourhood focus as well as major events that attract national attention. Manage the location and duration of displays to avoid conflict, maximise impact and minimise nuisance.

6.1.3 Sponsor “festivals of light”.

Continue to support the Christmas and the Winter Solstice Light Festivals. Link the festival with “city lights” tours and “window shopping” promotions.

All major events should consider the visual appeal of promotional displays at night. These events include the following:

- Art Centre events
- Melbourne Fringe
- Melbourne International Comedy Festival
- Melbourne International Jazz Festival
- Melbourne International Film Festival
- Melbourne Queer Film Festival

6.1.4 Install infrastructure for temporary event-based lighting in major public spaces.

Identify streets and gathering places where special events are likely to occur. Include supplementary power outlets and ducts for video or computer cables in the design of new light poles. Provide underground services and discrete hook-ups within large open spaces.

6.1.5 Do not use “bud lighting” or in ground up-lighting in footpaths

“Bud lighting” and in ground up-lighting in footpaths are not to be used.

- Bud lights and in ground up-lighting in footpaths are maintenance intensive and expensive to run.
- Permanent bud lighting installations can damage foliage, and prevent effective maintenance of trees.
- As bud lights have become more common, they have lost much of their impact.
- Remove all existing bud lighting

6.1.6 Limit the use of up-lighting on tree canopies.

Restrict up-lighting to a few significant locations. Illuminate selected specimen trees in large parks and gardens. Highlight sections of major boulevards at thresholds to the Central City. Direct illumination towards the densest part of the tree canopy. Install timer controls, and switch off up-lighting after 1:00 am. Further limit operating times during winter, when foliage is no longer present to block the illumination.

- Up-lighting contributes directly to sky glow.
- Indiscriminate use of tree lighting can reduce its dramatic effect.

6.2 Window Dressing Promoting more Attractive Retail Frontages

Retail streets define the core of the CBD, and identify the heart of many neighbourhoods. By day, these areas are some of the most vibrant places in the city. By night, they can appear empty and forbidding because display windows are shuttered, and shop interiors are left in darkness. In some locations, the problem is compounded by verandahs that block out the streetlights, and cast deep shadows across the building frontages. These conditions undermine Melbourne’s reputation as a “shopping capital”. They also have pervasive negative effect on the city’s night image. This occurs because many retail streets remain important pedestrian routes long after the shops have closed.

6.2.1 Promote creative shop window displays that engage the attention of passers-by, and add interest to the street edge.

Initiate a program to improve the appearance of shop windows. Support themed retail displays with a strong narrative component and a “soft” advertising message. Encourage traders to consider the total image of their shop front, including external architecture and signage. Promote frequent changes to the content and format of display windows. Target resources on retail streets that have high evening pedestrian counts, or provide access to popular night destinations.

- Retail streets link many of the city’s most popular evening destinations.
- Within parts of the CBD’s retail core, pedestrian counts remain high until 9:00 or 10:00 pm.
- Many retail displays are designed for daytime viewing only.
- Although some retailers regularly change their displays, many shop windows are cluttered and unattractive, or they change little from one year to the next.

6.2.2 Encourage store owners to illuminate their windows after hours.

Provide advice on how to increase the effectiveness of retail displays with dramatic night lighting. Promote the use of specialised display lighting that allows flexibility and automated control. Limit the duration of shop window lighting to maximise its effectiveness, and limit energy consumption.

6.2.3 Encourage shop owners to replace grilles and shutters with less unobtrusive security devices.

Promote the use shatterproof glass and transparent protective coatings. Encourage shop owners to replace passive security devices, such as grilles and shutters, with electronic surveillance. Provide advice to retailers on how to combine display lighting and security lighting.

6.2.4 Support after-hours window shopping in the Central City’s core retail precinct.

Initiate retail promotions that include after-hours street entertainment and special shop window displays. Coordinate these events to ensure a comprehensive response within certain districts of the CBD. Encourage extended hours for public access to arcades and indoor retail complexes.

- Retail promotions are often more effective if a coordinated approach is taken.
- Indoor retail complexes contain some of Melbourne’s most attractive shops.
- Many shopping complexes close their doors once trading is finished.

**6.3 High Lights
Placing a Civic Signature on the City’s Skyline**

Late night events help to distinguish the City of Melbourne from the rest of the metropolitan region. The primary expression of this role is the city’s dramatic skyline. At night, the CBD is a beacon, advertising round-the-clock activity, and identifying the centre as the pre-eminent destination for evening entertainment. Sky signs and the illuminated interiors of high-rise buildings create a spectacle that no civic initiative could ever equal.

Yet, for all its power, the image is reduced to a collection of competing objects. Coordinated design could enhance the combined effect of these towers. Overlaid with a single lighting treatment, the whole skyline could project a coherent image that is tuned to changing civic events.

6.3.1 Superimpose a single lighting treatment on the Central City skyline.

Target buildings that are 50 storeys or more in height. Overlay the individual lighting signature of each tower with a second subtle source of illumination. Coordinate these installations to produce unified displays that encompass the whole of the Central City. Vary their appearance to suggest different moods and themes. Limit operating times, and match these to the dates of major public events.

- The tops of high-rise buildings are visible from great distances.
- The display should rely on the collective effect of the lights for its impact. The individual light sources should be small, like aircraft warning lights. In this case, they will be economical to run, and produce less nuisance. Moreover, they will not conflict with the separate lighting signatures of the towers.
- Visual impact will be greater if the display changes and the lights operate intermittently.

6.3.2 Encourage a Responsible Approach to Decorative External Lighting on the tops of High-Rise Buildings.

Allow each CBD tower to make a distinctive display on the city's skyline. Encourage the higher buildings to make stronger statements than the lower ones. Ensure that each lighting signature is fully integrated with the building's overall form and appearance. Encourage subtlety and precision so that nuisance is avoided, and stray light is minimised. Consider the environmental impact of each new installation.

- Major tower blocks contribute to the image and identity of Melbourne.
- As its height increases, each tower separates from its context and establishes a unique profile within the city's skyline.
- The Lighting Strategy aims to limit the use of decorative external lighting.
- Unless it is carefully targeted, roof-level lighting can add to the problem of "sky glow".

6.3.3 Limit the use of lasers and "skybeams" to short term installations linked to major public events.

- Lasers and skybeams impact negatively on the environment.
- Animated high-intensity illumination can undermine the effectiveness of more subtle lighting effects.

6.3.4 Bring key building owners together to co-operate on the Melbourne High Lights vision.

Establish a co-operative approach with key owners of high rise buildings to deliver the outcomes of this section. Consider approving a licence to light the exterior of external buildings over 50 storeys so that the design can be altered periodically and overlighting does not occur as more and more high rise building are constructed.

7 Designing a Sustainable City

Minimising negative environmental impacts of outdoor lighting

Bright lights are synonymous with big cities. The two concepts are functionally and expressively interlinked. Modern cities could not function without an extensive system of outdoor illumination. Artificial light allows 24 hour activity. It protects people and property. Light also provides an important medium for communication. As a result, streetlights are part of municipal infrastructure, and some kind of exterior lighting is included in every large property development. City lights are also regarded as an attraction in their own right. The excitement of being in the centre of a large city at night depends on well-lit public places and the illuminated displays of buildings and signs.

These benefits are indisputable. Yet, it is possible to have too much of a good thing. The advantages of outdoor lighting need to be assessed in relation to its negative impact on the environment. New terms such as “light pollution”, “stray light”, “light spill” and “sky glow” record growing community concern about intrusive outdoor lighting. Sustainable use of resources is another important issue. Street lights account for more than half of the City of Melbourne’s electricity use. Furthermore, the public lighting system is a particularly conspicuous form of energy consumption that can send positive or negative messages about Council’s commitment to environmental sustainability.

