

CITY OF MELBOURNE LIGHTING STRATEGY

2021



CITY OF MELBOURNE



A CITY FOR PEOPLE

A city for people welcomes all. It is accessible, affordable, inclusive, safe and engaging. It promotes health and wellbeing, participation and social justice.

Acknowledgement of Traditional Custodians

The City of Melbourne respectfully acknowledges the Traditional Custodians of the land, the Bunurong Boon Wurrung and Wurundjeri Woi Wurrung peoples of the Eastern Kulin Nation and pays respect to their Elders past, present and emerging. We are committed to our reconciliation journey, because at its heart, reconciliation is about strengthening relationships between Aboriginal and non-Aboriginal peoples, for the benefit of all Victorians.

CONTENTS

1. Executive summary	04	6. Attracting the evening crowd	39
2. Introduction	07	6.1 Making a spectacle	39
3. Background to strategy	08	6.2 Window dressing	40
3.1 Changes to the 2013 strategy	08	6.3 High lights	43
3.2 Other Council strategies	08	7. Designing a sustainable city	45
3.3 Codes of practice	09	7.1 Thrills and spills	45
3.4 Outdoor lighting	09	7.2 Glowing greener	47
3.5 Recent projects	09	8. Keeping the lights shining	51
3.6 Stakeholders and communication	10	8.1 Maintain the light	51
3.7 Further work	10	8.2 Learn and improve from practice	52
4. Designing a luminous city	12	9. Action plan	54
4.1 Night and day	12	9.1 Introduction	54
4.2 Navigation lights	14	9.2 Summary of actions	54
4.3 Grids and lux	16	9.3 Cost implications of Designing a sustainable city	57
4.4 Local colours	20	9.4 Cost implications of Safety and amenity	58
4.5 Parks after dark	22	9.5 Cost implications of Attracting the evening crowd	59
4.6 The big splash	25	9.6 Upgrading the public lighting system	59
4.7 The active community	27	9.7 Setting priorities	59
5. Safety and amenity	28	Appendix 1 - Glossary	60
5.1 Good measures	29	Appendix 2 - Maps	62
5.2 White nights	32	Appendix 3 - Photo references	66
5.3 Form and light	33		
5.4 Peripheral vision	35		

May 2021

Cover Image: Former Melbourne General Post Office. Photo Credit: Andrew Curtis

Disclaimer

This report is provided for information and it does not purport to be complete. While care has been taken to ensure the content in the report is accurate, we cannot guarantee it is without flaw of any kind. There may be errors and omissions or it may not be wholly appropriate for your particular purposes. In addition, the publication is a snapshot in time based on historic information which is liable to change. The City of Melbourne accepts no responsibility and disclaims all liability for any error, loss or other consequence which may arise from you relying on any information contained in this report.

To find out how you can participate in the decision-making process for City of Melbourne's current and future initiatives, visit melbourne.vic.gov.au/participate

1. EXECUTIVE SUMMARY

1.1 Origin and justification

The City of Melbourne Public Lighting Strategy 2021 (the strategy) is an outcome of City Plan 1999, which called for a comprehensive and integrated urban lighting strategy for all streets. This strategy is also part of a broader commitment to make Melbourne an even more liveable and attractive city. The original strategy was adopted in 2002 and revised in 2013. The current revision was completed in 2021.

1.2 Scope and purpose

The strategy aims to make central Melbourne a place of interesting spaces with lighting (and darkness) that enhances people's experience of the city after dark. It aims to responsibly manage the environmental and social impacts of night-time lighting whilst promoting improvements to safety and amenity, especially for pedestrians. In doing so, it recognises that people's sense of well-being results from a complex mix of factors. At night, these include way-finding and visual comfort, as well as road safety and personal security.

The strategy recognises that brighter is not always better as far as outdoor lighting is concerned. Over-lighting of buildings or spaces dilutes dramatic effects, contributes to 'sky glow' and can result in other negative outcomes. Many objectives in this strategy aim to limit the extent or intensity of external illumination.

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

This strategy draws on the experience gained from three decades of successful public lighting projects in the City of Melbourne. It provides direction for public and private external lighting throughout the municipality. It covers the 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 strategy outlines issues and objectives and sets priorities for lighting initiatives to 2026. In addition, the action plan sets out a range of specific initiatives.

1.3 Audience

The strategy is written for a broad audience. It is intended to be used by designers, developers, building owners and their agents (such as architects and lighting designers). In addition, the strategy will be used by planners and other staff within the City of Melbourne to assess proposed lighting initiatives.

1.4 Major themes

The strategy is divided into five key themes:

- Designing the luminous city reinforces perceptions of Melbourne's physical form. The aim is to ensure a consistent, attractive and balanced approach to the design of lighting throughout the municipality.
- Safety and amenity aims to ensure that public lighting provides the required levels of illumination so that the public realm is appropriate and safe.
- Attracting the evening crowd aims to promote and support Melbourne's growing reputation as a 24-hour city. A vibrant and event-filled city is enhanced by innovative, well-considered lighting.
- Designing the sustainable city promotes efficient technology, responsible management practices and other forms of energy conservation. This theme calls for large-scale replacement of aged, inefficient lighting with more efficient and longer-lasting technologies.
- Keeping the lights shining calls for a proactive maintenance program for all lighting assets. This theme aims to deliver quality lighting and safety outcomes while managing operating costs and energy use.

Although each of these themes outlines individual objectives, priorities and design preferences, the strategy should be read and applied as a whole.

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 strategy outlines a wide range of high-level objectives and performance criteria to improve public lighting throughout the City of Melbourne.

Some improvements will be managed within existing resources while a number of new activities are planned to improve public lighting and reduce energy consumption. The costs and benefits of improvements cannot be fully quantified until individual projects are known, but the estimated costs of implementing the strategy are likely to be on the order of \$20 million over a five-year action plan.

However, implementation of the strategy will also save the City of Melbourne around \$1.8 million per year and reduce annual greenhouse gas emissions by 8,000 tonnes. Most of the costs relate to upgrading the metered lighting to LED with lighting controls. Decorative lighting will also be upgraded to LED with lighting control. Light poles in the north south direction of the CBD will be upgraded with King Street light poles.



Image 1. Melbourne's Hoddle Grid at sunset. Full details can be found in Appendix 3 - Photo References.



2. INTRODUCTION

2.1 Objectives

The primary objective of the 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. Sky glow, glare and other nuisances associated with outdoor lighting will be minimised.

The strategy adds to existing codes of practice for outdoor illumination, including all relevant Australian standards.

Appropriate, high quality lighting is important for all public places, although there is a natural tension between achieving this outcome and reducing greenhouse gas emissions. The strategy seeks to balance these priorities by ensuring new lighting projects are considered on a case-by-case basis during the design and development phase.

The strategy will help reconcile any competing aims by applying Melbourne's characteristic brand of urban design. This will result in a public realm that is simple and low-key, yet also elegant and clearly structured. However, event lighting and temporary illuminated displays are encouraged, especially when linked to Melbourne's festivals and other events.

Due to the number of public lighting assets in the City of Melbourne, the standard streetlight has the biggest impact on the appearance, amenity and environmental sustainability of public spaces. As such, this element is discussed in the most detail.

2.2 Scope

The strategy provides direction for public and private external lighting throughout the City of Melbourne. The strategy defines issues, identifies objectives and helps set priorities for lighting projects. It is a helpful resource for designers that outlines general performance standards but does not prescribe specific projects, precise measurements or technical details. Instead, the strategy focuses on achieving consistency across Melbourne's outdoor lighting infrastructure. Performance standards and detailed applications are addressed separately as part of design standards, implementation plans and specific project proposals.

The strategy has a 10-year lifespan with a five-year action plan. Even though Melbourne's physical character changes slowly over time, people's aspirations change more rapidly. For this reason, the action plan will be reviewed and updated for a further five years after the 2017-18 financial year.

2.3 Structure

The strategy is divided into five key sections:

- **Designing a luminous city:** reinforcing perceptions of Melbourne's physical form
- **Safety and amenity:** improving pedestrian safety and amenity
- **Attracting the evening crowd:** bringing more activity to Melbourne's public places
- **Designing the sustainable city:** minimising the negative environmental impact of outdoor lighting
- **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 presented in a standard format.

Firstly, a concise statement of the strategy is outlined, emphasised in bold type. This is followed by a paragraph of explanatory text that expands on the meaning of the strategy, contains more precise directions and suggests a means for implementation. Finally, a set of bullet points provide explanations and comments on each of the strategies.

Each strategy also includes maps and diagrams, which are referred to within the text and are attached at the end of this 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, Section 9 sets out an action plan to put the strategy into effect. This is needed to translate the general objectives of the strategy into a set of realistic lighting projects that can be achieved in a given time frame. The action plan provides a summary of activities in the strategy, including accompanying costs, responsibilities and priorities.

3. BACKGROUND TO STRATEGY

3.1 Changes to the 2013 strategy

Originally released in 2002, the strategy was strongly supported and used extensively by City of Melbourne staff, developers and other government organisations. The strategy has influenced every major precinct development and plan since it was written. It was used in the design of developments at Federation Square, Docklands and the QV and QVM site as well as the conversion of the central city and St Kilda Road Boulevard to white light.

Throughout this period, an innovative cycle of technology has been driving improved energy performance and lighting outcomes. Codes and standards have been refined in relation to these advances. As this process continues, best practice requires our understanding and application of current performance standards to develop as well.

In 2013 an update of the strategy included a five year action plan, addition of the section titled Keeping the Lights Shining, and a rewrite of the Designing the Sustainable City section. The current revision maintains the strategy's integrity with updates to ensure current priorities and themes are incorporated.

Key changes in this revision include:

- Updated dates and references to policies, codes and standards
- Added detail in Section 7 around requirements for the control of obtrusive lighting and the use of smart lighting.

3.2 Other council strategies

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

- Policy for the 24 Hour City (2009)
- Strategy for a Safer City 2011–2013
- Transport Strategy 2030 (2019)
- Active Melbourne Strategy
- Melbourne Retail Strategy
- Melbourne Hospitality Strategy
- Open Space Strategy (2012)
- Urban Forest Strategy 2012–2032
- Nature in the City Strategy (2017)
- Zero Net Emissions by 2020
- Waste and Resource Recovery Strategy 2030 (2019)
- Climate Change Adaptation Strategy Refresh (2017)
- Climate Change Mitigation Strategy to 2050 (2018)
- Structure plans for various City of Melbourne neighbourhoods
- Master plans and concept plans for various public parks and gardens.



Image 3. Lighting technologies have evolved rapidly in recent years. Full details can be found in Appendix 3 - Photo References.

3.3 Codes of practice

The 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: current date - Lighting for roads and public spaces. This series is undergoing ongoing updating. The use of the most recent published version of the relevant Standards is required.
- AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting
- AS 2560.2.3-2007: Sports lighting - Specific applications - Lighting for football (all codes)
- AS 2560.2.4-1986: Guide to sports lighting - Specific recommendations - Lighting for outdoor netball and basketball
- AS 1798:2014: Lighting poles and bracket arms - Recommended dimensions.

