SPORTHQ

Sports lighting best practice guide

DELIVERING FOR QUEENSLAND

Queensland Government

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Sports lighting best practice guide

SPORT HQ

Table of Contents

Please note that the Australian Standards listed in this guide, including AS 2560 Series and AS 4282-2023 as per Appendix 1, may be updated over time. Organisations are encouraged to stay informed about any changes and seek advice from qualified, accredited lighting designers to ensure their lighting designs comply with the most current and relevant standards.

The information presented in this guide:

- is general in nature and does not consider your organisation's specific situation;
- is correct at time of publishing; and
- should not be considered as legal advice.

DELIVERING FOR QUEENSLAND | Queensland Government

Introduction

Sports lighting technology has advanced rapidly in recent years and there are many new and emerging ways to light a playing arena in Australia and across the world. Like most countries, Australia sets standards to safeguard users and keep our venues safe. Organisations must comply with all relevant laws and authority requirements.

This guide helps your organisation plan and deliver sports lighting projects in line with best practice.

To help achieve best practice and industry standard lighting, it is important to:

- **Conduct research** to ensure that the products and configuration meets your sport's needs, including participation and competition standards
- **Consult with accredited lighting designers**, who can advise on legislative standards and infrastructure requirements
- **Gain advice from people and organisations who are experienced** in successfully delivering compliant lighting infrastructure in Australia

Definitions

Cross-arms and head frames: Horizontal beams/frames that support and position luminaires. These are designed to hold multiple luminaires at specific angles and spacing to achieve the required lighting coverage and uniformity.

Glare: The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, causing annoyance, discomfort, or loss in visual performance and visibility. Minimisation of glare is an important aspect of sports lighting.

LED drivers: All LED luminaires require drivers to operate, and these can be internal to the luminaire, luminaire mounted, mounted remotely such as in the pole, in pole mounted cabinets or in some cases up to 200m away from the actual luminaire in a central cabinet.

Lighting control system: An electrical or preferably electronic system that regulates the operation of lights, including switching on/off, dimming for the specific needs of an event.

Lighting poles: Tall structures designed to support luminaires (light fixtures) used in sports lighting. The height and structural capacity of these poles are tailored to the lighting design for the facility.

Luminaire: A complete lighting unit consisting of a light source (LEDs) and driver (when applicable), together with the parts designed to distribute the light, to position and protect the light source and to connect the light source to the power supply. Luminaire is also known as a light fixture.

Lux: A unit of illuminance, representing the amount of light that falls on a surface. It is a key measurement in sports lighting to ensure that brightness levels meet the specific requirements for different sports.

Spill light: Spill light or obtrusive lighting, is light that spills beyond the boundaries of the area it was intended to illuminate, which can cause light pollution or nuisance to nearby residents.

SSL: SSL stands for Solid State Lighting, the technically correct term for LED lighting. It covers a range of LED types such as semiconductor light emitting diodes (LED), organic light emitting diodes (OLED) and polymer light emitting diodes (PLED).

Uniformity: Lighting uniformity is the measure of how evenly light is spread across a surface, calculated as a ratio to show the difference between the brightest and darkest spots, ensuring visual comfort, safety, and consistent visibility by reducing harsh shadows and glare.

Switching mechanisms: There are a variety of switching methodologies including traditional switches, electronic control (touch panel) or mobile app. If installing manual switches, consider the use of timers to automatically switch lights off after pre-set run times.

A guide to your lighting project

See below for a snapshot of the steps involved in a sports lighting project. This guide provides a checklist for each step to help ensure you have considered important elements of your lighting project.

1. Research your options

Do your due diligence and undertake research

2. Project preparation

2.1 Project scope

Clearly outline and document what you want to achieve and the timeframes

2.2 Site considerations

Know the site limitations and requirements to adjust your project components and enable approvals

2.3 Approvals

Even if you are upgrading, make sure you know what approvals are required by landowner and Council

2.4 Design best practice

A lighting design should consider all your location specific details and contain the specific components

2.5 Design considerations

Undertake your due diligence by collating specific details to ensure that the planning is sound for your lighting project

2.6 Lighting components and existing lighting considerations

Ensure any existing light infrastructure is sound and will work well with new lighting components

2.7 Project costs

A comprehensive scope of works and a tender/quote process will enable an accurate project cost and assist your organisation to gain value for money

2.8 Warranty

Ensure you know warranty conditions/requirements at the planning stage and after delivery

3. Pre-construction considerations

3.1 Confirmation of scope

Thorough due diligence, particularly of your design, sets your project up for success before you break ground

3.2 Financial commitment

A comprehensive project budget enables you to make good financial decisions and make allowances for the unexpected

3.3 Project management

A well-managed project will save your organisation time and money

4. After construction considerations

4.1. Documentation

Keep your project aligned with the compliance requirements and ensure you have the right documentation

4.2. Operational aspects

Know how to operate your lights and system, how much it is costing you and who will manage the lights night by night

4.3 Asset and financial management

Ensure your organisation is ready to look after your new lights and has a sinking fund for the future

1. Research your options

Do your due diligence and undertake research by gaining advice from:

- **Accredited lighting designers (MIES, FIES or RLP)** – for expertise in Australian Standards and sports field illumination
- **Landowner and Council staff** – for site access, local approvals and any property-specific requirements
- **State or national sporting bodies** – to learn from recent projects and gain an understanding of any competition requirements

Accredited lighting designers are specialists in Australian standards and understand how to design a lit playing surface. Accredited lighting designers include:

- Member of the Illuminating Engineering Society of Australia and New Zealand (**MIES**)
- Fellow of the Illuminating Engineering Society of Australia and New Zealand (**FIES**)
- Registered Lighting Practitioner of the Illuminating Engineering Society of Australia and New Zealand (**RLP**)

Additionally, consider contacting your local Queensland Government sport and recreation service office for insights into recent lighting installations and upgrades. While advice from other organisations or discussions with licenced suppliers and installers can be helpful, remember that such guidance is general in nature and may not align with your specific circumstances. Always ensure you seek tailored advice from an accredited lighting designer.

> The Australian Standards AS 2560:2:2021 and AS 4282.2023 are the benchmark for lighting projects. Most funding programs will use the Australian Standards (as applicable) as the required standard to support community sport, whilst some state or national sporting bodies may desire a higher lux level these higher levels may not be eligible for funding.

2. Project preparation

2.1 Project scope

The first step is to clearly outline and document what you want to achieve and your project timeframes. Use the checklist below to ensure you have considered each element of the project scope.

