Development Control Plan

No. 1

Warrumbungle Shire Council

Lighting Code

to

Protect

Siding Spring Observatory

Development Control Plan No. 1 - Warrumbungle Shire Lighting Code to Protect Siding Spring Observatory

Contents

Why dark night skies?

Warrumbungle Shire residents need to protect their dark night skies from light pollution because of the importance of Siding Spring Observatory, Australia's leading optical astronomical observatory.

The observatory is also an important contributor to the economy of the Shire, and its staff and their families are an important part of the Shire community. Warrumbungle Shire Council is committed to protecting our dark skies. Light pollution has a detrimental effect on professional and amateur astronomy, nocturnal animals and everyone's enjoyment of the night sky. Waste light is also wasted energy.

Good lighting

Siding Spring Observatory operates on the frontiers of astronomy, observing very faint objects at very great distances. Any light with a line-of-sight to the observatory affects observing conditions there – the brighter the light, the greater the impact. Any light shining up into the sky makes the sky less dark and observing less clear. Coonabarabran's town lights are the brightest light source the Observatory can see.

The answer to protecting observing conditions is not *no* lighting, it is *good* lighting. Good lighting does its job well, without causing a nuisance to others. It directs the right amount of light in the right place, does not shine upwards, does not annoy neighbours and does not cause glare, so it is safe, and saves energy. Good lighting benefits everyone.

The aims of this plan

This plan aims to help the observatory by preventing Warrumbungle Shire's dark skies deteriorating. It will do this by ensuring that all new lighting is good lighting and by encouraging existing lighting to be improved and better managed.

The plan also aims to guide residents and lighting consultants to install and manage good lighting with little or no disruption to people's normal life. Normal house lighting, as described in the Technical Annex, will not need council approval except within 18 kilometres of the observatory. This distance does not include Coonabarabran urban area. Unusually strong lighting such as tennis court or area floodlighting will need council consent throughout the shire.

This plan aims to be more effective and simpler than the plan it replaces.
It will help carry out the aims of Orana Regional Environmental Plan No.1 - Siding Spring and its replacement, the draft Siding Spring Observatory Dark Skies REP, as well as the Australian and United Kingdom Governments' joint agreement to site an optical telescope at Siding Spring Mountain. Warrumbungle Shire Council must observe these legal requirements and is committed to doing this.

In this plan, **Director** means the Director of the Australian National University research School of Astronomy and Astrophysics, or her delegate.

Name
This plan is called Warrumbungle Development Control Plan No.1 - Shire Lighting Code to Protect Siding Spring Observatory. It was approved by Warrumbungle Shire Council on 18-11-2004.

Where this plan applies

This plan covers the whole Shire of Warrumbungle, the same area covered by Coonabarabran Local Environmental Plan 1990 and Coolah Local Environmental Plan 2000.
It operates in rings at different distances from the observatory and with different degrees of control. These are called Area A, B, and C. The plan covers all outdoor lights and also indoor lights which can be seen from outside. It does not apply, except on a voluntary basis, to any lights existing when this plan was introduced, however replacements and upgrades must conform to this plan.

How this plan works with other plans

This plan provides more detail about lighting than Coonabarabran Local Environmental Plan 1990, Coolah Local Environmental Plan 2000, or Orana Regional Environmental Plan – Siding Spring. It is consistent with all these plans.

This plan replaces Coonabarabran Development Control Plan No. 2 – Coonabarabran Shire Lighting Code to Protect Siding Spring Observatory. That plan is repealed. Their content is similar, but the new plan adds a Dictionary and a Technical Annex.

International lighting zones for the night-time environment

The zones in this plan are based on international lighting zones developed by the CIE (International Commission on Illumination) which relate light to land uses. These in turn will be used in Australian Standards, although these may adopt a higher standard.
The table below explains the CIE zones.

Zone	*Description*	*Example*
E1	Intrinsically dark	Areas near observatories, national parks, forests, broadacre agriculture (roads unlit)
E2	Low district brightness	Rural residential
E3	Middle district brightness	Towns
E4	High district brightness	Major urban areas (high night-time activity)

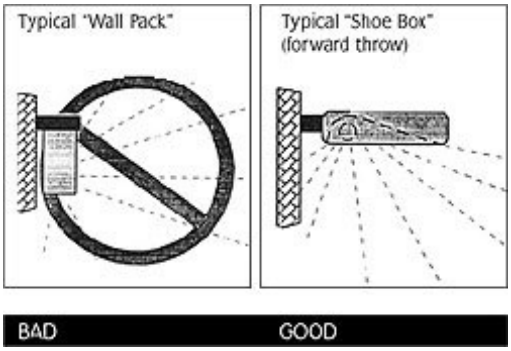
Only the E1 zone occurs in the shire. It is divided into three sub-zones based on distance from the observatory.