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 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 (Vic) (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 2004 (Vic) (Amended as at June 2011)
- Occupational Health and Safety Act 2004 (Vic) (Including 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 (Vic)
- Australian Standard AS1742.3 - 2009, Traffic control for Works on Roads
- Road Management Act 2004 (Vic), Worksite Safety - Traffic management code of practice
- Victorian Public Lighting Code 2015, Essential Services Commission.

3.4 Outdoor lighting

Users of the 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

This version of the strategy consolidates the lessons learned from three decades of public lighting projects in Melbourne. However, the range of issues covered in the strategy is broader than any single project. These issues include technical, environmental and urban design considerations that affect public and private lighting throughout the municipality.

Melbourne already has many fine examples of outdoor lighting. The strategy identifies a number of innovative or exemplary projects. Recent examples include:

- City-wide replacement of old technology streetlights to connected smart LED lighting
- Installation of LED lighting in major projects such as Swanston Street and Southbank Boulevard
- Upgrading of lighting in cultural precincts including Lygon Street, Lonsdale Street and Chinatown
- Adaptation of old lighting fixtures to more energy efficient technologies, e.g. along Southbank Promenade (induction)
- Installation of solar-powered LED lighting in Royal Park.

3.6 Stakeholders and communication

The Lighting Strategy was commissioned by the then Engineering Services branch (now Infrastructure & Assets branch) and produced with the support of a range of Council stakeholders.

The Infrastructure & Assets branch has primary responsibility for managing metered public lighting in streets and parks, although the Parks & City Greening branch is a major stakeholder in lighting the municipality's large public open spaces. In addition, the Design Studio branch implements street improvements, and initiates policies and designs for other public places.

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

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

The City of Melbourne will work collaboratively with electricity distributors to develop and implement plans to replace inefficient, unmetered streetlights with more efficient ones, while maintaining appropriate illumination levels.

Promoting this strategy and its successes to designers, developers, other organisations and the wider community will be important to help achieve better lighting solutions. Support for the strategy will be sought from surrounding municipalities and the Victorian Government. Feedback will be obtained via social media and other web-based platforms.

3.7 Further work

This strategy is the main document outlining the public lighting approach for the City of Melbourne. It aims to be easy-to-use and jargon-free so it avoids technical information or detailed design and is relevant to a wide range of users and conditions.

Precise specifications are inappropriate for a long-term strategy of this type as lighting technology is evolving rapidly. Reference to specific dimensions, products and applications could soon be obsolete.

As a result, the strategy is supported by other technical guidelines. The Infrastructure & Assets branch has prepared performance specifications for street lighting in the municipality, and the Design Studio branch has prepared design standards guiding the use of light poles and fittings suited to a variety of contexts. Together with the strategy, these design standards provide guidance for lighting in the public realm.

While design standards have been prepared for certain pole and fitting types, additional design standards are needed to establish good lighting practice in other situations. Each design standard should address energy conservation and provide advice on how to prevent nuisance from intrusive or waste light. Priority topics include:

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

Management of private lighting is also critical to help achieve the objectives of the strategy. Further work is needed to ensure planning schemes cater for the requirements of the strategy. Key areas to consider are:

- 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 Street and Flinders Lane).
- Ensure planning schemes adequately manage the use of reflective glass to reduce glare to neighbouring properties. 3.1 Changes to the 2013 strategy.



Image 4. Lighting in typical streets carrying mix of traffic and pedestrian activity. Full details can be found in Appendix 3 - Photo References.

4. DESIGNING A LUMINOUS CITY

Reinforcing how Melbourne's physical form is seen

Outdoor lighting should reinforce how Melbourne's urban form is seen 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. As such, lighting designers need to address a broad range of issues. Traditional concerns such as road safety and personal security remain fundamental and are addressed in detail in Section 5. 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 after dark

Melbourne is a different place after dark. Good lighting should enhance 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. Lighting can reveal elements and relationships that are less obvious during the day. It can alter the appearance of spaces or objects, either playfully or provocatively. It is important for the City to be a place of interesting, but connected, spaces. Lighting (and darkness) can be used to contribute to and enhance the feeling of interest and excitement when travelling the city at night.

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 the dominant impression is that of continuity between day and night. Against this familiar backdrop, use illumination to alter the appearance and importance of objects and spaces. 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 from day to night.

4.1.3 Create interesting spaces to interest and excite.

Use lighting to create interesting spaces that contribute to and enhance the feeling of interest and excitement when travelling the city at night. These spaces should invite visitors and residents to spend time and be connected to the City's unique food and cultural locations.

4.1.4 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 the city's network of paths, nodes, edges and landmarks is clearly visible, especially in areas that attract large numbers of pedestrians after dark.

4.1.5 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 the collective result of lighting installations is to enhance the structure of public space.



Image 5. A mix of standard and feature lighting at University Square. Full details can be found in Appendix 3 - Photo References.

4.2 Navigation lights

Lighting Melbourne's landmarks

Not every building can be a landmark. Although skilful illumination can enhance the most banal object, having too many points of emphasis dilutes its impact. This approach can also be a nuisance and sets 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 understanding 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. These should be chosen in relation to local patterns of form and use that may not extend further than a few blocks. In the same way, landmarks do not have to be 'public' in the full sense of this word. Many privately-owned buildings help to articulate the city's form and 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, elements should have one or more of the following attributes or functions:

- Express important historic associations or symbolic values
- Accommodate major public institutions or events
- Attract large numbers of visitors
- Occupy prominent locations, with obvious connections to other important elements of urban structure
- Display exceptional size, 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 floodlighting of buildings wastes energy and can create nuisance.

4.2.2 Illuminate significant buildings and other landmarks on the edge of the Central Business District (CBD) and around the Central City.

Today the central city encompasses the CBD, 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.

A good example of this work is the City of Melbourne's lighting scheme for Parliament House, 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 left over spaces that form when different street patterns meet. Such places provide unrestricted views of adjacent city buildings.

4.2.3 Within the central city, illuminate significant buildings in settings that allow good visibility.

Consider the following situations:

- Buildings set back from the street edge
- Buildings that sit within their own grounds
- Buildings that occupy major street corners or entire city blocks
- Buildings at the end of major street corridors
- Buildings that face parks, gardens and other public reserves.

Examples of this type of landmark include:

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

A good example of this approach is the City of Melbourne's recent lighting scheme for the Old General Post Office. The central city defines Melbourne's cultural and commercial heart. As a result 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:

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

Good examples of this approach are the lighting schemes for the Shrine of Remembrance, Melbourne Museum and the Royal Exhibition Building, and Southbank Arts Centre.

4.2.5 Draw attention to local landmarks in areas outside the central city.

Identify 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. Rely instead on the quality and distribution of light to make an impact. Enhance forms and materials by emphasising 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 floodlighting of buildings, landscape features or other objects can cause a nuisance. Up-lighting is particularly troublesome as 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 1am.

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



Image 6. Treasury Gardens, with lighting of key cross-paths that also emphasises important landscape elements. Full details can be found in Appendix 3 - Photo References.

4.3 Grids and lux

Lighting streets and lanes

Lighting should express the two hierarchies that organise Melbourne's streets. The first of these 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 is most evident within the central city where settlement first occurred.

The second hierarchy 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, while 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 CBD, 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 (Refer to map 2).

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 are appropriate for 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 help achieve this by focusing attention on the surrounding architecture and landscape.
- Consistent use of a limited number of fittings helps create more coherent streetscapes. Standard fittings also express large-scale street patterns that extend beyond individual precincts or neighbourhoods.
- Standard designs help 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 motorist amenity where lanes of fast through-traffic dominate. Ensure lighting layouts in each of these locations combine to form a cohesive overall impression.

- 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.
- 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 of the central city and St Kilda Road includes some of the city's major ceremonial spaces.
- 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 a street. Treat wider streets with greater formality. Treat 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 2 provides detail of streets in each category):

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

The CBD is a primary element of Melbourne's urban structure. It defines the origin and centre of Melbourne. It includes many of the city's most important pedestrian routes and destinations. For these reasons, it is appropriate to differentiate the CBD 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. Therefore, 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 positioned higher or 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 wide. 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:

- Local retail strips
- Tram routes connecting neighbourhoods with the central city
- Streets in commercial or mixed-use areas
- 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. Consider cultural precincts and their unique values as summarised in the City of Melbourne. Adopt a unifying lighting theme for all lanes within a single neighbourhood.

- Laneways are a distinctive feature of Melbourne. However, they are always incidental to the surrounding street pattern.
- For safety reasons, the City of Melbourne is committed to improving illumination in laneways, especially in the central city.
- The laneways’ small scale enables relatively modest one-off features to have an impact beyond what is possible in larger streets and spaces.
- Unique lighting installations, and art installations involving lighting, have been successfully completed in several central city lanes.

Lighting should reinforce the separate identities of Melbourne’s neighbourhoods. The central city 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 neighbourhoods and the central city are unclear. During the day, these intricate patterns and unexpected relationships often appear charming. However, the complexity of these patterns 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.



Image 7. Pedestrian-scale lighting in Swanston Street, one of the city's most important public transport spines. Full details can be found in Appendix 3 - Photo References.

4.4 Local colours

Lighting Melbourne's neighbourhoods

4.4.1 Identify local shopping strips as centres of community life.

Increase the intensity of illumination within community retail areas. These mixed-use areas should be brighter where pedestrian use is of primary importance and more subdued where residential use of the strip is the dominant factor. Locate lights where they 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 differentiate retail precincts from surrounding residential or mixed-use areas.
- Use of dimming and time-of-use should be tied to the needs of pedestrian shoppers and altered to cater for residential use after business hours.
- The edges of shopping streets should be well lit as this is where visual interest and pedestrian activity are concentrated.
- Shop-fronts provide additional light on retail streets. They can be an important light source along footpaths, when verandahs or trees block the illumination from streetlights.

4.4.2 Treat lighting as a background element within neighbourhood streetscapes.

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

Choose lanterns and poles from the City of Melbourne's suite of standard fittings. If necessary, adapt these designs to fit local conditions. Ensure the layout and appearance of 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 façades within neighbourhood shopping precincts. However, avoid excessive illumination where it wastes energy or causes a nuisance. Put feature lighting on a timer control and turn off installations after 1am.

- 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 clear only to 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.
- Adjoining two and three storey façades help identify the centres of most neighbourhood shopping precincts. The appropriateness of lighting these façades needs to be judged on a case-by-case basis. A common approach should be taken to all frontages along a single retail strip as 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.

Melbourne's parks and gardens are world famous. They include major recreational assets and act as counterpoints to city's regular street grids. By day, the relationship between built form and open space is one of positive contrast. However, by

night parks often 'disappear'. They can become islands of darkness within a network of brightly lit streets. Although casual use declines after dark, Melbourne's parks and gardens remain open. For example, sporting events and organised entertainment can attract large evening crowds to parks and gardens. 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 from the adjacent landscape. However, when night falls, the foliage and attractive views can be replaced with an unnerving void. For these reasons, Melbourne's parks and gardens are an important part of the city's public lighting system.