Have you clearly outlined your timeframes for project planning, delivery and completion? ☐

Be realistic and allow time for research, obtaining designs and approvals and if you are applying for funding, allow sufficient lead time for the design to be prepared prior to the funding submission.

Have you clearly outlined what you want to achieve? ☐

For example, outline the activities, competition standard, pole requirements (new/existing), and switching system you need. Think about the organisation's future needs while remaining realistic. If you're applying for grant funding, it is common that any future-proofing costs beyond the grant's agreed lux levels must be covered by the organisation, so be sure to itemise those extra expenses and their funding sources in your application.

Have you considered if usage of the lights will be available (for hire) to other user groups or individuals? ☐

Do you know the lighting standards required at the site for your organisation and other users? ☐

For example, training, competition or semi-professional play. For multi-use facilities, it is important to be aware of any specific requirements for each activity.

Have you sought input from a suitably qualified lighting designer (MIES, FIES or RLP) to assist with planning and design, and to ensure that it meets relevant sports lighting standards? ☐

Remember, Australian Standards provide the benchmark for lighting projects. Any decision to exceed these standards is generally not covered by grant funding and will need to be funded by other means.

Have you reviewed and considered all the lighting infrastructure components with your project? ☐

For example, lighting fittings, lighting poles, cross arms, electrical (power supply/source, meters, switchboards, cabling) and switching control system. Refer to Section 2.6 Lighting components and existing lighting considerations for more details.

Have you considered what impact this project will have on your organisation's current operations? Can the work be scheduled outside of the playing season? ☐

Is the project proposed to be undertaken in multiple stages? ☐

Do you have the expertise to manage project planning and delivery? ☐

Hiring a qualified independent project manager with specialist knowledge to manage the lighting contractors and delivery can be extremely valuable and may be mandatory if you have received funding.

How much will it cost to maintain and run when completed and can you afford it over the long term without subsidies? ☐

If you are applying for a grant, have you checked the program guidelines and any funding eligibility requirements? ☐

A grant may require specific eligible lux level requirements and is likely to require qualified lighting designs, approvals and audits.

2.2 Site considerations

The next step is to identify your site's limitations and requirements so you can tailor your project components and streamline approvals. Use the checklist below to confirm you've covered every site factor.

Is the development on a former landfill site? ☐

If so, this is likely to require additional engineering design for poles and footings as well as additional costs for possible removal of contaminated soil.

Does the project site have any other unsuitable soil conditions e.g. rock or high-water table? ☐

Geotech investigations will help answer this question, if not known.

Have you considered obtrusive light (spill light)? ☐

Refer to AS 4282:2023 (Control of the obtrusive effects of outdoor lighting) for further detail. This is a mandatory requirement for any lighting design.

Has ecological consideration been given to the limitations placed on artificial lighting if your venue exists close to significant habitat areas? (See obtrusive spill lighting above) ☐

Have you or do you need to consider the potential impacts of your installation on aviation? ☐

- Venues within 6 kilometres of an airport must seek and comply with the airport operator's determination on obstacle limitation surface requirements (OLS)
- Depending on the height of the poles and the lux levels required you may also need to comply with:
  - The Civil Aviation Regulation 1988 regarding dangerous lights
  - Air Services Australia requirements

Note: This determination is in addition to your development application through your relevant local Council.

Has consideration been given to the wind loading for cyclonic conditions and earthquakes if applicable to your area? ☐

Are there any trees that need to be removed? Are there any protected trees?

The design may need to be adjusted to avoid impacting protected trees as trimming will not be permissible. ☐

Is the site on a floodplain or have a history of flooding?

Yes – You need to keep your LED drivers and switchgear above the highest recorded flood level in the past 25 years or install them in IP68-rated cabinets so water cannot enter during floods. ☐

Moving the driver to a location outside of a flood zone may be a good solution, just be sure to include the extra cable runs and associated costs in your budget.

No – Consider mounting your drivers inside the pole or in weatherproof cabinets fixed high up on the pole so they're only reachable by ladder, helping to deter vandalism and keep your gear secure. ☐

2.3 Approvals

Early in the planning project, make sure you know what approvals are required by the landowners and Council, even if you are just upgrading.

> **Check early!**
> Failure to gain appropriate approvals prior to design and construction may cause delays that result in significant increases in project costs. Better to check early.

Have you checked with your landowner about any permissions required to undertake the work? ☐

Make sure you provide specific details of the elements and design of the project. Keep your landowner updated with any changes.

Are the facilities currently lit for sport use?

Yes – Development approval (DA) may not be required but this will depend on increases to external lighting intensity (lux levels) or to the replacement of poles (requiring new footings) or pole heights. DA will typically not be required for internal lighting changes. ☐

No – DA will likely be required for new poles and footings as well as compliance with AS 4282:2023 (Control of the obtrusive effects of outdoor lighting). Council will advise relevant requirements through the application process. ☐

Have you gained building approval documentation? ☐

Ensure that you gain all necessary documentation prior to and after construction from a professional certifier. Generally, a pole manufacturer or a registered structural engineer will not need to provide a Form 15. However, it is a good idea to confirm this requirement.

Refer to the *Sport HQ Development and building approval fact sheet*.

2.4 Design best practice

A lighting design should consider all your location details and contain specific components.

