

SUNSHINE COAST AIRPORT

AIRPORT NORTH PRECINCT MASTER PLAN

LIGHTING MANAGEMENT PLAN



Sunshine
Coast
Airport



Executive Summary

This Lighting Management Plan (LMP) has been prepared to establish a framework for the provision and management of artificial lighting associated with the proposed Sunshine Coast Airport – Airport North Precinct. The precinct is located adjacent to the coastline and areas of important marine turtle habitat, requiring careful consideration of the potential impacts of artificial light at night on marine turtles, neighbouring areas, wildlife and the broader night-time environment.

The LMP establishes principles, performance criteria and control measures to ensure that artificial lighting is provided only where required, at the appropriate level and in a manner that fulfils the intended operational, safety or amenity purpose while minimising unnecessary light spill, sky glow and ecological impacts. The approach is consistent with the requirements and intent of the *Priority Development Area Development Scheme*, relevant planning provisions and marine turtle conservation strategies, while drawing on recognised best-practice guidance for responsible outdoor lighting.

The LMP applies to lighting associated with the future development of the Airport North Precinct, including roadway, pathway and carpark lighting, indoor and outdoor building lighting, security lighting and decorative lighting. Lighting associated with airfield operations and terminal facilities, areas outside the precinct, and temporary lighting required for specific night-time construction or maintenance activities are outside the general scope of the LMP, subject to the specific provisions identified within the document.

A central objective of the LMP is to protect the sensitive coastal environment through a hierarchy of lighting controls. These include:

- Establishing a need for lighting before it is installed,
- using adaptive controls to limit operating periods,
- directing light only towards the intended area,
- minimising lighting levels,
- using fully shielded luminaires,
- limiting reflected and upward light, and
- selecting light sources with reduced short-wavelength emissions.

The LMP also establishes additional assessment requirements under *AS/NZS 4282 – Control of the obtrusive effects of outdoor lighting*. Specific environmental assessment boundaries are nominated between the development and the adjacent coastal environment, including an A1 environmental zone at the interface with the natural dune/vegetation line and an A0 zone associated with the beach and environmentally sensitive area.

Lighting design within the precinct is to be undertaken by appropriately qualified professionals and supported by technical documentation demonstrating compliance with the LMP.

Long-term effectiveness of the LMP will also rely on appropriate operation and management. Facility owners, managers, maintenance personnel, tenants and occupants will need to understand and maintain the lighting principles established by the LMP.

Overall, the LMP provides a precinct-wide framework to support the safe, functional and appropriate use of artificial lighting while maintaining the environmental values of the adjacent coastal environment. Its implementation will ensure that future development within the Airport North Precinct appropriately balances operational and community requirements with the protection of marine turtle habitat and the broader night-time environment.

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1. Introduction

This Lighting Management Plan (LMP) has been prepared to provide guidance for the provisioning of artificial lighting associated with the proposed Airport North Precinct. The Airport North Precinct is located adjacent to an area of coastline that has been identified as an important habitat for marine turtles¹. Under the precinct outcomes outlined in the Development Scheme all lighting must be designed to minimise harm to sea turtles.

The principles and control measures established under the LMP are intended to regulate the use of artificial light at night (ALAN) to ensure that artificial lighting is only implemented when it is strictly needed, where it is needed, and in the appropriate amount for a specific task. Where lighting is deemed to be required, the LMP will ensure that artificial lighting is provided in a way that appropriately achieves operational or safety requirements while minimising the impact of such light on protected outdoor spaces, viewsheds and wildlife.

The LMP has been developed in accordance with relevant regulatory and planning requirements, as well as drawing upon best practice guidelines for minimising the impact of ALAN on the surrounding environment and ecology. Refer Section 2.2 for strategic context and regulatory considerations.

2. Context and Application

2.1 Geographic Factors

With reference to Figure 1 below, the Airport North Precinct is located in the north-eastern corner of the Sunshine Coast Airport site.



Figure 1: Airport North Precinct site location

¹ As established in the *Queensland marine turtle conservation strategy 2021–2031* and *Sunshine Coast Council Marine Turtle Conservation Plan 2023-2033*

The site adjoins David Low Way to the north; and existing residential properties to the south-east. As shown in Figure 2, the site is located between ~130m (northern development area) and ~400m (southern development area) from Marcoola Beach. This section of coastline lies within an area of interest under the *Queensland marine turtle conservation strategy 2021–2031* and *Sunshine Coast Council Marine Turtle Conservation Plan 2023-2033*, which establish a 10 year strategic framework aimed at recovering self-sustaining marine turtle populations, focusing primarily on nesting and hatchling success for the critically endangered loggerhead and vulnerable green turtles.

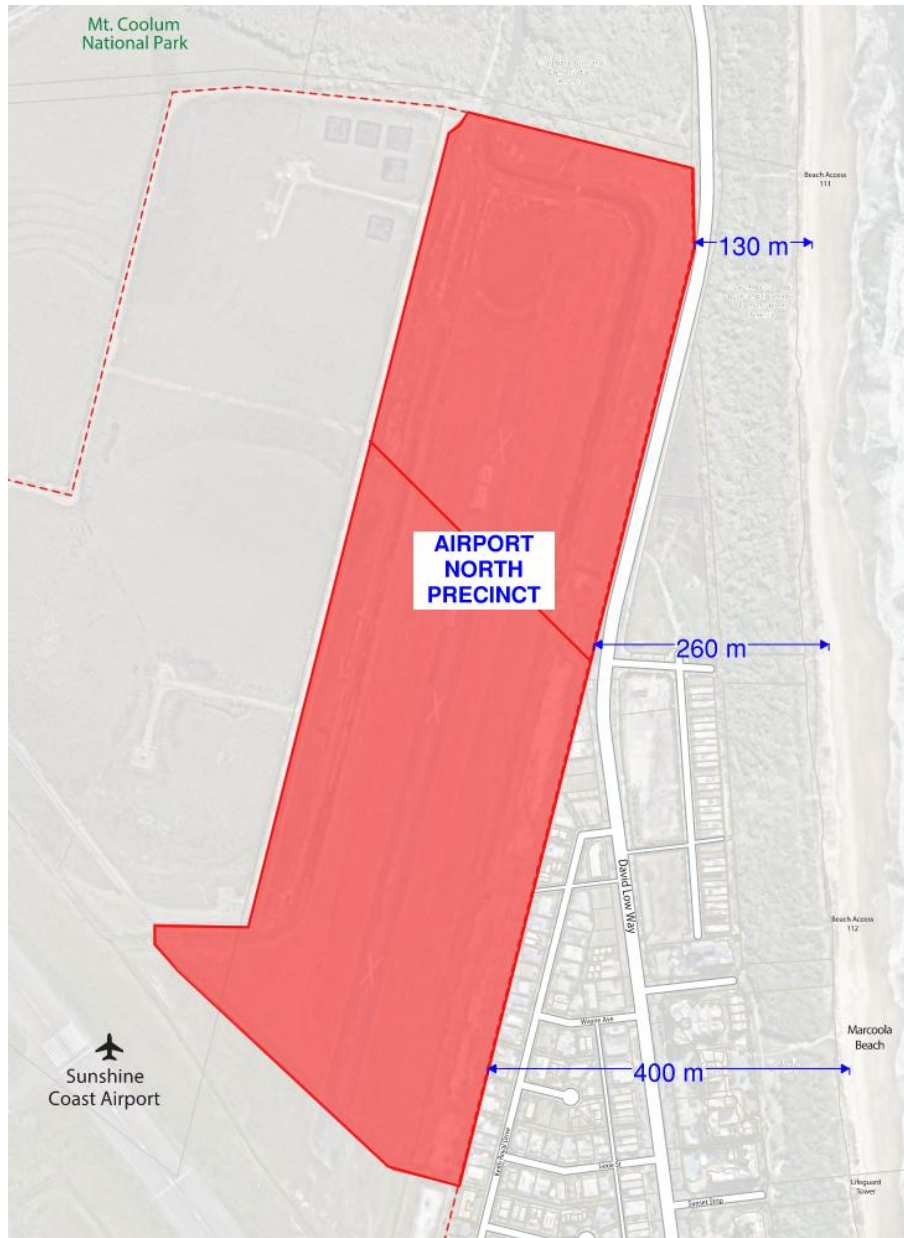


Figure 2: Airport North Precinct geographic context

The following additional geographic features are considered important in establishing the overarching context of the Airport North Precinct in relation to surrounding land uses:

- Approximately half of the eastern site frontage directly borders David Low Way, with the south-eastern half of the precinct adjoining existing residential developments buffering the site from David Low Way and the coastline.
- David Low Way is controlled by the Department of Transport and Main Roads (DTMR), with roadway lighting provisioned in accordance with DTMR standard lighting policy and requirements.