With the exception of some large open space zones used for sporting activities (refer to Section 4.7), it is neither practical nor desirable to illuminate large landscapes in their entirety. Limited lighting in parks keeps costs down, reduces energy consumption and helps protect biodiversity in the city. For example, bats are sensitive to lighting and other nocturnal species rely on darkness to forage and locate 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.

This Strategy complements the work within the City of Melbourne's 2012 Open Space Strategy. Melbourne's parks are categorised by size, location and use. Map 4 outlines the location and category of each of Melbourne's parks. Map 3 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.

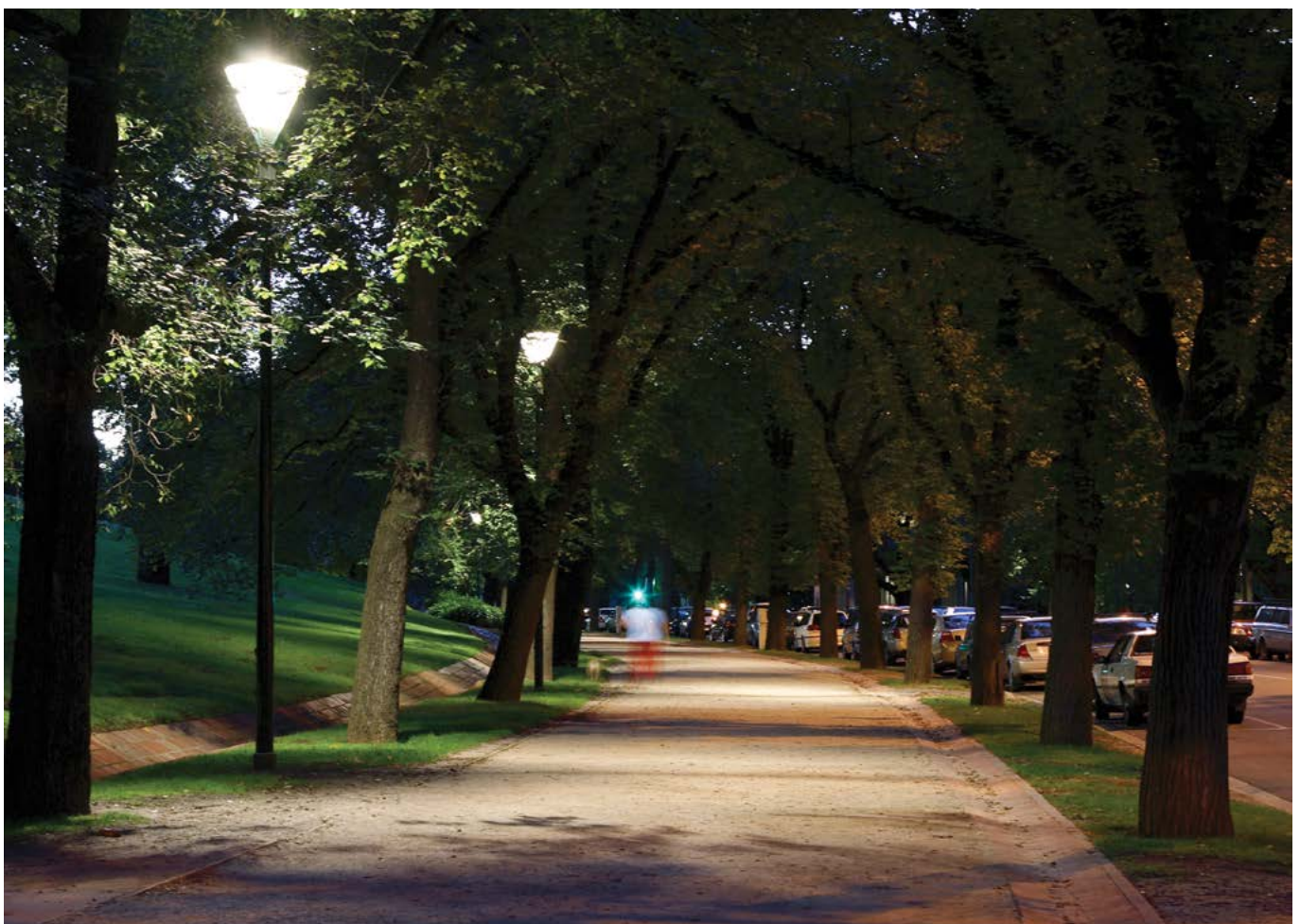


Image 8. Lighting of the Tan Track in the Domain Parklands. Full details can be found in Appendix 3 - Photo References.

4.5 Parks after dark

Lighting parks and gardens

4.5.1 Manage the use of lighting in different park categories.

Although every park needs to be considered based on local uses and other criteria within this strategy, in general a park's lighting plan should be implemented to reflect its location and category as per map 3. Below is a summary of the general requirements of each category, which covers all lighting within a park (pathway, entrance, feature, event, etc. unless otherwise stated).

Local, small local open space, and small local link:

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

Neighbourhood open space:

Lighting may be used and turned off at 10pm 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 1am unless a case can be made to extend or limit the hours. A skeletal path layout may be lit all night for major pedestrian routes through these parks and building security lighting is appropriate.

Royal Park:

Car park lighting (including near Melbourne Zoo) should be turned off at 1am.

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

The central city's major 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 parklands and Shrine Reserve
- Fawkner Park
- Fitzroy Gardens
- Flagstaff Gardens
- JJ Holland Park
- Princes Park
- Royal Park
- Treasury Gardens
- Yarra River banks (from Princes Bridge to Hoddle Bridge, including Birrarung Marr).

Assess the 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 of the most popular walking routes in parks. Ensure 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 direct pedestrians to the safest, most frequently used thoroughfares.
- A skeletal network of major pedestrian routes across parks should generally be lit all night.
- 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 viewed from surrounding streets. Illuminate elements at the terminations of view shafts.

- Conspicuous park entrances help 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 through feature lighting of 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 as the dark surroundings allow accent lighting to produce a dramatic effect.
- Not all features need to be lit.

4.5.6 Manage ambient lighting in parks.

Ambient lighting should not detract from the experience of using parks and other open spaces after dark. Consider and control nuisance lighting to ensure park lighting standards are not compromised.

All lighting in parks must have lighting control and reduced glare where possible.

4.5.7 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 (refer to Section 4.5.1).

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

4.5.8 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 in Royal Park and reduce the extent of illumination after 1am. Avoid feature lighting of buildings or landscapes. Organise ‘starlight nights’ when all sports lighting is turned off. Minimise stray light from surrounding streets and buildings. Work with neighbouring municipalities to extend these controls to a broader geographic area.

- Royal Park is the city’s only ‘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 city skyline.
- Royal Park is home to Melbourne Zoo. Intrusive outdoor lighting can have a negative effect on animals.
- Sports facilities in Royal Park should be lit only when activities are occurring and must be turned off at 10pm.
- Lighting to support active transport modes (bicycles, walking, tram) should be lit where and when there is heavy use and generally turned off after 1am.
- A skeletal path layout for major pedestrian routes and building security lighting can be lit all night.
- Remote-control technology should be installed to turn these off for ‘starlight nights’.

4.5.9 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 are relatively inconspicuous and will not date rapidly.

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

4.5.10 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 can also cause damage to trees and other landscape features.
- Permanent infrastructure could cut production costs and reduce turn-around times for outdoor public events.

4.5.11 In large open spaces, ensure 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 with their own independent lighting layouts.

- Different divisions of the City of Melbourne are responsible for park lighting and street lighting.
- Lighting in large parks needs to operate independently from 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, with the ability to be altered on-site 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 when 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. Although the original shorelines of these waterways vanished long ago, they still provide a dramatic reminder of the natural features and forces that have helped shape the central city.

The water's edge also records human intervention in the landscape. During the first century of Melbourne's development, local industries 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, Melbourne's 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 aspects of these waterways are their visual amenity and recreational opportunities. Water holds a special attraction for people. Due to their natural form and historic functions, Melbourne's three major waterways are ideally placed to connect the city's premier parks and gardens with each other, and with areas of significant urban renewal.

Melbourne's waterways are now being fully integrated with the rest of the city's public open space. Effective public lighting can assist with 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.

The quality, intensity and appropriateness of illumination should identify this river as Melbourne's preeminent public space. Orchestrate public and private lighting to create cohesive large-scale effects. Emphasise bridges as thresholds to the central city. Install distinctive light fittings that announce the special status of the river precinct. Ensure 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 River provides the foreground for many representative views of the city skyline.
- The Yarra River helps orient visitors to the city and connects many visitor destinations.
- The Yarra River 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's 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 River'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 two rivers connect many of the city's major cultural and recreational facilities.

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

Treat bridges as sculptural objects. Illuminate buildings, infrastructure and landscape features that can serve as beacons along dark sections of both rivers. Ensure 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 River and, to a lesser extent, along each side of the Maribyrnong River. In their new role as recreational spaces and venues for public events, both rivers need to function as drawcards rather than boundaries. Good cross-river connections support this change.
- Current pedestrian activity and public amenities are concentrated on the southern bank of the Yarra River. In the future the north bank will also accommodate major visitor destinations.
- Parts of the Yarra River's north bank are still underutilised. 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 city skyline.

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, 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 both 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 attractive in a gridded city because the fluid lines of the Yarra and the Maribyrnong rivers contrast with the rigorous 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 (Docklands) have quite different characteristics from Melbourne's other major waterways. Unlike the two rivers, these bodies of water are static spaces, having developed as destinations rather than as thoroughfares. In some respects, they provide missing links in the chain of Melbourne's major public open spaces.

- 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 provide a continuous pedestrian promenade along the water's 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 with orientation.

4.7 The active community

Lighting Melbourne's sports facilities

The City of Melbourne provides year-round recreational venues for a variety of sporting and community organisations. There are over 50 sports grounds, tennis and bowls facilities, many of which have lighting for evening use. In addition, many open spaces are used for activities such as jogging, rowing and other sports.

In addition, the City of Melbourne is home to many sporting facilities it does not manage that are of national significance. The need for lighting should be consistent with the relevant master plans for each location.

Establishing the capacity of natural and synthetic sports fields, and balancing this against supply and demand, will establish the requirements for sports lighting. Not all sports fields will need lighting, but more will be required above the current offering.

The City of Melbourne has a small (but growing) number of synthetic sports fields. These fields save a significant amount of water and all are lit at night. Encouraging active recreation at sports fields is an important way to promote health and community connectedness, while lighting these venues allows for extended use and wider community benefit.

The use of lighting at sports fields needs to be carefully balanced with the needs of the wider community, wear and tear on the facilities, and attention to energy use and costs.

4.7.1 Create effective sports lighting only where it is required.

Ensure lighting is used only when and where it is needed to provide a safe venue for users. Lighting levels are to meet relevant Australian standards for sports lighting as appropriate.