How to obtain a lighting design

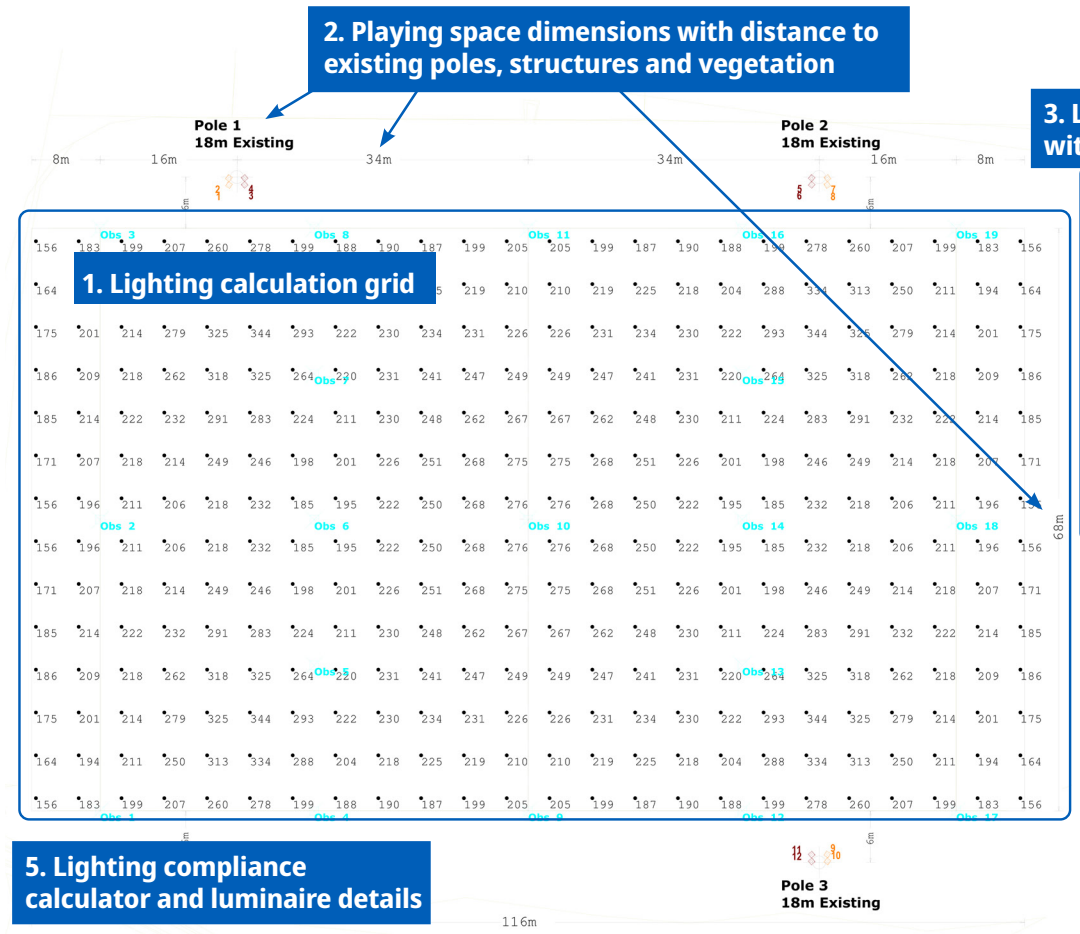
There are three main options when seeking a lighting design that includes a calculation grid/illumination results sheet and obtrusive light analysis and compliance report:

1. Engage a MIES, FIES or RLP lighting designer to develop a design on behalf of your organisation. This will come at a cost to your organisation. Depending on the timing of the design, it may not be retrospectively claimed if your organisation receives funding after the design is undertaken.
2. Contact preferred luminaire provider and request that they develop an appropriate design for your facility. In most cases this will be at no charge. However, it is likely that suitably licensed contractors will need to obtain the design from the luminaire provider directly to ensure that they purchase the fittings through them. You will however need to provide the luminaire supplier/manufacturer either a lot and Plan number or with a Google earth / Nearmap / Qld Globe image of the site which clearly shows adjacent infrastructure including residences and commercial premises, if applicable, to ensure design is compliant with AS 4282:2023.
3. Request quotes from suitably licensed contractors who will each in turn have designs developed by a MIES, FIES or RLP lighting designer to suit the luminaires of their preference and experience. Contractors can be reluctant to incur design costs without knowing if they have the contract.

Use the example and checklist on the following page to confirm your design includes all the relevant elements.

Lighting design example

2. Playing space dimensions with distance to existing poles, structures and vegetation



1. Lighting calculation grid

3. Lighting design compliance with the necessary standards

Design Notes:

1. This scheme is for information only and not for construction.
2. Field lighting was designed to meet the illumination requirements of AS 2560-2-2021 Lighting For Football (all codes).
   Semi-professional Competition - 200lux (page 1)
   Amateur Club Competition - 100lux (page 2)
3. Field light level values shown on page 1&2 are maintained values calculated at local ground level in the horizontal plane.
4. The maintenance factor used for the design life is MF=0.9, the design life is L98=50,000 hrs (25 years - 1000hrs per year), using LDD=0.92 (dirt) from AS 2560.1:2018 6 year cleaning cycle.
5. The design uses existing poles as labelled. The pole heights listed are the crossarm heights above the playing surface.
6. Obtrusive Light compliance is as per reports on page 3 to suit AS/NZS 4282:2023, A3 - Medium District Brightness, Non-Curfew L1.
7. Construction drawings and aiming details will be issued after an order for fittings has been received.
8. This calculation was created using AGI32-21.3 (direct calculation mode) and should only be viewed and printed in colour.

6. Obtrusive lighting report

Obtrusive Light - Compliance Report
AS/NZS 4282:2023, A3 - Medium District Brightness, Non-Curfew L1
Filename: Lockhart River FNQ - Blank-2024
20/05/2024 1:26:08 PM

Illuminance
Maximum Allowable Value: 10 Lux

Calculations Tested (12):

Calculation Label	Test Results	Max. Illum.
House 3 - Obt Lt_Ill_Seg1	PASS	0.4
House 3 - Obt Lt_Ill_Seg2	PASS	4.6
House 3 - Obt Lt_Ill_Seg3	PASS	1.4
House 2 - Obt Lt_Ill_Seg1	PASS	0.6
House 2 - Obt Lt_Ill_Seg2	PASS	2.0
House 2 - Obt Lt_Ill_Seg3	PASS	0.1
House 1 - Obt Lt_Ill_Seg1	PASS	0.3
House 1 - Obt Lt_Ill_Seg2	PASS	0.6
House 1 - Obt Lt_Ill_Seg3	PASS	0.0
House 4 - Obt Lt_Ill_Seg1	PASS	0.0
House 4 - Obt Lt_Ill_Seg2	PASS	0.5
House 4 - Obt Lt_Ill_Seg3	PASS	0.3

Luminous Intensity (Cd) At Vertical Planes
Maximum Allowable Value: 12500 Cd

Calculations Tested (12):

Calculation Label	Test Results
House 3 - Obt Lt_Cd_Seg1	PASS
House 3 - Obt Lt_Cd_Seg2	PASS
House 3 - Obt Lt_Cd_Seg3	PASS
House 2 - Obt Lt_Cd_Seg1	PASS
House 2 - Obt Lt_Cd_Seg2	PASS
House 2 - Obt Lt_Cd_Seg3	PASS
House 1 - Obt Lt_Cd_Seg1	PASS
House 1 - Obt Lt_Cd_Seg2	PASS
House 1 - Obt Lt_Cd_Seg3	PASS
House 4 - Obt Lt_Cd_Seg1	PASS
House 4 - Obt Lt_Cd_Seg2	PASS
House 4 - Obt Lt_Cd_Seg3	PASS

Threshold Increment (TI)
Maximum Allowable Value: 20 %

Calculations Tested (4):

Calculation Label	Adaptation Luminance	Test Results
TI - Street 2 Southbound	1	PASS
TI - Street 2 Street Northbound	1	PASS
TI - Street 1 Northbound	1	PASS
TI - Street 1 Street Southbound	1	PASS