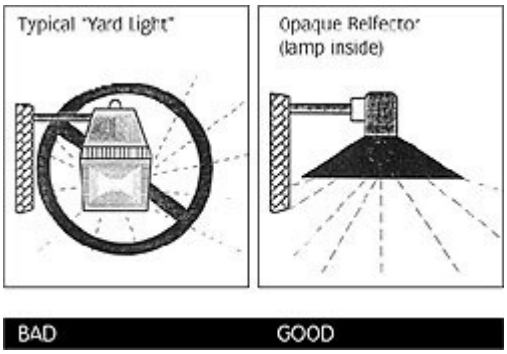
What makes good lighting?

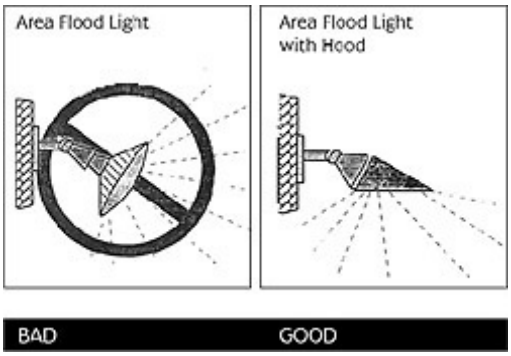
Good lighting –
- Uses the right amount of light for the job (only the amount necessary)
- Directs the light where it is needed (is shielded to avoid annoying neighbours and affecting Siding Spring Observatory)
- Does not create glare (so is safe and helps avoid crime)
- Does not waste energy (so saves money) or needlessly create greenhouse gases.

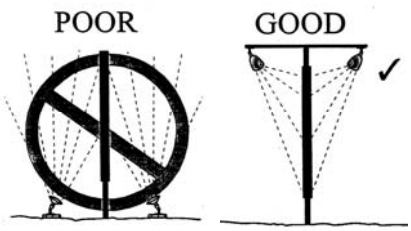
Fully shielded light fixtures, properly mounted, achieve good lighting. They stop light shining where it is not needed and stop it shining upwards. They prevent light trespass.

Examples of poor lighting and good lighting









Advice on lighting

Council staff can help you with advice on all types of lighting. Please ask them before you buy your light fittings.

Council consent and Director's concurrence

A few types of lights are not covered by this plan. See 'Lights that this plan does not cover' below. Normal residential and farm lights over 18 kilometres from Siding Spring Observatory do not need council consent if each is no more than 420 lumens or is a motion sensor light of not more than 1200 lumens, as described in the Technical Annex. The same applies to business, industrial and public lighting.
All other lights need council consent and some need the Director's concurrence. These are -
All lights in Areas A and B
Stronger residential lighting in Area C, including tennis court or area floodlights
All other business and industrial lights in Area C, including illuminated signs and all night businesses.
Lights totalling 15 000 lumens or more per development need the Director's concurrence.

Restricted and prohibited lighting

The number and brightness of lights is restricted in Zones E1a and E1b and some lights are prohibited in all zones. For details please see the Technical Annex at the end of this plan.

Types of Lighting

Street lighting and park and gardens lighting

All new streetlights will have high-pressure sodium lamps, except where it is important for safety to see colours clearly. In this case, metal halide lamps may be used with the concurrence of the Director.
All lights must have fully shielded fittings in Areas A, B, and C.
Park and garden lighting should follow Australian Standard AS/NZS 1158.3.1:1999.
The Australian Standards website is www.standards.com.au.

Sports fields and tennis courts

No sports field or tennis court lighting will be approved in Areas A and B.
In Area C, all sports field and tennis court lighting must have fully shielded fittings, installed so that no light shines above horizontal, to minimise sky glow. There must also be no light trespass to adjacent properties. (See Australian Standard AS 4282 Control of the obtrusive effects of exterior lighting, which deals with this). Indoor sports centres with skylights must prevent light escaping, by using curtains, blinds or shutters.

Security lighting

Good security lighting helps prevent crime, feels safer and is safer. But it needs to be well-aimed and low intensity, to avoid glare and harsh shadows that can hide people and make visibility more difficult. In Areas A and B, security lighting of unattended premises must use a motion detector sensor switch. This is also encouraged in Area C. Fittings must be fully shielded so that no light shines above the horizontal.

