



Australian Government

National Capital Authority

OUTDOOR LIGHTING POLICY

REPORT ON CONSULTATION

AUGUST 2012



The National Carillon on Aspen Island

NATIONAL CAPITAL AUTHORITY © 2012

Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without written permission from the National Capital Authority.

National Capital Authority
August 2012

WWW.NATIONALCAPITAL.GOV.AU

CONTENTS

| | |
|---|-----------|
| INTRODUCTION | 4 |
| THE NATIONAL CAPITAL AUTHORITY..... | 4 |
| PURPOSE..... | 4 |
| IMPLEMENTATION | 4 |
| LEGISLATION AND STANDARDS..... | 4 |
| APPLICATION..... | 5 |
| EXECUTIVE SUMMARY | 6 |
| STRUCTURE | 8 |
| KEY ISSUES | 8 |
| PART 1: URBAN CONTEXT | 9 |
| GRIFFINS' PLAN | 9 |
| URBAN DESIGN..... | 9 |
| LANDSCAPE | 9 |
| HERITAGE | 9 |
| PART 2: PLACE-MAKING | 15 |
| LIGHT QUALITY AND CHARACTER | 15 |
| LIGHT COLOUR..... | 15 |
| BUILT ENVIRONMENT | 15 |
| AMENITY AND QUALITY OF PUBLIC SPACE | 15 |
| PART 3: SAFETY | 19 |
| HUMAN VISION..... | 19 |
| GLARE 19 | |
| SAFETY AND SECURITY..... | 19 |
| PART 4: ENVIRONMENT AND SUSTAINABILITY | 21 |
| LIGHT POLLUTION..... | 21 |
| ENERGY USE..... | 22 |
| ENERGY WASTE..... | 22 |
| URBAN ECOLOGY | 22 |
| NIGHT SKY VISIBILITY..... | 22 |
| PART 5: CELEBRATION AND COMMEMORATION | 25 |
| EVENTS IN THE NATIONAL CAPITAL | 25 |
| COMMEMORATIVE LIGHTING..... | 25 |
| REQUIREMENTS FOR NCA WORKS APPROVAL | 27 |
| GLOSSARY | 27 |

1. INTRODUCTION

1.1 THE NATIONAL CAPITAL AUTHORITY

The National Capital Authority (NCA) is established under the *Australian Capital Territory (Planning and Land Management) Act 1988*. The statutory functions of the NCA establish the Australian Government's continuing interest in the strategic planning, promotion, development and enhancement of Canberra as the National Capital.

1.2 PURPOSE AND BACKGROUND

This report summarises the issues raised during the public consultation process undertaken by the NCA on the draft Outdoor Lighting Policy.

The policy has been prepared to guide the range of considerations necessary when installing or renewing outdoor lighting in the National Capital, within the framework of the National Capital Plan (the Plan). The draft policy seeks to ensure that the planning, design and operation of lighting balances the needs of people and the environment and strengthens the role that lighting plays in our understanding and appreciation of Canberra's urban landscape.

1.3 APPLICATION

The policy will apply throughout the Designated Areas of the Plan, which are the nationally significant parts of the Australian Capital Territory including the Central National Area and the approach routes to the City.

The policy has been developed to supplement the provisions of the Plan and is intended to be read in conjunction with the Plan and all other relevant legislation and standards.

1.4 EFFECT OF THE DRAFT OUTDOOR LIGHTING POLICY

The policy provides a planning and design framework that can be implemented over time by parties responsible for lighting installation, operation and management. The draft Outdoor Lighting Policy sets out the following objectives:

- Lighting must reinforce the planned urban geometry of the National Capital, its heritage and its relationship with the landscape.
- Lighting must contribute to the creation of a high quality public realm.
- Lighting must provide a safe night time environment for residents of, and visitors to, the National Capital.
- Minimise the obtrusive effects of artificial lighting on the natural environment.
- Provide opportunities for celebration and commemoration through lighting.

2. CONSULTATION

The NCA released the draft Outdoor Lighting Policy for public comment on Saturday 17 March 2012. A notice was published in *The Canberra Times* (Attachment 1) on that day. A media release was provided to media outlets, and a 'tweet' was sent to NCA Twitter followers stating the draft Outdoor Lighting Policy was open for public consultation.

In accordance with the NCA's Commitment to Community Engagement (August 2011) the period for public comment ran for 30 business days, concluding on Friday 4 May 2012. Hard copies of the draft Outdoor Lighting Policy were made available to the public at the National Capital Exhibition, as well as the NCA offices. In addition, the draft Outdoor Lighting Policy and supporting documentation was available on the NCA's Have Your Say website.

Key activities during the consultation period of the draft Outdoor Lighting Policy included:

- On 15 March 2012, the NCA wrote to the following stakeholders, providing a copy of the draft Outdoor Lighting Policy and inviting comment:
 - ACT Government Environment and Sustainable Development Directorate
 - ACT Government Territory and Municipal Services Directorate
 - ACTEW Corporation Limited
 - Approved Electrical and Communications
 - Australian Government Department of Infrastructure and Transport
 - Australian Government Department of Sustainability, Environment, Water, Population and Communities
 - Australian National University Facilities and Services Division
 - Australian National University Research School of Astronomy and Astrophysics
 - Australian Institute of Architects
 - Australian Institute of Landscape Architects
 - Barry Webb Design Pty Ltd
 - Bluebottle
 - Canberra Airport Pty Ltd
 - Canberra Astronomical Society
 - Canberra Business Council
 - Civil Aviation Safety Authority
 - Conservation Council ACT Region
 - Design Stage
 - Ecowise Services
 - Engineers Australia
 - Friends of Grasslands
 - Friends of the Albert Hall
 - Guida Moseley Brown Architects
 - Human Factors and Ergonomics Society of Australia (HFESA)
 - ICLEI - Local Governments for Sustainability
 - Illuminating Engineering Society of Australia and New Zealand Ltd
 - International Lighting

- > Kicks Entertainment Pty Ltd
- > Lighting Council Australia Ltd
- > Lighting, Art and Science
- > Lighting Analysis and Design
- > National Electrical and Communications Association (ACT)
- > National Heart Foundation
- > National Trust (ACT)
- > North Canberra Community Council
- > Optometrists Association Australia (NSW Division)
- > Outdoor Lighting Reform Action Group
- > Planetarium and Observatory Association of Canberra
- > Planning Institute of Australia
- > Property Council of Australia
- > The Royal Australian and New Zealand College of Ophthalmologists
- > Steensen Varming
- > Versalux Pty Ltd
- > Walter Burley Griffin Society Incorporated
- > On 16 March 2012, the draft Outdoor Lighting Policy was launched on the NCA's Have Your Say consultation website, available in .pdf and html formats.
- > On 17 March 2012, the draft Outdoor Lighting Policy was advertised in *The Canberra Times* Public Notices section. A copy of the advertisement can be found at [Attachment 1](#).

3. KEY ISSUES AND RECOMMENDATIONS

The NCA received 13 written submissions in response to the draft Outdoor Lighting Policy. All submissions were acknowledged by the NCA, together with an undertaking to inform the submitters of how the NCA had considered their submissions.

The submissions on the draft Outdoor Lighting Policy were generally supportive of the NCA's policy initiative on outdoor lighting. The feedback received during consultation showed a broad level of support for the key issues and objectives set out in the draft policy. The majority of submissions sought only to reinforce and extend the policy's strategies and design requirements in order to strengthen the policy intent and ensure its successful implementation.

A summary of the key issues raised during the public consultation process and the NCA's response is provided here. A more detailed summary of each submission, together with the NCA response, is included at [Attachment 2](#).

The key issues raised were:

- > Human health and safety
- > Light pollution
- > Light colour, colour temperature and rendering
- > Heritage
- > Wildlife health
- > Energy use and lighting system management
- > Australian and ACT standards
- > Human vision
- > Astronomy
- > Urban Design
- > Terminology
- > Detailed design issues.

