Sports Field Lighting (Summary)

This fact sheet is a short form version of the full Sports Field lighting document and is designed to assist individuals and organizations in the early days of considering the feasibility in installing lighting on sports fields, courts and ovals.

This fact sheet has been developed to assist in the installation of affordable and effective sports field lighting and to provide background to assist in discussions with consultants. It covers key issues to be considered in the planning and ongoing maintenance of a new sports field lighting projects:

- Scoping of project
- Planning and Approvals
- Design Considerations including Power supply, Types of lighting and Pole heights and location.
- Cost of Ownership
- Maintenance

Scoping of Project

A starting point in the development of any infrastructure project is to ask:

1. what exactly do we want to achieve and over what timeframes?
2. do we have the expertise to deliver the project and what impact will it have on our current operations?
3. how much will it cost to plan, deliver, maintain and run when completed and can we afford it over the long term?

Before deciding to install sports field lighting, it is important to undertake a cost benefit analysis. This must consider the potential increased use, venue flexibility and additional income v's the initial capital cost, increased risks, safety of participants as well as increased energy, maintenance and management costs.

Installation of sports field lighting will require the services of professionals; such as lighting designer, electrical and structural engineers. We also recommend engaging a professional project manager to coordinate the delivery of the project, The Project Manager will be responsible for coordinating consultants, planning requirements, Council and building certifiers as well as engaging contractors, project tendering, certification of payments, commissioning and project certification. Other factors to be considered are:

- Levels of lighting required to suit the sport/s
- The varying and conflicting requirements of individual sports in a multi-sports facility.
- Developing performance requirements into acceptable design solutions and specifications.
- Consideration of other environmental lighting that will be required for support areas.
- Related systems such as electrical supply, wiring and illumination controls.

Planning and Approvals

Local Governments (Councils) control the planning requirements around the operation and construction of sports field lighting. These can vary, but the same basic principles will apply in every installation.

Local planning schemes together with zoning controls are used to determine approval on your site. Generally, both Development approval (DA) and Building approval (BA) will be required. It is important not to confuse DA with BA. Building approval relates to the method of construction to ensure it complies with relevant standards whilst DA is advice that a particular use or development may proceed on a specific parcel of land. Typically, new sports lighting will require DA whilst upgrade to existing lighting may not. DA does not remove the need to obtain a building permit (BA). For further information on DA and BA, please refer to the SRS fact sheet.

In many instances, DA and associated community consultation will be required prior to a sports field lighting project receiving approval. In addition, BA will be required for any installation where the height of poles exceeds local conditions and controls. challenges include:

- Ground Conditions - poor or contaminated soil conditions.
- Flood Inundation Overlays and the need to factor in types of equipment installed and mounting heights.
- Light spill - installation must limit and control spill light (light that falls outside the required area)
- Potential impacts of aviation and proximity to airports
- Cyclone and earthquake design considerations
- Ecological considerations

Design Considerations

Power supply - Site power supply requirements are frequently neglected until very late in the project development phase. This could have a major impact on delivery timeframes and project costs, if not considered early in the project cycle. It is therefore essential that contact is made with your local electricity distributor (in QLD that is either Energex or Ergon) as early as possible to arrange for the new or upgraded power supply to the facility if required

Types of lighting - There are a variety of different lamp types used for sports field lighting. Currently the most widely used being HID Metal Halide or High-Pressure Sodium. Solid State Lighting (SSL) such as Light Emitting Diode (LED) is becoming popular, due to its reduced maintenance and running costs. However, LED remains significantly more expensive initially than an equivalent lumen output HID Luminaire. The characteristics of each lamp type differ and selection is usually based on the colour of the light emitted, energy consumption and life expectancy.

Pole height and location - Guidelines for Pole Heights and Locations are provided in the Australian Standard (AS2560) series of documents. This specifies a minimum of 5m clearance from the edge of the playing area (PA) (i.e. line marked boundary) for pole positions.