Shops, commercial and industrial buildings

Lighting of these buildings must cater for public safety, security and work needs. Under awning lighting must be recessed or integral with the awning. Building facade lighting should be aimed downwards and should be no brighter than necessary, taking account of the surrounding light conditions. When illuminating light coloured surfaces, care should be taken not to over-light them. Unnecessary brightness produces glare which makes it harder for people, especially older people, to see objects and people. This makes areas less safe not more safe. All lights must be fully shielded and only operate during normal business hours. Display lighting in shop windows, and advertising signs, should be switched off at the end of business hours or no later than 11pm. Subdued internal security lighting may operate all night. Special exceptions can be approved for essential all night businesses.

In work areas where recognising colour is important, sodium lights cannot be used. Heritage buildings should use small light sources to accentuate their architectural details without causing unwanted light spill. Two Australian standards are useful for commercial and industrial buildings: AS/NZS 1158 3.1 Pedestrian area (Category P) lighting; and AS 4282 Control of the obtrusive effects of outdoor lighting.

Advertising signs

Illuminated signs add to the liveliness of towns but flashing signs are annoying to neighbours and are unsafe for pedestrians and motorists. They will not be allowed. All signs should be switched off either at the end of business hours or at 11pm, whichever is earlier. Essential businesses which operate all night must have specially approved low output lighting for signs. Bare lamps (eg festoon lighting) must be avoided unless they are completely screened, for instance by an awning.

The best illuminated signs have white or light-coloured lettering on a dark background without reflecting surfaces nearby. These signs are clearer to read and cause less glare, nuisance and stray light. They get their message across better.

Recreational, decorative, promotional and special effects lighting.

These lights are prohibited in Areas A and B. Lasers, searchlights and similar high intensity lights are prohibited everywhere except in emergencies by police or fire personnel, or to gather meteorological data. These lights are ineffective because they can only be seen from a distance but people usually cannot identify where the light is coming from.

Other lights should be fully shielded and well aimed to produce no upward light spill or nuisance to neighbours. They should be turned off at 11pm or before then.

Major developments in rural areas

All development, especially animal feedlots, animal saleyards, grain elevators, mines and gas flares on natural gas fields must take special care with lights to avoid upward light spill and nuisance to neighbours, including motorists. Most of these developments will need to be assessed by the Director.

Short term exemptions for temporary lighting

Temporary lighting is lighting operated for 28 days or less in one calendar year, whether or not the 28 days are consecutive. It includes lighting for televised sporting or other events, or single community events. Anyone may make a written request to the council for a short-term exemption from the requirements of this plan for temporary outdoor lighting. The request for the exemption must contain, as a minimum, the following information -

- Specific exemption requested
- Reason for the requested exemption
- Time period for use of proposed temporary lighting
- Proposed location of outdoor lighting
- Type and use of outdoor fixtures and lights proposed
- Details of screening and aiming of lights
- Total wattage, light output and type of lamps.

In addition to this information, the council may ask for any other information it needs to consider your request. This consideration will be done with the Director. The council will usually accept or reject your request in writing within twenty-one days of receiving it. Reasons for rejection may include special astronomical observations taking place at the time.

To speed up decisions on short-term exemptions the council will delegate its powers to approve them to nominated council staff. All requests not accepted by staff will be referred to the council for a decision. These may take longer than twenty-one days because council meetings are monthly.

Lighting that this plan does not cover

This plan does not cover -

- Lighting that existed prior to this plan, unless 25 percent or more of the lamps and/or fittings in an existing installation will be replaced, or any additional light fittings installed. However, voluntary compliance with this plan for all existing lighting is encouraged and this will help Siding Spring Observatory, neighbours and the community
- All lights on moving vehicles
- Lights on Commonwealth or State Government properties. However, these governments have agreed to comply with this plan
- Fires or fuel lamps, but it does cover lamps with an incandescent mantle, and gas flares on natural gas fields
- Fireworks and Christmas decorations, subject to an 11pm curfew.

Managing lights

Even when lights comply with this plan, you can help achieve dark night skies by managing lights well. This means –

- Shielding or screening outside lights
- Preventing inside lights shining outside. Using heavy curtains, blinds, or shutters and keeping doors closed achieves this. Do not forget skylights
- Preventing lights reflecting from white or other surfaces
- Using the minimum number and size of lights
- Switching lights off when they are not needed
- Installing time switches or, preferably, motion detector switches

Areas in this plan

This plan operates in rings from the observatory. These are shown on the map. These areas are -

Area	*Distance from Observatory* (radius in kilometres)
A	Less than 3
B	3 - 18
C	More than 18 - (includes all urban areas in the shire)

In Areas A and B, all new outdoor lighting (and indoor lighting which can be seen from outside) needs council consent and must be assessed by the Director. Indoor lighting includes lighting shining through skylights.