3.1 HUMAN HEALTH AND SAFETY

ISSUES

A key issue raised during the consultation related to the impacts of artificial lighting on human health and safety. A number of submissions suggested that artificial lighting contributes to negative health effects for humans. Conversely, one submission proposed that outdoor lighting is important for the health of the community, by encouraging active transport modes (walking and cycling) that in turn, can reduce obesity rates and improve social activity.

One submission sought to ensure that outdoor lighting is not likely to endanger the safety of aircraft, through distracting or confusing lighting arrangements.

One submission noted that if the lighting policy requires a reduction in light output at times of reduced activity, on the contrary it should be necessary to require an increase in light output at times of high activity to ensure there is adequate lighting for safety.

Comment was made that crime levels can be decreased by reducing lighting levels, however it was acknowledged that this needs to be balanced with feelings of security, movement safety and way finding at night.

One submission suggested that light pole locations should consider the risk of vehicle or pedestrian collision.

NCA RESPONSE

A key strategy of the policy seeks to reinforce the safety and health of people in the design and operation of outdoor lighting.

The draft policy recognises the important role that the Civil Aviation Safety Authority (CASA) plays in maintaining aviation safety with regard to outdoor lighting. CASA has acknowledged that the policy directly refers to the role of CASA in controlling the operation of outdoor lighting where it may affect aircraft safety or navigation.

Property owners and land managers are responsible for providing safe and accessible areas at night through well-designed outdoor lighting installations. This includes a responsibility to continually assess and monitor the risk of crime and safety for any given property.

It is recommended that changes be made to the policy to recognise the need for outdoor lighting installations to respond to changing levels of activity.

It is also recommended that changes be made to more explicitly require proponents of lighting installations to consider pole design and location to minimise the risk of injury to people.

RECOMMENDED CHANGES

- Insert additional Design Requirement at Strategy 3a as follows:
Select light poles and locations that minimise the risk of injury for people travelling on paths or roads.
- Amend Design Requirement 4b(iii) to read as follows:
'Install efficient lighting control systems that can adjust illumination to suit activity levels, saving energy whilst maintaining safety when required.'

3.2 LIGHT POLLUTION

ISSUES

Many submissions noted that light pollution reduces night sky visibility and wastes energy. These submissions made reference to the importance of effectively managing light pollution for a range of reasons that included human health, environmental quality, astronomy and safety.

Glare is a condition experienced in many forms, which at low levels can produce discomfort for the viewer and in more extreme cases can cause disorientation or disability. Several submitters commented that glare can be experienced in various forms, depending on the age and capability of the individual.

Light trespass or spill (also referred to as 'spill light' or 'over spill') was raised in a number of submissions, to draw attention to the unwanted effects of artificial light on adjacent properties. These submissions identified that sources of light spill can include traffic lights, vehicle lights, light escaping from windows and lights from signs and billboards. It was suggested that these light sources be acknowledged in the policy. Submissions also pointed out that these sources can contribute to 'light clutter'.

The effects of sky glow were referred to in a number of submissions, notably causing degradation in night sky visibility (and through this, astronomy). Sky glow is caused by many

forms of outdoor lighting, but predominantly by poorly-designed lighting installations that distribute artificial light sideways or upwards. It was noted in submissions that the sideways direction was the worst of these forms for its contribution to sky glow.

Many submissions noted that reflected light off building windows or building floodlighting are damaging forms of artificial light that can create high levels of glare and other light pollution.

NCA RESPONSE

Light pollution in its various forms has many significant and adverse consequences for the city and its visitors, and therefore must be managed carefully. The policy sets out a range of mechanisms for the management of light pollution. The NCA's Outdoor Lighting Policy is expected to contribute to improvements in the management of light pollution over time.

The policy has been reviewed for opportunities to further improve the management of glare and other forms of light pollution, resulting in some key recommendations listed below.

RECOMMENDED CHANGES

- > Amend paragraph one of the Executive Summary to read as follows:
'Lighting in the National Capital is to enhance the experience and understanding of the city's unique urban landscape through night time illumination. The objectives and strategies set out in this policy are to be addressed in any design proposal for outdoor lighting within Designated Areas of the National Capital Plan.'
- > Insert additional sentence in Part Three: Safety, section titled 'Human Vision' as follows:
'The impact of artificial light on our ability to see varies between individuals according to differences in age and vision capability.'
- > Amend Part Three: Safety, section titled 'Glare' to read as follows:
'Glare is experienced where a light source creates visual discomfort or reduces human vision. This can be a result of light intensity, contrast, or change in light level that is too rapid for the eye to adapt. Discomfort glare is defined as making vision uncomfortable or navigation difficult. Disability glare is when it is difficult for people to perceive their environment accurately or navigate safely. The threshold between discomfort and disability glare varies according to differences in age and vision capability. Beyond the impacts of human vision, glare is also a form of light pollution and represents wasted energy.'
- > Amend additional Design Requirement at Strategy 3c as follows:
'Minimise any sources of light spill or glare beyond the intended area to be lit.'
- > Amend Part Four: Environment and sustainability, section titled 'Light pollution', dot point one, third sentence, to read as follows:
'Light spill can be a nuisance to residents and also affect the legibility of the city at night. It can include forms such as traffic lights, vehicle headlights, internal building lights and signs.'
- > Amend Design Requirement 4a(iii) to read as follows:
'Install and operate lighting only where it responds to a demonstrated need or requirement. Consider the removal of lighting where it does not meet this criteria.'
- > Amend Design Requirement 4a(iv) to read as follows:
'Co-ordinate the removal or replacement of existing light fittings in proximity to any proposed lighting works to reduce variances in lighting hardware and its effects.'
- > Insert additional Design Requirements at Strategy 4a as follows:
'Select optical systems and shielding designs for artificial light sources that effectively manage glare and light distribution behind and above the light sources.'
'Minimise the distribution of artificial light beyond the intended area to be lit.'

3.3 LIGHT COLOUR, COLOUR TEMPERATURE AND RENDERING

ISSUES

A number of submissions raised concern with the proposed range of colour temperature values; citing evidence that certain lamp types and the colours they produce can affect human health, wildlife health, light pollution, astronomy and glare.

It was suggested that artificial lighting of higher colour temperatures rich in blue-white light wavelengths contributes to negative affects for humans, astronomy, wildlife and insects and light pollution. It was submitted that such effects include:

- Light emitted in the blue end of the spectrum attracts flying insects such as the Bogong Moth at an increased rate.
- Light Emitting Diode (LED) type lamps have an excess of blue light component in their spectral distribution which can have negative effects.
- Blue-white type artificial light can contribute to sleep disruption and serious diseases in humans (and other mammals) such as breast and prostate cancers.

Some submissions pointed out that certain lamp types are to be avoided for outdoor lighting unless fitted with yellow or orange lenses. These included fluorescent, compact fluorescent, metal halide and white LEDs. Preferred lamp types were listed as High- and Low-Pressure Sodium (HPS and LPS), yellow-orange and red LEDs and tungsten-filament lamps.

NCA RESPONSE

The draft Outdoor Lighting Policy proposed the use of lamps that offer a colour temperature close to the appearance of daylight (approximately 4500-6500 degrees Kelvin). The rationale behind the proposed colour temperature values in the draft policy was intended to most accurately illuminate the National Capital's landscape features and character at night, as it was recognised that 'higher' or 'cooler' colours in outdoor lighting will have better outcomes for the night time rendition of the landscape.

The submissions received have presented a number of significant issues that this intent must be balanced with, including health and environmental issues. As there is no definitive lighting hardware solution for all applications, the policy must allow lighting designers to balance technical issues with the needs of the community and the environment. It is proposed that the colour temperature values be amended using an approach based on location and application.

