



AS/NZS 4282:2023

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AS/NZS 4282

Control of the obtrusive effects of outdoor lighting

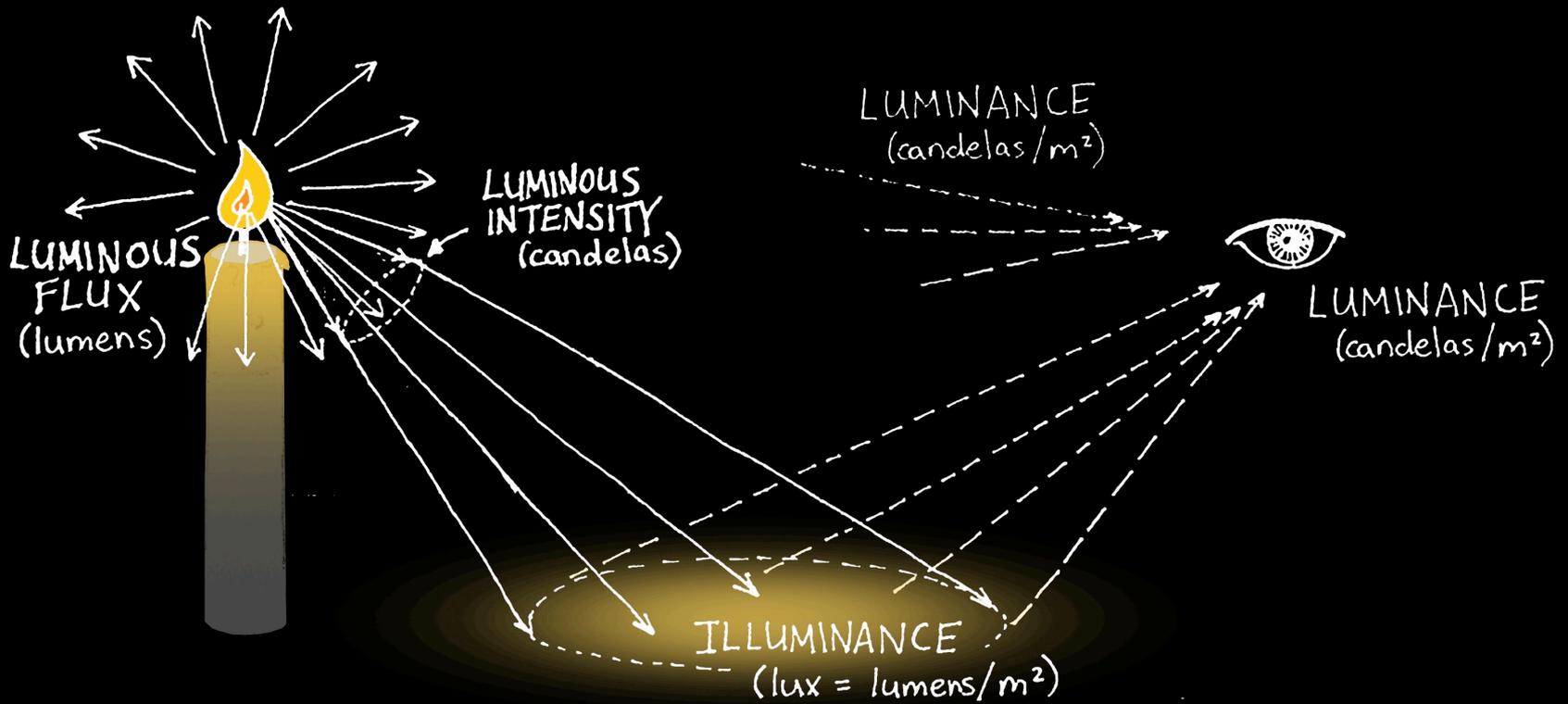
- The pre-eminent standard for controlling artificial light from external installations at night
- First Published 1997- Primarily focused on floodlighting (excluded signage)
- Updated in 2019 with increased scope, including signage, facades and other installations
- New Revision published **3 November 2023** after 3 years of committee work including 2 rounds of public comment



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Lighting Terminology and Units



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Control of the obtrusive effects of outdoor lighting

The Standard covers 5 “Specific Effects”:

- Effects on Residents
- Effects on transport system users
- Effects on transport signalling systems
- Effects on the night sky (sky glow)
- Effects on the Environment

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1. Effects on Residents

- Spill Light into “habitable rooms” of dwellings (Illuminance)
- Direct view of light sources (Luminous Intensity)
- Changes in luminance from variable content



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2. Effects on Transport System Users

- Includes road users, pilots, water craft operators, train drivers
- Disability Glare – the reduction in the ability to see objects against the background caused by bright light sources (Threshold Increment)



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3. Effects on Transport Signalling Systems

- Disability Glare reducing visibility of signals OR
- Visual Clutter - eg backgrounding of traffic signal lights by signage (Visual Clutter is typically addressed by Traffic Consultant)