In Area C, all exterior lights over 420 lumens need council consent (except for complying motion sensor lights up to 1200 lumens), but only applications for lights totalling 15 000 lumens or more need to be assessed by the Director. This includes light from skylights. 15 000 lumens is roughly the amount of light from one 150 watt metal halide lamp. This is explained in the Dictionary and the Lamp Light Output Annex.

Making a development application - what to include

Please discuss your development with council staff before you prepare your application. The staff may be able to save you time, money and worry by helping you make a better application, which can gain a quicker consent. They may be able to advise you on the most suitable types of lights.

Your development application should include -

- Plans showing the location of the development
- Plans showing the location and type of lighting fixtures and their lamps
- A description of the lighting fixtures and lamps, their method of mounting and screening, and their aim. This description may include drawings (including sections where required), excerpts from manufacturers' catalogues and other useful information
- For commercial developments, certified photometric data for all specified lighting fittings. This should also include illuminance values for horizontal and vertical surfaces in the form of computer-generated output
- Where the council considers it necessary, NATA certified photometric data to IESNA standard, on computer diskette or CD.

These plans and descriptions should be sufficient to enable the council to determine quickly whether your application complies with this plan.
For a development application in Area C, the council may waive these requirements for such detailed plans if the total light will be less than 12 000 lumens.
The council will delegate to nominated council staff the power to decide whether a development application qualifies for this waiver.

Dictionary

Baffle An opaque or translucent element to shield a light source from direct view.

Brightness The strength of the sensation that results from the eye viewing the surfaces which the light comes from.

Bulb or lamp The source of electric light. To be distinguished from the whole assembly (see luminaire).

Candela (cd) Unit of luminous intensity. One candela is one lumen per steradian. Formerly called the candle.

CIE Commission Internationale de l'Eclairage. The International Commission on Illumination.

Colour rendering The effect of a light source on the colour appearance of objects in comparison with their colour appearance under a reference source at the same colour temperature.

Cut-off angle of a luminaire The angle measured between the line straight down and the line of sight at which all surfaces of high luminance (of lamps and of the luminaire) just cease to be visible.

Cut-off Luminaire A luminaire that provides a cut-off (shielding) of the emitted light so that no light is emitted above the horizontal. This applies to all lateral angles around the luminaire. This kind of luminaire is often referred to as Full Cut Off (FCO) or Fully Shielded.

Director In this plan, Director means the Director of the Australian National University Research School of Astronomy and Astrophysics, or her delegate.

Fully Shielded See definition for Cut-off Luminaire. If a luminaire is to be used which does not comply with this requirement then some form of permanent physical opaque material must be used to provide the cut-off requirement. This can be a cover or part of a building. Care must be taken to ensure that adjacent surfaces, especially if they are light coloured, are also shielded to prevent excessive reflected light from adding to unwanted sky glow or glare The shielding should be constructed to minimise emission in the 10 degrees below horizontal.

Glare Intense and blinding light. Never helps visibility. This is further described as either **discomfort glare** which, while causing discomfort, does not necessarily diminish visual performance, or **disability glare** which results in reduced visual performance and visibility.

HID lamp In a discharge lamp, the emitted energy (light) is produced by the passage of an electric current through a gas. High-intensity discharge (HID) includes mercury, metal halide, and high pressure sodium lamps. Other discharge lamps are low pressure sodium and fluorescent.

Illuminance - horizontal The density of luminous flux incident on a horizontal surface. The unit is lux (lumens/meter^2).

Illuminance – vertical The density of luminous flux incident on a vertical surface. The unit is lux (lumens/metre^2).

IES – The Lighting Society The Illuminating Engineering Society of Australia and New Zealand. This body is the professional society of lighting engineers, including those from manufacturing companies and others professionally involved in lighting in Australia and New Zealand.

IESNA - Illuminating Engineering Society of North America The US professional society of lighting engineers, including those from manufacturing companies and others professionally involved in lighting. It is the major standardising body for illuminating engineering in the US.

IESNA format One of the recognised electronic formats used to store and present the photometric information which describes the light technical characteristics of luminaries.

Incandescent lamp Light is produced by a filament heated to a high temperature by electric current.

Intensity The degree or amount of energy or light in a given direction(s). The unit is candela (cd).