RECOMMENDED CHANGES

- Amend the Design Requirements of Strategy 2c to read as follows:
 - i] *Use lamps of a colour temperature (as measured in degrees Kelvin) and colour rendering ability (as measured in Colour Rendering Index, CRI) in accordance with the values prescribed in the table below:*

| PRECINCT AND SPECIFICATION | DEFINED AREAS | LAMP REQUIREMENTS |
|---|--|--|
| Precinct A 4,500-5,500K Min. 80 CRI | Constitution, Commonwealth and Kings Avenues, State Circle and all areas encompassed by these roads Anzac Parade Parklands adjacent to Lake Burley Griffin City Hill Precinct (area inside London Circuit) Suburbs of Parkes and Russell | Select lamps in this central area that provide the most accurate colour rendition of landscape possible to enhance the spatial qualities of the National Capital's most symbolic areas. A light quality close in appearance to natural cool daylight is desired, to highlight the key built elements and foliage of the landscape setting. |
| Precinct B 3,500-4,500K Min. 80 CRI | Main Avenues (as defined in the National Capital Plan) Car parks and all other roads in the Central National Area not within 5km radius of Mount Stromlo Observatory | Select lamps in these areas to contribute to high quality landscape corridors and accurate rendition of their key elements. A white light quality is desired to highlight contemporary metal and glass architecture and green foliage. |
| Precinct C 2,000-2,500K | Approach Routes (as defined in the Plan) Inner Hills Areas within 5km radius of Mount Stromlo Observatory Minor roads within residential suburbs | Select lamps in these areas to contribute to maintaining the capital's rural setting and limit impacts on wildlife, astronomy, or residential suburbs. Light colours should emphasise the warm tones of exposed earth and stone surfaces and red/brown leaves. |
| Precinct D Min. 80 CRI | All other Designated Areas not identified above | Select lamps to accurately display the area to be lit, while minimising the adverse effects on people or the environment. |
| Precinct E Min. 80 CRI | Parliament House National Carillon Australian War Memorial Old Parliament House All other key elements identified elsewhere in this policy | Select lamps for lighting of key elements that enhance the architectural and symbolic qualities of the structure's materials and finishes. A hierarchy of lighting colour and quality is to be used to express the individual elements within each structure. |

- ii] *Select lamps ideally with an efficacy greater than 75 lumens/watt.*
- iii] *Select lamps ideally with a burning life in excess of 10,000 hours.*
- iv] *Select luminaires ideally with a minimum light output power ratio of 80.*
- v] *Select lamps that minimise blue-white light output.*

3.4 HERITAGE

ISSUES

Several submissions made reference to the heritage values of existing lighting hardware and lighting of buildings or structures with heritage value. These submissions expressed a view that lighting designs with heritage values should not necessarily be retained, simply because of the heritage aspects. Submissions highlighted that some older lighting designs are in fact poorly-performing in terms of light distribution, glare and light pollution. There was also a concern that the draft policy might encourage these designs to be replicated or continued in new installations.

Comment was made that Indigenous Australian cultural heritage is closely linked with night sky visibility, which is affected by outdoor lighting.

One submission expressed confusion around statements in the policy regarding the need to express 'the key geometric elements of the Griffins' formally adopted plan for the city.' It was recommended that what constitutes the key geometric elements of the Griffins' plan for Canberra for the purposes of the policy be clarified.

NCA RESPONSE

An objective of the policy is to ensure that outdoor lighting respects the planned geometry and heritage of the city. Strategies to support this policy objective include conserving significant heritage lighting fabric and design elements.

The policy appropriately requires that relevant Heritage Management Plans are considered when developing lighting plans. It is recommended that additional design requirements be added to the policy to ensure that heritage listed lighting designs are not replicated inappropriately. It is also recommended that a number of clauses be amended to more appropriately respond to heritage matters.

The policy acknowledges that night sky visibility is a matter of cultural significance.

It is recommended that the key elements of the Griffins' formally adopted plan for the National Capital are clarified.

RECOMMENDED CHANGES

- Amend Part One: Urban context, section titled 'Griffins' Plan', paragraph one, to recognise the main elements of the Griffins' formally adopted plan for the National Capital and to read as follows:
 - 'Today, the main elements of this plan are recognised as:*
 - *the use of topography as an integral design feature and as a setting*
 - *a symbolic hierarchy of land uses designed to reflect the order and functions of democratic government*
 - *a geometric plan with the central triangle formed by grand avenues terminating at Capital Hill, the symbolic centre of the nation*
 - *a system of urban centres.*
- Amend Design Requirement 1d(ii) to read as follows:
 - 'Retain the essential character and lighting performance characteristics of any existing lighting installation with identified heritage value, in any proposed maintenance or replacement activity.'*
- Insert additional Design Requirement at Strategy 1d as follows:
 - 'Do not replicate or extend poor performing heritage lighting hardware into new areas or in new installations.'*

3.5 WILDLIFE HEALTH

ISSUES

A number of submissions commented on the impacts of artificial lighting on wildlife and insects, including sleep disruption, navigation, reproduction and hunting.

It was suggested that artificial lighting directed towards Lake Burley Griffin could adversely affect the health of the lake ecosystem, including the aquatic species which inhabit the lake.

Some lamp types were noted to have a lesser impact on wildlife health than others. For example, it was noted that the Bogong Moth is attracted to artificial light sources with a higher blue-white component.

Furthermore, submissions pointed out that artificial light affects all wildlife, not just nocturnal wildlife. In addition to the effects listed in the draft policy, it was noted that lighting can affect the population, reproduction and health of mammals, aquatic life, birds and insects.

NCA RESPONSE

It is important that biodiversity is not adversely affected by any development in the Designated Areas of the National Capital Plan including the effects of outdoor lighting. The policy sets out a range of design requirements to minimise the impact of outdoor lighting on the environment, including wildlife health.

It is recommended that the policy more comprehensively identify the impacts of outdoor lighting on all wildlife (including aquatic fauna).

RECOMMENDED CHANGES

- Amend Design Requirement 1c(ii) to read as follows:
'Use full cutoff lighting of pedestrian pathways and landscape areas in proximity to the edge of Lake Burley Griffin around West, Central and East Basin, that effectively manages the unwanted effects of light spill on the lake ecosystem (unless otherwise noted in this policy).'

3.6 ENERGY USE AND LIGHTING SYSTEM MANAGEMENT

ISSUES

Several submissions proposed that the policy should set targets for energy consumption reduction. Some of these submissions suggested that mandating certain lamps types, such as LEDs, could achieve reductions in energy consumption. It was further suggested that lighting curfews could help achieve reductions in energy consumption and greenhouse gas emissions, as well as being a means of improving health and biodiversity.

Submissions suggested that no additional lighting should be permitted for night-time events, public art or other structures.

It was proposed that the NCA adopt the same lighting hardware selections as the ACT Government and develop a preferred suppliers list.

One submission suggested that plans for outdoor lighting and landscape maintenance should be co-ordinated.

NCA RESPONSE

Property owners and land managers are responsible for providing and maintaining outdoor lighting in accordance with all relevant standards, legislation and policies which will include the Outdoor Lighting Policy. The policy is not intended to provide a street or path lighting plan or establish minimum levels for outdoor lighting.

Within the ACT there are many organisations responsible for the ownership, operation and management of outdoor lighting assets. These organisations are a mix of Australian Government, ACT Government and private organisations each with individual land management structures and priorities. Due to the complex nature of funding and decision making, it would not be feasible to mandate energy use, set reduction targets or curfews, or dictate lamp types. These decisions will be supported by the policy but remain a decision for property owners and land managers to make on a case-by-case basis.

There are no changes recommended to the energy use policy.

3.7 AUSTRALIAN AND ACT STANDARDS

ISSUES

Several submissions made reference to the Australian Standards, which are developed and maintained by Standards Australia, a not-for profit organisation recognised as the peak non-government Standards body in Australia. Submissions identified additional standards that may be relevant to the design, construction and electrical installation of outdoor lighting systems in the ACT.

It was noted in some submissions that some deficiencies exist in the Australian Standards and that other requirements, policies or legislation should over-ride the Australian Standards.