Lighting is appropriate for a variety of organised sports as well as for high-use locations for jogging such as around the Tan and the Prices Park Jogging Track.

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

- Lighting levels will meet training standards and not higher.
- Remote monitoring and switching of the lighting will be installed.
- Lighting will meet demand and not higher.
- Careful consideration of spill lighting will be 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 is required to allow for the choice of some or all of the venue to be lit.
 - Timers will be used to turn off sports lights at 10pm (with a 15-minute grace period if required).

4.7.2 Cooperate with stakeholders around facilities not owned and managed by the City of Melbourne.

For facilities not owned and managed by the City of Melbourne, it is important to ensure:

- The needs of visitors and users are met.
- Facility managers cooperate with the City of Melbourne to achieve the visions of this and other strategies.

5. SAFETY AND AMENITY

Improving pedestrian and bicycle safety and amenity

The issues of safety and amenity cannot be separated. 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 these factors. Lighting determines our ability to negotiate the city at night and perform tasks comfortably, efficiently and safely. Ironically, good ambient illumination is hardly noticeable. It merely provides a background to people's activities. We usually only become aware of lighting conditions when they are poor, dysfunctional or intrusive. However, the causes of bad lighting are complex, and often escape our attention.

The amount of light is only one factor to be considered when illuminating an area for safety and amenity. Frequently, the distribution, direction and even the colour

of light are more important variables. Impressions are also formed by comparison. Dimly lit areas appear darker if contrasted with patches of bright light. It is therefore helpful to take a holistic approach to lighting issues. The needs of different users should be acknowledged, multiple parameters examined, and each initiative should be placed within a wider physical context.

Bicycle usage is growing at a rapid rate in Melbourne, and the use of shared paths (for bicycle and pedestrian use) is also increasing. The City of Melbourne's Bicycle Plan, in combination with specific master plans for parks and precincts, helps ensure the lighting of shared paths is balanced with other uses of these areas. It is not appropriate to light all paths. However, busy shared routes usually require appropriate and relevant lighting.



Image 9. Even, glare-free lighting contributes to a safe city. Full details can be found in Appendix 3 - Photo References.

5.1 Good measures

Performance criteria for lighting public places

The City of Melbourne seeks to provide good amenity and access in public places. A key objective is to create high-quality streetscapes that improve pedestrians' experiences of the city. The attributes of attractive streets and squares are already well understood. However, these qualities 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, the City of Melbourne's public space objectives place an equally strong emphasis on pedestrian amenity. These objectives require streets to be 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 use and enjoyment of urban places after dark.

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

Comply with all relevant Australian standards and be guided by the following:

- Category V3 to be used for boulevards, major roads and neighbourhood retail strips
- Up to Category V2 to be used for King Street
- 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 PP4 to be used for parks
- Category PR5 to be used for residential streets
- Category PR3 to be used for the central city
- Category PA3 to be used for 10 metre CBD streets.

Refer to Map 2 for more information about lighting for streets.

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

Lighting during construction must meet Australian standards.

Ensure all overhead lighting does not impede overhead access for emergency services and maintenance vehicles.

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:

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

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

Perceptions of safety are just as important as actual effects. Care should be given before lighting an area as good lighting will attract more people. Better lighting leads to more people and improved safety, although care should be taken when encouraging greater use of locations that are inherently unsafe.

5.1.3 Lighting as part of the wider smart city system

The city's lighting system provides an element of the wider smart city system.

There are a number of attributes of streetlights make them an ideal component within a smart city:

- The lights' location high on a pole means there is good ability for clear communication.
- Their presence throughout areas of public activity means they can supplement the network where the need for data is greatest.
- The presence of power at the light makes it easy to connect the smart networks communication device to electricity.

The streetlight can be used as a relay for other information (in a smart grid network). This increases the effectiveness of the entire network and can improve the way the network operates. Alternatively, the street lighting communications devices can be part of a standalone lighting control network, without reference to other smart networks within a city. Council has installed these devices on the majority of its public lighting system as part of the citywide LED upgrade project.

Smart lighting functions, particularly the data that can be harvested, present a myriad of uses and have the potential to bring numerous social, economic and environmental benefits to councils and their communities. Benefits of smart lighting that have been identified up to now are just the tip of the iceberg. Smart controls, in their most basic form, present councils with two main benefits:

- They allow remote monitoring of whether a streetlight is functioning correctly, thus allowing for automated fault reporting.
- They provide the ability to increase or decrease lighting output levels to suit changing requirements at different times.

These functionalities can support significant cost and energy savings. As well as reducing maintenance costs, savings arise from the ability to use dimming and trimming to reduce energy use; this includes maintaining a constant light output over the lifetime of the asset (rather than maintaining constant energy input and having initial lighting levels higher than required to compensate for the degradation of lighting levels over time). These are discussed in further detail in Section 7.2.3.

5.1.4 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 the 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 as the eye automatically focuses on intensely-lit surfaces.

5.1.5 Use light to reveal three-dimensional forms.

Lighting from one direction only can create silhouettes and distort form and colour. This can create the impression that a 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 can distort the appearance of objects.
- Outdoor lighting levels are usually measured on the ground, which can conceal the fact that upright surfaces are poorly illuminated. However, vertical surfaces such as walls and people's faces, are often the focus of attention.

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

Provide a high standard of illumination along streets in popular restaurant districts. Ensure the colour and intensity of street lighting is 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 lighting. However, where sidewalk cafés and restaurants are common, new public lighting installations should be designed to support this activity.

5.1.7 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 centre 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 smaller species. If the tree canopy is 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.

5.1.8 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 visual clutter.
- Permanent streetlighting poles can provide infrastructure for temporary decorative lighting and smart city assets such as electric vehicle charging stations.

5.2 White nights

Improving the colour of street lighting

Different types of light sources produce different coloured light. 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. LED lighting provides a wide range of colour options.

Some lamps and colours produce more favourable effects than others. In particular, white light (4000K) performs better than yellow light (3000K) in terms of perceptions of safety and colour identification. White light reveals the natural colours of surfaces and 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 for orientation and way-finding.

A warmer, slightly yellow light is still suitable for parks and gardens where this adds to an inviting feeling for visitors. The colour provides a gentle and attractive view for pedestrians and park users. In addition, the use of yellower colours for decorative effect in locations such as façade lighting at Flinders St. Station can enhance the brick and sandstone features of the building.

(Note: refer to the glossary for precise definitions of 'white' and 'yellow' light).

5.2.1 Use white light in city streets.

Utilise lighting with a white colour for city streets (4000K as per AS 1150 series). Install advanced technology with energy-efficient lamps and full cut-off fittings.

White light provides good colour rendition. White light provides more effective illumination, and creates the impression that spaces are more brightly lit. Streets appear clean, crisp and pristine.

The most energy efficient light that can be used for the purpose should be considered. Recommendations around lighting types will vary over time as technology changes and improves.

5.2.2 Use yellow light in large parks and gardens.

Yellow lighting is preferred for city parks and gardens. The warmer colour provides a gentle and attractive view for pedestrians and park users. Install advanced technology with energy efficient lamps and full cut-off fittings.

- Yellow light (3000K) provides an inviting feeling of warmth to these spaces.
- Parks and gardens attract less use after dark, and therefore a lower performance specification is justified.
- Yellow light can reduce impacts on wildlife from lighting. Although the use of energy efficient and full cut off lighting to direct lighting to key pathway and locations is critical to reduce these impacts.
- Care must be taken in the selection of these lights as they vary widely in quality and efficiency.

5.2.3 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. Noting that the creation of interesting spaces and the use of light and darkness that creates this interest is beneficial within the overall common approach to lighting across the city.

5.2.4 Take care when mixing light and surfaces of different colours.

The colours of building materials and landscape elements should be taken into account whenever a mixture of light sources is considered, as the appearance of different materials and colours can be affected significantly by the colour of light that is shone onto them. Light colours that differ from the ambient lighting of an area can sometimes be combined effectively for feature lighting to deal with this issue.

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 everyday activities. Light can also introduce nuance, so that the form and meaning of a structure appears 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 provides daytime interest to a building's frontage. However, in the best examples of night illumination, lighting can reveal architectural details that only become apparent after dark.

Excessive lighting, or a clash of lighting between nearby sites, can result in unfavourable outcomes.

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-time observers experience 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 mask light sources to prevent glare or over spill. Give priority to lighting the following features and locations:

- Building entrances
- Colonnades, alcoves and other recesses
- Undersides of verandahs
- Shop windows and other street frontages
- First floor openings and elevations
- Street corners.

Full-facade lighting, or floodlighting, 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 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 floodlighting 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 of 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 due to their size, brightness or location. Ensure signage is not over-lit.

- In nightlife districts such as lower King Street, Lygon Street and Chinatown, 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 the City of Melbourne.

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 these installations off after 1am. 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 reduce energy consumption and greenhouse gas emissions.
- As these displays are conspicuous, they have the potential to deliver positive or negative messages about responsible energy use.



Image 10. Illuminated shopfronts and signage in balance with the ambient lighting can enhance the streetscape. Full details can be found in Appendix 3 - Photo References.

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, the edges and tributary pathways of a street are often more important to pedestrians. Effective lighting needs to take these peripheral areas into account.

At night, building lighting should help create the 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 1am.

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 install light poles that are dimensioned relative 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 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 dead-ends and changes in direction within 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.
- As 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.
- Building 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 guidance for lighting ground-floor interiors should be used with care. Over-lighting can be as detrimental to pedestrians as lack of light. The focus of ground-floor lighting should be on revealing the shape of the space, not on lighting the entire internal area.

5.4.4 Illuminate unsecured recesses in ground-floor frontages.

Ensure the following spaces are illuminated:

- Recessed entrances
- Alcoves
- 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 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 enhances the space and advertises 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.
- As 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 can 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 was provided for the University of Melbourne, RMIT and development sites such as QV, resulting in positive lighting outcomes and enhanced integration with the wider public 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 the colour and intensity of site lighting is 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 central city's neighbourhoods host 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 and visitors often need to traverse large sites after dark.

5.4.7 Use lighting to facilitate access to parked cars.

Ensure public and private parking lots are well lit. Provide good illumination along 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 an important part of Melbourne's transport network. Lighting in and around train stations and bus/tram stops is managed by the relevant authority. To create a safe transition from highly-lit train stations to local neighbourhoods, a gradual transition of lighting levels is recommended.

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



Image 11. Park style lights used consistently through the city's green spaces. Full details can be found in Appendix 3 - Photo References.



Image 12. Park-style lighting at the State Library forecourt, a green space that is heavily used at all times. Full details can be found in Appendix 3 - Photo References.

6. ATTRACTING THE EVENING CROWD

Bringing more activity into Melbourne's public spaces

The centre of Melbourne is a vibrant place after dark. A wide variety of cultural and entertainment facilities attract large crowds to the central city at night. Nearly every week there is a festival, major conference, cultural event or big game in town. These occasions all contribute to Melbourne's nightlife. In recent years there has also been a rapid rise in the city's residential population. With city streets remaining active for longer, improvements to the public realm are needed to accommodate this activity. When people feel comfortable in a public place, they are more inclined to linger and engage in casual activities that make a city truly memorable.

