

*Section ¹	*Section Identifier	Paragraph/ table/ figure/ commentary/ note	*Comment Type ²	*Page No	*Comment Detail	*Proposed Change
Foreword	Foreword	6	General	4	Paragraph 6 states “ <i>Research indicates that the limiting values of illuminance at windows and of the intensity of bright light sources, necessary to satisfy the large majority of people as being at all times unobtrusive, are rather low.</i> ” This is a claim with which I, at least, am previously unfamiliar, so I think it should be properly sourced. There are other statements in the same paragraph that also seem to need some supporting references; otherwise they sound arbitrary.	Add a reference supporting the claim.
Foreword	Foreword	10	General	5	Paragraph 10 states “ <i>Public lighting has been included in this Standard; however, different limits have been applied in recognition that such lighting is provided to facilitate all-night safety and security for the public at large.</i> ” It’s unclear to me whether providing such lighting is a legal obligation of local/regional councils, state or national governments. I don’t disagree that these are the goals of providing the lighting, although <u>there is no unambiguous, peer-reviewed scientific evidence suggesting that the use of outdoor lighting discourages perpetration of either property or violent crime during overnight hours.</u> But it should be clear whether this is a legal expectation of governments, or whether they elect to provide this lighting of their own volition.	Drop mentions of ‘security’ as a legitimate purpose for the use of outdoor light at night so as not to sanction such uses.
Clause	1.1	4	General	6	The fourth paragraph states: “ <i>Due to the diversity of biota throughout Australia and New Zealand and minimal information on thresholds and behavioural response of species to artificial light, the effect of</i>	Provide a better justification for deciding against considering non-human impacts of outdoor lighting under the broad definition of ‘obtrusive lighting’.

¹ Options include: Clause, Title, Table of Contents, Preface, Foreword, Introduction, Appendix, Bibliography or Index.

² Options include: Editorial, General or Technical.

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					<i>obtrusive light on fauna is not covered within the normative parts of this Standard.</i> While the organization is free to define 'obtrusive light' as it pleases, and it may choose to disregard aspects of 'obtrusive light' that are not human-centric in nature, I think it is disingenuous to suggest that there is "minimal information on thresholds and behavioural response of species to artificial light." There are plenty of studies in the literature, some of which pertain specifically to species found in Australia and New Zealand. It is therefore wrong to suggest that ecological impacts should not be considered in this document specifically because of some perceived lack of scientific data on the subject.	
Clause	1.4.9		General	8	In the definition of 'obtrusive light', the umbra of the definition should include light that limits the visibility of the night sky if the sky is considered a common public resource. Inability to see the natural night sky due to artificial light could, in some people, cause <i>"annoyance, discomfort, distraction or a reduction in the ability to see essential information."</i> If you <i>don't</i> intend to define it thusly, then you should explicitly say so somewhere in the document.	Provide a better justification for deciding not to address public access to the night sky in the context of an extended discussion of 'obtrusive light'.
Clause	1.3.11		General	8	Why are other forms of lighting (e.g., of purely aesthetic qualities) excluded from this definition? There are certainly installations of light on public property whose arguably sole purpose is aesthetic in nature, and does not address public <i>"safety and security"</i> . Furthermore, why are <i>"off road car parks"</i> specifically exempted from the definition?	Justify why outdoor lighting serving no obvious 'safety' or 'security' function are excluded from the definition of "public lighting".
Clause	1.4.17		General	9	In both scientific literature and everyday usage, no distinction is made between <i>"natural sky glow"</i> and <i>"artificial sky glow"</i> . It is just not conventionally used in the sense here. "Sky glow" generally refers to light in the night sky from anthropogenic sources. Experts	Drop instances of "sky glow" that refer to anything other than anthropogenic light scattered back to the ground by the atmosphere.

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					don't refer to natural sources of light in the night sky (starlight, moonlight, aurorae, etc.) as "sky glow". Inclusion of natural light in this section undercuts the distinctly anthropogenic source of light contained in the term "sky glow" as the term is commonly used. Also note Clause 2.4.4(1), page 11 ("Lightening of the dark sky caused by the scattering of light from the installation in the atmosphere, producing a luminous glow (i.e. sky glow).") in which "sky glow" is put in a <i>uniquely</i> anthropogenic context.	
Clause	1.4.20		General	9	While I understand that the definition used is a CIE definition for ULR, "the horizontal" needs some kind of clear definition. Usually it is defined as something a horizontal plane perpendicular to the vector pointing toward the center of the Earth and locally tangent to the Earth's surface.	Add a definition of 'the horizontal' to make the ULR definition unambiguous.
Clause	2.1	1	Editorial	10	The first sentence states that " <i>This Section provides guidance on effects that outdoor lighting may have on surrounding areas.</i> " The statement is probably too general, since 'obtrusive light' is defined on page 8 in a much more limited way. The language of this clause implies consideration of the totality of the natural environment in terms of impacts of artificial light at night, not just the situations where <i>humans</i> find the light objectionable. This is echoed in the first sentence of Clause 2.2 (page 10): " <i>Outdoor lighting whilst intended for a specific purpose may have some adverse effect on the environment in which it is installed.</i> " (emphasis added)	Edit the sentence to be more in line with 'obtrusive light' as in the definitions section.
Clause	2.2	2	Editorial	10	The second paragraph notes " <i>The objectives of the lighting may be incompatible with the containment of light within the intended area of application.</i> " Then it's not really an 'area', but rather some three-dimensional volume, right? It may be better just to say that.	Add clarity to the idea of the "intended area of application" of lighting.