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4. Effects on the night sky (sky glow)

- Effects on Astronomical Observations
- Cultural impacts eg- First Nations “Sky Country” gazing
- Impact on flora and fauna eg - navigation



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5. Effects on the natural environment (NEW)

- Behavioural and physiological changes in animals and plants
- In all habitat types - land, air and water
- Can be affected by very low levels of light – eg the moon



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Significant changes



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Significant changes include:

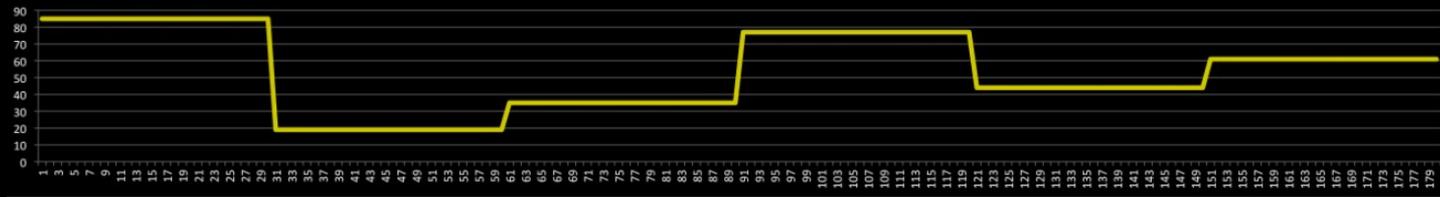
- Environmental receivers are now considered under the Standard. This change recognizes the impact that artificial light at night can have on plants, animals and ecosystems.
- The same limits in the standard that apply to human receivers apply to environmental receivers
- Calls for an Environmental Impact Assessment for protected species where appropriate (though outside scope of AS4282 document)



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Significant changes include:



- Altered requirements to address changing of light levels caused by different displayed images on digital signage
- 30% Average Luminance change between successive images requirement removed (Clause 3.3.5.4 of AS4282:2019)
- New requirements for signage that displays “dynamic content”

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Significant changes include:

- New upward waste light requirements to limit sky glow and light pollution

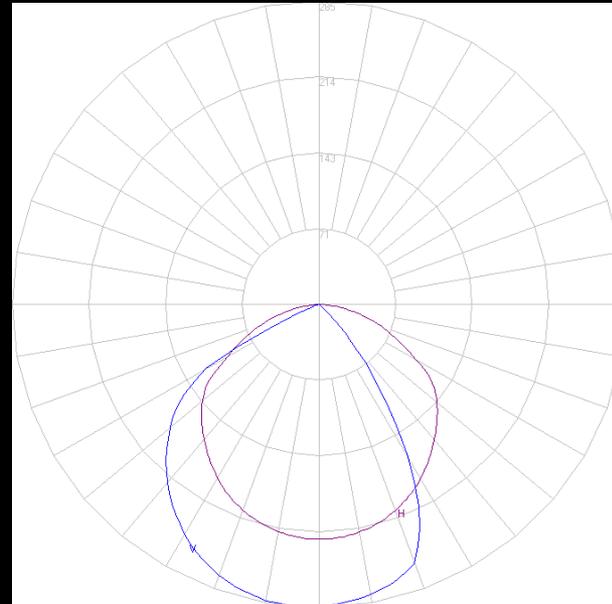
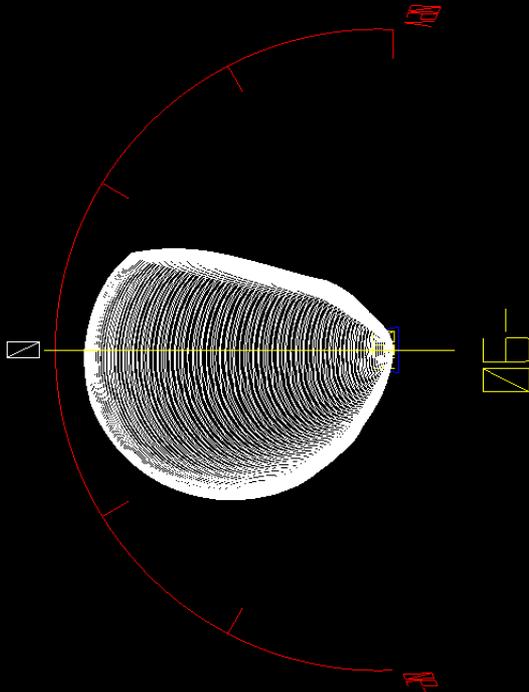


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Significant changes include:

- Signage Manufacturers required to provide electronic **photometric data** (*.ies) accurately describing the light distribution
- Requires testing in a certified photometric lab



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Significant changes include:

- Changes to environmental zone definitions
- The environmental zone for a lighting system/affected property shall be based on the current zoning for future development of the area **irrespective of the level of current development.**
- NOT reliant on existing ambient lighting level!
- Changes to locations of calculation grids – the introduction of ‘buffer zones’ in environmentally sensitive areas



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Significant changes include:

- Requirements for externally illuminated (floodlit) billboards



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Significant changes include:

- Changes to what can be used as obstructions (to block light)



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New Exclusions to scope:

Environmental impact assessment/s are beyond the scope of AS4282.