In urban design terms, the art of attracting an audience applies both to large public events that draw crowds to a single location as well as to countless small incidents that attract fleeting attention and spontaneous responses from passers-by. Night lighting should enhance both types of activity. Moreover, lighting should help link organised events with episodes of informal, follow-on activity to help animate larger 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. The City of Melbourne 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 as temporary lightshows have more impact than permanent installations.

In a similar way, decorative illumination is most effective when it is used as an accent within a cohesive framework of functional lighting. Linking such displays to unique architectural features, landscape elements or public art, enhances the effect. In other words, Melbourne's decorative lighting should be episodic or clearly bracketed in time and space.

Melbourne's urban design style has resulted in a public realm distinguished by quality and understated elegance, rather than ostentatious display. This approach has also helped reduce 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:

- Seasonal decorations
- Temporary installations
- Displays that change their appearance over time
- Lighting that is an integral component of public sculpture or performance art
- Installations that create incidental colour 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 light-themed festivals and complement these with 'city lights' tours and 'window shopping' promotions.

All major events should consider the visual appeal of promotional displays at night. These events include, but are not limited to, the following:

- Art Centre events
- Melbourne Fringe
- Melbourne International Comedy Festival
- Melbourne International Jazz Festival
- Melbourne International Film Festival
- Melbourne Queer Film Festival
- AFL finals
- ANZAC Day Parade
- Melbourne Fashion week
- New Year's Eve Festival
- Fire light festival
- Christmas 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 because:

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

All existing bud lighting should be removed.

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 1am. 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 central city, 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 streetlights and cast deep shadows across building frontages. These conditions undermine Melbourne's reputation as a 'shopping capital'. They also have a pervasive negative effect on the city's night image as many retail streets remain important pedestrian routes after dark.

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 shopfront, including external architecture and signage. Promote frequent changes to the content and format of display windows. Target 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 central city retail core, pedestrian counts remain high until 9 or 10pm.
- 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 obtrusive security devices.

Promote the use of 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 about 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 parts 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.

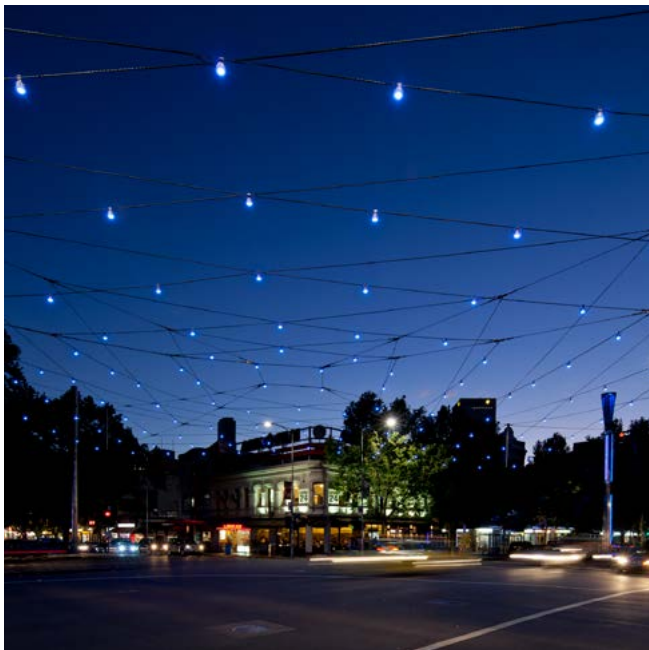


Image 13. Lonsdale Street, with feature lighting used to emphasise a major precinct rather than individual buildings. Full details can be found in Appendix 3 - Photo References.



Image 14. Window display lighting and illumination of re-cessed doorways enhances safety. Full details can be found in Appendix 3 - Photo References.



Image 15. Good lighting at public transport stops for legibility and safety. Full details can be found in Appendix 3 - Photo References.

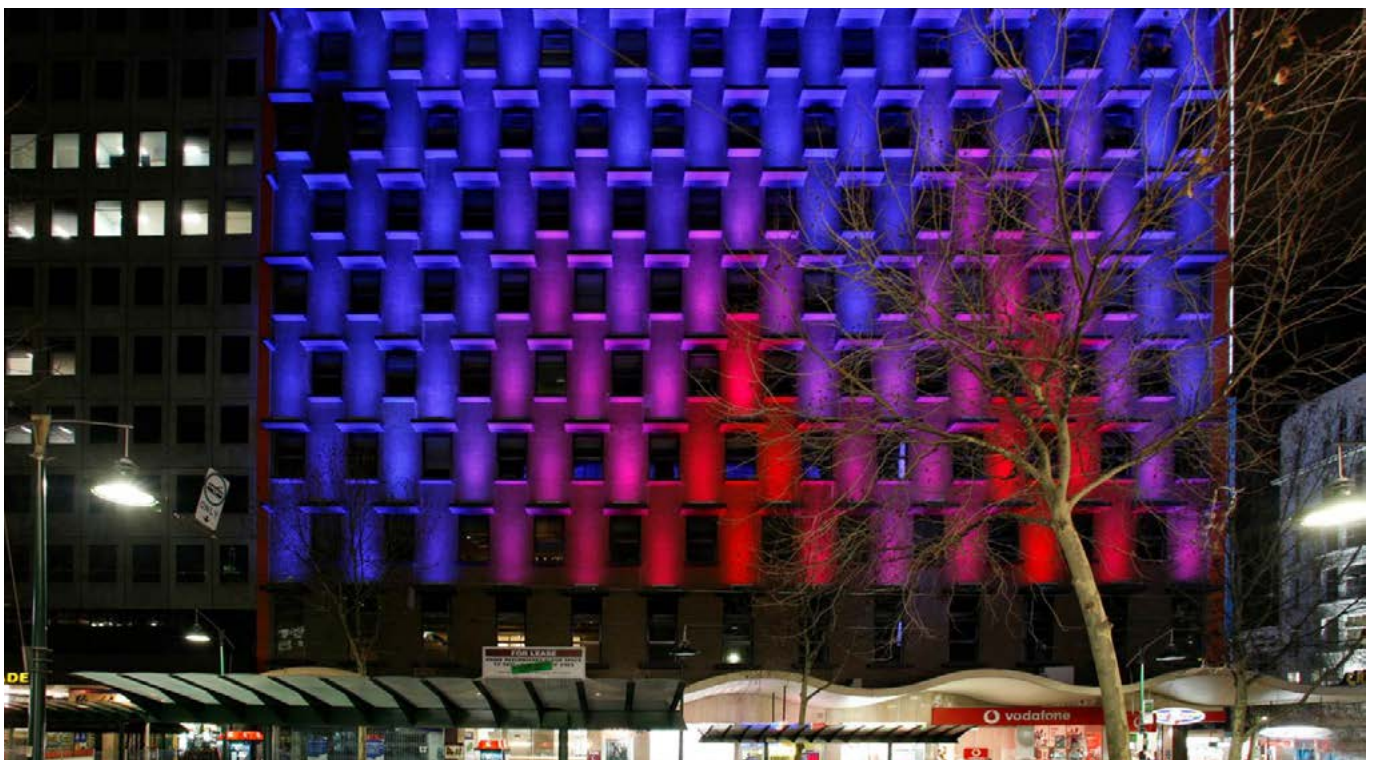


Image 16. Kinetic facade illumination as a public art commission, *Maxims of Behaviour*, by Alexander Knox, 2008. Full details can be found in Appendix 3 - Photo References.

6.3 High lights

Putting a civic signature on the city's skyline

Lighting helps to distinguish the City of Melbourne from the rest of the metropolitan area. The primary expression of this is the city's dramatic skyline. At night, the central city is a beacon of round-the-clock activity and a pre-eminent destination for evening entertainment. Sky signs and illuminated high-rise interiors create a spectacle that no civic initiative could ever equal.

Yet, for all its power, coordinated design could enhance the combined effect of the city skyline. 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 the 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.
- Displays should rely on the collective effect of lights for impact. 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.
- The 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 high-rise buildings.

Allow each tower to make a distinctive lighting contribution to the city's skyline. Encourage higher buildings to make stronger statements than lower ones. Ensure 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.
- This strategy aims to limit excessive or inappropriate use of decorative external lighting.
- Unless it is carefully targeted, roof-level lighting can add to the problem of sky glow. This lighting is to include zero upward wasted light.

6.3.3 Limit lasers and 'skybeams' to short-term installations for 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 cooperate on the Melbourne high lights vision.

Establish a cooperative approach with key owners of high-rise buildings to deliver the outcomes of this section. Consider introducing a licence for lighting the exterior of external buildings over 50 storeys.

This would allow for designs to be altered periodically and would prevent over-lighting in the future as more high-rise buildings were constructed.



7. DESIGNING A SUSTAINABLE CITY

Minimising negative environmental impacts of outdoor lighting

Bright lights are synonymous with big cities. Modern cities could not function without an extensive outdoor lighting system. Artificial light allows for 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 forms part of every large property development. Likewise, city lights are an attraction in their own right. The excitement of being in the centre of a large city at night is enhanced by well-lit public places, illuminated 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 against the negative impact on the environment. New terms such as 'light pollution', 'stray light', 'light spill' and 'sky glow' indicate growing community concern about intrusive outdoor lighting. Sustainable use of resources is another important issue.

There are over 14,000 outdoor lights in the City of Melbourne. The majority of these are in the CitiPower distribution area, with the remainder maintained by Jemena. Public lighting accounts for more than half of the City of Melbourne's electricity use. In addition, the public lighting system is a particularly conspicuous form of energy consumption that can send positive or negative messages to people about our commitment to environmental sustainability.

7.1 Thrills and spills

Avoiding over-lighting and stray illumination

Careful planning can reduce the environmental cost of exterior lighting. For a lighting program to be energy efficient and visually effective, strategic decisions need to be made about what elements to light, 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 in 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 façades. Consideration should 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 these displays. These decisions will not only affect how decorative illumination is perceived, they will also reduce nuisance and make better use of energy.

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

Ensure new outdoor lighting installations conform to Australian Standard AS 4282:2019: Control of the obtrusive effects of outdoor lighting. Select lanterns with precise control over the distribution of illumination. Reduce upward waste light from streetlights by replacing semi cut-off fittings with full cutoff 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.
- Systematic monitoring of the total amount of artificial light generated or the artificial sky glow observed is useful to measure the overall increase in spill lighting over time.
- 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.

Requirements to limit the impacts of obtrusive lighting are outlined in AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting. This Standard addresses limits to signage, façade lighting, projection brightness and light spill. Lighting control (generally by dimming or switching) is required during curfew hours. During the planning process evidence that the obtrusive lighting calculation, as outlined within this Standard, have been completed is required.

Other lighting types including (but not limited to) oval, general floodlighting and recreational lighting glare and spill must also meet the requirements of this standard (AS/NZS 4282:2019).