Upward Waste Light Ratio (UWLR)
Maximum Allowable Value: 2.0 %

Calculated UWLR: 0.2 %
Test Results: PASS

4. Lighting compliance calculator and luminaire details

Calculation Summary
Project: Horizontal Light Levels
Scenario: 200lux

Label	Units	Grid Z	Avg	Max	Min	U1-Min/Avg	U2-Min/Max	UG
Field - Eh ground	Lux	0	231.35	344	156	0.67	0.45	1.45

Calculation Summary
Project: Glare Rating
Scenario: 200lux

Label	Max
Glare Rating	46.0

5. Lighting compliance calculator and luminaire details

Luminaire Schedule
Scenario: 200lux

Symbol	Label	Qty	Description	Lum. Lumens	LLF	Lum. Watts	Total Watts
	A35-NB+LO	8	A35-NB+LO LED2590-4S/757 T35 100K OUT c/w IP66 remote DALI gear	151652	0.900	1505.9	12047.2
	A35-NB+LTM	8	A35-NB+LTM LED2590-4S/757 T35 100K OUT c/w IP66 remote DALI gear	183087	0.900	1505.9	12047.2

LIGHTING COMPANY NAME:
ABC Lighting

Design Certification Details:
Mr MIES (membership # - XXXXXX)

REVISION:	DATE:	DESCRIPTION:
P1	20-5-2024	Grant Application Issue

Design Certification Details:
Mr MIES (membership # - XXXXXX)

7. Details of the lighting company and designer details

PROJECT DETAILS:
Typical Rugby League Site
100 Rugby St, Rugby, Qld

8, 9. Organisation name and specific project location

REVISION:	DATE:	DESCRIPTION:
P1	20-5-2024	Grant Application Issue

10. Date of lighting design

#	Design elements
1	**Lighting calculation grid** A calculation grid/illumination results sheet is created to calculate and check the average horizontal maintained illuminance in the total playing area. A calculation grid is required for each of the switching levels included in the application e.g. 50 lux and 100 lux if switching to various levels is required. This also has to include a calculation summary showing the average, maximum and minimum levels achieved.
2	**Playing space dimensions with distance to existing poles, structures and vegetation** Specific dimensions of the playing area as well as any other existing poles, structures and vegetation need to be considered and outlined for the design.
3	**Lighting design compliance with the following standards** • AS 2560.2:2021 Sports lighting, Part 2 Specific applications and AS 2560.1-2018 Sports Lighting Part 1: General principles. If applicable to the sport or activity as not all sports are covered in this standard • EN 12193 2018 Light and Lighting – Sports lighting. This standard is only applicable to sports not covered under AS 2560.2:2021 • AS 4282-2023 Control of the obtrusive effects of outdoor lighting Ensure there is a note that the design, materials and works undertaken comply with Australian Standards.
4,5	**Lighting compliance calculator and luminaire details** Standard elements for a lighting design and important details to note.
6	**Obtrusive lighting report** An obtrusive light analysis and compliance report to show that the design has minimised any obtrusive light. Obtrusive light may be defined simply as unwanted light. More specifically, it may include light that falls onto the property of others and glare. An obtrusive lighting report will be based on the highest lux level in the design suite and in most instances will be on a single design page.
7	**Details of the lighting company and designer details** The designer's name, company/organisation (if applicable), contact details including, street address, telephone numbers, website/email address and IES membership number and level. Some funding programs require that your design is developed or signed off by a lighting professional (MIES, FIES or RLP). Electrical engineers are only qualified to develop a lighting design if they also have the appropriate membership.
8, 9	**Organisation name and specific project location** The design must contain identifying information such as the location and who the design is for – the organisation's name.
10	**Date of lighting design** The date of design is important to note, because site infrastructure and vegetation may change over time.

Remember, Australian Standards provide the benchmark for lighting projects. Any decision to exceed these standards will not be covered by grant funding. Keep in mind that standards are regularly updated and apply as the minimum standard at time of scheme design on release. All other standard versions become obsolete from that date e.g. AS 2560.2:2021 will be superseded by AS 2560.2:2026 when it is released (expected early 2026).

2.5 Other design considerations

Use this checklist to make sure your lighting project's planning is robust and well-formed.

Do you have a survey drawing of the site showing levels, dimensions and layout? ☐

Have you prepared a satellite image view of the applicable infrastructure to be illuminated? ☐

Have you specified the specific playing area of the site to be lit through this project on a site layout? ☐

Have you determined the lux level/s of lighting required for your project? ☐

If the facility is multipurpose, are there any specific areas that require different levels of lighting to accommodate a different sport or lux level? ☐

Has the area requiring the alternative lighting level or applicable sport footprint been clearly indicated on the site layout? ☐

Note: A compliant calculation grid will be required for each of the sports required.

Has consideration been given to accommodate desired future lighting level upgrades? ☐

If yes, ensure that the designed solution provides for known and likely future upgrades.

Has the professional lighting designer referred to the section of the Australian Standard for Sports Lighting (AS2560.2:2021) applicable to the sporting code/s? ☐

Does the height and configuration of the poles meet the requirements of AS2560.2:2021? ☐

This height should be determined by the lighting scheme designer.

Does the design have the light poles offset for the playing area as per AS2560.2:2021?

Yes – Confirm if any additional distance is required to suit the sport prior to accepting the design. ☐

No – Obtain confirmation in writing from the sport's governing body regarding the minimum runoff distance required from the principal playing area (PPA) activity boundary. ☐

Will the pole manufacturer also be supplying the footing cages and foundation bolt assembly (including rag bolts)? ☐

Has consideration been given to using alternative energy sources rather than just mains power? ☐

Has a cost benefit analysis (CBA) been undertaken on using solar and battery storage to reduce mains power needs? Has it been clearly evidenced that initial capital outlay will be recouped within the system's expected lifetime, say 10 years?

Is it expected that surplus energy will be exported to the grid and if so, has this been included in the CBA above? ☐

Has consideration been given to bird proofing options as part of the design? ☐

Appropriate bird proofing (flexible metallic conduit and fittings or similar) should be installed if the design includes exposed wiring, to provide protection from bird damage and severe weather events.

Alternatively, if there is a risk of birds roosting or nesting on luminaires or pole mounted infrastructure, this can be resolved using bird spikes. This helps to prevent fires and prolong the life of the luminaires.

Will the new or increased lighting have an impact on surrounding residences?