- The residential “buffer” also includes the *Marcoola Tourist Accommodation Zone (Precinct MNS LPP-3)* as established in the *Sunshine Coast Planning Scheme 2014*. This zone provides a focus for high density tourist and airport related accommodation, retail, and entertainment uses that contribute to the tourism focus of the precinct and complement the Sunshine Coast Airport.
- The full extent of the site is buffered from the coastline by dunal vegetation which limits the extent of the proposed development that would be directly visible from the beach (refer *Scenic Amenity Report* for additional details).

2.2 Strategic Factors

Sunshine Coast Airport (SCA) is committed to promoting and embedding a transparent sustainability culture, managing its growth and operations in a manner that minimises adverse environmental, social and governance impacts and embedding sustainability principles and practices into our operations. These commitments are established at the strategic level through the *Sunshine Coast Airport Environmental Policy* and *Sunshine Coast Airport Environmental, Social and Governance (ESG) Framework*.

The *ESG Framework* establishes environmental goals and objectives aligned with the *United Nations Sustainable Development Goals (SDGs)* through the creation of ESG Factors – key issues that underpin the ESG Goals and Objectives across environment, social and governance perspectives. Implementation of the LMP helps to align with the ESG Factors outlined in Figure 3.

Factor	Description / Scope	Strategic Outcome(s) Sought	Key Aligned SDGs
Land, water and biodiversity	Local natural environment values including areas on Airport land set aside for long term conservation and managing impacts on land, water and biodiversity in the surrounding community	Protecting the local natural environment and managing impacts from Airport operations and development on surrounding lands and waters.	 
Environmental management	Regulatory compliance requirements and environmental management practices including continuous improvement strategies	Operating an environmentally responsible Airport and addressing all relevant regulatory approval and compliance requirements.	 
Community engagement and support	The role of the Airport in our local community, including building and maintaining relationships with key stakeholders	Playing a meaningful role in our local community, while building and maintaining enduring relationships based on trust. Acting sustainably so as to protect our social licence to operate.	 
Education and awareness	Educating and building skills and awareness including those around sustainable business principles and operations	Providing our team and business partners with the knowledge and resources necessary to understand and meet the commitments of this ESG Framework.	 

Figure 3: SCA ESG Factors impacted through LMP implementation

2.3 Development Factors

The Sunshine Coast Airport was declared as a Priority Development Area (PDA)² on the 28 July 2023, with development now governed by the requirements of the *Priority Development Area Development Scheme – September 2024* (the *Development Scheme*).

The *Development Scheme* section 2.6.5 recognises the location of the Airport North Precinct in relation to sensitive turtle environments and establishes an overarching direction for development in this precinct to:

*h) be designed to minimise harm to sea turtle nesting and sea turtle activity by avoiding adverse impacts generated from artificial lighting*⁸⁷

⁸⁷ Refer to the Sea Turtle Sensitive Area Code model code for further guidance

Part 1 of the *Sea Turtle Sensitive Area Code* states the Code's applicability to all assessable developments within a defined Sea Turtle Sensitive Area overlay.

(1) This code applies to all assessable development (other than for reconfiguring a lot) occurring within the Sea Turtle Sensitive Area on the Overlay maps contained in the planning scheme.

Notwithstanding the *Development Scheme* referring to the *Sea Turtle Sensitive Area Code*, the current *Sunshine Coast Planning Scheme (2014)* has limited guidance on lighting requirements for turtle sensitive areas and does not include a Sea Turtle Sensitive Area overlay. For the protection of sea turtles, only the following is stated in the *Biodiversity, waterways and wetlands overlay code*.

Performance Outcomes		Acceptable Outcomes	
PO4	Effective measures are implemented during the construction and operation of developments on or adjacent to land containing an <i>ecologically important area</i> , to protect fauna that is sensitive to disturbance from noise, vibration, dust or light.	AO4.1	Any noise, vibration or dust generated during the construction and operational phases of development is managed to ensure it does not have an adverse impact on fauna within an <i>ecologically important area</i> .
		AO4.2	Lighting associated with development:- (a) does not contribute to an unacceptable level of illuminance (greater than 1 lux) for light-sensitive species within or at the boundary of an <i>ecologically important area</i> ; and (b) does not contribute to an unacceptable level of illuminance on landward horizons along coastal areas and known sea turtle nesting beaches.

Figure 4: *Biodiversity, waterways and wetlands overlay code* (extract)

The proposed Sunshine Coast Planning Scheme (2025) introduces updates to the Biodiversity, waterways and wetlands overlay code and associated Biodiversity, waterways and wetlands overlay map to include additional sea turtle layers (Figure 5).