There are over 14,000 outdoor lights in the City. The majority of these are in the CitiPower distribution area, with the remainder being maintained by Jemena. Public lighting is a significant cost and energy consumer for the Council.

7.1 Thrills and Spills

Avoiding Over-lighting and Stray Illumination

Careful planning can reduce the environmental cost of exterior lighting. To be energy efficient and visually effective, a lighting program must involve strategic decisions about which elements are lit, and in what way. Lighting initiatives should target areas of the city that are well used at night. Illumination should enhance only the most memorable features within each public place. Excessive or imprecise methods of illumination should be avoided, especially as brightness is judged on a comparative basis. A site or building that is over-lit competes with surrounding streetlights and “washes out” more subtle accent lighting on adjacent facades. Consideration should also be given to ephemeral forms of lighting, instead of static displays. If temporary or dynamic installations are chosen, careful thought should be given to the duration, frequency and timing of displays. These factors not only influence the impact of decorative illumination, they reduce nuisance and make better use of energy.

7.1.1 Reduce sky glow and other nuisances caused by obtrusive external lighting.

Ensure new outdoor lighting installations conform to Australian Standard AS 4282 (1997): Control of the Obtrusive Effects of Outdoor Lighting. Select lanterns that offer precise control over the distribution of illumination. Reduce upward waste light from streetlights by replacing semi-cut-off fittings with full cut-off designs. Minimise the component of light that reaches the sky from advertising boards, retail premises and outdoor sports facilities. Discourage indiscriminate floodlighting of buildings and open spaces. Instead, target illumination carefully so as to avoid stray light. In particular, minimise the quantity of light directed above the horizontal plane. Where up-lighting cannot be avoided, restrict this to narrow precisely targeted beams.

- Sky glow is increasing, and threatens to obscure views of major constellations such as the Southern Cross.
- Obtrusive outdoor lighting becomes more problematic as the Central City’s residential population increases.
- Excessive illumination of isolated buildings or spaces degrades the ambient lighting environment, and produces discomfort for viewers.

7.1.2 Discourage the use of reflective glass

Reflective glass can provide significant glare during daylight hours. Discourage its' use, in particular along major roads routes and where reflection can adversely impact on residents. Encourage the use of other, non-reflective window treatments to reduce heat gain into household in winter.

7.1.3 Adapt streetlights to prevent illumination spilling into adjacent dwellings.

Acquire a range of specialised reflectors for use inside full cut-off fittings. Pay close attention to the distribution of illumination in residential streets. Where necessary, direct illumination away from the windows of bedrooms and living areas.

- Intrusive outdoor lighting can disrupt people's sleep.
- As residential areas become more built up, foliage and verandahs are not always able to protect dwellings from unwanted light.
- In multi-storey developments, first and second floor openings are more likely to be subject to light spill.

7.1.4 Consider the environmental implications of new external lighting installations.

Address the effects of stray or obtrusive light as part of the development approval process. Request applicants to report on the environmental impacts of outdoor illumination whenever their projects are likely to have a major effect. When evaluating proposals for external lighting on buildings, balance the benefits of well-lit vertical surfaces against the negative effects of intrusive light. In parks, gardens and other large areas of landscape, consider the impact of night lighting on plants and animals. Review decorative lighting schemes on a case-by-case basis. Consider exempting these projects from obtrusive lighting controls, provided the duration of the display is limited.

- There is growing public concern about the effects of intrusive light.
- Conflicts between public lighting objectives and private lighting initiatives need to be identified before new installations are built.
- Environmental impacts are linked to the location of light sources and the direction in which illumination is emitted. Light sources that produce a large component of horizontal or upward light are more likely to cause nuisance.

7.2 Glowing Greener Responsible Energy Use and Waste Management

No Lighting Strategy would be complete without guidance on energy efficiency and waste management. As a public authority with a focus on improving the sustainability of Melbourne, Council plays a key role in reducing the consumption of non-renewable resources and emission of greenhouse gases. In part, these objectives can be achieved by changing people's attitudes towards the illumination of buildings, streets and parks. The Lighting Strategy begins this education process by providing performance criteria for responsible outdoor lighting. In addition, the City must also lead by example.

For this reason, the City should develop a more energy-efficient public lighting system that incorporates advanced technology and allows more sophisticated monitoring and control. The City of Melbourne should also expand the use of "green" energy, and seek to make a tangible connection between renewable energy sources and the illumination of streets and public spaces.

This section is driven by the following aims and objectives.

Aiming to achieve low energy-intensity of the public lighting asset base by implementing the following (in order of priority):

- Avoidance of artificial lighting
- Improvement in energy efficiency

The development, implementation and ongoing review of clear strategies and guidelines for public lighting that consider:

- Best practice sustainability outcomes (inc. energy efficiency and waste reduction)
- Intelligent design and control to reflect when and where lighting is required
- Durable and reliable assets that ensure effective maintenance
- Good data management to support effective asset management systems
- Consistent design to ensure high quality lighting and improved maintenance
- Enhancing safety, quality and the use of public transport
- Managing the conflicting issues of vegetation, lighting and safety
- Long term financial commitment and sustainability
- Assess financial mechanisms to deliver efficiency programs

7.2.1 Encourage the use of natural light for lighting in daylight hours

Natural light provides many benefits to users of buildings and open spaces. These benefits include reduced energy consumption and cost for the facility owners and improved health and productivity for workers and users of the spaces.

The use of natural light needs to be balanced with the potential heat gain in summer from radiant heat. So the use of intelligent glass treatments and active shading to allow sun in winter and shade in summer is recommended.

7.2.2 Promote and apply energy conservation practices.

Support the development of new lighting technologies that allow more flexible control and reduce power consumption. Encourage building owners and occupiers to switch off interior lights, when these are not in use. Provide benchmarks for energy efficient designs and responsible operating methods. Raise community awareness of the environmental implications of outdoor lighting. Ensure that time settings recommended in this document are followed. Assess and implement energy efficiency projects for metered lighting.

7.2.3 Reduce the amount of power consumed by public lighting.

Convert street lighting to newer, more energy efficient technology, and introduce “best practice” performance standards. Distinguish between commercial, residential and industrial areas, so that the level of illumination matches the intensity of use by pedestrians and motorists. Discourage over-lighting of public buildings and open spaces. Limit the duration and extent of large decorative lighting displays.

- Street lighting accounts for more than half the City’s total energy consumption.
- Recent City of Melbourne lighting projects have improved the quality of illumination, and reduced energy consumption by up to 16%.
- A further 10% can be saved through more efficient lighting choices.
- Council has enough information to be able to make specific recommendations to reduce energy use.
- It is to be expected that replacing all of Councils lights will occur every 10-20 years (as part of maintaining a quality asset base).

- For safety and amenity reasons, the City is committed to improving the quality of illumination in some intensively used streets and laneways.

To improve the sustainability of public lighting in the City of Melbourne to 2012 several key elements are important.

One of the more straightforward ways to increase sustainability is to replace the current lighting stock with more efficient lights. Council currently has approximately 3,500 mercury vapour street lights. There are several immediately viable replacement options which are more efficient and also have lower maintenance requirements.

The development of newer forms of lighting such as LED, plasma and induction lighting means that the older metal halide and high pressure sodium lighting types can also be replaced with more efficient and longer lasting lights. However, using these emerging technologies would require further work on ensuring alternatives are approved before they can be implemented throughout the City.

Because of its high number of non-standard luminaires, the City of Melbourne will require a detailed analysis, design and costing of its replacement options.

7.2.4 Assess financial mechanisms to deliver efficiency programs

Energy efficiency projects can result in financial savings from the reduction in energy consumption, and frequently, maintenance. This enables the consideration of a variety of options to fund energy efficiency projects, including through financing and the use of energy performance contracts, as well as through capital and operating budgets. Assess all financing options when considering which projects can be delivered.