One submission proposed that the design requirements in the draft policy pertaining to lighting hardware selection be aligned to the Design Standards for Urban Infrastructure that are developed and maintained by the ACT Government.

NCA RESPONSE

The policy appropriately recognises that the policy supplements the provisions of the National Capital Plan and should be read in conjunction with all relevant standards and legislation relevant to the design, development or operation of outdoor lighting installations.

The policy explicitly refers to some relevant legislation and standards, however it is not intended to provide a comprehensive list. It is recommended that *AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting* be added to the list of legislation and standards specifically mentioned and an additional clause be included that requires a proponent to demonstrate compliance with all other relevant standards.

The ACT Government's Design Standards for Urban Infrastructure is required to be considered by lighting designers within areas of land managed by the ACT Government (Territory Land). The Outdoor Lighting Policy will be the NCA's primary reference for lighting works in all Designated Areas of the National Capital Plan.

RECOMMENDED CHANGES

- Insert additional Design Requirement at Strategy 3b as follows:
'Demonstrate compliance of lighting design with other relevant Australian Standards relating to the installation and operation of outdoor lighting. Where an inconsistency arises between this policy and any Australian Standard, this policy prevails.'

3.8 HUMAN VISION

ISSUES

In regard to human vision, beyond recognising the importance of night time illumination in assisting people to see at night, submissions advised the following:

- The threshold between what is considered discomfort glare and disability glare is affected by the ageing eye. It was suggested that the policy could acknowledge this fact.
- The human visual system is seldom unable to adapt to changing light levels.
- Only the blue component of artificial light affects pupil size.

NCA RESPONSE

The primary purpose of outdoor lighting is to assist human vision at night, however some outdoor lighting designs can distribute light in ways that can inhibit human vision, through either intensity, direction or reflection. The policy aims to ensure integrated design solutions to lighting that enable the human eye to adapt to changes in light levels.

It is recommended that the design requirements for human vision be refined to ensure a broad range of 'users' of outdoor lighting systems are considered in lighting design.

RECOMMENDED CHANGES

- Amend Part Three: Safety, section titled 'Glare' to read as follows:
'Glare is experienced where a light source creates visual discomfort or reduces human vision. This can be a result of light intensity, contrast or change in light level that is too rapid for the eye to adapt. Discomfort glare is defined as making vision uncomfortable or navigation difficult. Disability glare is when it is difficult for people to perceive their environment accurately or navigate it safely. The threshold between discomfort and disability glare varies according to differences in age and vision capability. Beyond the impacts on human vision, glare is also a form of light pollution that represents wasted energy.'

3.9 ASTRONOMY

ISSUES

In Canberra, the Mount Stromlo Observatory facilities support the opportunity for scientific research and amateur astronomy.

It was raised in several submissions that the operation of these facilities would be improved through reduced light spill and sky glow. Furthermore, some lamp types were noted to affect astronomy more than others.

NCA RESPONSE

The preservation of night sky visibility in Canberra is supported by the Outdoor Lighting Policy. The policy is expected to contribute to improvements in conditions for astronomy over time, through the effective management of light pollution.

Changes are recommended to the acceptable range of colour temperature for lamps, to ensure that lamps of 2,000 Kelvin can be used, extending the provisions of the National Capital Plan with regard to Mount Stromlo Observatory.

The policy has been reviewed to investigate further improvements that might be made to manage light pollution, which in turn will improve night time astronomy activities in the National Capital.

RECOMMENDED CHANGES

See section 3.3 Light colour, colour temperature and rendering.

3.10 URBAN DESIGN

ISSUES

Submissions proposed that a number of additional key elements should be added to the hierarchy of symbolic illuminated elements, including the Australian-American Memorial, buildings facing Parkes Way, and development facing the edge of Lake Burley Griffin at West Basin.

Two submissions suggested that prescribing luminance values for key elements in the Central National Area was not practical given the wide variety of building materials, the landscape setting and the wide range of viewing angles that it is possible to view the key elements from.

NCA RESPONSE

The NCA has reviewed the key elements nominated in the draft policy and changes are recommended to ensure all key built elements can be appropriately addressed.

The prescribed luminance values for key elements are intended to provide a long-term framework for the development of lighting in these areas. The hierarchy of key elements outlined in this part of the policy is intended to give a cascading sense of importance to the viewer of each built element.

RECOMMENDED CHANGES

- Amend Design Requirement 1b(i) to include the following sites in the table:
 - Level One – *Australian-American Memorial*
 - Level Two – *Buildings facing Parkes Way*
 - Level Three – *Development facing the lake edge at West Basin.*

3.11 TERMINOLOGY

ISSUES

A number of submissions raised issues with the language and terminology used in the draft Outdoor Lighting Policy.

The difference in terminology and measurement of 'luminance' versus 'illuminance' values caused some confusion and was noted by several submitters.

The terms used to identify various lighting components also generated a number of comments. It was recommended that all references to 'lens', 'optical systems' and 'effective shielding' be amended to ensure a shared understanding of these terms.

Comment was made that the use of the parameter 'colour temperature' should not be used to describe lamp types that exaggerate colours such as yellow or blue.

NCA RESPONSE

Within the field of outdoor lighting internationally or domestically there are few universally agreed terms or definitions. The language used to describe outdoor lighting design and components varies by sector and discipline, based on needs and knowledge.

The NCA has reviewed the draft policy terminology and it is recommended terms be amended where it will improve understanding and clarity.

RECOMMENDED CHANGES

- Amend policy to refer to 'luminance values' rather than 'illuminance values.'
- Amend policy to refer to 'optical systems' rather than 'lens', where relevant.
- Amend Part Two: Place Making, section titled 'Light Colour' to read as follows:
'The colour of light emitted from an artificial source and the apparent colour of objects that the light strikes can affect the ability of people to accurately perceive their surrounding environment. Lighting that has a poor colour rendering ability can distort our perception of our surroundings, affecting our awareness and appreciation of the natural and built environment. The colour temperature of lighting can have impacts on human spatial awareness and health, wildlife health, astronomy and light pollution.'
- Amend Part Four: Environment and sustainability, section titled 'Light pollution', first sentence, to read as follows:
'Light pollution is the introduction by humans, directly or indirectly, of artificial light into the environment.'
- Add to the glossary the following terms:
Colour temperature – the colour of light emitted from an artificial source.
Colour rendering – the ability of artificial light to display the true colour of an object that it strikes.
- Amend glossary definition of 'full cutoff' to read as follows:
Restriction of light from being directed at or above the horizontal for the installed luminaire.

3.12 DETAILED DESIGN ISSUES

ISSUES

Some submissions nominated specific lamp types that were either desired or undesired for a range of reasons; however there was no lamp type that received universal support.

One submission acknowledged that the use of full cutoff lighting for road and pedestrian lighting will result in less glare, but it was suggested that this may also reduce the uniformity of illumination. Despite this, the submission recommended that full cutoff fittings should be the norm everywhere.

One submission proposed that the design requirement for uniform spacing may produce undesirable outcomes.

Submissions also noted the image of the Kings Avenue Overpass was a temporary lighting effect and should be recognised as such.

A number of suggestions or recommendations were made in regard to the detailed design of outdoor lighting installations, including:

- Any upward lighting of trees should be limited to non-deciduous trees. If it is necessary to illuminate deciduous trees, these trees should only be lit whilst they exhibit full leaf growth.
- Flag pole lighting for commercial purposes should not be permitted.
- Additional obligations should be placed on proponents to include further technical data on any proposed luminaire(s).
- The role of 'independent lighting designers' should be acknowledged in the policy.
- Road lighting objectives differ from those of area lighting and the policy requirements should reflect the need for sideways distribution of light in some circumstances.
- The removal or absence of artificial lighting should be considered an appropriate lighting design in some circumstances, and the policy should recognise this.