² Under the Economic Development Act 2012

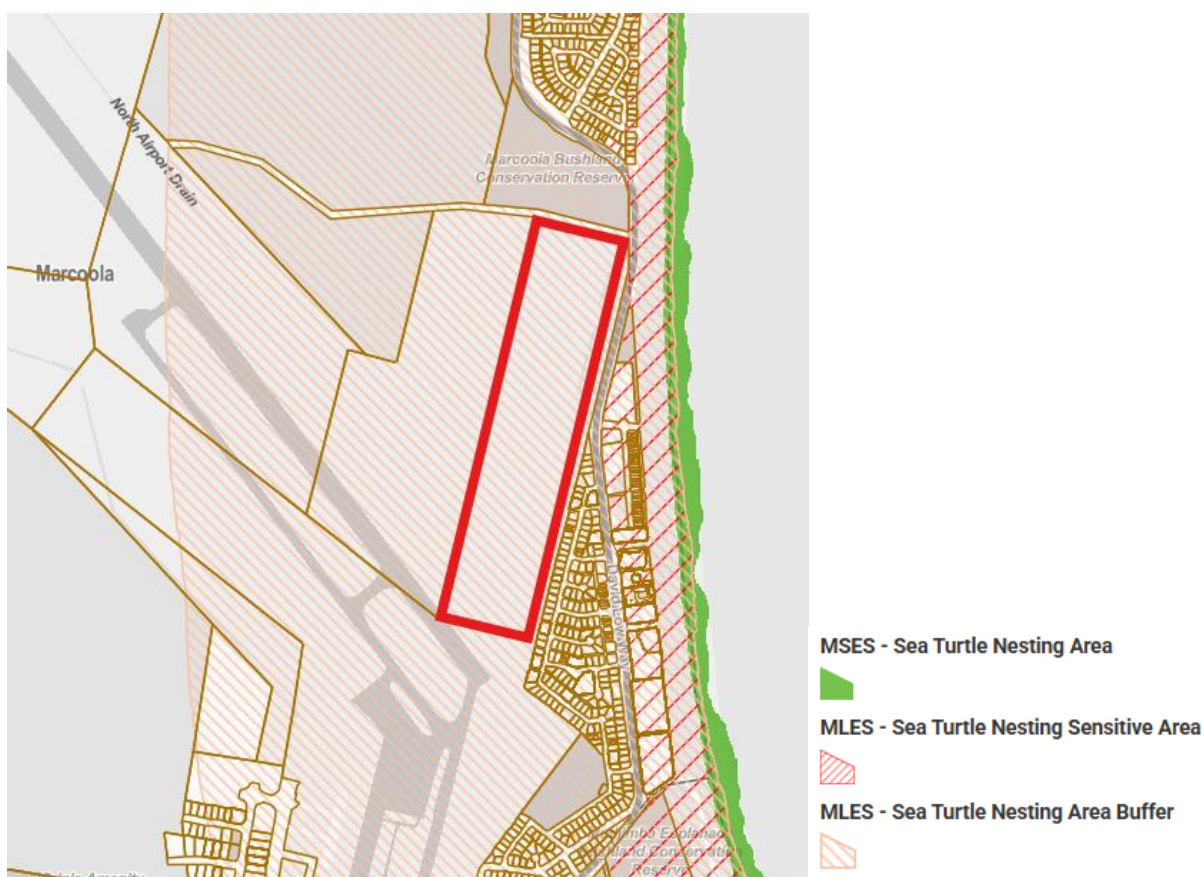


Figure 5: Proposed *Sunshine Coast Planning Scheme 2025 – Biodiversity, waterways and wetlands overlay*

Subject to the *Proposed Sunshine Coast Planning Scheme (2025)*³ being adopted, performance outcomes from both the *Sea Turtle Sensitive Area Code* and *Biodiversity, waterways and wetlands overlay code* may apply to proposed developments within the Airport North Precinct.

These Performance Outcomes are summarised in Table 1 and Table 2.

Table 1: *Sea Turtle Sensitive Area Code* Performance Outcomes

Ref	Performance Outcome	Applicability to Future Development in Airport North Precinct
PO1	All outside lighting provided as part of the development avoids direct illumination of the beach, ocean and sky at night.	Yes
PO2	Development minimises the use and intensity (brightness/luminance) of outside lighting required to achieve the light's purpose to avoid reflection from the ground, buildings and other surfaces.	Yes
PO3	Development minimises reflective glare that contributes to sky glow.	Yes

³ The *Proposed Sunshine Coast Planning Scheme (2025)* is not yet approved or endorsed but provides guidance on potential future planning scheme amendments.

Ref	Performance Outcome	Applicability to Future Development in Airport North Precinct
PO4	All interior lighting provided as part of the development avoids direct illumination of the beach, ocean and sky at night.	Yes
PO5	Development provides for landscape buffers that:- (a) protect the edges of existing native vegetation or any other areas of environmental significance and (b) screen the development (including associated artificial light) to a level where it is not visible from the beach or ocean.	Existing significant native vegetation buffers (coastal dunes) will be maintained and unaffected by the Airport North development. Future landscape buffers proposed through building offset controls and interface treatment guidelines, refer Airport North Precinct Master Plan.
PO6	Development involving sport and recreation activities avoids new floodlighting.	Potential indoor sporting applications, however all new sports lighting would be considered internal as part of the building / facility.
PO7	Where development involves advertising devices, illuminated signage is avoided.	Yes
PO8	No new beach access points are established unless the beach access is designed to reduce interference on turtle nesting areas, and: (a) is required to enhance public access to the beach or (b) there is no increase in the number of beach access points, with any replaced beach accesses fenced off and revegetated.	Not Applicable to development. No new beach access points proposed
PO9	Effective measures are implemented during the construction and operation of development to avoid impacts from lighting, noise and vibration on sea turtle activity and sea turtle nesting beaches.	Yes

Table 2: Biodiversity, waterways and wetlands overlay Code Performance Outcomes ⁴

Ref	Performance Outcome	Applicability to Future Development in Airport North Precinct
PO19	Development in a sea turtle nesting area buffer ensures all external lighting is positioned and managed to minimise sky glow and light spill.	Yes
PO20	Advertising signage and security lighting is designed to minimise sky glow and light spill.	Yes

⁴ Extracted from Proposed Sunshine Coast Planning Scheme (2025). Performance Outcomes not yet approved or endorsed and are provided for guidance only.

In addition to addressing these performance outcomes, the LMP also ensures alignment with the following region-specific plans and guidelines:

- *Recovery Plan for Marine Turtles in Australia* (Australian Government)
- *National Light Pollution Guidelines for Wildlife*
- *Queensland marine turtle conservation strategy 2021–2031* (Queensland Government)
- *Sunshine Coast Council Marine Turtle Conservation Plan 2023-2033* (Sunshine Coast Council)
- *Sunshine Coast Council Urban Lighting Master Plan* (Sunshine Coast Council)
- *Sunshine Coast Council Electrical and Lighting Infrastructure Manual* (Sunshine Coast Council)

2.4 Application of the Lighting Management Plan

Development Overview

The Airport North Precinct consists of a number of proposed land uses which will subsequently dictate a variety of lighting typologies that will be governed by this LMP.

Land uses are summarised in Figures 6 and 7.

Sub-Precinct	Land Use	Site
P5: Airport North		
North - Tourism & Accommodation	Resort Complex Function Facility (ie. Conference) Hotel, Bar, Food & Drink Outlet, Shop	A1
North - Tourism & Accommodation	Short Term Accommodation Bar, Food & Drink Outlet, Shop	A2
North - Tourism & Accommodation	Bar, Food & Drink Outlet, Function Facility, Hotel	A3
North - Tourism & Accommodation	Multiple Dwelling or Retirement Facility	A4
Central -Mixed Use	Bar, Food & Drink Outlet Shop, Market Office Civic Plaza	B1
Central -Mixed Use	Bar, Food & Drink Outlet Shop, Market, Showroom Health Care Services, Office, Veterinary Services Indoor Sport & Recreation	B2
Central -Mixed Use	Children's Playcentre, Gym or Indoor Sport & Recreation Bar, Food & Drink Outlet Health Care Services, Office, Veterinary Services Shop, Market, Showroom	B3
South - Employment	Low Impact Industry, Research & Technology, Service Industry, Warehouse, Air Services, Aviation Facilities, Indoor Sport & Recreation, Office, Tourist Activities	C1
South - Employment	Low Impact Industry, Research & Technology, Service Industry, Warehouse, Air Services, Aviation Facilities, Indoor Sport & Recreation, Office, Tourist Activities	C2
Drainage Corridors	Drainage Corridors	D1