7.2.5 Consider and reduce impacts on biodiversity from the use of artificial lighting.

The City has some areas of important wildlife habitat that support a range of species. Consider the impact of artificial lighting on biodiversity in all lighting designs.

7.2.6 Evaluate all new public lighting projects in terms of environmental sustainability criteria.

Consider energy efficiency and greenhouse gas emissions. Use measurable criteria, whenever possible. Employ these criteria to define project objectives, assign priorities, and assess funding applications. Ensure that systematic post-completion evaluation of performance occurs.

7.2.7 Introduce a waste management plan for Melbourne's public lighting system.

Recycle as many materials and components as possible. Dispose of other elements and substances responsibly, avoiding short or long term costs to the environment.

The Lighting Strategy recommends conversion of many inefficient lighting types. These practices may lead to an increase in waste products, especially in the short term. However, systematic maintenance of the public lighting system also allows wastes to be managed responsibly and economically.

7.2.8 Remove old assets when new ones are installed

Melbourne's parks, streetscapes and open spaces aim to be clear, clean and attractive. The update, refresh or installation of new assets in a location is an opportunity to clean out and declutter the area. When replacing and refreshing public lighting ensure the old assets are removed.

7.2.9 Collect environmental data

The environmental impact of lighting is substantial. Collecting data on the impact of lighting on the environment is essential to combatting these negative impacts. Collect data on utility and greenhouse information and energy abatement initiatives for carbon neutral reporting.

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8 Keeping the lights shining

Actively maintaining quality lighting assets

Designing and installing lighting that meets all of the above requirements and strategies will ensure the assets start their life in good condition and provide a good outcome for the city and its users. In order to ensure these assets continue to deliver a high quality outcome over their life, it is necessary to maintain them, monitor their performance, and learn from the outcomes of installation.

Maintenance of lighting for metered and unmetered installations is managed separately. The majority of street lighting is unmetered and is maintained by CitiPower. The metered sites (usually parks, sports, car parks and building lighting) are maintained by Council or a Council-appointed contractor.

The lighting installations need to maintain their performance over time, the careful selection and design of lights is important to reduce maintenance requirements.

Lighting designs and analysis should assume a 10-20 year asset life. High profile areas will usually have the lighting schemes reviewed and refreshed after 10 years. Neighbourhood and streetscapes will typically be refreshed after 20 years.

8.1 Maintain the light

Council is responsible for maintaining all metered lighting installations. This includes parks, gardens, sports lighting, building lights and feature and event lighting. Map 2 provides a summary of the main areas where metered lighting is installed.

A formal maintenance program for these assets is required to ensure the quality of light is retained.

8.1.1 Collect and maintain information on the assets in the city and assess their condition

Information is a key part of maintaining lighting assets. By understanding the location and condition of the assets proactive programs can be planned to ensure the quality and safety of lighting is maintained.

The following information is to be maintained:

- For new installations – as built drawings integrated into the GIS system
- Condition of poles, luminaires and cabling is to be collected at least every 4 years
- Maintain relevant safety information on assets as well as asset identification
- Ensure that lighting time settings recommended in this Strategy are documented and followed

The information systems should maintain data on GIS layers for easy review by relevant staff and users. The asset owners (such as Engineering Services) will be responsible for ensuring the data that is captured meets their requirements. Corporate data standards will be produced for each asset class. Long term contractors (or the asset owner) can enter data into the system. Management of projects and actions can be tracked on the one system.

8.1.2 Introduce pro-active maintenance programs.

Develop performance criteria and management plans for all public lighting installations. Regularly monitor systems, clean and adjust lanterns. Replace failed lamps immediately. Undertake bulk replacement of lamps before their average operating life is over. Introduce a waste management plan for the public lighting system. Recycle as many materials and components as possible. Dispose of other elements and substances responsibly, avoiding negative effects on the environment. Implement a maintenance contract for metered lighting.

8.1.3 Incorporate remote monitoring and management systems in new installations

Research and trial effective remote monitoring and management systems for Council lighting assets. New lighting installations should allow and promote the use of these systems. Increase the scale and scope of these systems over time until all metered lighting is managed in this way. Include options for remote dimming, time setting and identification of maintenance requirements.

8.1.4 Actively maintain any lighting in trees

Where lighting is attached to trees, the key criterion to consider is ensuring that lighting does not damage the tree. Fixed lighting can damage trees and consideration of any potential damage is required during the design phase, both when any physical structure is attached to trees and in respect to the impact of trenching and excavations on roots and hydrology.

When lighting is attached to trees, the attachment needs to be non-intrusive and moved annually (i.e. so that the tree trunk or branches are not constricted in the same spot for more than 1 year). Inspection and maintenance is required to adjust fittings so they don't strangle the tree as well as some flexibility in the attachments to enable automatic adjustment.

If a tree dies or needs to be removed there is a rapid response required to remove lighting (within one week). If a power supply needs to be attached to the tree, run the cable from a high point into the canopy of the tree (i.e. an adjacent pole). Do not attach to the base of the tree where it can be avoided.

Any trenching needs to adhere to the requirements of Australian Standard AS 4970 'Protection of trees on development sites'.

8.2 Learn and improve from practice

Review and assess the performance of new lighting schemes and projects. Learn from these assessments and understand the opportunities to improve future outcomes or roll out successful projects to other areas. Reviews should consider performance for light quality and output, energy efficiency and maintenance.

8.2.1 Investigate the relationship between personal safety, sustainability and lighting in public places.

Examine the safety implications of different outdoor lighting designs. Study the combined effect of public street lighting and illumination from private sites and buildings. Include pedestrians' perceptions of safety as well as measurable indicators of actual risk. Conduct "before-and-after" evaluations of spaces that receive new lighting installations. Examine the quality of illumination as well as its intensity. Include the impact of lighting from privately owned sites and buildings.

- The relationship between lighting and safety is not well understood
- Assumptions about this relationship underlie many lighting initiatives

- To avoid over-lighting and unnecessary energy use, the optimum illumination levels for public spaces must be known
- The City is engaged in a comprehensive program of lighting upgrades. Each project is a potential case study for testing the relationship between lighting levels and public safety
- Recent lighting projects suggest that improvements in lighting quality and reductions in energy consumption are compatible aims

8.2.2 Introduce better monitoring and control of the public lighting system.

Gather before-and-after information on new public lighting projects. Meter installations, and monitor them on an ongoing basis. Evaluate their performance in terms of energy consumption and effectiveness. Use this data to fine-tune the system's operation, and improve the design of future installations. Make provision for communications conduits to individual streetlights so that more sophisticated control mechanisms can be introduced at a later date.

- At present, the city's public lighting system is not metered. Power consumption is estimated rather than measured.
- Precise feedback is essential to improve the design and management of lighting installations.
- Integrate automatic feedback from site visitors to inform Council of issues with assets (e.g. the use of social media, smartphones and other relevant technologies may be considered)

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9 Action Plan

9.1 Introduction

The Lighting Strategy aims to improve the quality, consistency and efficiency of night lighting in streets and other public spaces. It also promotes improvements to safety and amenity, sustainability and maintenance practices.

The Lighting Strategy describes a wide range of objectives, outcomes and performance criteria. Some of its recommendations address the public lighting system or other Council assets. Some initiatives are targeted at the private sector and, in these instances, the City's role is limited to promotion and facilitation. For these reasons, there is great variation in the potential impact of the strategies on municipal budgets and operations.

The strategy adopts a pragmatic approach to lighting in that it emphasises functional outdoor illumination rather than decorative displays. However, the document stops short of defining particular solutions. With a few important exceptions, individual strategies are presented at an abstract level, providing general principles for design and operation rather than site-specific projects.