Light pollution Any adverse effect of artificial light. Often used to denote urban sky glow, but also includes glare, light trespass, visual clutter, and other adverse effects of lighting.

Light trespass Light falling where it is not wanted or needed. The terms Stray Light, Spill Light and Obtrusive Light can also be used to describe this.

Lumen The unit of luminous flux which is the light emitted by a lamp.

Luminaire The complete lighting unit, including the lamp, the fixture, and other parts.

Luminance The amount of light emitted in a given direction from a surface by the light source or by reflection from a surface. The unit is candela per square metre.

Lux One lumen per square metre. The unit of illuminance.

Mounting height The height of the fixture or lamp above the ground.

NATA National Association of Testing Authorities. This is Australia's authority for accreditation of laboratories producing certified reference materials.

Photometry The quantitative measurement of light level and distribution. Strict International and National Standards apply to ensure accuracy.

Photometric Requirements Photometric measurements for describing the light technical characteristics of a luminaire, so that they can be used to assess its performance and to enable accurate design calculations to be made. International Standards apply to ensure accurate presentation.

Reflected Light Not all light which causes sky glow is emitted directly from the luminaire. Reflected light from surfaces illuminated by the luminaire can cause varying amounts of sky glow. Light colours reflect more light than darker colours. When

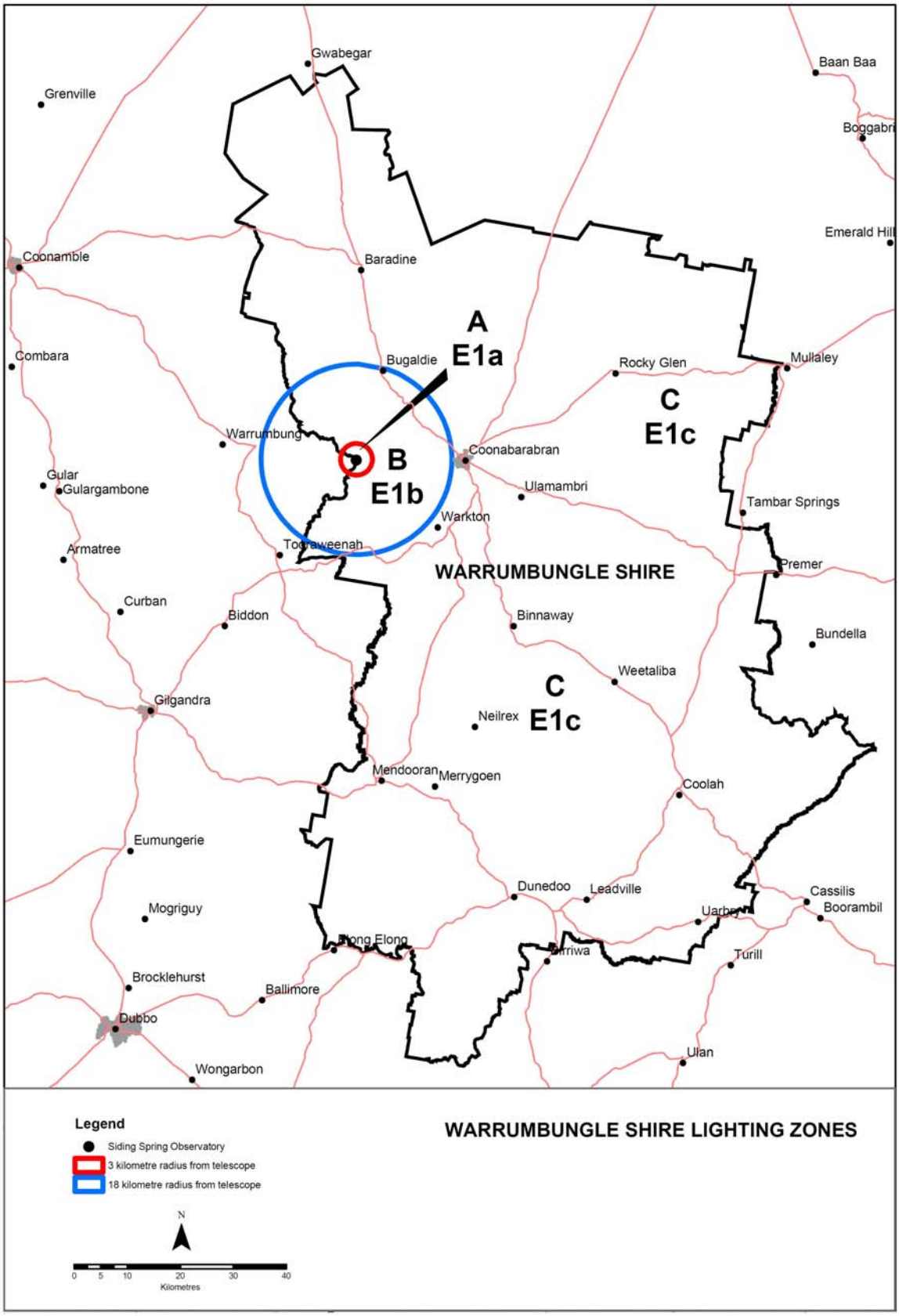
floodlights aimed at a grazing angle illuminate a vertical surface which has a specular (shiny) finish (such as windows), up to 70 percent of the light reaching that surface can be directed into the night sky at an equivalent angle.