NCA RESPONSE

The draft policy intentionally avoids referring to lamp type, to ensure that the most appropriate technology can be selected in each individual case. The provision of lighting and lamp selection will ultimately be a decision for property owners or land managers.

A range of changes are recommended that respond to the detailed lighting design issues summarised above.

RECOMMENDED CHANGES

- > Amend part titled 'Implementation' to reference independent lighting designers.
- > Amend caption associated with the Kings Avenue Overpass to read as follows:
'Ceremonial lighting scheme at the Kings Avenue Overpass (temporary lighting scheme only).'
- > Amend Design Requirement 1a(iv) to read as follows:
'Reinforce the Griffins' Water Axis by illuminating the promenade along the southern foreshore, Commonwealth Place and the International Flag Display.'
- > Amend Design Requirement 1c(ii) to read as follows:
'Use full cutoff lighting of pedestrian pathways and landscape areas in proximity to the edge of Lake Burley Griffin around West, Central and East Basin, that effectively manages the unwanted effects of light spill on the lake ecosystem (unless otherwise noted in this policy).'
- > Amend Design Requirement 2b(iii) to read as follows:
Locate lighting hardware around trees, signs, and street furniture to achieve a spacing, pattern and alignment that complements these and other urban elements.
- > Amend Design Requirement 3c(ii) to read as follows:
'Select optical systems and shielding designs for artificial light sources that effectively manage glare and light distribution behind and above the light source.'
- > Amend Design Requirement 5b(iv) to read as follows:
'Light flagpoles to heighten their impact when viewed at night, using up-lighting designs that minimise upward light wastage and glare. Consider pole-top mounted full cutoff lighting designs where it will not affect known heritage values.'
- > In the part titled 'Submission Requirements for NCA Works Approval', add an additional paragraph following the submission requirements as follows:
'In addition to the above, the NCA may request detailed photometric data where it considers that the impact of artificial light is likely to have a significant impact on National Capital values.'

4. INTERNAL REVIEW OF DRAFT OUTDOOR LIGHTING POLICY

An internal review of the draft Outdoor Lighting Policy has been undertaken by the NCA. A number of changes have been made that do not affect the intent of the policy, but either clarify the objectives, ensure consistency of language throughout the document, improve readability or respond to changes proposed as a result of issues raised in public submissions.

The majority of changes are considered minor. More significant changes resulting from the internal review include:

- > the addition of a part titled 'Structure' that describes the hierarchy of key issues, objectives and strategies and design requirements.
- > clarifying the intent of lighting around commemorative works.
- > clarifying a number of definitions contained with the glossary.

5. SUMMARY AND CONCLUSION

On 17 March 2012, the draft Outdoor Lighting Policy was released for public consultation. The period for public comment ran for 30 business days in accordance with the NCA's Commitment to Community Engagement (August 2011), concluding on 4 May 2012.

Thirteen written submissions were received in response to the draft Outdoor Lighting Policy. In response to these submissions, and based on internal review of the draft policy, a broad range of changes have been recommended to the draft Outdoor Lighting Policy. These changes are recommended to further clarify the intent of the policy, to improve its readability and accuracy and implementation.

6. ATTACHMENTS

- 1] Notice of release of the draft Outdoor Lighting Policy for public comment published in *The Canberra Times* on Saturday 17 March 2012.
- 2] Summary of submissions and NCA consideration.

ATTACHMENT 1: COPY OF PUBLIC NOTICE

 Australian Government
National Capital Authority

DIPLOMATIC ESTATES INVESTIGATION STUDY

ON-SITE DROP-IN SESSIONS

The National Capital Authority is currently assessing the potential suitability of three sites as diplomatic estates.

- » Land South West of Stirling Ridge
- » Land near Old Canberra Brickworks
- » Land adjacent to the Federal Golf Course

A consultant team headed by SGS Economics and Planning has been engaged to prepare a detailed planning investigation for each site.

An initial phase of community consultation, in September and October last year, generated a wide range of submissions and online discussion which is informing the study process.

In order to continue the community engagement process a series of drop-in sessions will be held at each of the sites during March. This opportunity for direct input to the study team will assist in the definition of community values, local uses and site issues. However, all input received during the 2011 consultations is being considered and there is no need to resubmit earlier comments.

The on-site drop-in sessions will be held:

| SITE | WHEN | MEETING POINT |
|------------------------------|---|--|
| South West of Stirling Ridge | Sat 17 March 4.30–5.30pm | Stirling Ridge off Hopetoun Circuit, Yarralumla, near intersection Fitzgerald Street |
| Near Old Canberra Brickworks | Sat 17 March 5.45–6.45pm | Denman Street, Yarralumla opposite corner of Woolls Street |
| Near Federal Golf Club | Sun 18 – Wed 21 March from 4.30–5.30pm | Red Hill Lookout |

It is expected that broad community consultation on the outcomes of the investigation will occur mid-2012.

HAVE YOUR SAY ON DRAFT OUTDOOR LIGHTING POLICY

The National Capital Authority invites public comment on a draft policy guiding outdoor lighting works in the designated areas of Canberra.

The draft policy provides a framework for the planning, design and development of lighting in the central areas of Canberra. It will apply to new installations and the renewal of outdoor lighting. The draft policy aims to balance the needs of people and the environment, while strengthening the role of lighting in our appreciation of Canberra's urban landscape.

Community feedback is sought via:

- » the NCA's consultation website, Have Your Say – www.nationalcapital.gov.au/haveyoursay
- » by hardcopy submissions, addressed to:
Mr Andrew Smith, Chief Planner, National Capital Authority
GPO Box 373, CANBERRA ACT 2601
- » emailing natcap@natcap.gov.au
- » Twitter using @nca_media

The policy is available online at www.nationalcapital.gov.au/haveyoursay, or a hardcopy version can be requested by calling 02 6271 2888.

Comments close at 4pm on Friday 4 May 2012.

PN170312

WWW.NATIONALCAPITAL.GOV.AU
02 6271 2888 NCA_MEDIA on TWITTER

COPY OF THE PUBLIC NOTICE
FROM *THE CANBERRA TIMES*,
SATURDAY 17 MARCH 2012

ATTACHMENT 2: SUMMARY OF SUBMISSIONS AND CONSIDERATION

This table provides a summary of the key points raised in each written submission and details how each point was considered by the National Capital Authority (NCA). Details of each submitter have only been reproduced in this table where a submitter has granted permission for their name and/or organisation to be used by the NCA for the purposes of the draft Outdoor Lighting Policy Consultation Report.