This section of the Lighting Strategy addresses implementation. It includes cost/benefit assessments and priorities for those initiatives that have predictable financial impacts. The strategy's generic recommendations and abstract principles are less susceptible to this kind of analysis. For this reason, Section 9 focuses only on those activities that can be accurately estimated, including street lighting, park and sports lighting. This emphasis is also justifiable in terms of capital cost and energy consumption, since these lights account for the great majority of municipal expenditure on outdoor illumination.

Each of the major strategies described in detail within the Strategy have specific actions for further work. This Action Plan provides an outline of specific actions to be implemented by 2018. These actions are summarised in Tables 1 and 2 below.

9.2 Summary of Actions

Table 1 below provides guidance around priority, costs and savings for the actions within the Lighting Strategy, and responsibility for its implementation.

Key of Responsibility					
Engineering Services	ES	Recreation Services	RS	Communications and Strategic Marketing	CASM
City Design	CD	Building and Planning	BP	Property Services	PRS
Urban Landscapes	UL	Events Melbourne	EM	Sustainability	S
Park Services	PS	Arts and Culture	AC	Strategic Planning	SP

In order to provide guidance around which actions are priorities a scoring system to identify the priority of the action and the ease of delivering the action has been used. For example, an action that has a high priority and high ease results in a score of 6 (3+3 for each category). A Low Priority and Low ease action would result in a score of 2.

Priority	Score	Ease	Score
High (H)	3	High (H)	3
Medium (M)	2	Medium (M)	2
Low (L)	1	Low (L)	1

Table 1: Major Strategy Actions, summary, reference and responsibility

Major theme	Action	Ref.	Responsibility	Priority	Ease	Priority Score	Cost ¹ implications
Scope and Purpose	Review the Action Plan after 5 years and the Strategy after 10 years.	1.2	ES, CD	H	H	6	\$ 30,000
Stakeholders and Communication	Consult with listed stakeholders with respect to the content and aims of the Strategy	3.6	ES	H	H	6	Within current budgets
Further Work	Communicate success stories and innovation to the broader community as they occur.	3.6	ES, S, CASM	H	H	6	\$ 100,000
	Maintain Design Standards	3.7	ES	H	H	6	\$ 50,000
	Write new Design Standards	3.7	ES	H	H	6	\$ 50,000
	Ensure planning schemes cater for the requirements of the Strategy.	3.7	SP, PS	H	H	6	\$ 50,000
Designing the Luminous City	Develop a suite of standard streetlights for use throughout the municipality.	4.3.1	CD, ES	H	M	5	\$ 120,000
	Where large open spaces are concerned, ensure that lighting is metered. Maintenance of clearance of trees around street lighting.	4.5.10	PS, RS	H	M	5	Within current budgets
	Introduce flexible monitoring and control systems for metered lighting installations that have their own independent lighting layouts.	4.5.10/ 8.1.3	PS, CD, RS, ES	M	M	4	\$ 240,000

¹ All figures costs unless otherwise stated

Safety and Amenity	Use white light in those parts of the city that have greatest pedestrian activity.	5.2.1	CD, ES	H	M	5	\$ 1,150,000
	Audit illuminated signs and ensure they do not exceed required illumination levels.	5.3.4	BP	H	H	6	\$ 25,000
	Use lighting to manage the transition to and from train stations.	5.4.8	ES	H	M	5	Within current budgets
Attracting the Evening Crowd	Sponsor “festivals of light”. Continue to support the Christmas and the Winter Solstice Light Festivals.	6.1.3	CD, EM, ES, AC	M	M	4	\$ 1,500,000
	Install infrastructure for temporary event-based lighting in major public spaces.	6.1.4	EM	M	M	4	Within current budgets
	Remove all existing bud lighting	6.1.5	ES	H	M	5	Within current budgets
	Initiate a program to improve the appearance of shop windows.	6.1.8 - 6.1.11	CASM	M	M	4	\$ 50,000
	Bring key building owners together to co-operate on the Melbourne High Lights vision.	6.2.4	CD, BP, PRS	M	M	4	Within current budgets
Designing a Sustainable City	Implement energy efficiency audit program for metered lighting assets (including, car parks, sports facilities, parks and gardens)	7.2.2	ES	H	H	6	Within current budgets
	Implement the actions from the energy efficiency audit for metered lighting assets (including, car parks, sports facilities, parks and gardens)	7.2.2	ES	H	L	4	\$ 375,000
	Reduce the amount of power consumed by mercury vapour public lighting.	7.2.3	ES	H	M	5	Cost of \$3.6m, savings of \$400,000 and 1,700 tCO ₂ -e pa
	Reduce the amount of power consumed by metal halide and high pressure sodium public lighting.	7.2.3	ES, CD	M	M	4	Cost of \$13.1m, savings of \$1.5m and 6,300 tCO ₂ -e pa
	Assess financial mechanisms to deliver efficiency programs	7.2.4	ES, S	H	H	6	Within current budgets
	Introduce a waste management plan for Melbourne’s public lighting system	7.2.7	ES	H	H	6	Within current budgets

	Collect environmental data including utility and greenhouse information and energy abatement initiatives for carbon neutral reporting.	7.2.9	S, ES, PS, UL others as required	H	H	6	Within current budgets
Keeping the Lights Shining	Collect and maintain information on the metered assets in the city and assess their condition.	8.1.1	ES	H	H	6	Within current budgets
	Introduce pro-active maintenance programs.	8.1.2	ES	H	H	6	Within current budgets
	Incorporate remote monitoring and management systems in new metered installations.	4.5.10 and 8.1.3	See 4.5.10 above	M	M	4	See 4.5.10 above
	Actively maintain any lighting in trees.	8.1.4	ES, PS, UL	H	H	6	Within current budgets
	Assess safety and performance of new and existing lighting installations.	8.2.1 - 8.2.3	ES	H	M	5	Within current budgets
Totals		Cost of \$20.4m, annual savings of \$1.9m and 8,000 tCO₂-e pa					

These actions include some that can be managed with existing resources and funding. In addition a number of new activities are planned. The estimated costs to implement the Strategy are approximately \$20.3m. Annual financial savings are approximately \$1.8m. More than 8,000 tonnes of greenhouse gas emissions will be reduced each year..

The majority of costs relate to two specific items within the Designing a Sustainable City theme: the replacement of mercury vapour (\$3.6m cost and \$400,000 annual savings) and the replacement of high pressure sodium and metal halide lights (\$13m cost and \$1.5m annual savings).

The most significant financial impacts of the Lighting Strategy are found within the Designing a Sustainable City theme. In particular the proposed replacement program for the existing mercury vapour lighting (action cost of \$3.6m, savings of \$400,000 and 1,700 tCO₂-e pa) and metal halide and high pressure sodium lighting (action cost of \$13.1m, savings of \$1.5m and 6,300 tCO₂-e pa) contribute almost \$17m of the \$20.4m project cost. However, the investment in these actions often contributes to a number of sections of the strategy and cannot be entirely isolated.

Other than Designing a Sustainable City, themes which have significant cost implications include Safety and Amenity and Attracting the Evening Crowd. For these three themes the discussion below considers the background to the theme and the associated costs and benefits.

**9.3 Cost Implications of Designing a Sustainable City
Background to the Strategy**

The Lighting Strategy recommends that the City of Melbourne leads a move toward more energy efficient assets. A number of strategies promote a more responsible approach to outdoor lighting. For example, replacement of less energy efficient lighting types is recommended, floodlighting of buildings is discouraged, and large-scale “feature lighting” is reserved for a small number of major public landmarks. It is impossible to predict the combined effect of these measures. However, the public lighting system accounts for more than half the City’s electricity usage. Within this system, it is feasible to estimate the Lighting Strategy’s impact on power consumption, energy sources and costs.