“Where protected entities are likely to be significantly impacted by artificial light, a risk-assessed and adaptive management approach should be undertaken to assess the impacts to protected species or ecological communities.”

An Environmental Impact Assessment may be required as part of your application.



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New exclusions include:

- Lighting for entertainment and festivals that is designed for a performance or an event that operates outside of curfew hours, and for a regularly occurring event that operates for an interval of not more than 30 min each night.
- Temporary lighting other than that stated above, operating for less than one month (**unless specified by the relevant authority**)

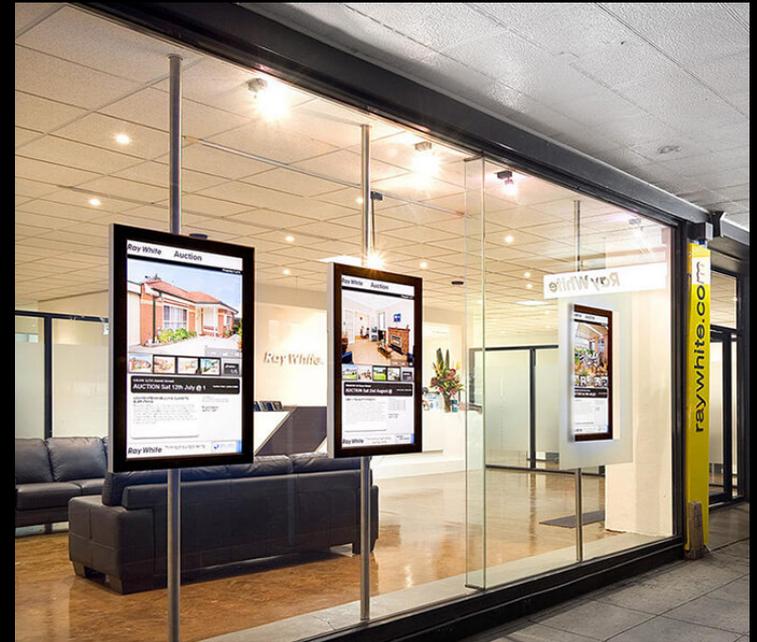


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New exclusions include:

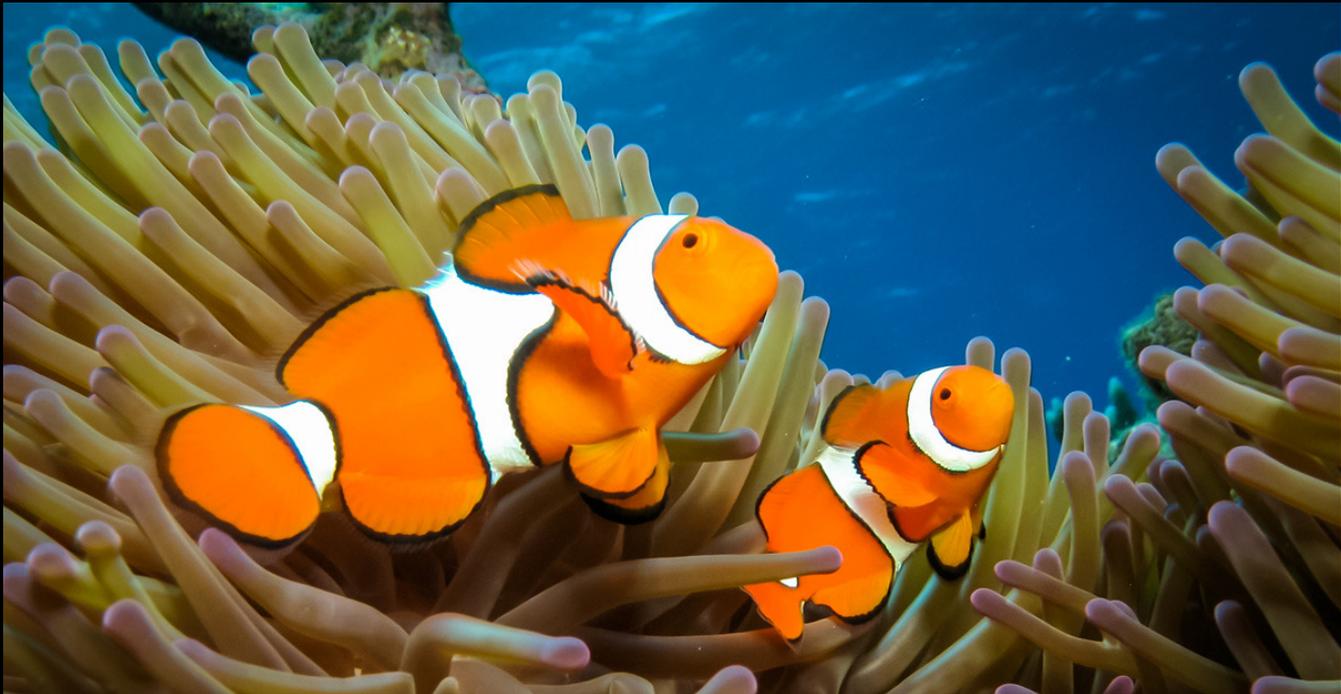
- Where an internally illuminated/digital sign operates during non-curfew operation only, the lighting requirements do not apply if the total illuminated area is less than or equal to 0.25m².
- During curfewed operation, the lighting requirements do not apply for signs with an illuminated area less than or equal to 0.05m².