Spotlight A fixture or lamp designed to light only a small area.

Steradian Light radiates in a sphere from a single bulb or lamp unless it is modified by a luminaire or baffle. A steradian is the angle, measured at the centre of a sphere, which cuts off an area on the surface of the sphere, that is equal to a square with sides the same length as the radius of the sphere.

Sky glow The brightening of the night sky due to artificial lighting.

Visibility Being perceived by the eye. Seeing effectively. The goal of night lighting.


Gwabegar
Grenville
Baan Baa
Boggabri
Emerald Hill
Coonamble
Baradine
A
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Combara
Bugaldie
Rocky Glen
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Warrumbung
B
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Coonabarabran
Gular
Gulargambone
Ulamambri
Tambar Springs
Warkton
Armatree
Premer
WARRUMBUNGLE SHIRE
Curban
Biddon
Binnaway
Bundella
Weetaliba
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E1c
Gilgandra
Neilrex
Mendooran
Merrygoen
Coolah
Eumungerie
Dunedoo
Leadville
Cassilis
Boorambil
Mogriguy
Uarbry
Turill
Brocklehurst
Ballimore
Dubbo
Ulan
Wongarbon
Legend
Siding Spring Observatory
3 kilometre radius from telescope
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WARRUMBUNGLE SHIRE LIGHTING ZONES

Technical Annex – Warrumbungle DCP No. 1

Introduction

The purpose of this annex is to provide easily understood light technical parameters used in achieving the lighting requirements necessary to control skyglow and obtrusive light. These unwanted and adverse effects of lighting not only interfere with the work undertaken at Siding Spring Observatory but also cause discomfort to residents.

While every effort has been made to simplify the application of this important part of the Development Control Plan, if any queries arise they should be directed to the staff at Warrumbungle Shire Council.

CIE Zoning System

The introduction of the CIE Zoning System follows the acceptance of zoning as a well established base for environmental regulations. This system employs clearly defined environmental zones where limits can be set for both light emission and equipment performance specifications. Only the first (darkest) zone is used in the shire, divided into three sub zones.

Siding Spring is the site of an astronomical observatory of international standing and as such it demands the highest degree of protection. To establish this it is necessary to introduce the 3 sub zones described in this Development Control Plan.
These are -
Area A (0-3km) becomes Zone E1a
Area B (3-18km) becomes Zone E1b
Area C (over 18km) becomes Zone E1c.
The E stands for Environmental.

For the area beyond the 18 kilometre radius to the boundary of the shire, CIE Zone E1c will apply, with limited exceptions for some specific activities. These exceptions will be approved by the Council, in consultation with the Director, after nomination by either the Council or the Department of Infrastructure, Planning and Natural Resources.

Lighting Requirements

Zone E1a 0-3 km

Only two external lighting fittings are allowed for each property. Each lighting fitting must have lamps with a light output of not more than a total of 940 lumens per unit. Refer to the Lamp Light Output Annex for lamps which will comply with this requirement. All fittings must have an opaque top and/or shielding to prevent any light being emitted above the horizontal, thus complying with the Fully Shielded definition. Where aiming is possible any adjustment must be such that no light is emitted above the horizontal.

In order to prevent sky glow, glare and unwanted light trespass, the lamp (light source) in the luminaire (lighting fitting) shall not be directly visible when viewed by a person standing 4 metres from a point directly below the unit.

Where permitted, any lighting fitting employing an internal reflector type lamp must be shielded so that no light is emitted above the horizontal. Downlights must be deeply recessed with effective low glare baffles.

The use of any other spot lighting luminaires or floodlights of any type is prohibited in this zone. Bollard lights are also prohibited.