9.3.1 Energy Consumption and Greenhouse Gas Emissions

One of the principal recommendations of the Lighting Strategy is the replacement of mercury vapour street lights with more energy efficient lighting. A second recommendation within the timeframe of this action plan is to replace all metal halide and high pressure sodium lights. Converted fittings will use less power and need less maintenance. Overall power use is expected to drop by approximately 40%.

These actions also can be designed to provide the following benefits:

Table 2: Lighting Strategy actions influenced by the replacement of older lighting types

Action Influenced	Comment
Consult with stakeholders with respect to the content and aims of the Strategy.	The action requires close consultation with many of the stakeholders listed in the Lighting Strategy.
Communicate success stories and innovation to the broader community as they occur.	A detailed communications plan would be implemented.
Maintain Design Standards.	Design Standards would be reviewed as part of the projects.
Develop a suite of standard streetlights for use throughout the municipality.	The project would require the assessment and approval of new standard lights fit for purpose.
Use white light in those parts of the city that have greatest pedestrian activity.	The projects would significantly improve the use of white light in many areas where it is not present.
Use lighting to manage the transition to and from train stations.	To be incorporated through the design process for this project.
Reduce the amount of power consumed by mercury vapour public lighting.	This project is to be delivered.
Reduce the amount of power consumed by metal halide and high pressure sodium public lighting.	This project is to be delivered.
Assess financial mechanisms to deliver efficiency programs.	This can be considered in the preparation for the project .
Introduce a waste management plan for Melbourne’s public lighting system.	Project based assessment will be implemented.
Collect environmental data including, utility and greenhouse information and energy abatement	Project based reporting will occur.

initiatives for carbon neutral reporting.	
Assess safety and performance of new and existing lighting installations.	Pre and post review of the project will occur.

As can be demonstrated above the action of replacing inefficient lighting types (2 nominated actions) can strongly influence, if not fully deliver as many as 13 of the 28 total actions within the Action Plan.

9.3.2 Quantifiable Costs and Benefits

The Designing a Sustainable City theme proposes the replacement of around 3,500 mercury vapour luminaires and over 13,000 metal halide and high pressure sodium lights. These projects are expected to cost almost \$17m and will result in savings of around \$1.9m and 8,000 tonnes of greenhouse emissions per year. The total greenhouse gas savings are around 40% of total street lighting greenhouse emissions.

These savings figures are broad estimates. A more detailed assessment of the business case and lighting replacement opportunities is required prior to final funding decisions.

**9.4 Cost Implications of Safety and Amenity
Background to the Strategy**

The Safety and Amenity theme includes many recommendations. The theme calls for a limited number of streetlights to be used throughout the municipality. Each model has a distinctive City of Melbourne style. However, the designs are tailored to particular locations such as tram routes, neighbourhood shopping strips and the Central City. In this way, the suite of standard fittings adds cohesion to Melbourne’s streetscapes, and also helps to articulate the city’s hierarchy of major and minor thoroughfares.

The City of Melbourne has produced its own streetlights for more than twenty years. The Lighting Strategy recommends that council seek approval for the use of a small number of street lights with the distribution network services providers, and to continue the program of street improvements.

9.4.1 Costs Associated with Safety and Amenity

Over the coming 5 years it is estimated that projects associated with this theme will require funding of approximately \$1.3m. The majority of this relates to replacing lighting in key roads and lanes within the City. This is part of a normal and continuous lighting improvement program.

However, it should be reinforced that due to the scale, the work associated with the replacement of older lighting types within the Designing a Sustainable City theme will have the largest impact on the aim of the Safety and Amenity theme during the time associated with the Action Plan.

9.4.2 Benefits Associated with Safety and Amenity

While project costs can be estimated easily, the benefits of a “house style” for street lighting are impossible to quantify. Melbourne’s distinctive lights contribute to the special identity of the capital city. They confirm the City’s role as a field leader, exhibiting state-of-the-art design and technology that is sometimes ahead of the market. Most importantly, the designs provide a tailored response to Melbourne’s unique lighting needs. These include compatibility with other street furniture developed by the City and consistency of design over a long period of time.

Long term maintenance is assisted by in-house lighting designs. Repairs can be based on the same principle as spare auto-parts. If components are damaged, they can be removed, and replaced with identical items from stock. In this way, the integrity of the whole lighting system can be preserved. Often, the damaged part can be refurbished and returned to the City's inventory as a "new" item. Sometimes, the replacement part will be an updated version that improves the performance of the whole light fitting. These practices depend on full compatibility between new and old parts. Yet, poles and lanterns may last as long as 35 years. During this extended period, spare parts are more likely to remain available if the City produces its own range of lighting fittings.

There is one more benefit to custom-made "City of Melbourne" streetlights. The City retains ownership of its designs. So, Melbourne's brand of light fittings represents a marketable product that has potential to generate a modest income.

When costs and benefits are taken into account, the premium that the City pays for customised high-performance fittings appears to be a good investment. For this reason, the Lighting Strategy attaches a high priority to the underlying objectives within the Safety and Amenity theme.

9.5 Cost Implications of Attracting the Evening Crowd Background to the Strategy

The Attracting the Evening Crowd theme aims to support and bring more activity into Melbourne's public spaces. Melbourne is a vibrant place at all times of the day and night. Attracting the Evening Crowd aims to actively support this activity and to plan for enhancing the appearance and experience of the City's major events, festivals and spectacles.

In addition the architecture, layout and design of the urban landscape of the City impacts on the experience of both visitors and residents alike. Supporting a cohesive and consistent approach to lighting key features is essential to managing Melbourne's image and amenity.

9.5.1 Quantifiable Costs and Benefits

The main costs associated with the Attracting the Evening Crowd arise from sponsoring two "festivals of light", the Christmas and the Winter Solstice Light Festivals.

The Strategy has allowed for a budget of \$150,000 per event (\$1.5m over the 5 years of the Action Plan). These festivals currently occur and can be expanded to include "city lights" tours and continue to support "window shopping" promotions, promotion and celebration of innovative and sustainable lighting.

By catering for the active night life within the City, lighting festivals will celebrate these important events and also allow for exploration of the newest and most innovative lighting technologies available.

However, the main aim is to celebrate the City, its public spaces, architectural landmarks and community in a creative and innovative night time setting.

9.6 Upgrading the Public Lighting System

As already noted, the Lighting Strategy advocates selective extensions and improvements to the public lighting system. Recommended outcomes include better illumination along waterways, within parks and throughout neighbourhood shopping precincts. Special emphasis is given to upgrading lighting at the edges of streets, where most people walk. In addition, the strategy promotes better visibility within ancillary spaces along major streets. These tributary areas include lanes, car parks, forecourts, and recessed building entrances.

Some of these objectives can be achieved through better technology and improved lighting layouts. Other results depend partly on the response of private property owners. Upgrading the public lighting system and improving the maintenance of existing assets will impact on maintenance costs, as well as capital expenditure.

9.7 Setting Priorities

Putting the remainder of the Lighting Strategy into effect requires the preparation of detailed implementation plans by responsible branches of the City of Melbourne. These documents should translate the more general objectives of the strategy into a set of specific lighting projects that are realisable within a fixed time frame. In many cases, the financial implications of individual strategies cannot be reliably assessed until such refinements have occurred.

Nevertheless, some general comments can be made about setting priorities for new lighting initiatives. The highest priority in this Strategy is to reduce the carbon footprint of outdoor lighting. The activities under Designing a Sustainable City, in particular the replacement of inefficient mercury vapour, high pressure sodium and metal halide lights, is critical to the success of this Strategy.

Additionally, priority should be given to projects that respond to several lighting issues at once. All priority projects should enhance safety and amenity, especially for pedestrians, and should be consistent with the strategy's maintenance and sustainability objectives. If these basic criteria are met, favourable consideration should be given to lighting initiatives that attract people and activities to the CBD or neighbourhood centres. One way to achieve this is to enhance the legibility of the city, the appearance of key landmarks, and the quality of public spaces.