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|--|---|
| 1 | Heart Foundation (ACT) | <p>The Heart Foundation (HF) welcomes the draft policy.</p> <p>HF's primary interest is the impact of the built environment on obesity rates in the ACT. Synergies were noted between the draft Outdoor Lighting Policy and the Active Living project around active travel, aesthetics, safety and surveillance, social inclusion and supporting infrastructure.</p> <p>The importance of lighting provision for encouraging active travel (walking and cycling) along strategic movement routes was highlighted.</p> <p>The HF advocated that safety should be prioritised over place-making.</p> <p>The dangers of over-lighting are to be avoided.</p> <p>Lighting provision should be prioritised at transport conflict points, and used to enhance architectural quality and to assist in way-finding.</p> <p>Shared path network lighting and landscaping should optimise sight-lines. Integrated approach needed for lighting and landscape maintenance.</p> <p>Pedestrian and cycle crossing points of roadways should be well-lit.</p> <p>Energy efficiency should be improved through the use of LED lighting and setting targets for energy reduction.</p> <p>Lighting 'zones' should be considered to ensure lighting is appropriate for the population, activity and needs of an area.</p> |
| 2 | John McCormick, Director of Aviation Safety, Civil Aviation Safety Authority (CASA) | <p>CASA's interest in outdoor lighting is to ensure that such lighting is not likely to endanger the safety of aircraft.</p> <p>CASA supports the specific reference made in the draft policy to CASA's role in outdoor lighting.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|--|--|
| 3 | Submission 3 | <p>Light pollution reduces night sky visibility (in particular, light pollution reduces the number of stars visible and makes it harder or impossible to see many galaxies, nebulas and other deep sky objects). Light pollution also needlessly wastes energy.</p> <p>The impact of light pollution has seen many of Mt Stromlo’s observational functions moving to Siding Springs. It is still possible to observe from Mt Stromlo, although this is increasingly difficult due to the spread of urban development and lighting for the Cotter Dam project.</p> <p>Canberra has a 100-year history of astronomy beginning with the installation of the Oddie telescope, so astronomy protection should be a high priority. The original Oddie telescope was destroyed in the 2003 bushfires, but a replica has been constructed and it to be installed in the original dome. The telescope will be available for public viewing at night, and it will be unfortunate if increasing light pollution further diminishes the quality of viewing.</p> <p>The submitters recommends that NCA implement policies to reduce light pollution and improve energy efficiency, including:</p> <ul style="list-style-type: none"> Deployment of efficient light fittings designed to reduce light pollution. Use of timers and sensors to activate/deactivate lighting in car parks, outside buildings, etc, consistent with public safety. Reduce lighting between midnight and 5am to a minimum level needed for public safety. <p>CAS supports the draft Outdoor Lighting Policy, but with more strict requirements to reduce light pollution and improve energy efficiency.</p> |
| 4 | Submission 4 | <p>Questions how it is proposed to measure illumination levels when the draft policy proposes the use of cd/m2 which is a measure of luminance and not illuminance.</p> <p>Suggests that from a practical point of view, where there is parkland and wide open spaces, this seems to be unrealistic and unmeasurable as this measure needs to be from a specific direction. Strategy 3 provides for a safe environment in terms of lighting levels, so it is assumed that the intention of Strategy 1b relates more to the visual contrast of the various areas – it still seems impractical to be able to physically measure this metric.</p> |
| 5 | Jennifer Long, Human Factors & Ergonomics Society of Australia Inc. (HFESA) | <p>General support given for document.</p> <p>In regard to Part 4: Environment and Sustainability, the management of energy wastage presents an issue of how to provide light when it is needed. It was questioned what mechanism(s) will ensure there is adequate lighting for safety if there is pedestrian or vehicular activity between midnight and 5:00am.</p> <p>Similarly, it was questioned that if ambient light levels change (for example, shopfront window lights get switched off), what mechanism(s) are in place to maintain adequate lighting for safety.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|--|--|
| 6 | Submission 6 | <p>Draft policy is generally supported.</p> <p>Strategy 2c attempts to meet aesthetic hardware requirements that may lead to undesirable lighting technical results.</p> <p>Strategy 3c should consider reflected luminance off adjacent structures.</p> <p>Strategy 4a needs further emphasis.</p> <p>In regard to Policy Objective 5, commemorative or celebratory lighting also need to address glare (safety) and light pollution restriction.</p> <p>In regard to Strategy 1a, high levels of luminance from lighting designs that affect adjacent premises needs to be addressed.</p> <p>In regard to Strategy 1b, the luminance specification is supported.</p> <p>In regard to Strategy 1d(ii), the replication of unique existing luminaires may not be suitable in all applications.</p> <p>In regard to Part 2: Place-Making - Light Colour, the use of the parameter "colour temperature" should not be used to describe lamp types that exaggerate colours such as yellow or blue.</p> <p>In regard to Design Requirement 2a(ii), where 'special' luminaires are proposed, they must meet the requirements of AS1158 .6 Luminaires.</p> <p>In regard to Strategy 2b, the requirements of the relevant Australian Standards should apply.</p> <p>In regard to Design Requirement 2c(ii), high CCT values such as 5600K might meet some present efficacy advantages using LEDs but is not good for astronomic research.</p> <p>In regard to Part 3: Safety – Human Vision, this section should recognise the difference between discomfort glare and disability glare, in relation to the ageing eye.</p> <p>In regard to Strategy 3b, reference should be made to AS4282 – Control of the Obtrusive Effects of Outdoor Lighting.</p> <p>In regard to Design Requirement 3c(ii), road and street lighting depends on effective light distribution sideways. There is no reference to restricting light emission behind luminaires. The word 'lens' should be replaced with 'optical systems'.</p> <p>In regard to Part 4: Environment and Sustainability – Night Sky Visibility, sky glow should be restricted to a practical minimum for Mt. Stromlo Observatory.</p> <p>In regard to Design Requirement 4a(i), references to 'lens' should be updated to 'optical systems' and 'effective shielding.'</p> <p>In regard to Design Requirement 4d(i), this should refer to lighting systems which have effective systems preventing upward light and which restrict excessive luminance.</p> <p>In regard to Design Requirement 4d(iii), light emitted in the blue end of the spectrum will attract all night flying insects including the Bogong Moth. At this time all LEDs, regardless of colour temperature have an excess of blue light component in their spectral distribution which can have negative effects. Two publications were provided as references to support this point.</p> <p>In regard to Design Requirement 5a(iii), any upward lighting of trees should be limited to non-deciduous trees. If it is necessary to illuminate deciduous trees, these trees should only be lit whilst they exhibit full leaf growth.</p> <p>In regard to Design Requirement 5b(iii), flag pole lighting for commercial purposes should not be allowed.</p> <p>In regard to 'Submission Requirements for NCA Works Approval', any proposed luminaire should include full photometric data in Illuminating Engineering Society (IES) format produced by a National Association of Testing Authorities (NATA) Australia -approved photometric laboratory and should include a complete lab report.</p> |
| 7 | Eric J Martin, AM, President, National Trust (ACT) | <p>The National Trust generally supports the draft Outdoor Lighting Policy.</p> <p>In relation to expressing the key geometric elements of the Griffins' formally adopted plan for the city as outlined in Policy Objective 1, it is unclear what this refers to. The strategy appears to indicate that this is three nodes, triangle of roads and two axis when in fact the 'plan' is more than this (even though these may be the main element).</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|---|---|
| 8 | Dr Barry A.J. Clark PhD, Astronomical Society of Victoria Inc | <p>Recent scientific discoveries that link environmental degradation by light with serious diseases in mammals including humans should be considered, for example, cancers. Artificial light at night is a health hazard for humans. NB: Two journal articles were provided by the submitter as information in support of this.</p> <p>The management of sky glow over Canberra relies on reducing the number and intensity of existing light installations over time.</p> <p>Light distribution at or near horizontal angles is what contributes most to sky glow.</p> <p>The Australian Standards for outdoor lighting do not take account of scientific work in the last 20 years. The intensities and illuminances are misleadingly high.</p> <p><i>AS 4282 - Control of the obtrusive effects of outdoor lighting</i> should be referenced as a relevant standard for compliance, despite many of the most obtrusive forms of outdoor lighting being exempt from this standard.</p> <p>The health and safety requirements of humans, wildlife and the EPBC Act should over-ride Australian Standards on lighting.</p> <p>The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) needs proper enforcement in relation to the adverse effects of lighting at night on biodiversity.</p> <p>Low- or high-pressure sodium lamps have a lower impact on wildlife health, however all artificial light affects wildlife, not just nocturnal wildlife.</p> <p>Canberra's heritage includes a relatively unpolluted night sky that has allowed astronomical research. The maintenance or replacement of existing lighting installations should not be constrained by heritage values. The unique promenade lighting shown on the southern shore of Lake Burley Griffin's Central Basin is of a design that creates excessive sky glow and glare. Aboriginal cultural heritage relies on night sky visibility which is affected by glare and sky glow.</p> <p>Lighting plans set out in Heritage Management Plans need to address the adverse effects of artificial night lighting and not contribute to over-lighting.</p> <p>Heritage can be negatively impacted by outdoor lighting.</p> <p>Crime can actually be reduced by reducing lighting, however this needs to be balanced with feelings of security, movement safety and way finding at night.</p> <p>The human visual system is seldom unable to adapt to changing light levels.</p> <p>No additional lighting should be permitted for night time events.</p> <p>Full cutoff glossary explanation should read: 'Restriction of light from being directed at or above the horizontal for the installed luminaire'</p> <p>Use of Full Cutoff lighting for road and pedestrian lighting will result in less glare but may increase non-uniformity of illumination. Full Cutoff fittings should be the norm everywhere covered by the policy.</p> <p>The alignment of light pole locations should consider risk of vehicle or pedestrian collision.</p> <p>The illumination values set out in the draft policy for key built elements in central Canberra need to be clarified as luminance or illuminance values, and reduced due to human health impacts. Building floodlighting is a damaging form of artificial light.</p> <p>The value of the Mount Stromlo Observatory facilities would be improved through replacement of existing street lighting luminaires in Canberra with designs that reduce light spill and sky glow.</p> <p>Lighting around Lake Burley Griffin should not allow controlled water reflections as proposed, as this is damaging to living things in the lake and contributes to sky glow.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|----------------------|--|
| | | <p>The blue component of light at night is responsible for adverse biological effects on living things, such as some cancers in animals including humans. Preferred light sources appear yellowish or even orange with a colour temperature typically below about 3000K. The molecular light-scattering process (Rayleigh scattering) that generates the blue colour of the daytime sky and artificial sky glow at night means that high colour temperatures used in outdoor lighting are contributing to sky glow. This affects astronomy and increases the ambient blue light levels at night for humans and animals and thereby tends to increase the adverse effects of this blue light on health and wellbeing.</p> <p>Fluorescent, compact fluorescent, metal halide, mercury vapour lamps and blue-white LEDs should be avoided for outdoor lighting unless fitted with yellow or orange lenses to filter out the harmful blue content. More acceptable light sources are high pressure sodium (HPS), low pressure sodium (LPS), yellow-orange and red LEDs, and tungsten-filament lamps.</p> <p>Public art, structures, landscape elements and buildings should not be lit with artificial light sources.</p> <p>Human vision – only the blue component of artificial light affects pupil size.</p> <p>The effects of glare are increased as the colour temperature of lighting increases.</p> <p>Select light fittings and lenses that shield light from being directed at or above the horizontal. Apply this requirement to replacement fittings for all existing luminaires that do not already comply fully. Do not allow exemptions for any reason.</p> <p>Lighting curfews should be established in the interests of health, biodiversity and greenhouse gas emissions reduction.</p> <p>Light pollution should be defined as, 'Light pollution is the release of artificial light into the environment,' based on the definition agreed in 2007 at the Right to Starlight international conference in Spain under the auspices of UNESCO.</p> <p>Light clutter can include all visible sources of artificial light, including traffic lights, vehicle lights, light escaping from windows and light from signs and billboards.</p> <p>Reducing waste light will in turn reduce energy waste and light pollution.</p> <p>In addition to the listed effects, lighting can affect the population, reproduction and health of animals, aquatic and marine life, birds and insects.</p> <p>No lighting, or the removal of existing lighting, may both be appropriate outcomes in assessing outdoor lighting requirements, and should be noted as such in the policy and submission requirements for works approval.</p> <p>The proposed control of external building lighting for Bogong Moths should be extended to all times of the year, regardless of Bogong Moths.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|---|--|
| 9 | Emrah Baki Ulas, Steensen Varming | <p>Generally supportive of the policy initiative.</p> <p>Implementation</p> <p>This section should acknowledge the role of ‘independent lighting designers’ in the implementation of the policy.</p> <p>Policy Purpose</p> <p>It should be recognised that night-time lighting and the environment are also impacted by indoor lighting.</p> <p>Policy Objectives</p> <p>It is questioned whether there is a plan to review and change existing lighting installations to suit the objectives.</p> <p>Kings Avenue Overpass image</p> <p>A note should be included in relation to this image to point out that the image does not show the day-to-day lighting scheme for the overpass.</p> <p>Strategy 1b</p> <p>Questions whether the existing candela per square meter (cd/m²) luminance values of the sites are known. Many of the buildings included in the table are complex structures with various materials and finishes and have their own luminous hierarchies between different elements. The lighting hierarchy of the sub-parts of these key elements is also important for achieving harmony both in micro and macro scales.</p> <p>Support this luminance-based approach, which is preferred to the illuminance-based approach in the Australian Standard AS1158. It is suggested that since surface qualities of buildings have a significant impact on the luminance (for example, to provide 20cd/m² luminance on a brick surface requires much more light compared to achieving the same on a white painted surface and may lead to light pollution).</p> <p>The hierarchy of luminance values should be perceivable from a distance (for example, the contrast between 10 and 5cd/m² may be unnoticeable from a distance).</p> <p>Part 2: Place-making</p> <p>Suggests that a light colour of 2500-4000K may be appropriate for good colour rendering.</p> <p>Strategy 2c Colour Temperature</p> <p>The objective of trying to replicate the daytime environment at night may not be the most desirable outcome, and the objective of night time lighting should focus on complementing and appreciating the night time environment, and making it safe comfortable and enjoyable.</p> <p>Cooler colour temperatures would result in attracting more insects, which causes environmental, operational and performance issues.</p> <p>People feel more comfortable under warmer colour temperatures; therefore a colour temperature range of 2500-4000K may achieve a better outcome.</p> <p>Strategy 4b Minimise Energy Use</p> <p>Supports the approach of dimming at certain times of the night to minimise energy use and impact on the night sky environment.</p> <p>Objective 5 Celebration & Commemoration</p> <p>The opportunity for permanent special lighting treatments for decorative and aesthetic purposes should be retained. Any event or commemorative lighting design must achieve a high standard of coordination, harmony and consistency.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|---|---|
| 10 | ACT Government Environment and Sustainable Development Directorate (ESDD) | <p><i>Introduction</i> – role of Canberra as the National Capital.</p> <p><i>Executive Summary</i> – a number of minor amendments were suggested to the wording of these policy objectives.</p> <p><i>Part One: Urban Context</i> – further discussion needed in issues section on hierarchy and symbology. Strategies could consider distinguishing the perimeter of the National Triangle from the interior, and using colour to define these roads.</p> <p><i>Strategy 1b</i>: Consider adding a number of additional key elements to the hierarchy. Consider extending the City Hill precinct building lighting to not just buildings of RL 617 height. Furthermore, this section could also address internal building illumination values and its effects.</p> <p>Policy Objective 3, Strategy a) Maintain a well-connected movement network of illuminated public paths, roads and spaces.</p> <p>Policy Objective 4, Strategy b) <i>Consider setting targets for minimising energy use?</i></p> <p>Policy Objective 5: Strategy b) Ensure that lighting <i>is integrated</i> with commemorative works. Re-ordering of 5 a) and 5 b) is recommended.</p> <p>Use of Full Cutoff light fittings for all new building façade lighting could be too restrictive.</p> <p>Noted that Acton Peninsula and Kingston Foreshore are already built-up areas, therefore the controls relating to light spill and glare may be unnecessary.</p> <p>Strategy 1d – Questioned whether all performance characteristics of any existing lighting installation with identified heritage value are intended to be retained.</p> <p>Design Requirement 2b(iii) – Requirement for uniform spacing may produce undesirable outcomes.</p> <p>Design Requirement 3c(iii) – define ‘typical field of view’ further.</p> <p>Design Requirement 4b(i) – define ‘durable aesthetics’ further.</p> <p>Design Requirement 4b(ii) – Replace ‘cost’ with ‘value for money’.</p> <p>Design Requirement 4b(iii) and Strategy 4d – Specify guidelines for lighting control systems to operate within, such as times of night and power reductions.</p> <p><i>Strategy 5a Design Requirements</i> – These lighting designs could be considered as permanent installations and not just temporary. Consider hierarchy within landscape elements.</p> <p>A number of typing and outline numbering inaccuracies were identified in the draft policy.</p> |
| 11 | Barry Webb | <p>General support given to the document.</p> <p>Recommends integrating the Lamp and Luminaire technical requirements within Strategy 2c.</p> <p>Suggests the following Variable Lighting Values:</p> <p>Use lamps with a colour temperature of 4,500- 5,500 degrees Kelvin.</p> <p>Use lamps with a colour rendering index in excess of 80.</p> <p>Use lamps with an efficacy greater than 75 lumens/watt.</p> <p>Use lamps with a burning life in excess of 10,000 hours.</p> <p>Use luminaires with a minimum light output power ratio of 80.</p> <p>Provide a lux plot for the area to be illuminated.</p> <p>Luminous intensity diagram for selected luminaires.</p> <p>Provide a proposal for solid state ballasts and transformers.</p> |