Figure 6: Airport North Precinct – Proposed Land Uses

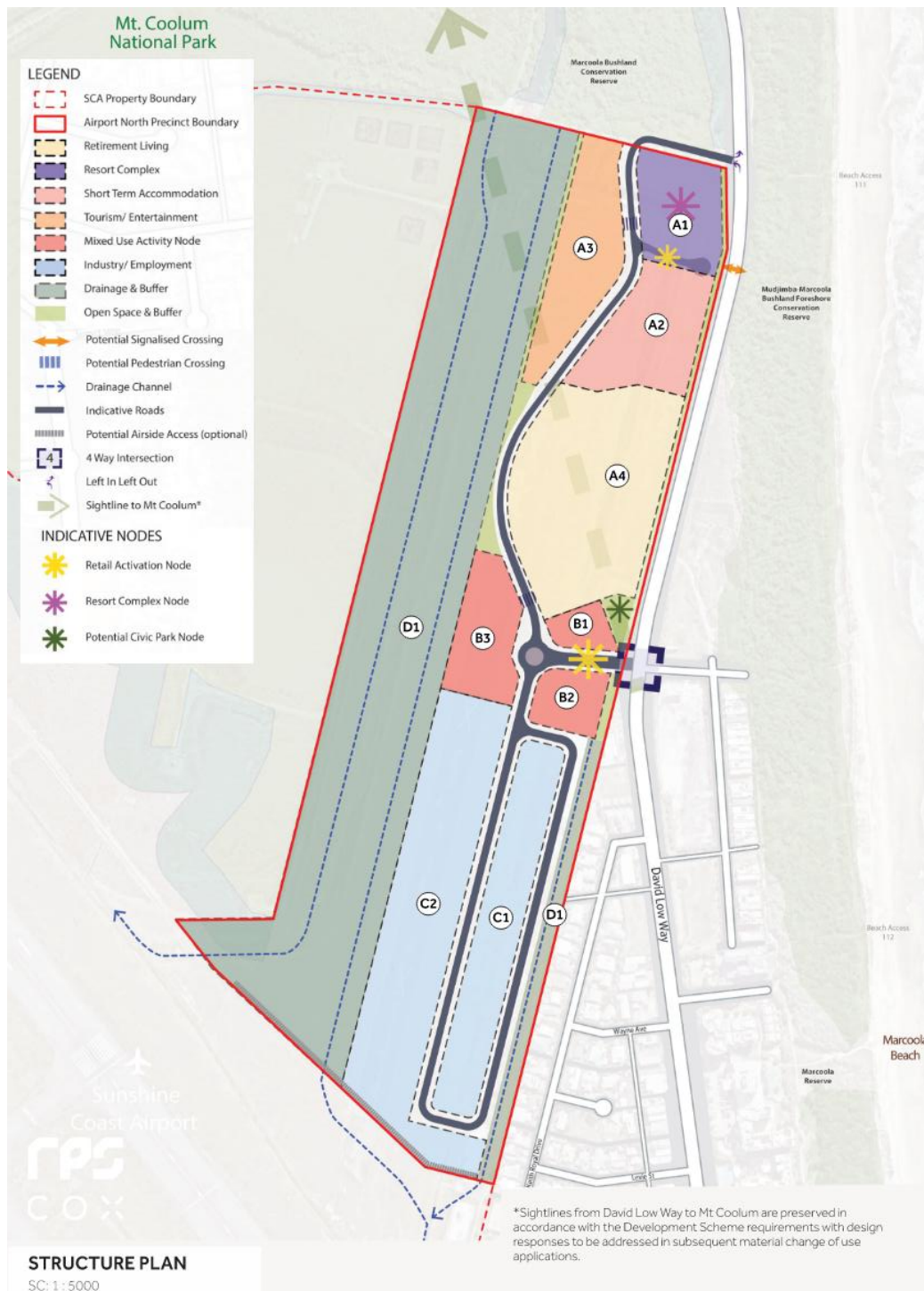


Figure 7: Airport North Precinct – Proposed Structure Plan

Aside from general mitigation of sky glow across the whole of the development, the proposed land uses to the north of the precinct will likely consist of multi-level facilities (proposed 6-10 storeys) that will be directly visible from the beach. Proposed central and southern land uses are primarily envisaged as single level facilities and will typically be buffered from direct visibility from the beach by existing and proposed commercial and residential developments to the east.

In addition to these land uses, the development is also expected to include new roadways, pedestrian pathways, carparks and other external open spaces, including new intersections with David Low Way. Note that any required street lighting along David Low Way (including intersections) will be governed by DTMR standard requirements and will fall outside the scope of this LMP. Light mitigation strategies for these areas will require coordination with DTMR through the design and delivery process.

Lighting Types

Based on the anticipated land uses and associated open spaces throughout the precinct a number of different lighting types are expected to be governed by the LMP. These are summarised in Table 3.

Table 3: Anticipated Lighting Types

Category	Description
Area lighting (roadway, pathway, carpark)	Typically characterised by pole-top lighting installations provisioned to achieve performance requirements for operational and safety considerations (often to the requirements of AS/NZS 1158).
Building / facility lighting – indoor	Indoor lighting installations are required to fulfill basic operational functions within the facilities to be developed as part of the Airport North Precinct. The nature and extent of indoor lighting will depend on the function of the facility (with key land uses as described in Figures 5 and 6). The impact of indoor lighting on the night-time environment will also depend on the hours of operation for each facility type.
Building / facility lighting – outdoor	External, building mounted lighting is often provided for safety and/or security purposes. The nature and extent of external, building mounted lighting will depend on the function of the facility (with key land uses as described in Figures 5 and 6).
Decorative lighting (including illuminated signage)	Decorative lighting is typically provided to enhance the amenity of an area and can include illumination of built or landscape elements, as well as direct-view feature lighting elements such as lanterns, festoons and the like.

LMP Application

The LMP is intended to be applied in conjunction with other mandatory development guidelines. The Preliminary Approval for the PMP does not give rights for development to proceed. This will be undertaken as part of subsequent Development Permits for Material Change of Use applications. However as required by Section 2.6.5 of the *Development Scheme*, this LMP considers future principles and control measures to guide future development in regard to artificial lighting near the coastline identified as important habitat for turtles.

The LMP does **not** apply to the following:

- Areas outside of the Airport North Precinct (refer Figure 1).
- Lighting required to fulfill airfield operations, including terminal lighting.
- Lighting installations required temporarily for the safe performance of nighttime tasks (such as construction or emergency maintenance works). Refer Section 5.2 for additional considerations with regards to temporary lighting installations.

3. General Requirements

3.1 Fundamental Principles

The LMP aims to address the Performance Outcomes of the *Sea Turtle Sensitive Area Code* (refer Section 2.3) through the application of design practices developed around the fundamental principles outlined in Table 4).

Table 4: Principles of best practice lighting design (from: *National Light Pollution Guidelines for Wildlife*)

Principle	Description and Application
<i>Start with natural darkness</i>	Outdoor lighting should only be provided to fulfill a defined purpose, enhancing the safety, usability or amenity of a night-time space. Prior to installation or replacement of any lighting within the Airport North Precinct, consideration must be given to: • Whether the light is required and what purpose it will fulfill. • How the light may impact the surrounding area including neighbouring properties, wildlife and the environment. • Whether there are alternatives to permanently installed lighting that may fulfill the same purpose (such as reflective paints or self-luminous markers).
<i>Use adaptive controls</i>	Lighting installations must utilise controls such as timers or motion sensors to ensure that light is available when needed, dimmed when possible, and switched off when not needed.
<i>Light only the intended object or area</i>	Where fixed lighting is deemed to be required, it must be directed in such a way as to fulfill its intended purpose without causing unnecessary spill or other obtrusive effects to surrounding areas. The following strategies should be used to ensure any lighting installed within the Airport North Precinct is appropriately targeted to fulfill its intended function: • Application of appropriate standards such as <i>AS/NZS 4282 - Control of the obtrusive effects of outdoor lighting</i>. • Undertaking design activities through appropriately qualified professionals. • Use of appropriate luminaire types and distribution profiles. • Use of shielding (factory-fitted to the luminaire, or external built elements).
<i>Use appropriate lighting</i>	When planning for a lighting installation within the Airport North Precinct, ensure that operational factors are carefully considered and well understood to ensure lighting levels adopted are appropriate for the task and any associated risk factors, with lower lighting levels preferred. Where possible, other design measures can be considered such as landscape buffering to minimise the impacts of required outdoor lighting.
<i>Use non-reflective, dark-coloured surfaces</i>	Highly reflective, light-coloured surfaces can result in undesired amounts of light being reflected into the night sky. Consideration should be given to surface properties during the development of building, landscape and civil design elements for the Airport North Precinct – with a preference for non-reflective, darker coloured surface treatments wherever possible.
<i>Use lights with reduced or filtered-out blue, violet and ultraviolet wavelengths</i>	Short wavelength light sources scatter more readily in the atmosphere, contributing to skyglow; as well as having a direct, detrimental impact on turtle species. Lighting installations within the Airport North Precinct must limit the amount of shorter wavelength light to the least amount needed. "Short wavelength" is generally regarded as blue and violet light whose wavelengths are below 500 nanometres (nm).