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Effects on the Natural Environment



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Effects on the Natural Environment

- Environmentally Sensitive Area (ESA) -
area of ecological value including, bushland, waterways and marine and coastal areas

Note 1 : These areas may be in any environmental zone and include areas that are unlit and should remain dark to provide refuge for flora and fauna that require naturally dark environments. **These may include green/black-belts through urban environments.**



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For luminance of lit vertical surfaces (signs), the environmental zone shall be selected for the lighting system and/or for each affected property and in accordance with the following:

- The luminance shall be assessed based on the environmental zone of the lighting system (**not based on the background**)
- Where internally illuminated/digital signs are proposed to be installed abutting an ESA, the environmental zone for the assessment shall be the zone of the site that the sign is located; **however an assessment of the specific nature of the sensitive area shall be made to address the specific impact on any endangered flora and fauna in the specific area affected by the sign.**
- **Pre-curfew limits not allowed to be used for ESAs**, only the more stringent curfew limits
- Our Lighting Impact Assessment Process excludes Environmental Impact Assessments

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Effects on the Natural Environment

- Appendix C of AS4282 includes information on environmental self Assessment

C.3 Self-assessment of whether an action should be referred under the Australian Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environment legislation. For the purposes of the EPBC Act, a self-assessment should be undertaken to determine whether a proposed action will need formal assessment and approval under the EPBC Act. A referral will be the principal basis for the Minister's decision as to whether approval is necessary.

Below is a list of Australian Government resources that can assist in determining whether or not lighting projects may need to be referred under the EPBC Act. In accordance with the EPBC Act, it is an offence to have a significant impact on a [Matters of National Environmental Significance](#) (MNES).

The resources are as follows:

- (a) To determine whether lighting that is visible outdoors is likely to have a significant impact, the [Environment assessment and approval process](#) for understanding how the EPBC Act may or may not apply.
- (b) The department's [Protected Matters Search Tool](#) for generating a report that summarizes [MNES](#) that may occur in, or adjacent to, your project area.
- (c) The [Species Profile and Threats Database \(SPRAT\)](#) for finding out more information about protected species and ecological communities.
- (d) The [Significant Impact Guidelines](#) 1.1 can assist in deciding whether the proposed project is likely to have a significant impact on the environment.
- (e) Where artificial lighting may potentially have a significant impact on a MNES, the [CMS Light Pollution Guidelines for Wildlife](#) provides a risk assessed and adaptive management approach to managing light for the benefit of listed species and ecological communities.

For any lighting project where light is visible outdoors the risk assessed and adaptive management approach described in the CMS [Light Pollution Guidelines for Wildlife](#) can be used by anyone.

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- Based on the zoning of the sites adjacent to the lighting system and any environmentally sensitive areas *it may be necessary to consult appropriate persons with competence in the field of environmental assessment to determine the potential effects of a specific proposal.*



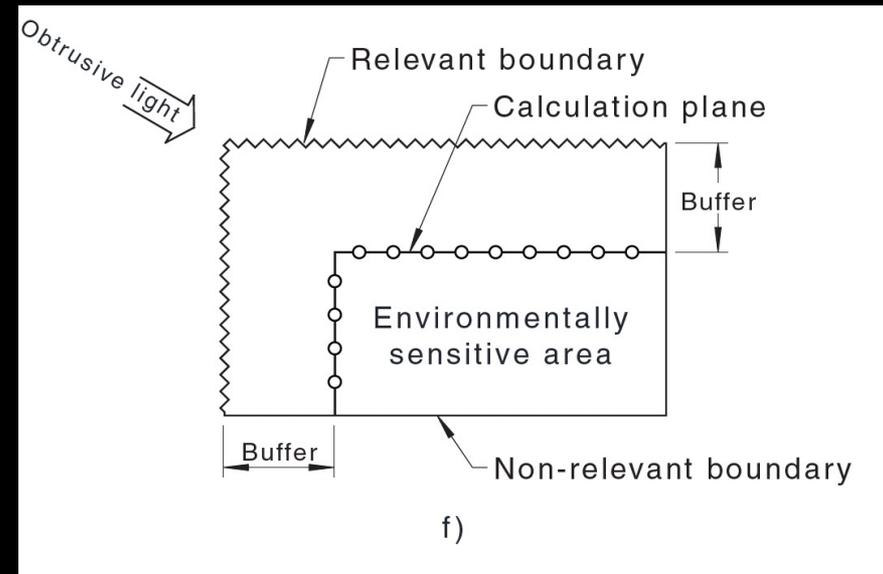
- Council/ The Authority may request an Environmental Impact Assessment
- While AS4282 (and our Lighting Impact Assessments) exclude Environmental Impact Assessments for protected species, **this does not override regulatory and environmental legislation.**