Yes – An obtrusive light compliance report will be required as part of the lighting design. This will demonstrate compliance with AS4282:2023. Shields (rear, side and louvres) may be required to be fitted to the lights to cut off or control obtrusive light. ☐

No – An obtrusive light compliance audit report may still be required to demonstrate compliance with AS4282:2023 Effects of Obtrusive Lighting after construction. ☐

Has the effect of vegetation been considered?

Yes – It is not permissible to use trees and other vegetation for shading to assist the lighting design to conform to AS4282:2023 ☐

No – The positioning of the poles must be adjusted to avoid vegetation and to prevent any possible future 'shading' of the lights. ☐

Are all proposed luminaires appropriately IP and IK rated?

Yes – Does the luminaire have an IP (ingress protection) rating minimum of IP65? ☐

Yes – Is the IK (impact rating) appropriate for the environment e.g. IK08 or IK10? ☐

No – Alternative luminaires may need to be sourced for your installation, to meet these minimum levels. ☐

For further details on these ratings, refer to Appendix 1.

2.6 Lighting components and existing lighting considerations

Make sure you consider all of the lighting components including lighting fittings, lighting poles, cross arms, electrical (power supply/source, meters, cabling) and switching control system.

If you have existing lighting infrastructure, make sure it is sound and will work well with new lighting components. Use the checklist below to ensure you have considered the condition and impact on your current infrastructure.

Light fittings

What type of light fittings are you considering? ☐

Consider the following:

- Type of light required
- Hours of use and any maintenance benefits
- Dimensions and luminaire weight for cross arms
- Inter-play between the existing infrastructure on site, particularly position of poles

Funding programs may stipulate the type of light fitting eligible under the funding program, such as LED fittings.

UPGRADING? Has a lighting audit been undertaken to establish current lighting (lux) levels? ☐

An audit helps you see what's working well and what's not, giving you valuable insights that can save your organisation both time and money.

Poles – height, location, cross arms, footings and soil investigation

Even if you are not upgrading poles, the structural integrity, height and location of poles and cross arms will impact on the lighting design and longevity of your project.

If installing lights into an existing indoor facility, has a dilapidation report been undertaken? ☐

UPGRADING? Has a structural engineering assessment and certification been undertaken to determine the condition of the existing poles and capacity to carry additional lights (if required)? ☐

For existing poles and cross arms, structural certification will be required from a registered professional structural engineer to confirm the reuse/relocation of poles and cross arms is possible.

If switching to LED, drivers and fixtures could add extra weight and wind-sail area compared to metal halide, so you may need sturdier cross-arms or pole upgrades to keep your lighting safe and serviceable.

To do this the structural engineer will need to know the weight, size and number of luminaires and drivers (if applicable) to be mounted on the poles. As such, an illumination design will need to be completed first as this will also determine if the existing poles for reuse are of sufficient height and enable the engineer to determine the structural capacity of the poles for the new installation.

Has soil/geotechnical testing been undertaken at each proposed light pole position?

Yes – Ensure the results have been used to develop the pole footings design. ☐

No – Tendering sports lighting contractors will require this testing information to provide to professional structural engineers/pole suppliers to determine the appropriate footing design for the poles and the chosen luminaires. ☐

- Additional costs in pole footings are likely to be incurred where adverse soil conditions are experienced e.g. sandy soil, landfill sites or highly reactive soils
- A result indicating contamination may trigger the involvement of the Contaminated Land Unit within your local Council and further approval/building conditions may apply
- The location of concrete, rock, asbestos or other items such as buried services during installation will trigger variations and may increase project costs

Has a site-specific footing design been obtained prior to seeking quotes for construction and installation?

Yes – Ensure the design is provided to all companies quoting/tendering on the works and ensure the designs have been prepared by an appropriately qualified structural engineer. ☐

No – Not having site-specific footing design adds a financial risk to the project. ☐

Whilst a contractor may be able to provide a generic footing design in their quote, without soil/geotechnical testing, additional project costs are likely to be incurred as the type of footing cannot be confirmed.

Have you gained advice on completing Form 15? ☐

Form 15 (compliance certificate for building design or specification) states that an aspect of building work or specification will, if installed or carried out as stated in this form, comply with the building assessment provisions.

A professional certifier is required to provide advice on Form 15 requirements. Generally, a pole manufacturer or a registered structural engineer will not need to provide a Form 15. However, it is a good idea to confirm this requirement.

Electrical – supply, transformer, meters, cabling and controls

UPGRADING? If required, has an electrical assessment been undertaken to determine the capacity of the existing electrical infrastructure to accommodate new and or additional lights? ☐

The time and cost of upgrades and replacement need to be factored into your plan and budget. Ensure that you allow generous timeframes for the installation/upgrade of a new supply line or transformer as this is generally measured in months and not in weeks.

Is there a requirement for a new/upgraded power meter e.g. smart or 3-phase meter? ☐

Ensure any associated costs are included in the contractor's quote.

Is there a requirement for a new/upgraded supply line or transformer? ☐

If required, ensure that any of the contractor's direct costs are included in their quote. Note that network costs will be a direct contract with the energy distributor (Energex or Ergon in QLD) rather than through the contractor and therefore at the organisation's cost. The contractor will also incur costs, and these will need to be reimbursed by the organisation.

Has consideration been given to installing the LED drivers remotely from the luminaires? ☐

Luminaires that incorporate integrated drivers are not recommended. Luminaire mounted drivers will require the hiring of height accessible equipment to undertake any driver related work and these usually are the main source of failure in most LED installations.

It is a good idea to request that drivers be mounted at an accessible level for ease of replacement and repair.

Are there any requirements for external power points or public address speakers at the light poles? ☐

If the organisation decides to include power points or speakers, ensure that the number and location are provided to the electrical designer or tenderer including single or 3-phase and any control requirements e.g. timer controlled and audio-visual system at the clubhouse.

What type of cabling do you require, or does the existing cabling need to be upgraded? ☐

Theft of cabling is a current occurrence. Consider and discuss this issue with your Council.

Switching control systems

Have you considered requirements for the lights to be switched to different lux levels to reduce unnecessary expense? ☐

- Different usage areas – for example, half-field only, or shared use between AFL and cricket
- Lighting levels matched to activity – such as lower levels for training and higher levels for competition

Have you considered the best location for the following? ☐

- Lighting main switchboard – Consider future access needs by organisation personnel and electricians
- Lighting control box – Consider proximity to entry/exit points/car park and accessibility by non-regular user groups
- Height of the electrical infrastructure – consider a location high enough to avoid any damage from potential flooding events and vandalism but still accessible without needing to hire expensive equipment

Have you considered the preferred light switching mechanism? ☐

The inclusion of a user friendly, app-based lighting control system helps ensure that your lights can be controlled remotely and that users are unable to increase lux levels without agreement.