These fundamental principles are based upon those established in the *National Light Pollution Guidelines for Wildlife* and are also aligned with DarkSky International's *5 Principles for Responsible Outdoor Lighting* (Figure 8).

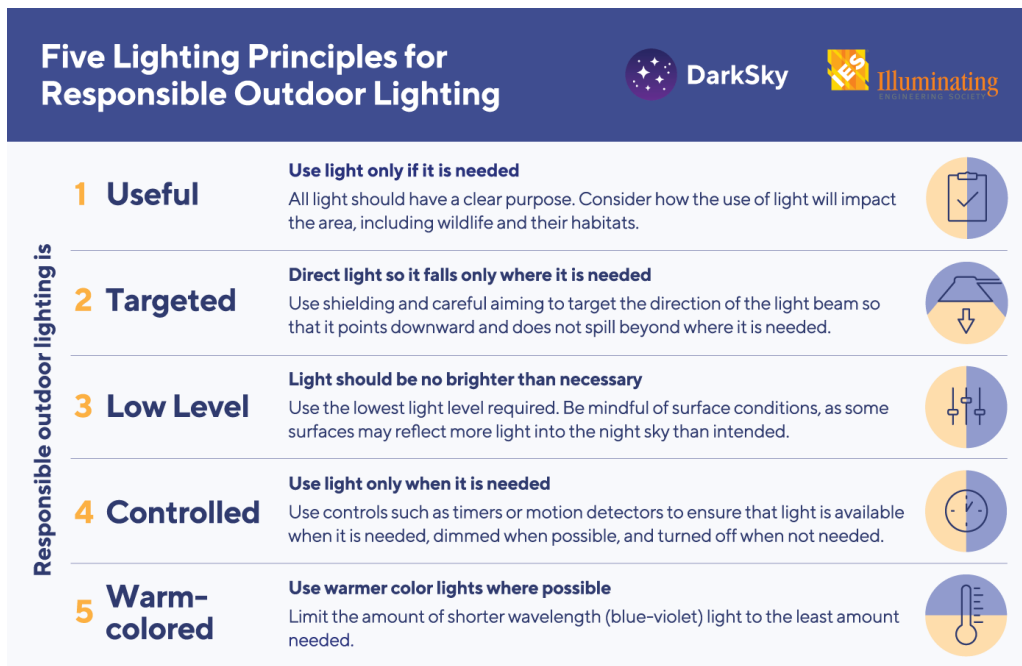


Figure 8: 5 Principles for Responsible Outdoor Lighting (Darksky International)

3.2 Design Advice

While the LMP is intended to provide a framework in which to guide the general application to all types of outdoor lighting installations within the Airport North Precinct, it is recommended that professional design services or advice be sought through the design and delivery phases of development when provisioning or upgrading outdoor lighting. Minimum qualifications for design advice are typically defined as:

- Registered Professional Engineer QLD (RPEQ), or
- Member of Illuminating Engineering Society (MIES)

Lighting design activities should include provision of a technical summary (supported by calculations where relevant) as to how the proposed lighting installation addresses the requirements outlined in this LMP.

4. Lighting Performance Criteria

4.1 Overview



To fulfill the fundamental principles established in Section 3.1, the following sections contain specific technical guidance that should be followed when planning and designing lighting installations within the Airport North Precinct. Prior to installation of lighting elements consideration must be given to justifying the overarching need for lighting in the first instance (*"start with natural darkness"*). The guidance contained within the following subsections assumes that this need has been justified, and the required extent of lighting has been confirmed.

4.2 Lighting Controls



Lighting control strategies will vary depending on the nature of the proposed lighting installation. All lighting installed within the Airport North Precinct must utilise an appropriate control strategy to ensure lighting is used only when required and is not inadvertently left on when not needed to fulfill its intended purpose. The guidance presented in Table 5 should be adopted to suit the nature of the proposed installation.

Table 5: Guidance for selection of appropriate lighting controls

Category	Lighting Control Guidance
Area lighting (roadway, pathway, carpark)	All area lighting must be installed with the following minimum control provisions: • PE cell for automatic on/off at dusk/dawn. • Time clock for time scheduled switching where lighting is not required to operate until dawn. Consideration should be given to the following additional control provisions: • Presence detection to facility occupancy-based control rather than reliance of PE cell or time scheduling only. • Use of dimmable lighting fixtures, with dimming profiles coordinated with time scheduling and/or presence detection to account for “low use” operational modes where relevant.
Building / facility lighting – indoor	Indoor lighting control provisions will typically be governed by minimum requirements outlined in the National Construction Code (NCC) to suit the relevant building classification. In addition to minimum mandatory NCC requirements, indoor lighting that is installed in a location that is directly visible from the coastline should consider the following additional control measures: • Use of timers or occupancy sensors to provide automatic turn-off of lighting when not in use. • Use of dimmable lighting fixtures with associated control provisions to facilitate a reduction in lighting levels during low use occupancy periods.
Building / facility lighting – outdoor	Outdoor, building mounted lighting control provisions will typically be governed by minimum requirements outlined in the National Construction Code (NCC) to suit the relevant building classification. In addition to minimum mandatory NCC requirements, outdoor lighting within the Airport North Precinct must incorporate the following: • PE cell for automatic on/off at dusk/dawn. • Time clock for time scheduled switching where lighting is not required to operate until dawn. Consideration should be given to the following additional control provisions: • Presence detection to facility occupancy-based control rather than reliance of PE cell or time scheduling only. • Use of dimmable lighting fixtures, with dimming profiles coordinated with time scheduling and/or presence detection to account for “low use” operational modes where relevant.

Category	Lighting Control Guidance
External decorative lighting (including illuminated signage)	Decorative lighting and illuminated signage must be controlled via a PE cell and/or time clock to facilitate time scheduled switching. Consideration should be given to the use of dimmable lighting fixtures to aid in commissioning of decorative lighting elements to ensure appropriate lighting effects are achieved, without “over-lighting” the space.

4.3 Shielding



Shielding of light sources is a key mechanism to protect the integrity of the night sky environment. Shielding helps to fulfill two of the fundamental principles of good practice lighting introduced in Section 3.1; ensuring lighting is *appropriate* and targeted towards an *intended area*.

Shielding within the Airport North Precinct is considered in two layers:

1. Shielding of outdoor lighting fixtures: All outdoor luminaires must be fully shielded. Fully shielded outdoor luminaires permit zero upward waste light (or light beyond the 90° plane tangential to the light source) as highlighted by the reference images at Figure 9.



Figure 9: Shielding and Upward Waste Light

(Source: <https://engageparkcity.org/dark-sky>)

Shielding requirements are typically satisfied through the selection of appropriate luminaires that have been manufactured to prevent upward waste light. Examples of these are shown in Figure 10.