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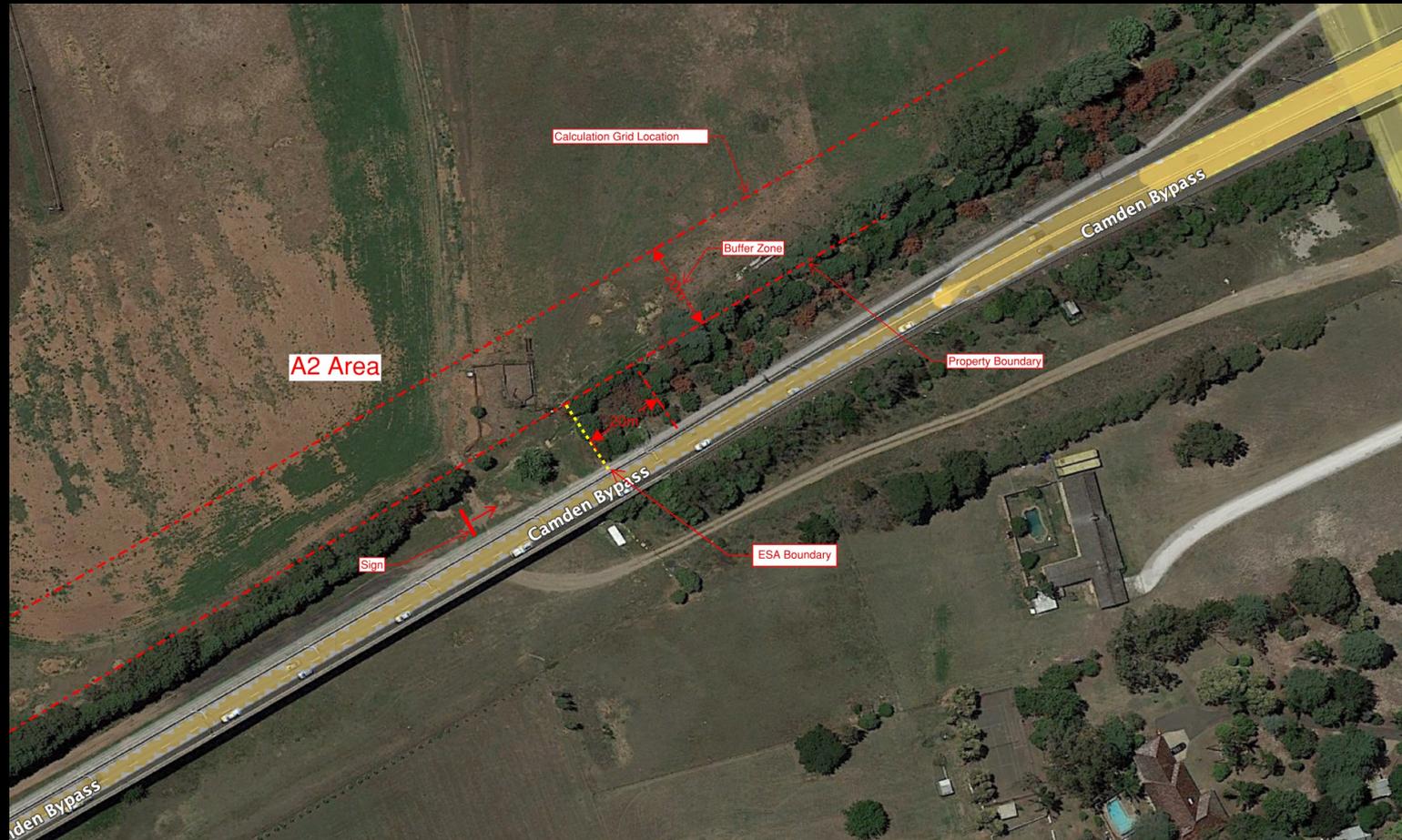
Effects on the Natural Environment

- For ESAs the location of the calculation plane is generally determined at a distance inside of the relevant boundary.
- For A0, A1 or A2 ESAs the calculation plane/s shall lie along a line that is **no greater than 10 m from all relevant boundaries**.
- Where an internally illuminated sign is located in an A2 area, the calculation plane/s shall lie along a line that is **no greater than a 20 m buffer zone** from all relevant boundaries.