Image 18. Cohen Place, in Chinatown. Even in an area with decorative lighting, most light is directed to the pavement and facade lighting is carefully directed to avoid spill. Full details can be found in Appendix 3 - Photo References.

7.1.2 Standard planning permit conditions relating to obtrusive lighting

The following additions to typical planning permit condition requirements are recommended for relevant proposals as a result of the requirements within AS/NZS 4282:2019. These conditions may be refined or added to as appropriate for particular projects.

The applicant must provide, at their own expense:

1. Evidence that all lighting has been designed in accordance with AS/ANZ 4282:2019.
2. Evidence that VicRoads standards for lighting have been applied where appropriate.
3. A Lighting Impact Assessment Report prepared by an independent qualified consultant.
4. Evidence that all luminaires include smart lighting functionality (as outlined in Section 7.2.3.2.3 of this strategy.)
5. Evidence that the proposed building lighting does not exceed the ambient public lighting levels of adjoining streets or spaces unless there is documented support to do so by the manager of the street or space.
6. A Post Occupancy Lighting Assessment Compliance report prepared by an independent qualified consultant, if requested by the Responsible Authority.

7.1.3 Discourage the use of reflective glass.

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

7.1.4 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 light in residential streets. Where necessary, direct illumination away from bedroom windows and living areas. Concerns about over-lighting and spill can be tested by assessing the light spill at the windows of habitable rooms where buildings are adjacent. (Noting this does not apply to street lighting applications, which are considered under the AS/NZS 1158 Series, and not AS/NZS 4282:2019.)

- 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.

7.1.5 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 impact. 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 landscaped areas, 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 strong commitment to sustainability, the City of Melbourne 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. This strategy aims to contribute to a better understanding of responsible outdoor lighting. However, the City of Melbourne must also lead by example by developing a more energy-efficient public lighting system that incorporates advanced technology and allows for more sophisticated monitoring and control.

This section is driven by the following aims and objectives:

The City of Melbourne will aim to achieve low energy-intensity of the public lighting asset base by (in order of priority):

- Avoiding unnecessary artificial lighting
- Improving energy efficiency.

The City of Melbourne will also develop, implement and review clear strategies and guidelines for public lighting that consider:

- Best practice sustainability outcomes including 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 the safety, quality and 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 facility owners and improved health and productivity for workers and users of these spaces.

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

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 the time settings recommended in this strategy are followed. Assess and implement energy efficiency projects for metered lighting.

7.2.3 Utilise smart lighting technology to reduce energy consumption whilst maintaining lighting compliance.

Smart lighting control can deliver both maintenance and energy benefits. Smart lighting enables the ability to control lighting levels and thus realise significant additional energy savings. For the City of Melbourne all new lighting systems require optimum energy management functionality. This includes through the use of the following functions:

- **Trimming:** With modern lighting technology, 'trimming' allows lights to be dimmed in small increments. Past lighting designers were restricted to non-dimmable lights and as a result, almost all older lighting that achieved compliance with V3 and V5 did so with a certain level of 'overshoot'. For example, a design using one light may result in illumination below the relevant standard for a given location, while adding a second light or using another type would exceed the standard. In such cases, designers were obliged to use the option that resulted in over-lighting. Trimming allows designers to eliminate this over-lighting, reducing wasted energy.
- **Dimming:** When meeting the requirements of the Australian Standards, lighting categories are determined based on traffic speed, traffic volume and the prestige of the location. Traffic volumes vary during the day and night. As a result, it is justifiable to change categories, and subsequently lighting levels, depending on this variable at different times of the night.
- **Constant Light Output:** All lights depreciate in light output over time. To combat this, initial lighting levels used in the design stage must be higher than required so that at the end of a streetlight's life, lighting levels are still compliant. Smart lighting technology allows you to set lighting levels to remain constant over the 20-year life of a streetlight, meaning that there is never any unnecessary over-lighting. This element does not impact on compliance and will save a calculated 8-10% of energy over 20 years depending on the LED technology.

7.2.4 Reduce the amount of power consumed by public lighting.

Distinguish between commercial, residential and industrial areas so that illumination levels match 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 of the City of Melbourne's total energy consumption.
- The City has replaced its old technology street lighting to energy efficient LEDs, in process saving over 60% of the energy and millions of dollars of operating costs, whilst improving lighting quality.
- A further 20-40 per cent of current energy consumption can be saved through greater utilisation of smart technology.
- Council has enough information to be able to make specific recommendations to reduce energy use.
- The City of Melbourne expects to replace its lighting assets every 10 to 20 years as part of maintaining a quality asset base.
- For safety and amenity reasons, the City of Melbourne 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, several key strategies will be undertaken.

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

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

Wildlife corridors are important links to enhance the biodiversity of the City. Many native animals will avoid crossing or travelling on lit areas. Consider the connectivity of darkness corridors throughout the city and to neighbouring regions and ensure these corridors are maintained or enhanced through appropriate lighting design and avoidance. The City will map current darkness corridors and work in collaboration with relevant stakeholders to identify relevant approaches to improve biodiversity.

Balancing darkness corridors with the other important aspects of this strategy will need to be carefully considered in key lighting projects along these corridors.

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 systematic, post-completion evaluation of performance.

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

Promote energy efficiency by choosing long-life products, deciding against public lighting in some circumstances, reusing existing assets, and recycling as many materials and components as possible. Dispose of other elements and substances responsibly to avoid short- or long-term the environmental impacts.

This 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 will enable waste to be managed responsibly and economically.

7.2.8 Remove old assets when new ones are installed.

Melbourne’s parks, streetscapes and open spaces are intended to be clear, clean and attractive. Refreshing or installing new assets in a location is an opportunity to clean out and de-clutter the area. When replacing and refreshing public lighting, ensure old assets are removed.

7.2.9 Collect environmental data.

The environmental impact of lighting is substantial. Collecting data about the impact of lighting on the environment is essential to combat its negative impacts. Collect data on utility and greenhouse gas emissions as well as energy abatement initiatives for carbon neutral reporting.



Image 19. Pedestrian scale lighting defines key routes along the pedestrianised streets flanking University Square. Full details can be found in Appendix 3 - Photo References.

8. KEEPING THE LIGHTS SHINING

Actively maintaining quality lighting assets

Designing and installing lighting that adheres to the above requirements will ensure these assets meet the needs of the city and its users. To keep these assets in excellent condition over their lifetime will require regular maintenance, monitoring of performance, and capturing of lessons learned from installation.

Maintenance of lighting for metered and unmetered installations is managed separately. The majority of street lighting is unmetered and maintained by CitiPower. Metered sites (usually parks, sports, car parks and building lighting) are maintained by the City of Melbourne or one of its appointed contractors.

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

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

8.1 Maintain the light

Avoiding over-lighting and stray illumination

Council is responsible for maintaining all metered lighting installations. This includes parks, gardens, sports lighting, building lights and feature and event lighting. Map 3 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 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 a relevant mapping system
- Condition of poles, luminaires and cabling (collected at least every four years)
- Relevant safety information on assets as well as asset identification
- Lighting time settings recommended in this strategy (documented and followed)
- Monitoring of proactive asset management information (including light condition, energy and voltage information and fault identification) utilisation smart lighting system/s.

Data should be maintained on relevant mapping layers for easy review by relevant staff and users. The asset owners (such as Infrastructure & Assets) will be responsible for ensuring that data meets their requirements. Corporate data standards will be produced for each asset class. The utilisation of smart lighting systems will automatically collate relevant asset data and assist in managing proactive maintenance activities. For other information, that cannot be collected in this manner, 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 proactive 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.

Implement actions from energy efficiency audits and remotely collected smart data of metered lighting assets, including for car parks, sports facilities, parks and gardens.

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 Actively maintain any lighting in trees.

Where lighting is attached to trees, the key criterion to consider is that lighting does not damage the tree. Fixed lighting can damage trees. Consideration of potential damage is required during the design phase, both when physical structures are attached to trees and with 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. This will ensure the tree trunk or branches are not constricted in the same spot for more than one 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, lighting is required to be removed 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 this 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 document 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 and include information from within council, relevant contractors and the wider community.

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 pedestrian 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 of Melbourne 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 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. Include smart city systems to deliver remote monitoring that can identify proactively maintenance and lighting management issues. This remote monitoring will identify whether a streetlight is functioning correctly, thus allowing for automated fault reporting.

Council has installed the bones of a smart lighting control system within the public lighting system, most notably as part of its' citywide LED upgrade project for streetlighting. Council should leverage these systems to implement a proactive maintenance and lighting system control system to reduce overall lighting costs and ensure safe spaces.

- Gather and use information from smart city systems to understand faults, lighting performance and energy consumption.
- Gather real-time information from site visitors about lighting asset issues (e.g. consider using social media, smartphones and other relevant technologies).
- Use this information to fine tune the management of particular locations to maintain the balance between lighting and environmental impacts.

9. ACTION PLAN

9.1 Introduction

This 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 strategy outlines a wide range of objectives, outcomes and performance criteria. Some recommendations address the public lighting system or other City of Melbourne assets. Some initiatives are targeted at the private sector and, in these instances, the City of Melbourne'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, it stops short of defining particular solutions. With a few important exceptions, individual strategies provide general principles for design and operation rather than site-specific solutions.

This section of the strategy addresses implementation. It includes cost/benefit assessments and priorities for those initiatives with predictable financial impacts. It focuses on activities that can be accurately estimated, including street lighting, park and sports lighting. This emphasis is justifiable in terms of capital cost and energy consumption, since these lights account for the vast majority of municipal expenditure on outdoor illumination.

Each of the major strategies outlined in the strategy has specific actions for further work up to 2018.

These actions are summarised in Tables 1 and 2 below.

Key of responsibility for Table 1

KEY OF RESPONSIBILITY					
Infrastructure & Assets	IA	Recreation & Waterways	RW	City Marketing	CM
Design Studio	DS	Planning & Building	PB	Property	P
City Strategy	CS	Tourism & Events	TE	Climate Change & City Resilience	CCCR
Parks & City Greening	PCG	Creative City	CC		

Key of priority and ease scores for Table 1

PRIORITY	SCORE	EASE	SCORE
High (H)	3	High (H)	3
Medium (M)	2	Medium (M)	2
Low (L)	1	Low (L)	1

9.2 Summary of actions

Table 1 provides guidance on priority, costs and savings for each of the actions in the strategy, and responsibility for its implementation.

To indicate which actions have the highest priority, a scoring system was developed to rank the level of priority and the ease of delivery. For example, an action that has a high priority and is easy to deliver results in a score of 6 (3+3 for each category). An action with a low priority that is not easy to deliver results in a score of 2 (1+1 for each category).

These actions include some that can be managed with existing resources and funding. In addition, a number of new activities are planned. The estimated cost of implementing the strategy is approximately \$20.4 million. Annual financial savings are approximately \$1.8 million. More than 8,000 tonnes of greenhouse gas emissions has been reduced each year.