Have you considered the preferred access to the lighting controls? ☐

- Padlock or keyed access – Consider who should have access and the need to provide dedicated keys to other users without the ability to access other facilities
- PIN pad or swipe/touch card entry
- Mobile phone app – No special site access necessary, can be controlled remotely and lux levels locked to suit users
- Manual override to account for malfunction or power failure

Is there a need to record electricity consumption? ☐

Recording consumption may be important if you have different user groups accessing your lit playing areas. Options include things like sub-meters, mobile phone app, tokens, PIN access and computer programming. Discuss options with your lighting designer.

2.7 Project costs

To gain a project cost, you will need a comprehensive scope of works and a procurement/quote process to improve your value for money.

Scope of work considerations

Have you developed a clear and detailed scope of works that outlines the following?

- Site specific details and layout ☐
- Activity/sport requirements ☐
- All the lighting components (fittings, poles, electrical, switching control, etc) ☐
- Reports (i.e. structural, dilapidation) ☐
- Audits/tests/assessments (i.e. soil, final audit) ☐
- Approvals ☐
- Project management ☐
- Warranty requirements ☐
- Other – vegetation management, disposal of removed old structures or contaminated fill/soils ☐

Please see *Appendix 2 – Examples: Scope of Work Considerations* and the *Sport HQ Scope of works fact sheet* for a list of items that could be included in a quote. Not all will be applicable to all projects, however, they should be considered.

Have you determined who is responsible for the costs and if costs are grant eligible? ☐

If you are leasing then some costs may not be your organisation's responsibility. Additionally, it is possible that only costs within your lease boundaries and incurred within the approved funding program timeframe may be eligible. Your organisation may need to cover the costs if work is required between the boundary and the main power supply and prior to the approved program timeframe. Check with your specific funding program.

Tendering or quotes

Do you want to get a current market costing for your project? ☐

It is best practice to gain at least three quotes or go through a public tender process. Some funding providers may require a public tender process.

Refer to the *Sport HQ Cost estimation guide* and *Sport HQ Procurement and tendering fact sheet* for more information on the tendering process, including Local Buy and other tendering options.

Will you tender your project as a design and construct (D&C) contract or follow a traditional model by completing design and engineering first and then calling for construction quotes?

If D&C – Ensure that the tenderers are provided with a detailed scope of works and if relevant a detailed performance specification and any relevant grant guidelines, if applicable. ☐

If traditional delivery – Use this guide to help you through the design and procurement process. ☐

> **Performance specification:** Performance specifications deliver projects that meet specific quality standards and performance requirements which is essential for ensuring client satisfaction and project success. Performance specification is a valuable approach used to define the functional and performance characteristics of construction materials, products or systems. By focusing on performance outcomes rather than prescribing specific methods or materials, performance specification empowers construction professionals to innovate and optimise project outcomes.

2.8 Warranty

Use the below checklist to ensure you know warranty conditions/requirements at the planning stage and then check it again after delivery.

> **Check before you sign**
>
> Check all warranty details before signing a contract. Make sure it's a genuine manufacturer's warranty, not just a supplier's or contractor's warranty.

Check the defects liability period, where the contractor will be responsible for replacing faulty components (usually 12 months). ☐

Note this does not negate product warranty conditions as these are supplied by the manufacturer.

Check the provision of manufacturers' warranties for poles, luminaires, fixtures and fittings, control systems, switchgear and switchboards. ☐

Check all warranties are for the benefit of the recipient (your organisation) and not only to the contractor or supplier. ☐

Ensure every lighting component is sourced from Australian manufacturers or their authorised suppliers/distributors with Australian-based warranties, and avoid products without confirmed Australian warranty coverage. ☐

Check lifetime warranty conditions match the expected life of the product. ☐

For example if the product has an expected life of 15 years and comes with a lifetime warranty, then this warranty should also be 15 years.

Check SSL (LED) luminaire warranties are at least 5 years. ☐

Warranties of at least 5 years should be provided on SSL (LED) luminaires.

- Most reputable manufacturers will provide a 3 or 5 year warranty with the option to extend the warranty at a cost of around 5% to 7.5% of purchase price per annum
- Warranty must also cover LED chips, drivers and the luminaire housing, louvres, lenses and mounting brackets
- You will generally not get a warranty that matches the stated lifetime hours

Preferred luminaires should be NATA certified or their international equivalents. ☐

Ensure copies of certificates are received. NATA is Australia's leading national accreditation body. NATA's role in lighting is to confirm that luminaires sold in Australia meet acceptable benchmarks for quality, longevity, electrical safety and achieve what the manufacturer says they achieve.

Ensure you gain clear information. ☐

Including how to action a warranty claim (if required) and the terms and conditions of the warranty.

Confirm the organisation can make a warranty claim directly from the supplier/distributor. ☐

3. Pre-construction considerations

3.1 Confirmation of scope

Thorough due diligence, particularly relating to your design, sets your project up for success before you break ground. Use the checklist below to confirm you have covered every critical element.

Have you updated your lighting design, ensuring compliance with AS 2560.2:2021 and AS 4282:2023, after any of these changes? ☐

- Pole heights
- Luminaires
- Lux levels
- Location

Has your FINAL lighting design, with calculation grid and obtrusive light compliance report, been signed off by a MIES, FIES or RLP member? ☐

Each switched lighting level must demonstrate compliance with AS 2560.2:2021 and AS 4282:2023. Note that many funding programs often require MIES or above accreditation. If this is the case, an electrical engineer's design won't be accepted without that IES rating.

3.2 Financial commitment

A comprehensive project budget enables you to make good financial decisions. Complete the checklist below to guide your budgeting process.

Do you have a cost estimate to complete the entire project including: ☐

- Professional fees for lighting designers and engineers
- Approvals
- Site analysis including soil tests
- Compliance tests and audits for before and after installation
- Switchboard and cabling
- Tree removal and disposal of redundant material and equipment
- Delivery costs
- A qualified project manager

Have you included an allowance for escalation of costs of materials and services up to the possible construction start date? ☐

Have you considered if there are any additional costs due to the location of your project, delivery and disposal of components? ☐

Have you included a contingency allocation to cover issues such as problematic soils or rock, unforeseen issues and eventualities? ☐

At the design stage, this contingency should be around 10-15%. Once you get to the stage of awarding the contract, this contingency could be reduced provided that you have undertaken relevant geo-testing.

Is your organisation registered for GST? ☐

If not, consider if any grant funds being obtained to deliver your project will mean that your annual revenue exceeds the GST registration threshold for not-for-profit organisations. Also remember that some grant providers will only pay you the funds to cover the GST component of your project if you are GST registered.