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- For A3 or A4 ESAs, the buffer zone can be up to 50 m, provided that the width of the buffer zone is less than 10 % of the overall depth of the ESA as measured inwards from the relevant boundary.

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Dynamic Content



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Dynamic Content

- New definition for signs that display “dynamic content”
- *where the luminous image, pattern, colour or direction of light changes over an interval of **less than 60 seconds***

AND IF:

- The sign is located **within 100 m of a residential dwelling** with views to the content
- Then the spill lighting limits from Dynamic Content signs into residential properties is **50% of the usual maximum**



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Table 3.2 — Light technical parameter limits

Zones	Maximum vertical illuminance (E_v) lux		Threshold increment (TI)		Upward Light Ratio
	Non-curfew	Curfew	Maximum TI %	Default Adaptation level (L_{ad}) cd/m^2	Maximum ULR_S or ULR_L
A0	0 ^a	0.0	N/A	N/A	0.00
A1	2 1	0.1 0	20	0.1	0.00
A2	5 2.5	1 0.5	20	0.2 ^b	0.01
A3	10 5	2 1	20	1	0.02
A4	25 12.5	5 2.5	20	5	0.03
TV	N/A	N/A	20	10	0.08

^a For A0, E_v shall be as close to zero as practicable without impacting safety considerations.

^b For an internally illuminated sign in a A2 zone, $L_{ad} \leq 0.25 \text{ cd/m}^2$

DYNAMIC <60 secs dwell time & within 100m of dwellings

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Effects on the night sky & Environment



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Upward Light Ratio (ULR)

The upward light impact of lighting of signage shall be assessed as individual items as follows:

- Internally illuminated signs and other internally illuminated objects shall have a **ULR of ≤ 0.50** (must be vertical or tilted downwards)
- Digital signs shall have a **ULR of ≤ 0.45** .
- Externally lit signs shall be lit from the top and shall have a ULR no greater than that specified in Table 3.2.



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Table 3.2 — Light technical parameter limits

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	Non-curfew	Curfew	Maximum TI %	Default Adaptation level (L_{ad}) cd/m^2	Maximum ULR_S or ULR_L
A0	0 ^a	0.0	N/A	N/A	0.00
A1	2	0.1	20	0.1	0.00
A2	5	1	20	0.2 ^b	0.01
A3	10	2	20	1	0.02
A4	25	5	20	5	0.03
TV	N/A	N/A	20	10	0.08

^a For A0, E_v shall be as close to zero as practicable without impacting safety considerations.

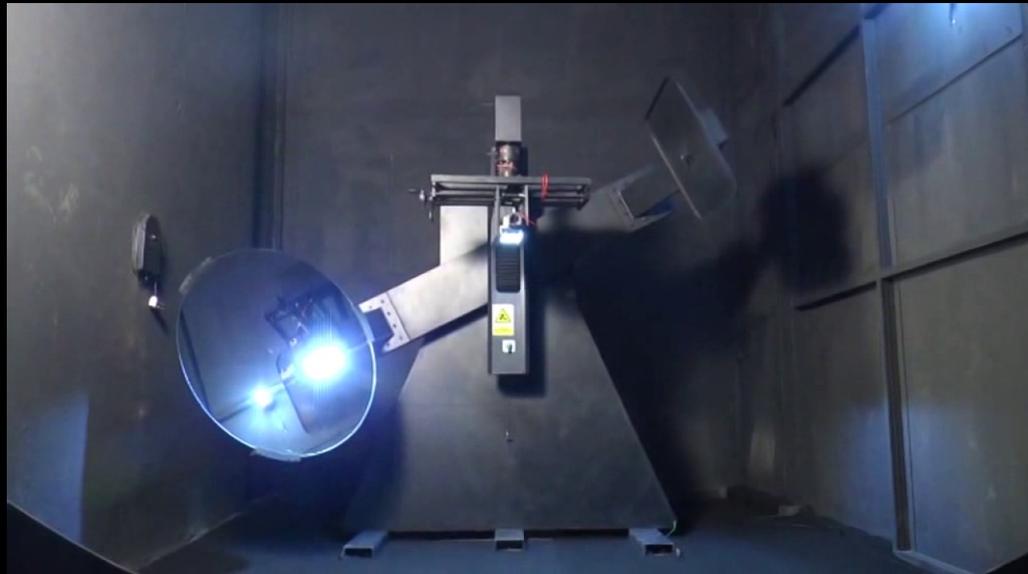
^b For an internally illuminated sign in a A2 zone, $L_{ad} \leq 0.25 \text{ cd/m}^2$

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Upward Light Ratio (ULR) for digital signs:

- Signage Manufacturers required to provide electronic **photometric data** (*.ies) to demonstrate compliance with ULR of ≤ 0.45 .
- Requires testing in a certified photometric lab for signage with integral louvres
- Each model with different lighting performance/viewing angle needs to be tested
- Time and costs associated with this testing
- Some manufactures have this information already