Any structural part of the luminaire or the surrounding material providing the cut off must be securely and permanently fixed. Where the luminaire is bracket mounted from a white or similar highly reflective surface, the light emitting surface of the luminaire facing the wall must be rendered opaque in a permanent manner, to reduce the amount of light reflected from the wall.

If intended as a security light during periods of non attendance etc, such luminaries must be fitted with a motion detector (sensor) switch rather than used continuously. Such a switch should be configured to shut off the luminaire a maximum of 5 minutes after activation.

In order to prevent light escaping through doors, windows and skylights into the night sky, the installation of heavy duty blinds, curtains or shutters is essential and the use of high powered interior lighting is prohibited.

All exterior lighting other than that specified above is prohibited. Note that this includes temporary decorative lighting and post top (bollard) lighting. Sign lighting and sports lighting of any type are also prohibited in this zone.

Zone E1b 3-18 km

Exterior lighting is limited to a total of 4 luminaires (lighting fittings), each with a single or multiple lamp combination producing not more than a total of 1800 lumens per unit. Refer to the Lamp Light Output Annex for lamps which will comply with this requirement. All units must have an opaque top and shielding to prevent any light being emitted above the horizontal, thus complying with the Fully Shielded definition. Where aiming is possible any adjustment must be such that no light is emitted above the horizontal.

Any structural part of the luminaire or the surrounding material providing this cut off must be permanently fixed. Where the luminaire is bracket mounted from a white or similar highly reflective surface the light emitting surface of the luminaire facing the wall must be rendered opaque in a permanent manner to reduce the amount of light reflected from the wall.

In order to prevent sky glow, glare and unwanted light trespass the lamp (light source) in the luminaire shall not be directly visible when viewed from a standing position 4 metres from directly below the unit.

If intended as a security light during periods of non attendance etc, such luminaries must be fitted with a motion detector (sensor) switch rather than used continuously. Such a switch should be configured to shut off the luminaire a maximum of 5 minutes after activation.

Any lighting fitting employing an internal reflector type lamp (maximum light output of 1300 beam lumens) shall be shielded (see above) so that no light is emitted above the horizontal and in any case must be fastened so that it cannot be aimed above 45 degrees below the horizontal.

Any dedicated flood lighting luminaire must be of the full cut off (horizontal glass) type and shall be fastened to prevent it from being aimed above the horizontal.

Post top, bollard or similar luminaires which are to be mounted along driveways or at entrances to properties in this zone are discouraged even if they comply with the light distribution requirements detailed above. But if used they must be included in the total number of luminaires specified in this sub zone and shall be limited to using lamps with a maximum output of 600 lumens. A curfew of 11pm applies.

Sign lighting and sports lighting of any type is prohibited.

Zone E1c over 18km

All luminaires with a light source(s) producing more than 420 lumens must be fully shielded to ensure that no light is emitted above the horizontal. Unshielded luminaires fitted with lamps exceeding 420 lumens but less than or equal to 1200 lumens are permitted provided that they are activated by a motion sensor of the type in which fail safe is 'off', they are located to prevent glare and light trespass, and they have a total activation time of 5 minutes maximum.

Any luminaire which employs a lamp with a light output exceeding 1200 lumens must either be fully shielded or have a full cut off light distribution characteristic.

All floodlights and similar area lights – no matter for what application – must have a full cut off light distribution characteristic and be aimed so that no light shines above the horizontal.

Property owners (including residential) must be aware of the location and direction of light so as to minimise glare and light trespass impacts onto neighbouring property and/or public thoroughfares etc. Property owners must also comply with other requirements to protect the night time environment.
Great care must be exercised in the selection of lighting fittings and their use in all applications, small or large. (Please see the illustrations above).

All lighting fittings, except as detailed above, or specially approved for specific applications, must not emit light above the horizontal.

Exceptions include building façade lighting which is permitted subject to the following restrictions -

(a) Upward aimed building façade lighting which must not exceed 1800 lumens with the luminaires being fully shielded, and fully confined from projecting light into the sky, by eaves, roofs, or overhangs combined with special luminaire shielding
(b) Where luminaire light output exceeds 1800 lumens, all lighting must be fully shielded, aimed downward and restricted to illuminating only the nominated vertical wall surface. Light trespass beyond the nominated surface is not permitted.

Heritage buildings should be lit with small light sources to highlight their architectural details.

Any luminaire which emits light above the horizontal for decorative purposes is prohibited eg ground level lights illuminating trees.
However, small cottage style business identification signs may have single, small, low-powered lights shining up, but only if they are carefully directed onto the sign without spill light.