Have you obtained estimates on the running costs and ongoing maintenance for your new lights, including:

- Running costs of the lights (consumption) at each of the lighting levels ($ per kWh). Include service fees/supply charges and meter fees, if applicable ☐
- Maintenance and cleaning schedules and costs. This will be dependent on the type and technology of the luminaire used, pole type and environment ☐

3.3 Project management

A well-managed project will save your organisation time and money. Complete the checklist below to help your organisation establish best practice project management.

Consider engagement of an independent qualified project manager with experience in managing sports lighting projects and working with Council approval processes. ☐

Identify and outline the preferred timing/milestones of the project works and communicate these to your contractor through a desired program of works. ☐

Check with your insurer about updating your policy with the new/upgraded lighting infrastructure. ☐

Have you considered the value or importance of advising nearby residents of the upgrade prior to construction? ☐

Notification could be done through on-site signage or letter box drops and can help minimise complaints to the landowner if residents are aware of what is happening on site.

Project plan tips

A project plan sets expectations and outlines a clear plan of action. You may need to adjust the project plan over the life of the project to keep all stakeholders updated and involved.

Consider the following points when developing a project plan:

- Avoid peak usage periods of the facility (out of season is typically the best option)
- Allow time for Council approval process
- Allow long lead times for:
  - Energex/Ergon transformer or supply upgrades as this can be more than 6 months (if applicable)
  - Poles and luminaires delivery can take up to 12–17 weeks or more
- Wet weather may prevent access to playing fields for cranes
- Rectification of damaged playing surfaces can take 8 weeks or more until activities can resume

2 weeks prior to construction

Meet the contractor at least 2 weeks prior to construction commences to discuss:

- [ ] **Suitable access times.**
- [ ] **Desired vehicle paths, entry and exit points.**
- [ ] **Consider trees on site.**

  An arborist from your local Council may be required to provide approval to trim trees, if required for vehicle/cherry picker access.
- [ ] **Potential for damage to playing surfaces.**

  Take photos of the facility in its pre-construction condition.

  Especially in areas where construction vehicles are likely to access, or vegetation has to be moved or trimmed.
- [ ] **Mechanisms to mitigate playing surface damage.**
- [ ] **Adjustments to irrigation to ensure ground stability.**
- [ ] **Location of access pits to ensure compliance.**
- [ ] **Access to the facility, onsite amenities and site security need to be confirmed directly with the contractor.**

  This access should include end-of-day procedures and lock-up.
- [ ] **Confirm what the remediation process will be for any damage that occurs during construction.**

Before completion

Meet the contractor to ensure that the following steps are undertaken during and at the conclusion of the project:

- [ ] **Any keys to locks are returned by the contractor, pin codes changed or electronic access revoked.**
- [ ] **Any infrastructure removed by the contractor is replaced e.g. bollards, goal posts.**
- [ ] **Post construction meeting with contractor to assess playing surface condition and any required rectification works at the facility.**
- [ ] **All other items required as part of the contract are fulfilled, including warranties and lighting audit.**
- [ ] **Ensure the contractor provides a completed Compliance Certificate for Building Design or Specification (Form 15) on completion of the project and before any retention monies are released.**
- [ ] **Check if the contractor will provide an instruction session to you and other personnel to explain how to use the lighting controls.**
- [ ] **Check if there are problems or issues with the lighting and the associated warranties process.**

4. After construction considerations

4.1 Documentation

Keeping your project aligned with the compliance requirements you set at the start of your project, and with your contract terms, is essential. Use the checklist below to ensure you receive the following documentation after construction.

Final commissioning of the lights, including an audit showing lux plots across the activity areas in accordance with the measurement grid in AS 2560.2:2021 for each and all lighting levels. ☐

It is required that this is undertaken by an independent MIES, FIES or RLP lighting specialist and NOT the contractor that has installed the lights. Make sure this cost is included in the budget.

Refer to Appendix 3 for an audit sample.

Certification by an independent lighting designer that the installation meets the required Australian Standards. ☐

Again, this step should be completed by a suitably qualified lighting specialist (MIES, FIES or RLP) who was not involved in the construction of the lighting system, to ensure total independence.

Provision of all applicable warranty information (if not received yet). ☐

Manual on how to operate the lights and all the related settings. ☐

This manual can be in the form of instructions and a diagrammatic "how to" guide contained in the switchboard and may vary depending on the lighting control system chosen.

Provision of 'as-constructed' documentation for your records and future maintenance/replacement needs, particularly location of cabling. ☐

Other documents that may be applicable following construction include:

- Photos of the lighting project components
- Permanent signage to acknowledge funding contribution
- Certificate of practical completion

4.2 Operational aspects

Knowing how to operate your lights and system, how much it is costing you and who will manage the lights night by night.

Make sure that the personnel involved in operating the lights have a full understanding of the switching system and consider gaining onsite training for all involved. ☐

Know the cost associated with the operation of the lights. ☐

Regular lighting audits may assist with the maintenance of your sports lighting and should be factored into the operational budget. ☐

Develop clear directions on who to discuss issues and maintenance needs particularly after extreme weather events, lighting strikes or theft. ☐

4.3 Asset and financial management

Use the checklist below to help your organisation look after your new lights.

Does your organisation have an asset management plan in place?

Yes – Add the new lighting to the asset register and specify the maintenance activities required, frequency and approximate costs for all elements of the lighting. ☐

No – Prepare an asset management plan and add your new lights and any other infrastructure controlled by your organisation. ☐

You can use the template provided in the *Sport HQ Asset management spreadsheet*.

Is your organisation making regular deposits into a facility sinking fund?

Yes – Ensure that the contributions are increased to accommodate the maintenance and replacement activity costs identified against this new project. ☐

No – Establish a sinking fund and make regular contributions to cover maintenance and replacement. ☐

The Sport HQ Asset management spreadsheet can help you calculate your required sinking fund contributions.

Is your organisation seeking external funding to undertake the project?

Yes – Complete all your funding conditions and grant acquittal requirements. ☐

Appendix 1: Acknowledgements, resources and reference documents

Australian Standard AS 2560 Series including Sports Lighting, General Principals and Sport specific versions

When participating in a variety of sports, Standards play an important role in providing the lighting needed to ensure a safe game.

AS 2560.1:2018 Part 1: General principles

This Standard contains recommendations and requirements for the lighting of places, both indoors and outdoors, where sport is played. It includes general principles and recommendations for sports lighting, descriptions of suitable types of lighting equipment, and requirements regarding methods for the assessment or measurement of sports lighting installations.