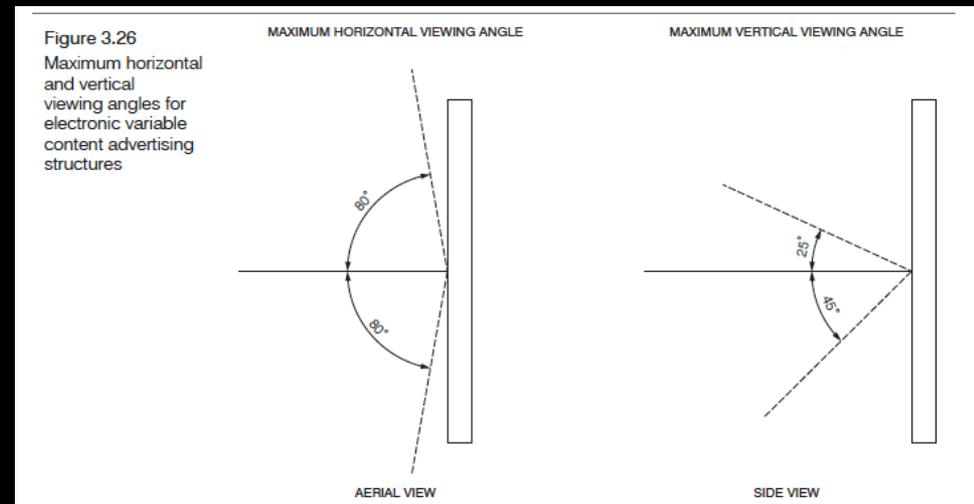
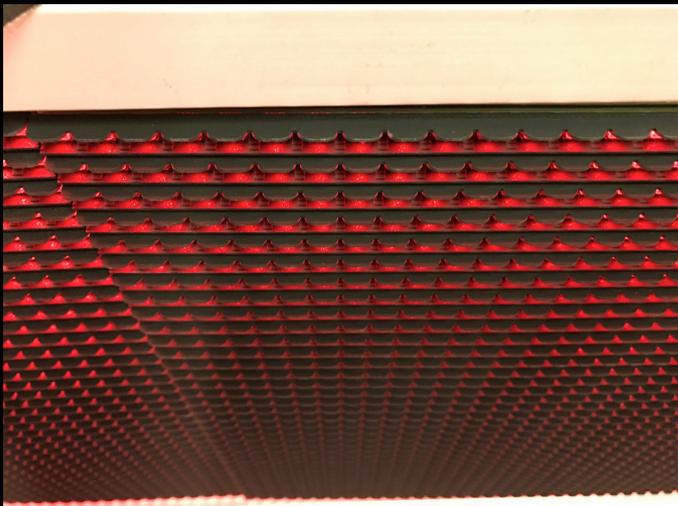


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Upward Light Ratio (ULR) for digital signs:

- Where digital sign has integral louvres (eg large scale billboard) the design of the integral louvres inside the digital signage determines the ULR



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Upward Light Ratio (ULR) for digital signs:

- Where a digital sign has no louvres (for eg – LCD screen in bus shelter) an awning or top mounted hood is required to get to $0.45 > \text{ULR}$.
- The lighting designer can assist in determining size of hood/awning



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Another pathway for compliance with ULR for digital & backlit signs is to tilt the sign downwards (approx 6 degrees)

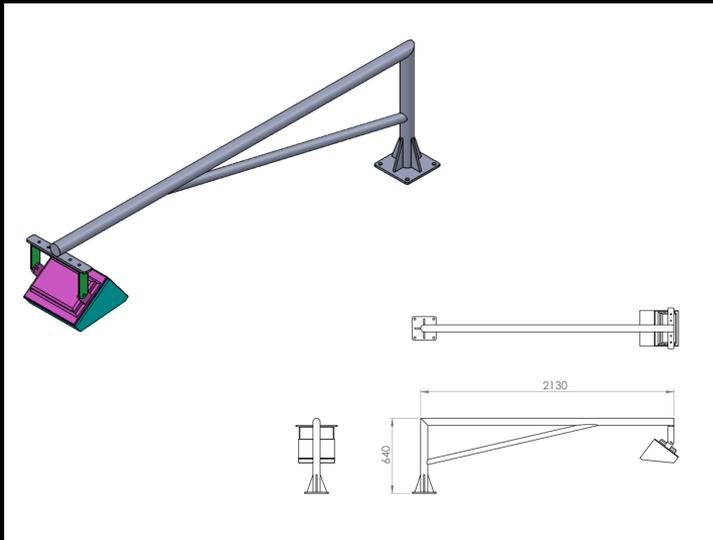


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Upward Light Ratio (ULR) for floodlit signs:

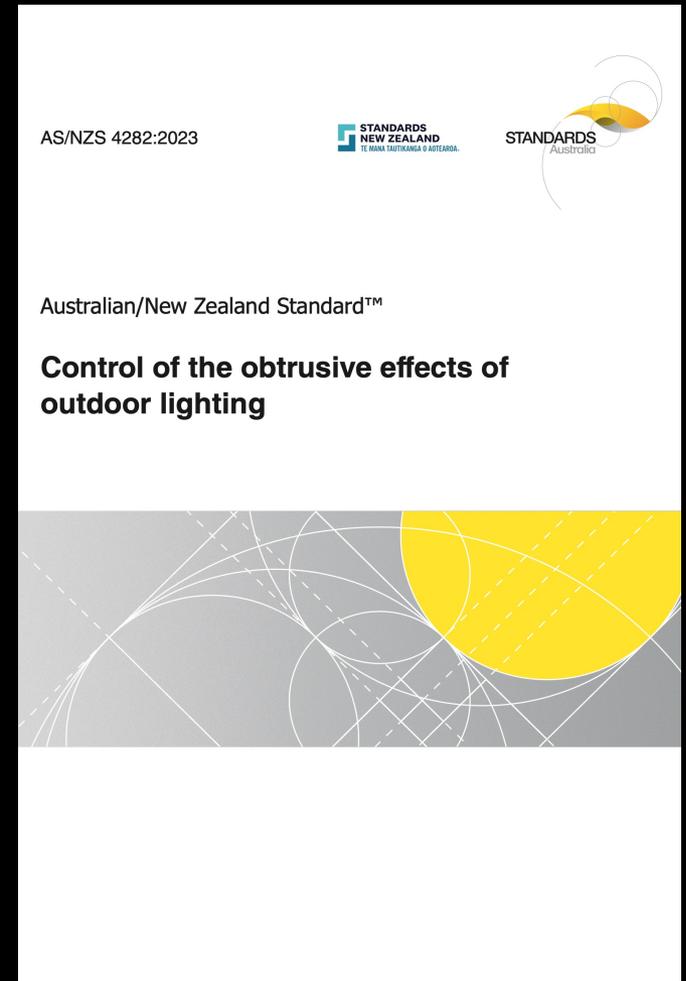
- Floodlights must be mounted at the top of the sign
 - Floodlights should be “full cut off” **asymmetric** (horizontal- not tilted up)
- OR
- Where tilted, baffles/glare shields need to be fitted to ensure compliance with uplighting requirements
 - Lighting Suppliers/Manufacturers should be able to assist with this



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Other important changes



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Obstructions

Trees and foliage may be considered as obstructions provided that —

- they are evergreen;
- the obstruction comprises one or more tree or plant that achieves a transmission factor of <0.2 ;
- the light sources are not visible through the tree or plant; or
- the trees and plants are sufficiently developed at the initial operation of the lighting to achieve the level of obstruction assumed in the conformance certification.



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Updated Environmental Zone Descriptions

Environmental zones	Ambient light conditions	Descriptions/ Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA: Dark Sky Parks, Reserves or Sanctuaries Major optical observatories Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
A1	Dark	Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) Generally roadways without streetlighting through rural areas
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas Generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A3	Medium district brightness	Suburban areas in towns and cities Generally roadways with streetlighting through suburban, rural or semi-rural areas
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and Port areas Transport Interchanges
TV	High district brightness	Vicinity of major sport and event stadiums during TV broadcasts
NOTE Zones A0 and A1 would normally have a minimum area of 50 ha.(0.5 km ²). There may be smaller environmentally sensitive areas.		

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Changes to assessment methodology

- A lighting system shall be counted as a stand-alone installation. Where there are lighting installations on several properties their impact may be assessed independently of each other.

However:

- Where the lighting installation site contains existing lighting, the vertical illuminance from the existing lighting installation **should** be allowed for in the assessment.
 - SHOULD wording is **not mandatory** but “holds weight”
- The allowance may be based on site measurements, design simulations, or the application of a lower maximum illuminance limit.

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Example of existing installation with new lighting



For neighbouring house Impact:

- can be modelled, measured or **lower category (easiest)**
- For eg – House Zone changed from A4 to A3

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What does this all mean?



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Time to embrace new ideas



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New thinking and approach is required

- Smarter signage design
 - Location, orientation, tilt etc
 - Adaptive luminance for pre-curfew/curfew
 - Dynamic Dwell times (eg 60+ secs during curfew if needed)
- Work with digital signage suppliers on new requirements
 - Select correct louvres and viewing angles
 - Photometric files and testing
 - Use of hoods or awnings for digitals without integral louvres (eg LCD)



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New thinking and approach is required

- Work with flood light suppliers on new requirements
 - Top mounted floodlights only
 - Install “full cut-off” fittings or fit with baffles



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New thinking and approach is required

- Install away from ESAs where possible
- Orient signage away from habitats and towards the road
- Use trees, fences or other obstructions to block obtrusive light to ESAs or dwellings



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Thank you!