All lights totalling15 000 lumens or more on a development need to be assessed by the Director. Also, lights added to an existing development site that take the total over 15 000 lumens must be assessed by the Director.

Signs
The most easily read signs have white or light–coloured lettering or logos on a dark background that covers most of their area.
No flashing or moving signs are permitted.
All signs must be turned off when a business closes or at 11pm, whichever is earlier. Special exceptions can be made for essential all night businesses. These applications must be referred to the Director.

Australian Standards
Compliance is necessary with the current requirements of -
AS 4282 Control of the obtrusive effects of outdoor lighting and
AS/NZS 1158 Road lighting series.

Restricted and Prohibited Lighting in all Areas

The operation of searchlights (including xenon types used for advertising purposes) and lasers is prohibited. So are all upward-directed floodlights including those associated with advertising signage and billboards, except for small cottage style business identification signs.

Non cut off (unshielded) floodlights used for sports lighting and showground activities are also prohibited, although application can be made for special temporary installations associated with major community events.

The use of exposed linear lamps – including fluorescent, cold cathode (neon lighting and signage) and light emitting diodes (LEDs) – primarily intended as an architectural feature or for advertising, is also prohibited except for approved signage.

Compliance Requirements

Lighting Plans and Supporting Information.

A lighting plan must be submitted with any Development Application for a development that includes lights. This plan should include the following for all types of installations -

1 A scaled site plan plus plan and elevation(s) of buildings included in the installation. This should preferably show adjacent property details.

2 The location and mounting height of all proposed and existing luminaires.

3 The type of light source with power (watts) and light output (lumens).

4 The general style of each luminaire type with a copy of the manufacturer's catalogue information sheet and where necessary the photometric information in digital form from a NATA accredited laboratory, preferably in IESNA format.

5 Details of all shielding necessary to meet the requirements of this document, including those incorporated in the luminaire construction.

6 For area and sporting floodlight installations the results of computer based calculations performed by using a recognised calculation program, as required by the relevant Australian Standards, must be submitted. This includes showing compliance with AS 4282 Control of the obtrusive effects of outdoor lighting.

Replacing Light Fittings

If any existing, non-complying external light fitting is replaced, it must be replaced with a complying fitting. If 25 percent or more of these are replaced at any development site, then all must be replaced. If an existing, non-complying external light fitting can be made to comply by replacing the lamp (light source) with a different type, then this must be done when the lamp fails.

Lamp Light Output Annex

To assist you to select complying lamps for Areas A (Zone E1a), B (Zone E1b) and C (Zone E1c), the following table provides typical light output information of some most-used types. Note that the parameter 'Beam Lumens' applied to reflector lamps is specifically excluded from this list.

Area A (ZoneE1a) 0 to 3 km from the Observatory

Compact Fluorescent Lamps

5W Compact Fluorescent lamp	=	250 lumens
7W Compact Fluorescent lamp	=	400 lumens
9W & 10W Compact Fluorescent lamps	=	600 lumens
11W & 13W Compact Fluorescent lamps	=	900 lumens

General Lighting Service (GLS) Incandescent Lamps

25W Incandescent lamp	=	225 lumens
40W Incandescent lamp	=	420 lumens
60W Incandescent lamp	=	700 lumens
75W Incandescent lamp	=	940 lumens

Area B (ZoneE1b) 3 to 18 km from the Observatory

The following list is not intended to be a complete itemisation of all applicable lamp types for this zone and it is additional to those listed above for Zone E1a . This list is intended to provide some guidance but the light output of unlisted types should be checked before specification or purchase. Note that the parameter "Beam Lumens" applied to reflector lamps is specifically excluded from this list.

Compact Fluorescent Lamps.

18W Compact Fluorescent lamp = 1200 lumens
26W Compact Fluorescent lamp = 1800 lumens

Tubular Fluorescent Lamps

14W Tubular Fl. lamp (T5) = 1350 lumens
18W Tubular Fl. lamp – Standard = 1150 lumens
18W Tubular Fl. lamp – Tri-Phosphor = 1350 lumens

General Lighting Service (GLS) Incandescent Lamps

100W Incandescent lamp = 1360 lumens

Area C (Zone E1c) over 18 km from the Observatory

The following list gives some lamp types with outputs close to the threshold outputs for this zone.

7W Compact Fluorescent lamp = 400 lumens
40W Incandescent lamp = 420 lumens
18W Tubular Fl. Lamp – Standard = 1150 lumens
18W Compact Fluorescent lamp = 1200 lumens
26W Compact Fluorescent lamp = 1800 lumens