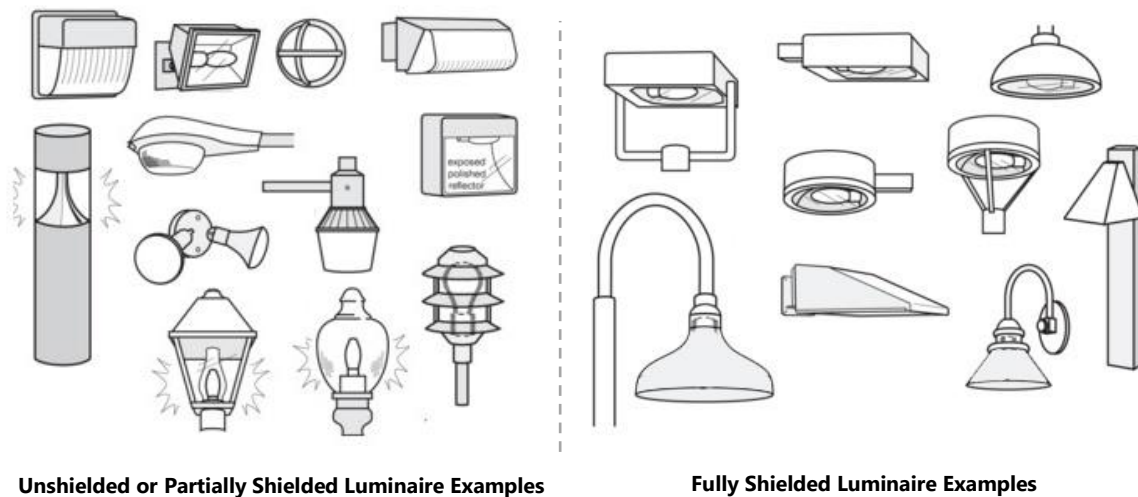


Figure 10: Shielding - luminaire examples

In conjunction with shielding properties of the luminaire itself, consideration can also be given to the fitting of external shielding elements or installation of the luminaire in a location that provides the same limitations for light emissions above 90°. This may include one or more of the following strategies:

- External shields attached to the luminaire body (note – this may impact on product warranties and should be confirmed with the luminaire supplier prior to fitment).
- Recessed installation under eaves or in ceilings in lieu of wall-mounted lighting.
- The use of vertical screening elements or the like to remove upward waste light components.

2. Shielding of incidental light emissions from indoor spaces: To the greatest possible extent, light emissions from indoor spaces to the outdoor environment must be limited through consideration of the following:

- The use of appropriate building materials, reducing transparency and translucency where possible.
- The use of window coverings such as curtains, blinds or shutters. This should extend to considerations for minimising artificial light transmission through skylights.
- The installation of physical barriers such as walls or screens.
- Appropriate control strategies such as timers or occupancy sensors.
- Other measures as deemed appropriate.

4.4 Light Distribution



Distribution and directionality of light is an important factor to consider in conjunction with shielding. Appropriate consideration of light distribution ensures that lighting is targeted to fulfill its intended purpose whilst minimising spill light into surrounding areas.

In conjunction with shielding concepts outlined in Section 4.3, targeted distributions can typically be achieved through careful selection of luminaire products with distribution profiles to suit the required extent of illumination.

Targeted distribution can also be achieved through aiming of adjustable luminaires, however great care must be taken if utilising adjustable luminaires to ensure that:

- Upward waste light requirements are not compromised.
- Aiming does not create issues with direct glare.

Figure 11 provides a visual representation of targeted light distribution.

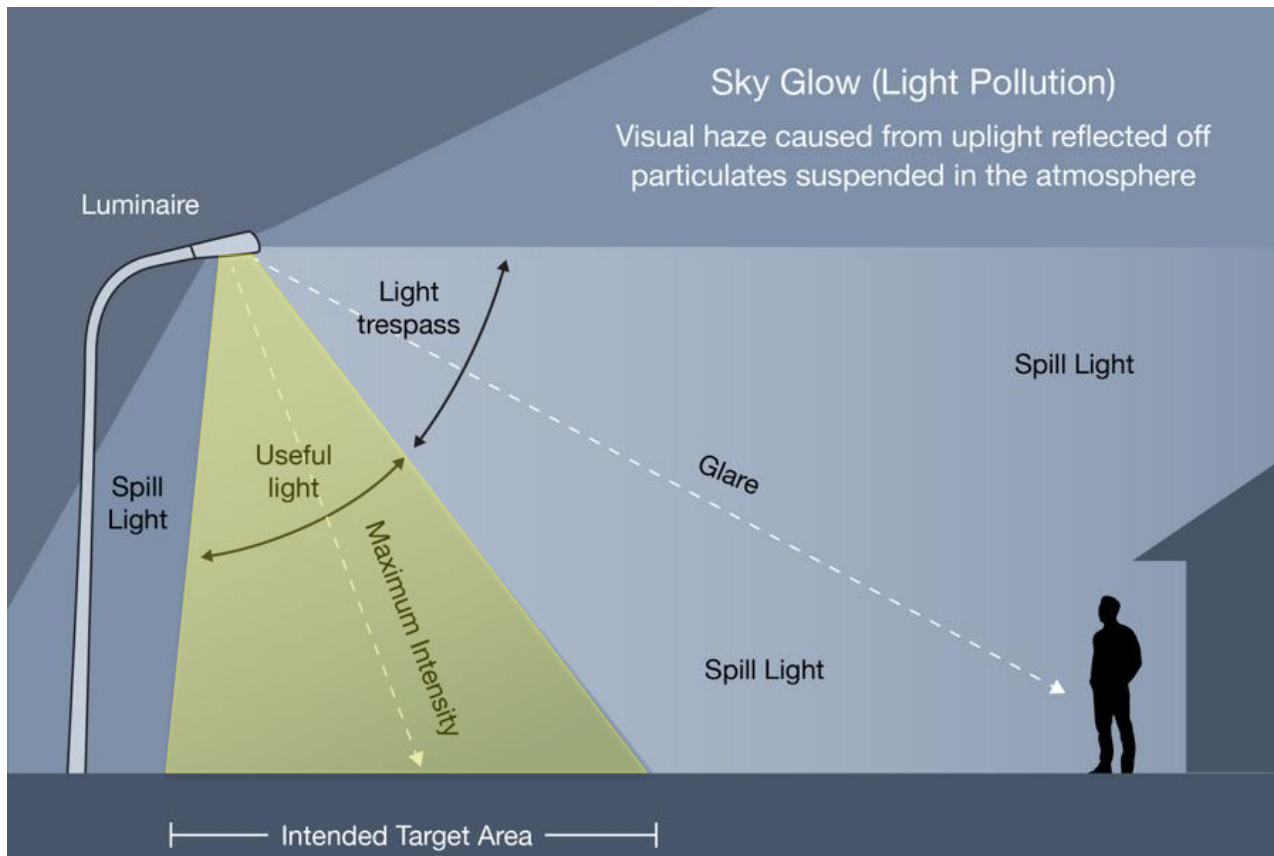


Figure 11: Targeted light distribution

4.5 Lighting Levels



In order to protect the integrity of the night sky environment lighting levels for all applications must be carefully considered. “Appropriate” illuminance would be defined as the *minimum* illuminance required to fulfill the intended purpose, taking into account relevant, considered operational and risk profiles. The guidance presented in Table 6 should be adopted to suit the nature of the proposed installation.