Lighting should not be considered in isolation. Upgrades to street lighting should "piggy back" on major development projects or other street improvements. Therefore, new lighting should be given a high priority in areas where paving, planting, services and street furniture are due for replacement. Other priorities include locations where personal safety is perceived to be at risk, and areas of conflict between streetlights and street trees.

Many of the recommendations within the Strategy can be implemented with no additional capital cost. The success of this Lighting Strategy will be heavily influenced by the quality of Council's plans, strategies and designs for the City's lights.

Acknowledgments

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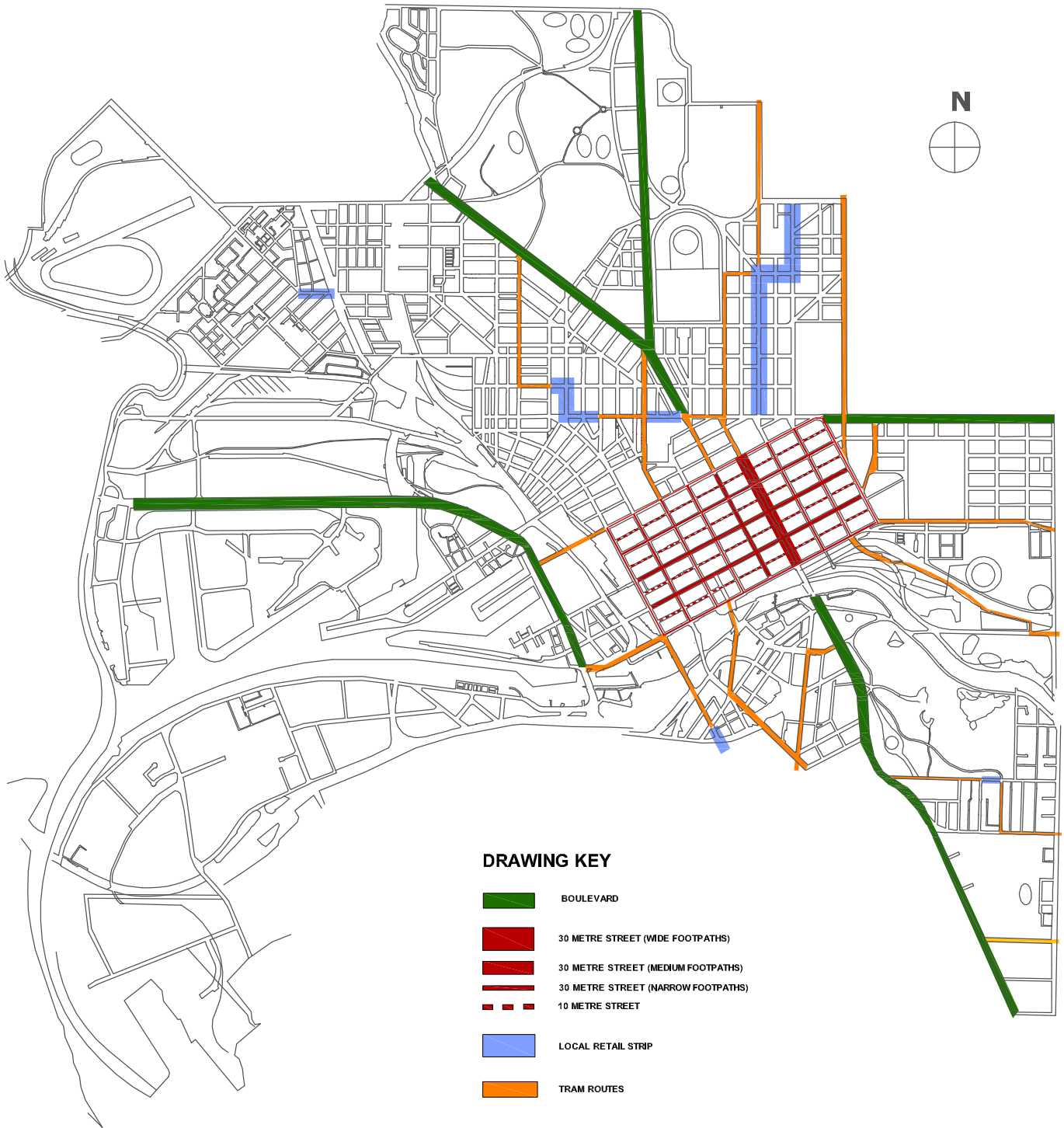
Appendix 1: Glossary of Lighting Terminology

Blue-White Light	Blue-white light is a “cool” white light, produced from lamps with a Correlated Colour Temperature of at least 4000K. It has a minimum Colour Rendering Index (CRI) of 80. The Lighting Strategy requires sources of blue-white to be energy efficient, and to be housed within full-cut off lanterns. With present technology, blue-white light is produced from metal halide, plasma, LED, induction and fluorescent lamps.
Bud Lighting	Bud Lighting refers to the myriads of small incandescent lamps that are strapped to the branches of trees to create decorative effects.
Central City	Today the Central City encompasses the Hoddle Grid, Southbank and Docklands
Colour Temperature	Correlated Colour Temperature (CCT) describes the colour of a light source, and is measured in degrees Kelvin (K). Blue-white lamps have a high colour temperature, e.g. 4000K. Yellow lamps have a low colour temperature, e.g. 2000K.
Colour Rendering	Colour Rendering describes the degree to which natural colours can be perceived under different kinds of artificial light. It is measured on a Colour Rendering Index (CRI). A CRI of 100 indicates that colours are depicted accurately. A CRI less than 30 indicates that colours are distorted and difficult to recognise. A CRI of 80 or above provides an acceptable standard for outdoor lighting.
Down-Lighting	Down-lighting refers to feature lighting that is directed down onto buildings or landscape elements from elevated sources. Down-lighting is less likely to contribute to sky glow than up-lighting. However, unless it is carefully targeted, down-lighting can create glare for pedestrians and the occupants of neighbouring buildings. Effective down-lighting also depends on the availability of suitable locations for elevated lamps.
Feature Lighting	Feature lighting is a form of decorative or promotional lighting. In this strategy, the term refers to night illumination of landscape features or building exteriors. Feature lighting includes “accent” lighting of small details as well as extensive installations that illuminate entire structures.
Floodlighting	Floodlighting is a crude form of feature lighting. It refers to indiscriminate, high-intensity illumination of whole building facades or landscape elements.
Full Cut-Off Lanterns	Full cut-off lanterns conceal a light source from most viewing angles. They do this by housing lamps completely inside the light fitting.
Glare	Glare refers to an acute contrast between light and dark. In simple terms, glare results when bright spots are viewed against a dark background. Under these conditions, a reflex action fixes attention on the bright source. Glare can impair visibility and cause discomfort. As a result, background surfaces often appear darker if they are viewed alongside areas of much higher illumination.
High Pressure Sodium Lamps	High pressure sodium (HPS) lamps are commonly used for streetlights. They typically have a Correlated Colour Temperature of 1900-2200K, and produce characteristic yellow or orange illumination. On some surfaces, this can produce a “warm” colour. HPS lamps are also energy efficient, and they have a long operating life. However, under typical night lighting conditions, the human eye is less sensitive to yellow light than it is to white or blue-white light. This means that HPS lamps are less effective than white or blue-white lamps. Furthermore, yellow or orange light distorts colours and can change the appearance of objects. The Colour Rendering Index for HPS lamps may be as low as 25. (see also comments on “Yellow Light”).