| NO. | DETAILS OF SUBMITTER | KEY POINTS RAISED IN SUBMISSION |
|-----|--|--|
| 12 | ACT Government Territory and Municipal Services Directorate (TAMS) | <p>Need to clarify in the introduction that this policy applies only in Designated Areas of the National Capital Plan.</p> <p>Additional Australian Standards should be referenced in the policy in relation to outdoor lighting hardware, its construction and electrical installation.</p> <p>Light spill and glare should be minimised within a 5km radius of Mount Stromlo Observatory.</p> <p>It is recommended that the policy refer to the Vehicular (V) and Pedestrian (P) lighting categories set out in the Australian Standards, as opposed to the candela per square meter values listed in the draft policy. These Category V or P values should be compatible with the relevant Australian Standards and Roads ACT categories, as specified in the <i>TAMS Design Standards for Urban Infrastructure, Streetlighting, Section 12</i> (DS-12).</p> <p>Any proposal to reduce lighting levels at times of reduced pedestrian or vehicular activity should be based on a risk assessment of crime and vehicular accidents.</p> <p>Reducing the operation of un-metered street lights will not produce energy savings unless metering points are established.</p> <p>Streetlight lamps and their colour should be consistent with DS-12, to ensure that driver comfort is not impacted as people move throughout the ACT road network.</p> <p>It is recommended that NCA establish a list of approved lighting hardware suppliers, to reduce the range of lighting components needed to maintain NCA's network of lighting assets.</p> <p>The Submission Requirements for Works Approval section should also address:</p> <ul style="list-style-type: none"> where forms can be located, fees and expected processing times for NCA works approval; Works As Executed information should be required as ActewAGL provide 'Dial Before You Dig' clearance for all electrical services including street lights; and ActewAGL connection approval that ascertains that there is sufficient power in the electrical distribution network so the street lights can be connected. |
| 13 | Leslie Kelety | <p>Supports the objectives of the draft Outdoor Lighting Policy. Such a policy is needed to preserve and protect the aesthetic and environmental values of Canberra's landscape during the night.</p> <p>Special protection is needed for the War Memorial vista and for Anzac Parade</p> <p>While the draft policy gives due attention to the illumination of the three sides of the National Triangle in terms of reinforcing the geometric landscape elements of the city, it has little to say about protecting the vista from Parliament House to the War Memorial.</p> <p>The only provisions in the draft policy which has relevance to protecting the War Memorial vista and the ambience of Anzac Parade is paragraph (i) under strategy 1B. This provision should be strengthened by measures that are designed to protect the War Memorial vista and the ambience of Anzac Parade. The measures should include:</p> <ul style="list-style-type: none"> • The intensity of the street lighting in the middle section of Constitution Avenue (on the east and west sides of Anzac Parade) should be restricted. • Even stricter restrictions should apply to street lighting on Anzac Park East and West. • The Anzac Park East and West buildings should not be lit up any more than they are now. • Balconies and large windows should be prohibited on those sides of the proposed high rise buildings on Section 5 Campbell and around St John's church that will face Anzac Parade. These prohibitions should apply, at the very least, above 13 metres. Strict restrictions should apply to lighting on any balconies that are permitted below that level. • Lighting anywhere on the outside of the proposed buildings on Section 5 Campbell and around St John's church should be prohibited, except for subdued lighting at ground level. • Special requirements should apply to all developments on either side of Anzac Parade to prevent light from being directed upwards and from projecting beyond the area sought to be directly lit. • Very limited lighting should be allowed in the proposed park on Section 5 Campbell. |