Table 6: Guidance for selection of appropriate lighting levels

Category	Guidance for lighting levels
Area lighting (roadway, pathway, carpark)	<u>Standard:</u> To AS/NZS 1158.3.1 Area lighting levels should comply with AS/NZS 1158.3.1 to suit operational characteristics. However, consideration must be given to the following: • Selection of the lowest possible lighting sub-category that meets the minimum operational requirements of the space. • Options for dual classification of spaces, with control strategies to switch/dim to lower levels during low usage times. • The use of luminaires with the lowest possible output that meet the compliance requirements of the standard. • Relaxation of AS/NZS 1158.3.1 compliance requirements (such as vertical illuminance).
Building / facility lighting – indoor	<u>Standard:</u> To AS/NZS 1680 (guidance only) Guidance should generally be taken from AS/NZS 1680 to suit the internal lighting application where appropriate – particularly for commercial / industrial applications. Where applied, care should be taken to ensure average maintained illuminance levels do not exceed AS/NZS 1680 recommendations by >10%.
Building / facility lighting – outdoor	Building mounted lighting could be installed for a number of reasons and (where deemed required), must take into account the following considerations: • Operational/task lighting: Lighting levels adopted should reflect the nature of the required task and be located directly over the area of operation. • Security lighting: ensure security lighting is considered in conjunction with other security measures (that may facilitate a reduction in lighting levels) based on a formalised security risk assessment. Additional guidance is provided in Section 3.7 with regards to illuminated signage and façade lighting.
External decorative lighting (including illuminated signage)	Where deemed to be required, decorative lighting elements should be used sparingly, with low light levels adopted to compliment surrounding features. Lighting intensity should provide suitable visibility only from the intended viewing angle and distance.

4.6 AS/NZS 4282



The LMP is intended to work in conjunction with broader compliance requirements and recommendations outlined in AS/NZS 4282 – *Control of the obtrusive effects of outdoor lighting*. AS/NZS 4282 outlines the process for assessment of the impacts of obtrusive effects of outdoor lighting.

In addition to mandatory development requirements for assessment of obtrusive lighting impacts to neighbouring residential areas, this LMP establishes environmental boundaries and performance requirements associated with the nominated wildlife sensitive area to the east of the Airport North Precinct. All outdoor lighting installations

proposed within the Airport North Precinct must be assessed using AS/NZS 4282 at the following environmental boundaries:

- Buffer: Nominally located on the western edge of the natural tree / sand dune line extending through the north-south extent of the Airport North Precinct.
AS/NZS 4282 Environmental Zone: Zone A1
- Environmentally sensitive area: Nominally located on the western edge of the natural tree / sand dune line at the commencement of the beach; extending through the north-south extent of the Airport North Precinct.

AS/NZS 4282 Environmental Zone: Zone A0

These boundaries are shown representatively in Figure 12.

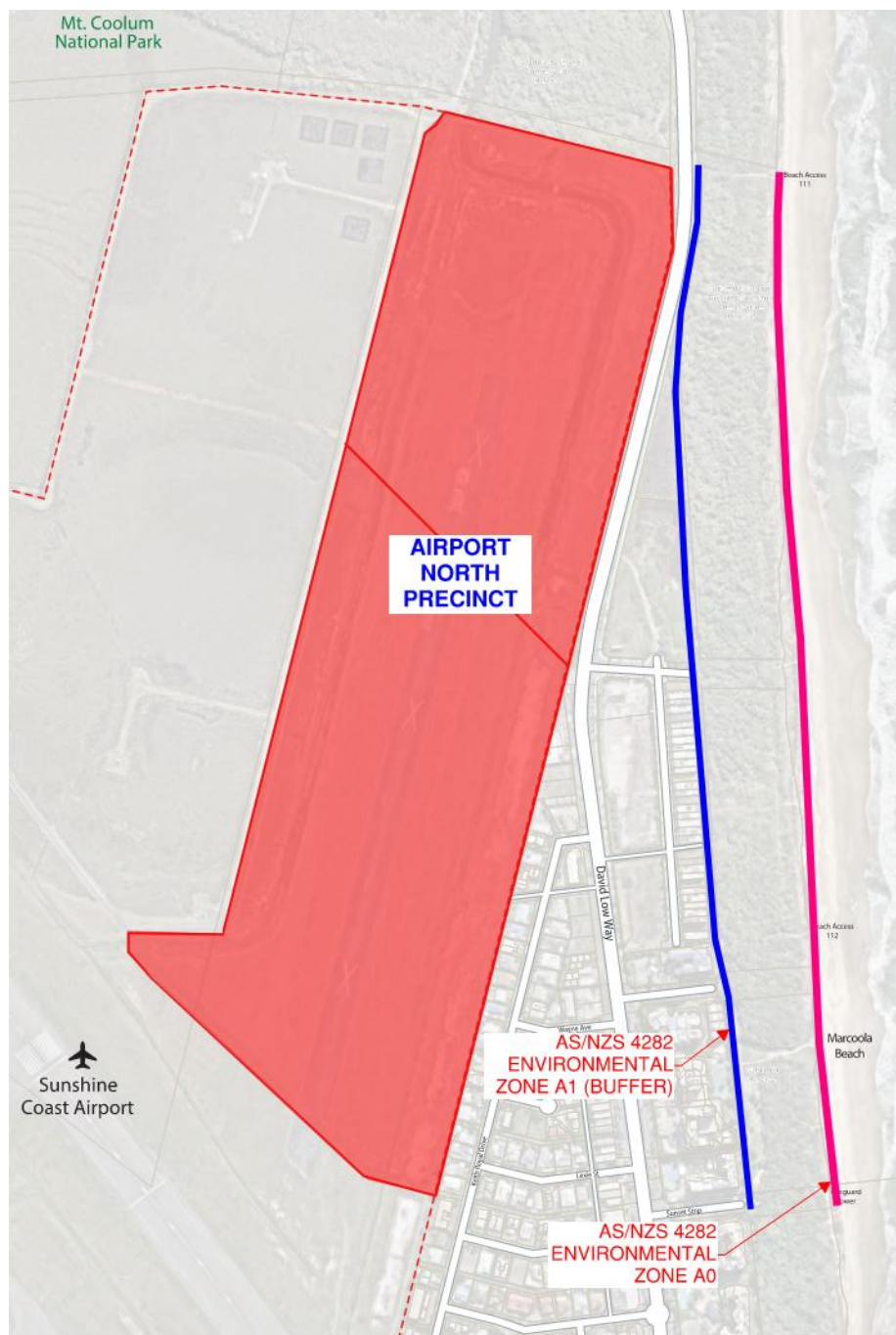


Figure 12: Additional AS/NZS 4282 environmental assessment boundaries

4.7 Illuminated Surfaces and Signage



Illuminated surfaces are defined as surfaces that may produce obtrusive light either by emitted or reflected light. Examples include internally and externally illuminated signage, façade lighting and other objects such as flag poles. Lit surfaces could also include ground surfaces, walls and/or other general structures located directly adjacent a permanent lighting installation. While there are no specific performance targets for reflectance from incidental surfaces, consideration should be given to the use of darker, less reflective surface finishes to minimise the adverse effects of reflected light.

Under Acceptable Solution AS20.1 of the *Biodiversity, waterways and wetlands overlay code* of the proposed *Sunshine Coast Planning Scheme (2025)*, illuminated signage is typically to be avoided wherever possible within the Airport North Precinct (due to the precinct's location within a defined sea turtle nesting buffer). Where illuminated signage is absolutely necessary to fulfill a specific operational requirement, the following must be implemented:

- Reduced lighting intensity: The maximum average luminance of a lit surface must not exceed 100 nits (100 cd/m²).
- Use of long wavelength lights: Wherever possible, displays should be single-color on a black background with colour selections adopted to minimise blue-light components of the spectrum (refer Section 4.8).
- Use of shielding: Location and orientation of illuminated signage elements must minimise risk of direct view from the coastline. Secondary shielding should be considered where required.
- Directing lighting downwards and onto areas of interest: Externally illuminated signage should implement a lighting strategy from "top-down" rather than using uplighting.
- Lighting control: Lighting elements (internal or externally illuminated) should incorporate time-based control provisions wherever possible, with timer settings set to ensure lighting is not left on outside of agreed operating or curfew hours.