Illumination	Illumination refers to the amount of light falling on a given surface. When street lighting is concerned, illumination is usually measured on the ground. However, it is also important to know how much light reaches vertical surfaces. The correct technical term for illumination is “illuminance”. It is measured in units called “lux”.
Lamp	A lamp is a light source. In everyday language, a lamp is often referred to as a “light bulb”.
Lantern	A lantern is a light fitting that houses a lamp. In technical language, a lantern is referred to as a “luminaire”.
Lux	A unit of measurement for the amount of light that reaches a given location.
Obtrusive Light	Obtrusive light refers to light that has the potential to cause negative environmental impacts, including nuisance to pedestrians and the occupants of nearby properties. These effects may result from the intensity or direction of the illumination.
Renewable Energy	In this strategy, renewable energy refers to energy from sources such as solar energy collectors, wind turbines and biomass. Hydro generation of electricity is not anticipated, because no more viable untapped resources are available. The issue of renewable energy is closely linked to that of greenhouse gas emissions. The use of alternative energy sources such as the wind and the sun can also cut greenhouse gas emissions.
Semi Cut-Off Fittings	Semi cut-off fittings allow lamps to protrude partially from the lantern. As a result, the light source is clearly visible, and frequently becomes a source of glare. Semi cut-off fittings allow little control over the distribution of illumination. Because the lamp protrudes from its housing, light falls over a very broad area. This spread allows streetlights to be placed further apart. However, it also results in as much as a third of the light generated being wasted, and emitted in a skyward direction.
Sky glow	Sky glow refers to the unnaturally bright night sky that occurs over large cities. Sky glow is caused by the component of artificial light that radiates upwards, and scatters in the atmosphere. It obscures the stars, planets and other celestial phenomena. It hinders the work of astronomers, and it diminishes everyone’s awareness of features like the Southern Cross. In extreme cases, sky glow may also disturb birds and other wildlife.
Spill	Spill refers to light that misses its target. It represents waste light and energy. Light spill contributes to sky glow, and may cause a nuisance to observers.
Up-Lighting	Light spill is sometimes referred to as “stray” light. Up-lighting refers to feature lighting that is directed up onto buildings or landscape elements from low-level sources. Unless it is carefully targeted, up-lighting can contribute to sky glow, and create a nuisance for the occupants of adjacent buildings. However, provided the light sources are concealed from view, up-lighting is unlikely to create glare for pedestrians at ground level. Effective up-lighting depends on the availability of suitable locations for low-level lamps.
White Light	In this strategy, white light refers to illumination produced from lamps with a Correlated Colour Temperature of at least 3700K in major streets and public places, or 3000K on minor streets or spaces. White light is also understood to have a minimum Colour Rendering Index of 80. The Lighting Strategy requires sources of white to be energy efficient, and to be housed within full cut-off lanterns. With present technology, a typical source of white light is the metal halide lamp.
Yellow light	In this strategy, yellow light refers to illumination produced from lamps with a Correlated Colour Temperature of 2000K or less, and maximum Colour Rendering Index of Ra25. The Lighting Strategy requires sources of yellow light to be energy efficient. With present technology, a typical source of yellow light is the high pressure sodium (HPS) lamp.

Appendix 2: Maps

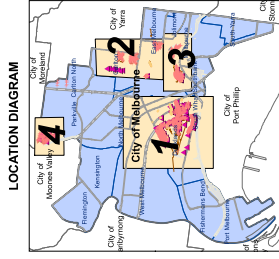
DRAFT



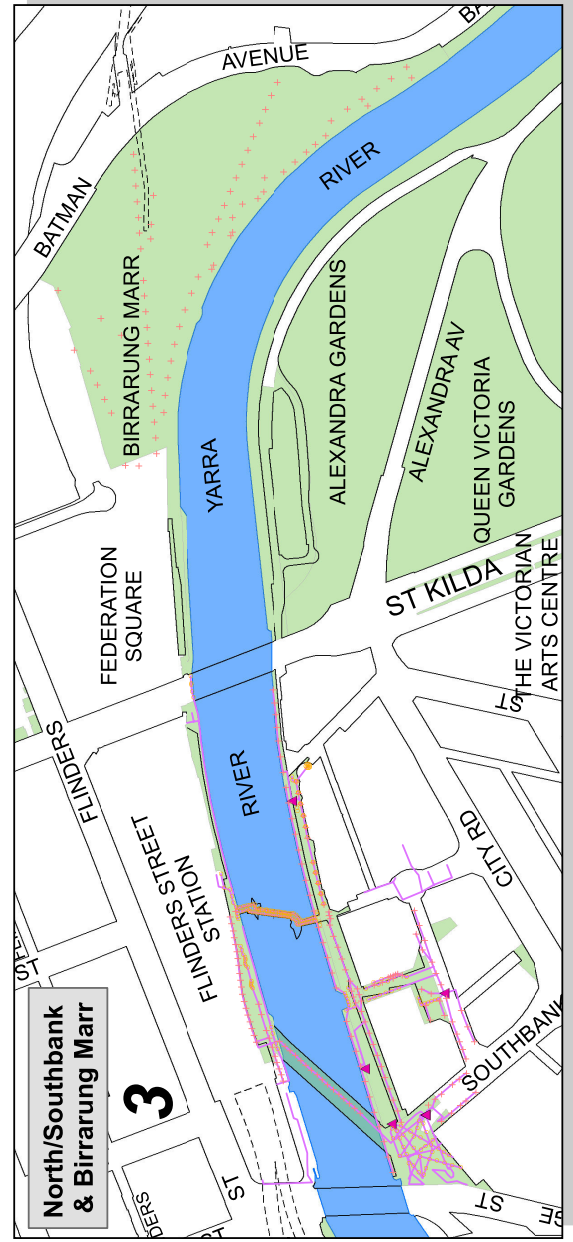
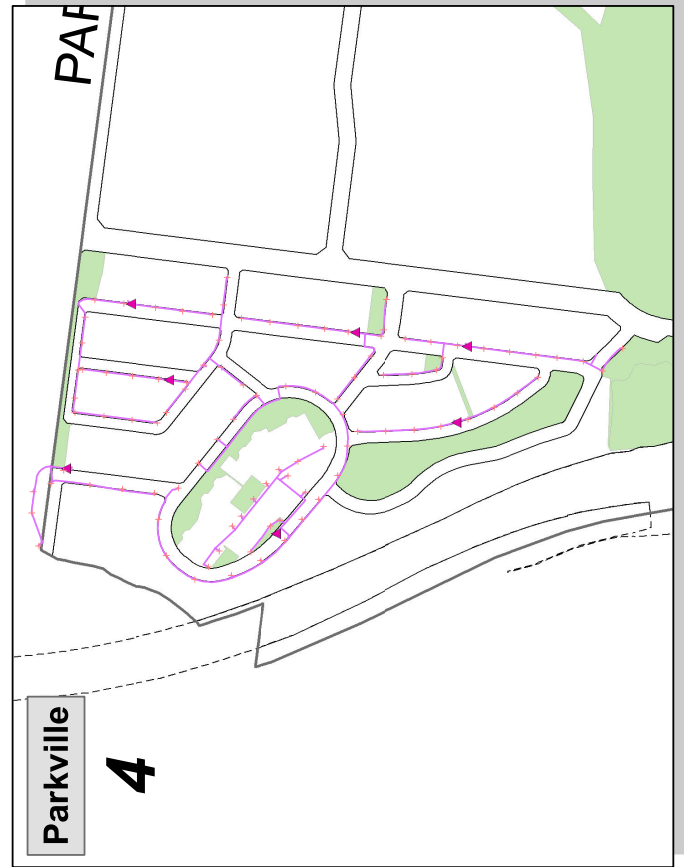
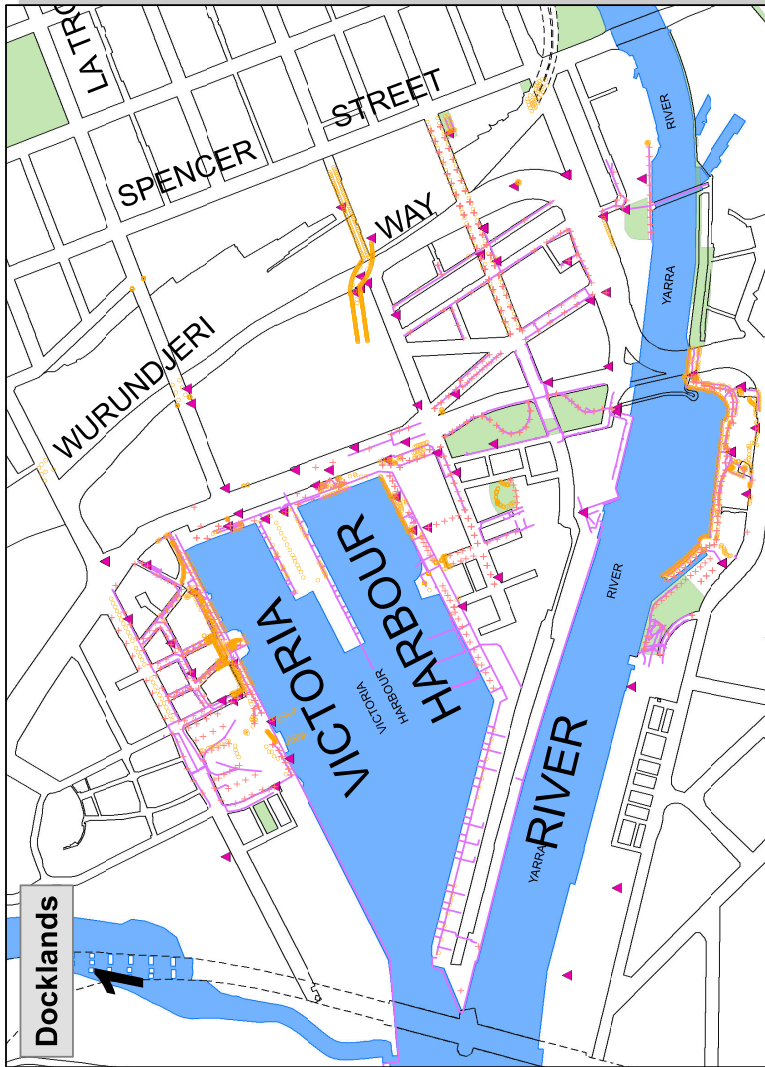
Map 1 Street Hierarchies