Light beacons should not be placed needlessly on Red Hill or Mount Pleasant

The draft policy contains a proposal to 'consider identification of Red Hill and Mount Pleasant through the installation of a single light source, such as a navigational light beacon'. Cluttering Canberra's natural topography which cradles the city in a ring of darkness at night with more beacons that are installed purely for decorative purposes would undermine the sense of the night and the darkness which is a valuable feature of the city. This proposal should be omitted from the policy.

Over-engineered safety standards should not be allowed to undermine the other important objectives of the Outdoor Lighting Policy

Policy Objective 3 in the draft policy provides that *'lighting must provide a safe night-time environment for residents of, and visitors to, the National Capital.'* Policy Objective 3 goes on to say that strategies must *'ensure Australian Standards for illumination are met'*.

Where a policy contains conflicting objectives, a hierarchy among the objectives or some other mode of resolving a conflict should be established.

There is a possibility that if strictly applied, Australian safety standards (which have a single objective) may conflict with and undermine other objectives of the policy (such as reinforcing the planned urban geometry of the National Capital, its heritage and its relationship with the landscape).

An unqualified commitment to apply Australian Standards relating to safe illumination could result in an over-lit environment which would damage the other important landscape and environmental values which the Outdoor Lighting Policy aims to promote.

The policy should allow safety standards to be interrogated to determine whether and to what extent they are really necessary in the circumstances and whether there are alternative ways of achieving a reasonable level of safety.

The draft policy states that *'the perceived and actual level of security within an area is strongly characterised by lighting...'* The policy should avoid encouraging the over-lighting of public spaces in the hope that people who are afraid of the dark or who have an exaggerated fear of violent crime will be enticed to go there, as the hoped-for benefits would be outweighed by the detrimental aesthetic and environmental impacts from such over-lighting.

Careful consideration is needed before installing more lighting around the perimeter of Lake Burley Griffin

Paragraph (ii) under Strategy 1C provides: *'Use full cut-off lighting of pedestrian pathways and landscape area in proximity to the edge of lake Burley Griffin around West, Central and East Basin, that provide controlled water reflections to the lake.'*

It is not clear whether this paragraph refers solely to the treatment of existing lighting around the lake or is providing for the extension of lighting to parts of the shoreline not presently illuminated. If it is providing for the latter, it should be omitted from the policy. At most, the policy should only propose that **consideration be given** to the extension.

Leaving significant sections of the edge of the lake dark at night is important for ensuring that this body of water retains a peaceful, natural feel and for providing a contrasting dark backdrop to the lit areas which has the effect of enhancing the special qualities of both the unlit and lit parts.


Over-use of lighting to achieve the landscape objectives of the Outdoor Lighting Policy should be avoided

Lighting should not be over-used in pursuit of the landscape objectives of the policy. The illumination of the structures and geometric elements in the landscape that are presently lit up is effective in large part because of the contrast with other structures and landscape elements that are not lit up.

The ACT Government's outdoor lighting policy should be aligned with the NCA's policy

Because the areas under the jurisdiction of the NCA and the ACT Government are interspersed, outdoor lighting in the areas controlled by the ACT Government can have a negative impact on the areas controlled by the NCA – as well as on the quality of life of Canberra residents – unless the policies of both jurisdictions are aligned.

The NCA should work with the ACT Government to align their outdoor lighting policies.



The National Capital Authority was established under the
Australian Capital Territory (Planning and Land Management) Act 1988

NATIONAL CAPITAL AUTHORITY

GPO Box 373, Canberra ACT 2601

Telephone: +61 2 6271 2888 **Facsimile:** +61 2 6273 4427

Email: natcap@natcap.gov.au

WWW.NATIONALCAPITAL.GOV.AU