4.8 Spectral Composition



While this section applies specifically to *exterior* lighting applications, consideration should also be given to implementation of the same principles for *interior* lighting, particularly where interior lighting is directly visible from the coastline.

Exterior lighting to be installed within the Airport North precinct must be chosen to minimise the amount of short-wavelength light emitted into the nighttime environment. To achieve this, all lighting should comply with one or more of the following requirements (note: these metrics can be sourced from manufacturer data sheets for lighting products):

1. The correlated colour temperature (CCT) of the light source must not exceed 3000K.

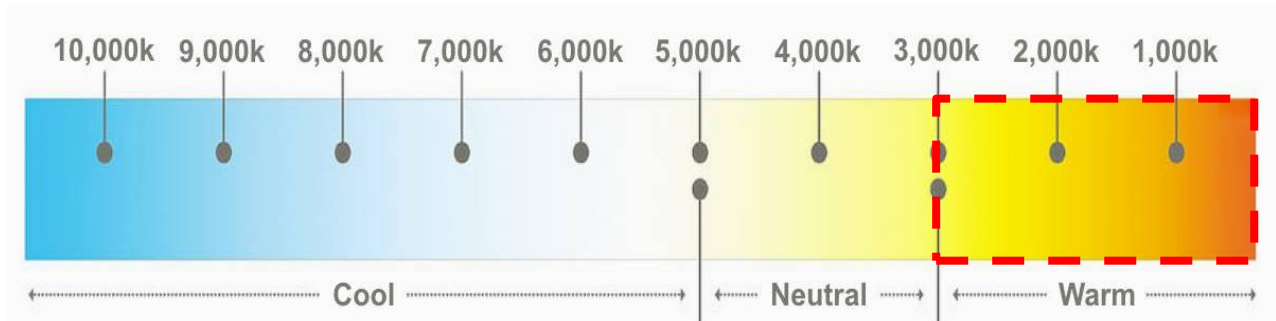


Figure 13: Correlated Colour Temperature (CCT) scale

2. Lighting must not emit more than 25% of its total spectral power at wavelengths shorter than 550nm

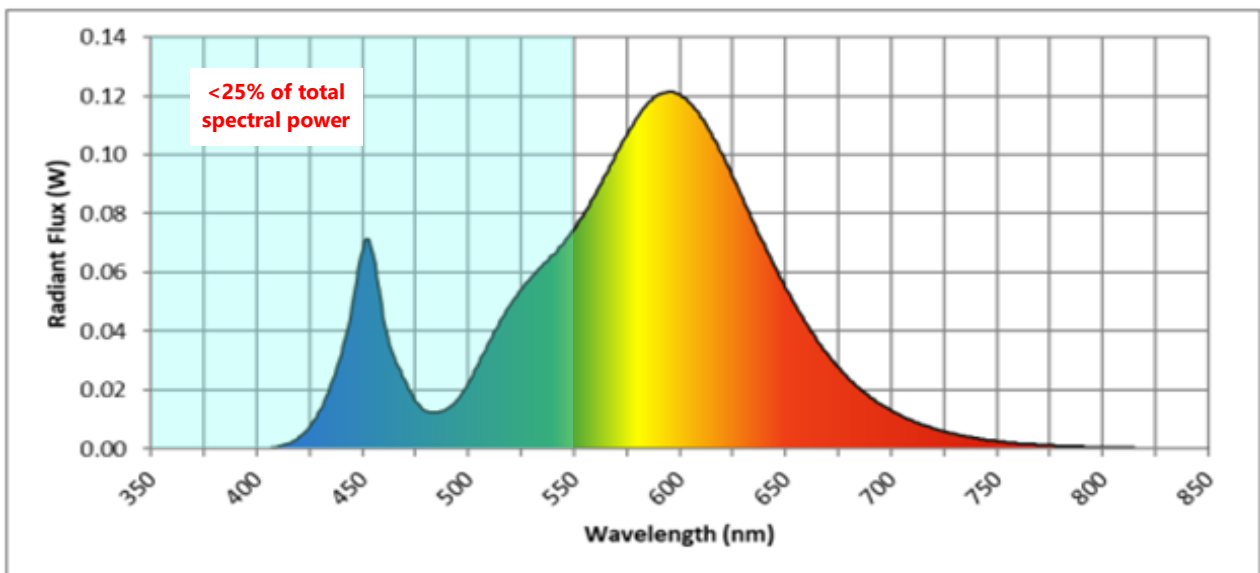


Figure 14: Spectral composition

5. Operational requirements

5.1 Education

Implementation of this LMP will be guided through the development application process and associated conditions, however long-term adherence to the principles established in the LMP will be reliant on education and awareness of key stakeholders including (but not limited to):

- Facility owners
- Facility managers
- Maintenance staff / contractors
- Occupants, tenants, residents

It is recommended that educational measures be put in place to increase awareness of the importance of responsible lighting practices as outlined in the LMP. This could be in the form of signage, brochures, or other material provisioned as part of development and ongoing operation of the precinct and its facilities. This material should be considered for inclusion in the Tenant Development Guidelines.



5.2 Temporary Lighting Installations

Temporary lighting for night-time tasks is permitted in the precinct however must be limited and controlled to reduce light pollution by adhering to the LMP as far as practical. All temporary lighting will need to be managed through individual construction management plans, appropriate for the works and is to be removed as soon as night-time task is completed.

6. Glossary of Terms

Table 7: Key terms

Term	Description
AS/NZS 1158 (suite)	<i>Lighting for roads and public spaces</i> Australian standard providing requirements for lighting of roadways and other public spaces. Includes the following: - AS/NZS 1158.0: Introduction and a guide to terms. - AS/NZS 1158.1.2: Vehicular traffic (Category V) lighting — Guide to design, installation, operation, and maintenance. - AS/NZS 1158.2: Computer procedures for calculating light technical parameters for Category V and Category P lighting. - AS/NZS 1158.3.1: Pedestrian area (Category P) lighting — Performance and design requirements for paths, car parks, and public spaces. - AS/NZS 1158.4: Lighting of pedestrian crossings. AS/NZS 1158.5: Lighting for tunnels and underpasses
AS/NZS 4282	<i>Control of the obtrusive effects of outdoor lighting</i> Australian standard outlining guidelines for minimising obtrusive light for exterior lighting installations.
Correlated Colour Temperature (CCT)	A measure of the "colour" of a light source, expressed in kelvins (K). It corresponds to the temperature of an ideal black body that would emit light of a similar "colour." Measured on a scale from 1,000 to 10,000 K.
Glare	The reduction of visual performance or the disturbance of perception, as caused by high luminances or contrasts in luminance within a visual environment.
Luminaire / Lighting Fixture	A complete lighting fixture that includes a light source (such as an LED) as well as any necessary components such as a housing, reflectors, lenses, diffusers, etc.
Obtrusive light	Spill light which, because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information. This includes general impacts on humans and the environment.
Occupancy sensor	An electronic control device that detects the presence of people within a specific space to automatically turn lights on and off.
PE cell	Photoelectric cell. An electronic device used as a light-sensitive switch to automatically control lighting circuits.
Sky glow	A form of light pollution caused by artificial light shining (or reflecting) upward and reflecting off moisture, dust, and gases in the atmosphere creating a brightening of the night sky.
Spectral power density	Specifies the amount of power a light source contains at each wavelength in the visible spectrum.
Spill light	Unwanted light falls outside the target area of illumination. Spill light can be a source of obtrusive light and light pollution.
Tilt	The angle at which a luminaire is tilted above the horizontal (zero degree) plane.
Time clock	A control device that uses time-based scheduling to automatically turn lights on and off.
Upward waste light	The proportion of the luminous flux emitted by the luminaire above the horizontal, in the installed position.