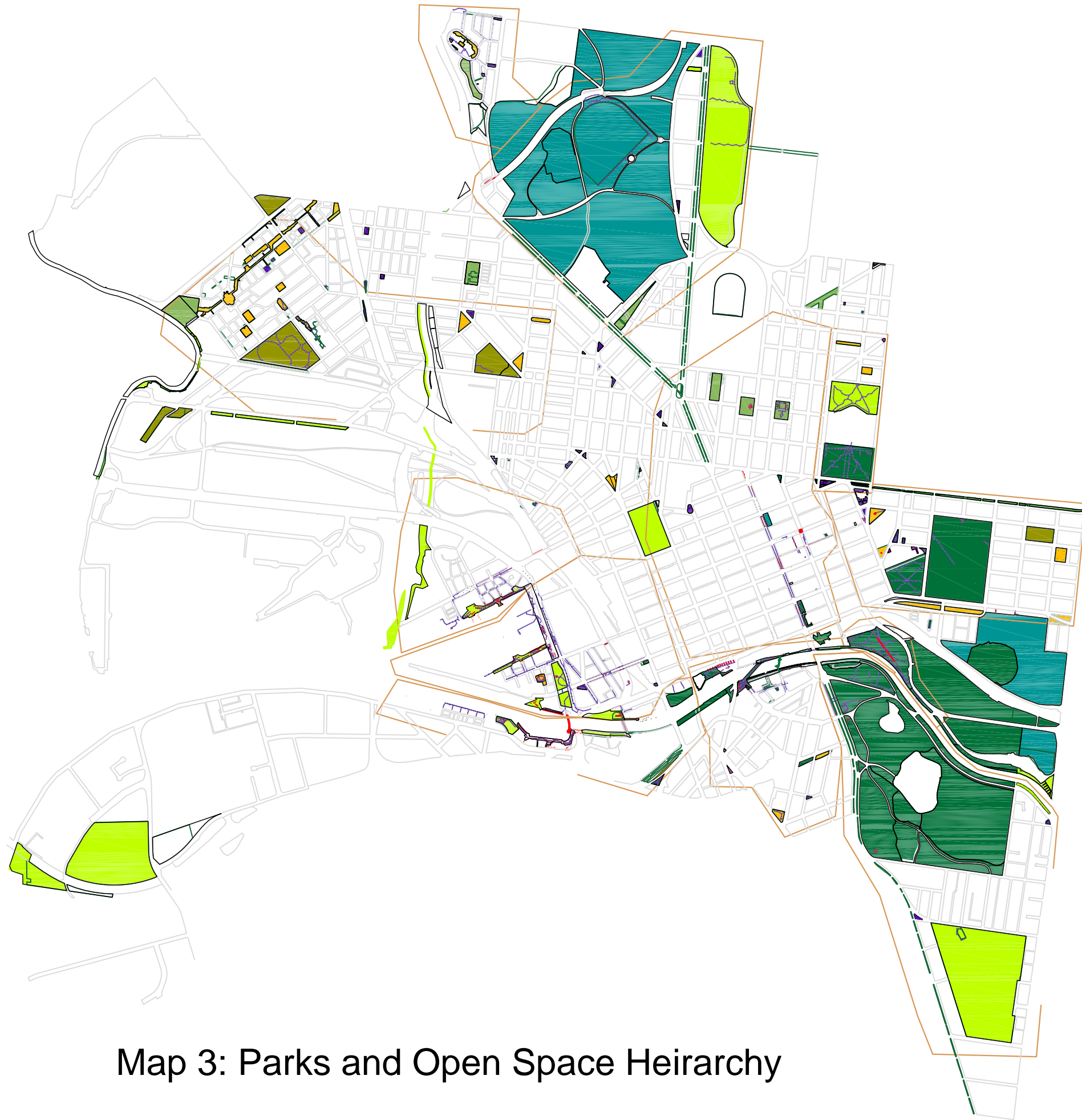
- Legend**
- Metered Lighting (indicated by a red triangle)
 - Feature Lighting (indicated by an orange triangle)
 - Electrical Meter (indicated by a purple triangle)
 - ESG-ElectricalConduit (indicated by a pink line)
 - Blocks (indicated by a black outline)
 - Parks (indicated by a green area)
 - River (indicated by a blue area)











RESPONSIBILITIES & ADOPTION EDCMENTS
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 PG 1000 (Melbourne, Victoria 3001) 1/18/2018



Map 2 Metered Lighting



DRAWING KEY

-  **CAPITAL CITY OPEN SPACE**
500 m safe walking distance
where they are not restricted access
-  **STATE OPEN SPACE**
500 m safe walking distance
where they are not restricted access
-  **REGIONAL OPEN SPACE**
with 500m safe walking distance
to a regional open space
-  **MUNICIPAL OPEN SPACE**
500m safe walking distance
to a municipal open space
-  **NEIGHBOURHOOD OPEN SPACE**
500 m safe walking distance
without crossing major roads
-  **LOCAL OPEN SPACE**
300 m safe walking distance
without crossing primary or
secondary arterials or railways
-  **SMALL LOCAL OPEN SPACE**
200 m safe walking distance
without crossing collector roads,
secondary or primary arterials
-  **SMALL LOCAL LINK**
less than 300m² in size
(therefore no specific
walking distance is applied)

Map 3: Parks and Open Space Heirarchy