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Clause	2.2	(c)	General	10	This item talks about “security lighting”. To repeat what I wrote above: there is no unambiguous, peer-reviewed scientific evidence suggesting that the use of outdoor lighting discourages perpetration of either property or violent crime during overnight hours. It is not arguable as a point supported by scientific evidence that light reduces or eliminates crime. To the extent that there are other references to ‘security’ lighting in the document, and in full knowledge that consumers want light for this reason (and lighting designers often give it to them), it remains true that there is no objective reason to believe that ‘security’ lighting fulfills its stated purpose.	Drop references throughout the document to ‘security’ lighting.
Clause	2.4.1		General	11	‘Effects on residents’ notes that “ <i>Effects on residents generally involve a perceived reduction of amenity arising from light technical factors</i> ” and the ensuing discussion implies what is generally referred to as ‘light trespass’ as a form of legal nuisance. The notion of ‘tolerability’ is somewhat moot; the notion of ‘light trespass’ doesn’t necessarily entail and specific injury on the part of the recipient; i.e., residents need not establish <i>any</i> of the kinds of specific effects in (a)-(c) in order for the light to be considered “objectionable” and, depending on the jurisdiction, possibly illegal.	Add some disclaimer that residents need not demonstrate an injury in order to establish that light is obtrusive, but may be so on a purely theoretical basis.
Clause	2.4.4	6	Technical	12	In the second to last paragraph (“ <i>Blue and high colour temperature light sources should be avoided as light at the blue end of the spectrum increases scatter.</i> ”), I would add a reference to Luginbuhl, C. B., Boley, P. A., & Davis, D. R. (2014). “The impact of light source spectral power distribution on sky glow.” <i>Journal of Quantitative Spectroscopy and Radiative Transfer</i> , 139, 21–26 (doi: 10.1016/j.jqsrt.2013.12.004).	Add the reference.
Clause	3.2.1	4	General	12	In the discussion of curfew times, which “should be taken as being between 11 p.m. and 6 a.m.,” these numbers really should be adjusted both seasonally	Add some language to the effect that users should consider changing day length throughout the seasons at their latitude in order to adjust the

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					and as a function of latitude, specifically the end time of the curfew. In midsummer the sky is bright well before 6 a.m., and in midwinter it's still dark at that hour.	end time accordingly.
Clause	3.2.3	1	Editorial	14	The statement in paragraph 1 that " <i>The limiting values for Ev and I necessary to satisfy a large majority of the population at all times are relatively low</i> " really seems like it needs a justification. It's a sweeping conclusion without any evidence cited.	Add a reference to justify the statement.
Clause	3.3.1.7		Editorial	18	Where do the formulae in this section come from? How are they derived. Without a reference, this comes across as totally arbitrary. Furthermore, the discussion of the veiling luminance calculation (e.g., Equation 3.2) is hard to understand and needs a figure of some kind of completely indicate all of the factors and variables. Does the theta-squared term in the denominator rely on some kind of small-angle approximation? I expected something like a cos(theta) term here. Even theta, defined as " <i>the eccentricity of the luminaire from the observer's line of sight</i> " is almost unintelligible given the use of the term 'eccentricity'. Is this just the angle relative to the line of sight?	Clarify the points in this discussion.
Clause	5.2		General	28	Just a comment — this contains a list of factors that may influence field measurements of lighting installation performance. Source of ' <i>direct light</i> ' include ' <i>the moon and overcast sky.</i> ' This directly implies that sky glow can impact measurements, given it is known that clouds amplify the received flux from anthropogenic sky glow in cities (q.v., Kyba, C. C. M., Ruhtz, T., Fischer, J., & Holker, F. (2011). "Cloud coverage acts as an amplifier for ecological light pollution in urban ecosystems." <i>PLoS One</i> , 6(3), e17307. doi: 10.1371/journal.pone.0017307) Therefore, the combined effect of upward-directed light in a city environment (sky glow) can adversely affect	No change.

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					measurements seeking to limit it. That argues for reducing skyglow over cities as much as is practically possible.	
Appendix	A2.2	b	General	30	The clause makes yet another reference to 'security' as a function of lighting. I would avoid this for the reasons stated previously.	Drop references throughout the document to 'security' lighting.
Appendix	A2.2	e	General	30	The clause states that " <i>Lighting should meet the limiting factors required but not exceed them by more than 10%-25%.</i> " It's unclear what the source of that range is, and why exceeding specifications by as much as 25% should be considered acceptable.	Justify why a range of 10%-25% above the specified value for an installation is recommended.
Appendix	A.4	d	General	34	I take exception to the fourth cartoon in the diagram, (d), as an acceptable installation, specifically in that it depends <i>strongly</i> on correct installation, presuming that the tilt angle of the luminaire is adjustable. Careless installation could very easily result in light overshooting the top of the wall and creative obtrusion. Some mention of this should be made in the paragraph immediately preceding the figure.	Add language referring to situation (d) to the effect that this scenario is highly installation-dependent.
Appendix	C2.1		General	43	It's worth noting that this section doesn't just apply to lighting considerations near protected areas such as parks. Biota live in cities, too! As a result, the guidance here is equally relevant in cities and rural areas.	Make a note to the effect that the content of this section is relevant to design considerations in cities.
Appendix	C2.2		General	43	I'm concerned that there are many old (pre-2010) references in this section. Many more papers have been published on the subject since then, to the point that the section comes across as not particularly well researched.	Add references to newer papers, as appropriate.