Volume of the field of play - When installing lighting, there is more to consider than just the playing surface. Where a sport involves the use of the height above the playing area (PA) e.g. athletics throwing events, baseball, cricket or rugby then consideration of the volume of the PA is important.

Even illumination - The full volume of the field of play must be illuminated evenly to create equal playing conditions for all players and a consistent level of visibility including for spectators. This calls for suitable brightness and contrast over the playing area, sufficient light at all points, correct distribution of light and the adequate control of glare.

Levels of illumination - The level of illumination required for a particular sport should be checked with the State Sporting Organisation or against the Australian Standards 2560 series.

Glare - The complete elimination of glare in sport is difficult to achieve due to the ever-changing directions of view of participants. Nevertheless, measures should be taken to minimise glare that may affect the visual performance of participants.

Cost of Ownership

The initial purchase cost of a sports lighting installation may seem high, but the on-going costs associated with running the system are also significant. The on-going cost of ownership is made up of energy costs, maintenance costs and the need for a sinking fund for future replacement. When design proposals and alternative systems are being assessed, the ongoing costs including energy and maintenance, together with the initial capital need to be included as part of any realistic cost benefit analysis. It is essential when choosing lighting levels, they are matched to the requirements or the particular sport; higher lux, means higher ongoing costs.

Energy costs - The careful selection of lamp types and luminaires at design stage is the first step to ensuring good energy efficiency. Step 2 is to ensure that the switching and control (or ability to dim in the case of some LED's (not all LED's are dimmable)) system allows you to control the lighting by switching or diming so you are only using the right level at the right time in the right location.

Maintenance

All lighting should operate under a cyclic maintenance program. An effective cleaning and maintenance schedule will ensure the installation continues to operate at maximum efficiency throughout its life cycle. An effective maintenance program should include:

- Replacement of HID lamps in accordance with a 'Lighting Design Maintenance Plan'
- Cleaning of luminaires at intervals appropriate for the frequency of use and the ambient pollution levels.
- Keeping records of all maintenance performed
- Recording all maintenance to show the development of problems or faults before they become significant issues

Lamp replacement - The failure of an individual lamp may not require immediate replacement, particularly in installations were scaffolds and / or raised platforms are needed to do so. However, even a single lamp failure can create a dark area in the illuminated volume. On a field or court where there are often relatively few lights or low lux levels (there may be only 4 lights on a netball court), failure of a single lamp can cause lighting levels and uniformity to fall below acceptable levels.

Cleaning - Apart from replacing HID lamps, the glass (includes LED luminaires) and reflector of each fitting needs to be kept clean as well. Outdoor sports luminaires have a sealed front glass which may be opened to clean the reflector and replace the lamp; in some cases, lamps are replaced from the back of the luminaire.

Luminaire aiming - When a new system is installed each luminaire is aimed at a particular point on the playing surface, in accordance with the lighting design and associated calculation grid (see attachment 1 as example). After a period of time or a severe weather event, the luminaire may be shifted by vibration or high winds and will need to be adjusted back to the design parameters.

Sinking fund - Life cycle costs - A typical sports lighting system is likely to have a life expectancy of 20 - 25 years. Individual components will however have shorter lifespans and ongoing, adequate budget must be allocated to cover these costs. Lamps have a life expectancy related to actual hours of use, but the life expectancy of other components will depend on a range of factors such as wear and tear, switching frequency, environmental conditions, misuse and the level of maintenance. Contributions to the sinking fund must therefore be regular and realistic.

Acknowledgements, Resources and Reference documents

1. Australian Standard AS 2560 Series including Sports Lighting, General Principals and Sport specific versions
2. Australian Standard AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting
3. European Standard EN 12193 :2007 Light and Lighting – Sports Lighting
4. Peter Jones, Lighting Design Manager - Zumtobel Group
5. Sport England - Design Guidance Note, Artificial Sports Lighting Updated guidance for 2012
6. Community Sporting Facility Lighting Guide for Australian Rules football, Football (Soccer) and Netball. Dept of Planning and Community Development, Victoria.