The majority of costs relate to two specific items within the Designing a sustainable city theme: the replacement of metal halide, metered lighting upgraded to LED with lighting controls (\$1.5 million cost and \$400,000 annual savings). Replacement of light poles on the north, south route of the city \$5 million. Upgrade of lighting in Flinders Lane and Little Collins Street to LED catenary lighting \$2 million.

Other than designing a sustainable city, themes which have significant cost implications include Safety and amenity and Attracting the evening crowd. The discussion below outlines the background each theme and the associated costs and benefits.

Table 1 - Major strategy actions (summary, reference and responsibility)

MAJOR THEME	ACTION	REFERENCE	RESPONSIBILITY	PRIORITY	EASE	PRIORITY SCORE	COST IMPLICATIONS ¹
Scope and purpose	Review the action plan after five years and the strategy after 10 years.	1.2	IA, DS	H	H	6	\$30,000
Stakeholders and communication	Consult with listed stakeholders with respect to the content and aims of the strategy.	3.6	IA	H	H	6	Within current budgets
Further work	Communicate success stories and innovation to the broader community as they occur.	3.6	IA, CCCR, CM	H	H	6	\$100,000
	Maintain design standards.	3.7	IA	H	H	6	\$50,000
	Write new design standards.	3.7	IA	H	H	6	\$50,000
	Ensure planning schemes cater for the requirements of the strategy.	3.7	CS, PCG	H	H	6	\$50,000
Designing the luminous city	Develop a suite of standard streetlights for use throughout the municipality.	4.3.1	DS, IA	H	M	5	\$120,000
	In large open spaces, ensure park lighting and street lighting operate separately.	4.5.10	PCG, RW	H	M	5	Within current budgets
	Incorporate remote monitoring and management systems in new installations.	8.1.3	PCG, DS, RW, IA	M	M	4	\$240,000
Safety and amenity	Use white light in areas of the city with high pedestrian activity.	5.2.1	DS, IA	H	M	5	\$1,150,000
	Evaluate illuminated signs in relation to their surroundings. Ensure signs do not exceed maximum signage illumination levels as required by the City of Melbourne.	5.3.4	PB	H	H	6	\$25,000
	Use lighting to manage the transition to and from train stations.	5.4.8	IA	H	M	5	Within current budgets
Attracting the evening crowd	Sponsor 'festivals of light'.	6.1.3	DS, TE, ES, CC	M	M	4	\$1,500,000
	Install infrastructure for temporary event-based lighting in major public spaces.	6.1.4	TE	M	M	4	Within current budgets
	Do not use 'bud lighting' or in-ground up-lighting in footpaths. Remove all existing bud lighting.	6.1.5	IA	H	M	5	Within current budgets
	Initiate a program to improve the appearance of shop windows.	6.2.1 6.2.4	CM	M	M	4	\$50,000
	Bring key building owners together to cooperate on the Melbourne High Lights vision.	6.3.4	DS, PB, P	M	M	4	Within current budgets

¹ All figures costs unless otherwise stated

Table 1 - (continued)

MAJOR THEME	ACTION	REFERENCE	RESPONSIBILITY	PRIORITY	EASE	PRIORITY SCORE	COST IMPLICATIONS ¹
Designing a Sustainable City	Understand and reduce sky glow and other nuisances caused by obtrusive external lighting.	7.1.1	DS				
	Promote and apply energy conservation practices.	7.2.2	IA	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).	8.1.2	IA	H	L	4	\$375,000
	Reduce the amount of power consumed by public lighting.	7.2.3	IA	H	M	5	Cost of \$3.6m Savings of \$400,000 and 1,700 tCO2-e pa
	Implement smart lighting controls in all Council lighting applications during the replacement of lighting with LEDs and installation of new systems.	7.2.3	IA	H	M	5	Cost of \$3.6m Savings of \$400,000 and 1,700 tCO2-e pa
	Reduce the amount of power consumed by metal halide and high pressure sodium public lighting.	7.2.3	IA, DS	M	M	4	Cost of \$3.6m Savings of \$1.5m and 6,300 tCO2-e pa
	Assess financial mechanisms to deliver efficiency programs.	7.2.4	IA, S	H	H	6	Within current budgets
	Introduce a waste management plan for Melbourne's public lighting system.	7.2.7	IA	H	H	6	Within current budgets
	Collect environmental data.	7.2.9	CCCR, IA, PCG	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	IA	H	H	6	Within current budgets
	Introduce proactive maintenance programs.	8.1.2	IA	H	H	6	Within current budgets
	Where practical, incorporate remote monitoring and management systems in new metered installations.	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	IA, PCG, UL	H	H	6	Within current budgets
	Assess safety and performance of new and existing lighting installations.	8.2.1 8.2.2	IA	H	M	5	Within current budgets
Total	Cost of \$20.4 million, annual savings of \$1.9m and 8,000 tCO2-e per annum.						

¹ All figures costs unless otherwise stated

9.3 Cost implications of designing a sustainable city

Background to the strategy

The strategy recommends 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 of Melbourne's electricity usage. Within this system, it is feasible to estimate the 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 strategy is the replacement of mercury vapour streetlights with more energy efficient lighting. A second recommendation in the 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 per cent.

These actions also can be designed to provide the benefits shown in Table 2.

9.3.2 Quantifiable costs and benefits

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

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 \$17 million and will result in savings of around \$1.9 million and 8000 tonnes of greenhouse emissions per year. The total greenhouse gas savings are around 40 per cent 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.

Table 2 - 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 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 initiatives for carbon neutral reporting.	Project-based reporting will occur.
Assess safety and performance of new and existing lighting installations.	Pre- and post-review of the project will occur.

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 helps articulate the city's hierarchy of major and minor thoroughfares.

The City of Melbourne has produced its own streetlights for more than 20 years. The strategy recommends seeking approval for the use of a small number of streetlights with the distribution network services providers, and to continue the program of street improvements.

Within the City of Melbourne there are areas with very high usage by residents and visitors, night and day throughout the year. These areas have been identified as requiring a lighting update every 10 years. In other areas, it is appropriate to replace lights at the end of the asset life, approximately 20 years. Map 1 outlines this delineation.

9.4.1 Costs associated with safety and amenity

Over the next five years it is estimated that projects associated with this theme will require funding of approximately \$1.3 million. The majority of this relates to replacing lighting in key roads and lanes. 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 timeframe of 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 of Melbourne'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, 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 is preserved. Often the damaged part can be refurbished and returned to the City of Melbourne'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. Poles and lanterns can last as long as 35 years. During this extended period, spare parts are more likely to remain available if the City of Melbourne produces its own range of lighting fittings.

Another benefit of custom-made streetlights is that the City of Melbourne retains ownership of its designs. As such, 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 of Melbourne pays for customised, high-performance fittings is a good investment. For this reason, the 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 theme of attracting the evening crowd aims to 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 plan for enhancing the appearance and experience of the City of Melbourne's major events, festivals and spectacles.

Likewise, the architecture, layout and design of the urban landscape impacts on the experience of both visitors and residents. 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 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 (\$1.5 million over the five years of the action plan). These festivals could be expanded to include 'city lights' tours while continuing to support 'window shopping' promotions, and celebrating innovative and sustainable lighting.

By catering for an active night life, lighting festivals allow for exploration of the newest and most innovative lighting technologies available. However, the main aim is to celebrate the City of Melbourne, its public spaces and architectural landmarks in a creative and innovative nighttime setting.

9.6 Upgrading the public lighting system

As already noted, the 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. Meeting other objectives depends 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 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 timeframe. 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 outlined under Designing a sustainable city are critical to the success of this strategy, in particular the replacement of inefficient mercury vapour, high pressure sodium and metal halide lights.

In addition, 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 central city 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 be linked to 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 in this strategy can be implemented with no additional capital cost.

APPENDIX 1 - GLOSSARY

Table 3 - Glossary of terms

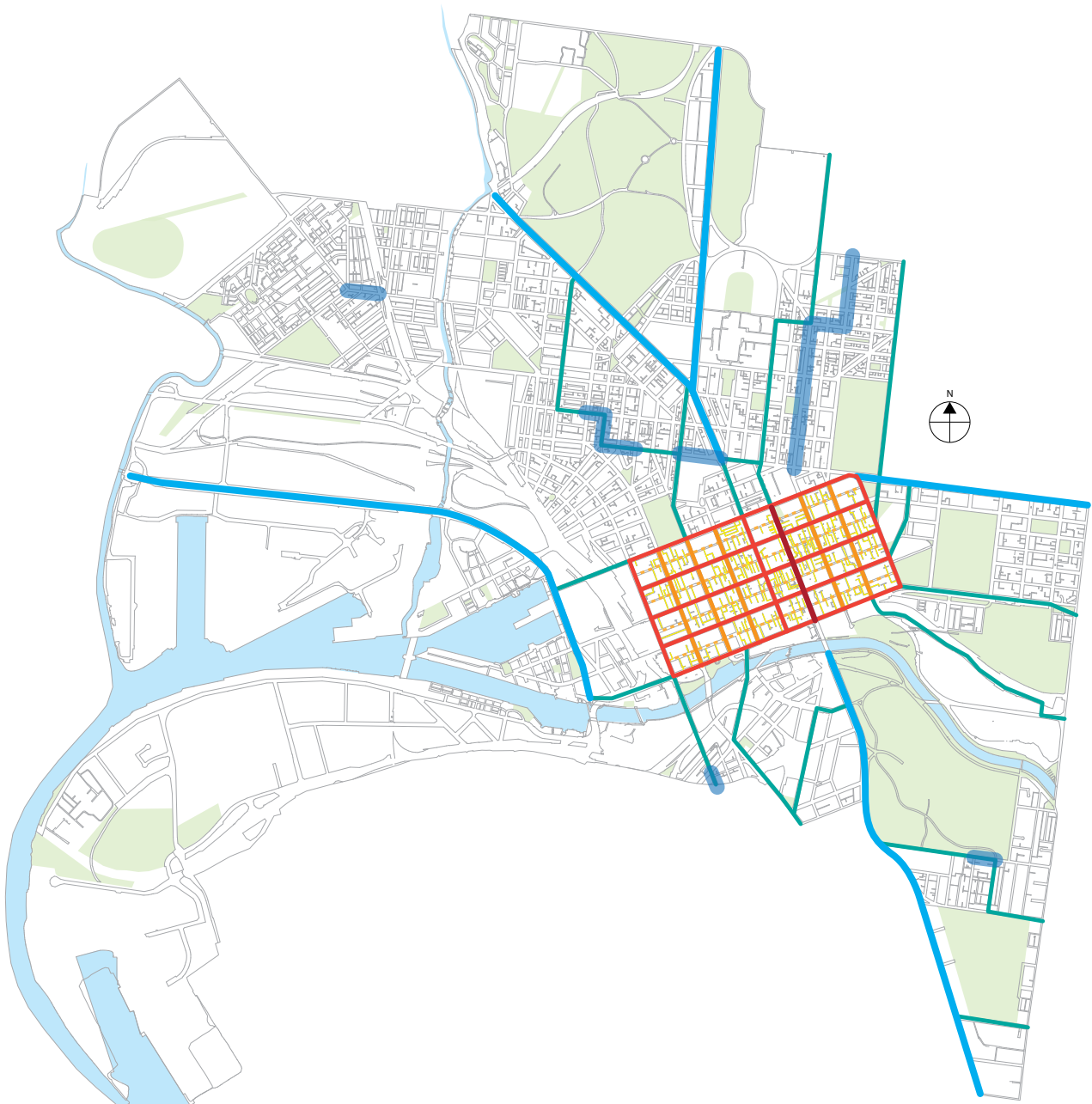
TERM	DESCRIPTION
Bud lighting	Bud lighting refers to the myriads of small incandescent lamps that are strapped to the branches of trees to create decorative effects.
Central city	Today the central city encompasses the Central Business District (CBD), Southbank and Docklands.
Colour temperature	Correlated colour temperature describes the colour of a light source, and is measured in degrees Kelvin (K). 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 of less than 30 indicates colours are distorted and difficult to recognise. A CRI of 80 or above provides an acceptable standard for outdoor lighting.
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 to 2200K, and produce characteristic yellow or orange illumination. On some surfaces this can produce a 'warm' colour. HPS lamps are also energy efficient and 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 HPS lamps are less effective than white or bluewhite 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 comments on yellow light).
Illumination	Illumination refers to the amount of light falling on a given surface. Where 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.