This Standard is intended to be read in conjunction with the applicable section of AS 2560.2:2021 covering the sport of interest. Taken together, these Standards cater for the requirements of different levels of play, e.g. recreational, training, club, national and international, and provide for the visual requirements of participants, officials and spectators, as appropriate.

AS 2560.2.2021 Part 2: Specific applications

This document contains design and performance requirements and recommendations for the lighting of specific outdoor and indoor sports areas. It also provides recommendations for spectator areas and safety lighting.

Australian Standard AS 4282-2023 – Control of the Obtrusive Effects of Outdoor Lighting

This Standard sets out requirements for the control of the obtrusive effects of outdoor lighting. It includes limits for the relevant light technical parameters to control these effects. As the obtrusive effects of outdoor lighting are best controlled by appropriate design, this Standard is primarily applicable to new installations or where luminaires are being replaced or upgraded (e.g. increase in lux levels or upgrading form Metal Halide to LED).

This Standard specifically refers to the potentially adverse effects of outdoor lighting on nearby residents (e.g. of dwellings such as houses, hotels, hospitals), users of adjacent roads (e.g. vehicle drivers, pedestrians, cyclists) and transport signalling systems (e.g. air, marine, rail), and on astronomical observations.

The Standard does not apply to public lighting, as defined in Clause 1.4.11, unless specified by the relevant authority.

This Standard does not apply to environmental impacts associated with the daytime appearance of outdoor lighting systems, including their support structures.

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 obtrusive light on fauna is not covered within the normative parts of this Standard.

European Standard EN 12193:2018 Light and Lighting – Sports Lighting

The use of the EN 12193:2018 standard is only acceptable where the sport concerned is not covered in AS 2560.2:2021. It is not to be used as an alternative. Light and lighting - Sports lighting This standard specifies lighting for those indoor and outdoor sports events most practised in Europe. It provides lighting values for the design and control of sports lighting installations in terms of illuminances, uniformity, glare restriction and colour properties of the light sources. All requirements are meant to be as minimum requirements. It also gives methods by which these values are measured. For the limitation of glare, it also points out restrictions on the location of the luminaires for specific applications.

When and if using EN 12193:2018 compliance with AS 4282:2023 remains mandatory and is not negated by the use of the European standard for lighting design in Australia.

Impact Rating (IK) rating chart

The IK Code (otherwise known as Impact Protection Rating) consists of the letters IK, followed by two digits. These two digits help us to identify the level of protection a piece of equipment offers.

As defined in the international standard IEC 62262:2002 and IEC 60068-2-75:1997, it classifies the degrees of protection provided by enclosures for electrical equipment against external mechanical impacts.

This standard specifies the way enclosures should be mounted when tests are carried out, the atmospheric conditions that should prevail, the number of impacts and their (even) distribution, and the size, style, material and dimensions, etc. of the various times of hammer designed to produce the energy levels required.

Ingress Protection (IP) rating

The IP rating is an international standard that tells you how resistant a device is to ingress by solids and liquids. The first digit defines protection from dust, and the second digit defines protection from water.

Acknowledgements, resources and reference documents

1. Australian Standard AS 2560.2:2021 including Sports Lighting, Part 1 General Principals
2. Australian Standard AS 4282-2023 – Control of the obtrusive effects of outdoor lighting
3. Peter Jones, - Peter Jones Lighting
4. European Standard EN 12193 :2007 Light and Lighting – Sports Lighting
5. Moreton Bay Regional Council – Sport and Recreation Club Manual, Sports Field Lighting Checklist
6. Civil Aviation Authority MOS139 – Manual of Operating Standards Part 139 – Aerodromes
7. Moreton Bay Regional Council – Sport and Recreation Club Manual, Sports Field Lighting Checklist
8. Civil Aviation Authority MOS139 – Manual of Operating Standards Part 139 – Aerodromes

Appendix 2: Scope of works considerations for sports lighting

Scope of works considerations

Ensure the following, as a minimum, are clearly defined and included in the scope of works for contractors to quote/ tender on.

Soil testing and footing design (if not completed earlier).	☐
Structural engineering certification of footings and poles.	☐
Any other costs associated with works permit/approvals.	☐
Electrical engineering design and sign-off.	☐
Pole type/s and number, heights and locations as per the supplied lighting design.	☐
All light fittings as per the supplied lighting design.	☐
All required electrical infrastructure including any new or upgraded connections to the site supply point (e.g. switchboards, cables, sub-meters).	☐
All switching mechanisms and access to light control systems including installation of smart phone app infrastructure, if selected.	☐
All Energex/Ergon fees, including supply upgrades and new meters (if applicable and if cost effective).	☐
If applicable, the removal and disposal of existing lighting infrastructure.	☐
Tree trimming and removal of debris.	☐
Rectification of any damage to playing surfaces.	☐
Instructions and diagrammatic "how to" guide to be contained in the switchboard which may vary depending on the switching methodology chosen.	☐
Final commissioning of the lights with audit, including lux plots across the activity areas for all lighting levels (if applicable).	☐
Certification by an independent lighting designer that the installation meets the required Australian Standards.	☐
Confirm payment schedules including any options to finalise payment until all post-construction documentation is provided and all damage is repaired.	☐
Provision of 'as-constructed' documentation for your records and future maintenance/replacement needs.	☐

Refer to the *Sport HQ Scope of works fact sheet* and incorporate these special considerations to have a comprehensive checklist to guide your project.

Appendix 3: Sample sports lighting audit

Sports lighting audit - AFL Oval Report

Organisation/venue name:

Street address:

General audit summary

Start time:	**Finish time:**
Meter used:	**Last calibrated:**
Audit date:	**Audit undertaken by:**
MIES/FIES/RLP number:	**Auditor signature:**

Level of play under:

Light technical parameters table: Club competition and match practice - 150 lux Average (for AFL)

Standards summary: Relevant Standard: AS 2560.2:2021

Calculation points: AS 2560.2:2021 – Measurement grid as per (b) AFL Measurement Points 10m x 10m

Audit results table

	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2													
3													
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Calculated audit results		Required under AS 2560.2:2021		Result
Average		**Average**	150	
Uniformity U1 min/avg		**Uniformity U1**	0.50	
Uniformity U2 min/max		**Uniformity U2**	0.30	
Max Uniformity Gradient		**Max Uniformity Gradient**		
Max Glare Rating		**Max Glare Rating**	50	
Pole Heights		**Pole Heights**		

The report is developed using methods outlined in the Relevant Standards and is subject to tolerances in AS 3827.1.

Nett audit result:

Please note: The audit results table and grid spacing is required to be adjusted to suit the applicable sport