Table 3 - (continued)

TERM	DESCRIPTION
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 as 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 wind and sun can 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 diminishes people's awareness of features like the Southern Cross. In extreme cases sky glow can 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. Light spill is sometimes referred to as 'stray' light.
Up-lighting	Up-lighting refers to feature lighting that is directed up onto buildings or landscape elements from low-level sources. Unless it is carefully targeted, uplighting can contribute to sky glow and create a nuisance for 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 lowlevel lamps.
White light	In this strategy, white light refers to illumination produced from lamps with a correlated colour temperature of 4000K in city and residential streets. White light is also understood to have a minimum colour rendering index of 80. This strategy requires sources of white light to be energy efficient and housed in full cut-off lanterns.
Yellow light	In this strategy, yellow light refers to illumination produced from lamps with a correlated colour temperature of 3000K. The strategy requires sources of yellow light to be energy efficient.

APPENDIX 2 - MAPS

Map 1. Street - Hierarchies



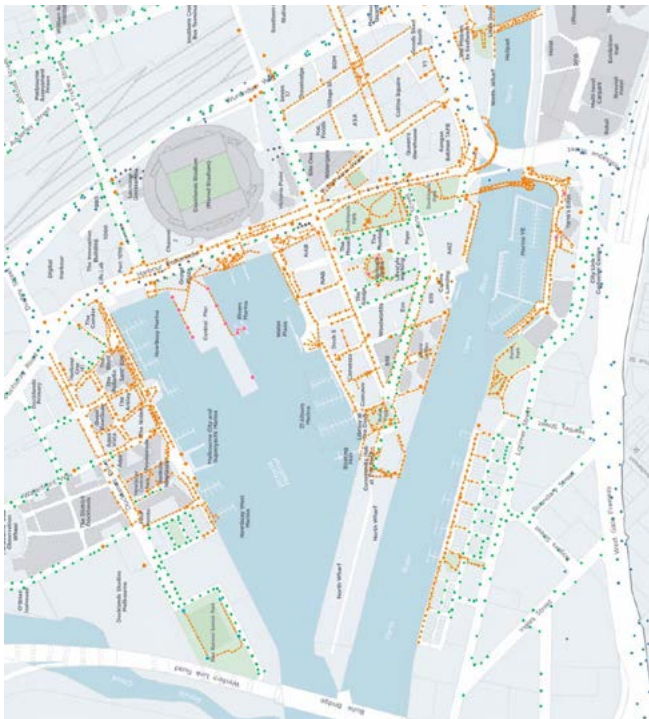
Key

- 30-metre street (Wide footpath)
- 30-metre street (Medium footpath)
- 30-metre street (Narrow footpath)
- 10-metre street
- 5-metre street (laneway)
- Boulevard
- Tram routes
- Local retail strip

Map 2. Metered Lighting



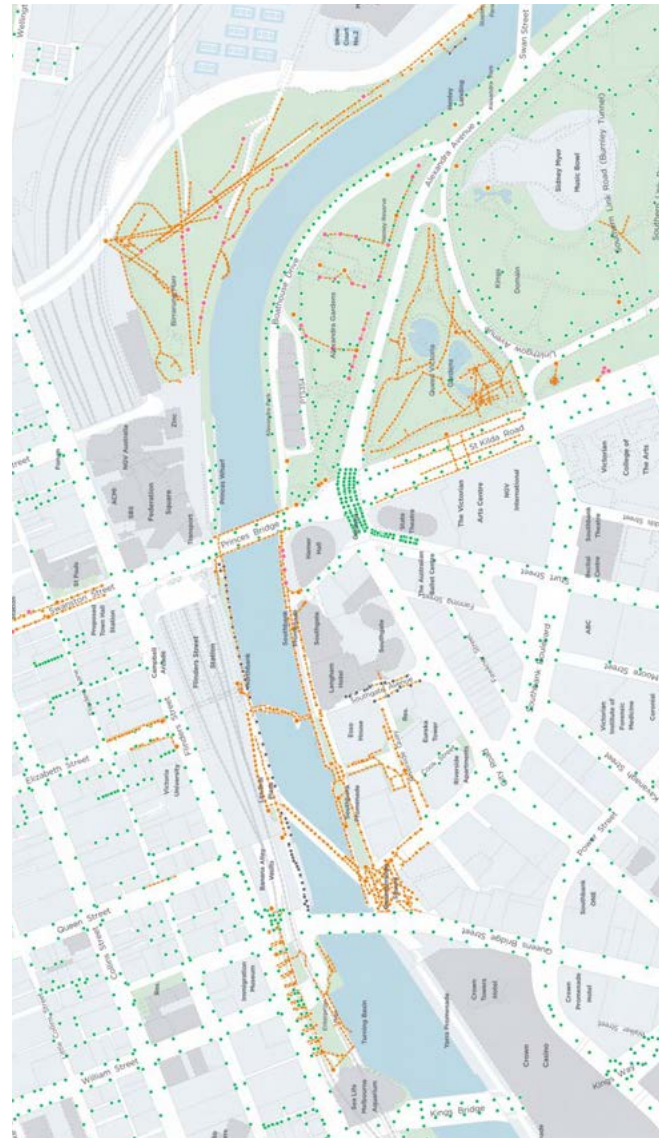
Lygon St, Swanston St and Parks



Docklands

Key

- Electrical conduit
- Electrical Meter
- Citipower lights
- City of Melbourne lights
- VicRoads lights



Northbank, Southbank and Birrarung Marr



Parkville

Map 3. Park and open space heirarchy





Key

- Capital city open space**
500m safe walking distance where access is not restricted
- State open space**
500m safe walking distance where access is not restricted
- Regional open space**
500m safe walking distance to a regional open space
- Municipal open space**
500m safe walking distance to a municipal open space
- Neighbourhood open space**
500m safe walking distance without crossing major roads
- Local open space**
300m safe walking distance without crossing primary or secondary arterials or railways
- Small local open space**
200m safe walking distance without crossing collector roads, primary or secondary arterials
- Small local link**
less than 300m² in size (therefore no specific walking distance is applied)

APPENDIX 3 – PHOTO REFERENCES

Cover Former Melbourne General Post Office.
(Photography Credit: Andrew Curtis)

Image 1. Melbourne’s Hoddle Grid at sunset
(Photography Credit: Andrew Curtis)

Image 2. Warm white lighting in Swanston Street.
(Photography Credit: Andrew Curtis)

Image 3. Lighting technologies have evolved rapidly in recent years. (Photography Credit: Andrew Curtis)

Image 4. Lighting in typical streets carrying mix of traffic and pedestrian activity. (Photography Credit: Andrew Curtis)

Image 5. A mix of standard and feature lighting at University Square. (Photography Credit: Andrew Curtis)

Image 6. Treasury Gardens, with lighting of key cross-paths that also emphasises important landscape elements. (Photography Credit: Andrew Curtis)

Image 7. Pedestrian-scale lighting in Swanston Street, one of the city’s most important public transport spines. (Photography Credit: Andrew Curtis)

Image 8. Lighting of the Tan Track in the Domain Parklands. (Photography Credit: Andrew Curtis)

Image 9. Even, glare-free lighting contributes to a safe city. (Photography Credit: Andrew Curtis)

Image 10. Illuminated shopfronts and signage in balance with the ambient lighting can enhance the streetscape. (Photography Credit: Andrew Curtis)

Image 11. Park style lights used consistently through the city’s green spaces. (Photography Credit: Andrew Curtis)

Image 12. Park-style lighting at the State Library forecourt, a green space that is heavily used at all times. (Photography Credit: Andrew Curtis)

Image 13. Lonsdale Street, with feature lighting used to emphasise a major precinct rather than individual buildings. (Photography Credit: Andrew Curtis)

Image 14. Window display lighting and illumination of recessed doorways enhances safety. (Photography Credit: Andrew Curtis)

Image 15. Good lighting at public transport stops for legibility and safety. (Photography Credit: Andrew Curtis)

Image 16. Kinetic facade illumination as a public art commission, *Maxims of Behaviour*, by Alexander Knox, 2008. (Photography Credit: Andrew Curtis)

Image 17. The city’s standard street lights direct light downwards. (Photography Credit: Andrew Curtis)

Image 18. Cohen Place, in Chinatown. Even in an area with decorative lighting, most light is directed to the pavement and facade lighting is carefully directed to avoid spill. (Photography Credit: Andrew Curtis)

Image 19. Pedestrian scale lighting defines key routes along the pedestrianised streets flanking University Square. (Photography Credit: Andrew Curtis)

How to contact us

Online:

melbourne.vic.gov.au

In person:

Melbourne Town Hall - Administration Building
120 Swanston Street, Melbourne
Business hours, Monday to Friday
(Public holidays excluded)

Telephone:

03 9658 9658
Business hours, Monday to Friday
(Public holidays excluded)

Fax:

03 9654 4854

In writing:

City of Melbourne
GPO Box 1603
Melbourne VIC 3001
Australia



Interpreter services

We cater for people of all backgrounds
Please call 03 9280 0726

03 9280 0717 廣東話
03 9280 0719 Bahasa Indonesia
03 9280 0720 Italiano
03 9280 0721 普通話
03 9280 0722 Soomaali
03 9280 0723 Español
03 9280 0725 Việt Ngữ
03 9280 0726 عربي
03 9280 0726 한국어
03 9280 0726 हिंदी
03 9280 0726 All other languages

National Relay Service:

If you are deaf, hearing impaired or speech-impaired,
call us via the National Relay Service: Teletypewriter (TTY)
users phone 1300 555 727 then ask for 03 9658 9658
9am to 5pm, Monday to Friday (Public holidays excluded)

melbourne.vic.gov.au



CITY OF MELBOURNE