

### ABOUT REES ELECTRICAL

- Have been specialising in the design and installation of sports lighting projects for 20years.
- Have successfully completed over 400x projects
- Installed the first LED lighting project in NSW
- Have aimed and commissioned local parks through to HDTV stadium level projects
- Currently employ 28x full time staff
- 95% Of our work is sports lighting installation and maintenance

### **Tuggerah Sporting & Recreation Complex**



### TIPS TO UPGRADE YOUR LIGHTING

- 1. WORKING OUT BUDGET, PLANNING
- 2. HOW MUCH DO 50lux, 100lux, 200Lux Lighting Upgrade Cost?
- 3. LED vs METAL HALIDE FLOODLIGHTS
- 4. CAN WE USE THE EXISTING POLES & CABLING?
- 5. CAN WE USE THE EXISTING CONDUIT AND CABLING?
- 6. LIGHTING DESIGN
- 7. POWER SUPPLY
- 8. GEOTECHNICAL INFORMATION
- 9. FOOTING DESIGN
- 10. CERTIFICATION & TESTING

### STANDARD FIELD SIZE 100m X 68m

4x Pole Layout8-12x Floodlights 100lux16x Floodlights 200lux

POLES LOCATED BESIDE PLAYING FIELD, EXLUDING POWER UPGRADE





Metal Halide 50lux= \$75,000-\$95,000

Metal Halide 100lux= \$90,000-\$110,000

Metal Halide 200lux= \$100,000-\$120,000

LED 50lux= \$100,000-\$120,000 (8x LED)

LED 100lux= \$130,000-\$150,000 (12x LED)

LED 200lux= \$160,000-\$180,000 (16x LED)

All above including new poles, footings and lights

### CAN WE USE THE EXISTING POLES?

Majority of the new installations require new poles

**Timber Poles** 

**GAL Steel Poles** 





| filling and |                       |
|-------------|-----------------------|
| POLE No.    | P3                    |
|             |                       |
|             |                       |
| MANUF BY.   | INGAL EPS             |
| DATE MANUF. | 04/2019               |
| PRODUCT No. | F28F3D-A636-86        |
|             | +XSP3000-11373-900-86 |
|             | +XLABEL-GA14019-86    |
| POLE HEIGHT | 28m                   |
| MAX. WEIGHT | 300 KG                |
| MAX. ESA.   | 2.3 m <sup>2</sup>    |
| LIGHT MODEL | PHILIPS OPTIVISION    |
|             | BVP525 LED            |
|             | •                     |



### CAN WE USE THE EXISTING CONDUIT AND CABLING?

We very rarely use existing cables, unless they have been installed within the last 5years.

My advise would be install new cables and conduit unless you are retrofitting, removing 1x metal halide floodlight and install 1x LED floodlight

# Lighting Design

- What is the intended purpose of the sport ground?
- Training?
- Amateur Club Competition?
- Semi Professional ?
- 50Lux 100Lux 200Lux

### Lighting Design 200lux





### **Glare Calculation**





### AS 2560.2.3-2007

11

#### 190 200 206 207 222 232 225 225 232 222 207 206 200 204 215 230 246 247 234-228-228-234 247 246 230 215 204 216 231 249 258 249 241 236 236 241 249 258 249 231 216 251 250 254 252 250 250 252 254 250 251 239 220 220 239 216 234 241 250 256 264 268 268 264 256 250 241 234 216 204 222 236 251 265 271 274 274 271 265 251 236 222 204 190 210 235 254 269 268 264 264 268 269 254 235 210 190 111 177 200 228 250 260 261 256 256 261 260 250 228 200 177 111 168 191 214 235 248 258 264-264 258 248 235 214 191 168 64 183 202 221 242 263 277 277 263 242 221 202 183 164 64 183 202 221 242 263 277 263 242 221 202 183 16 168 191 214 235 248 258 264 264 258 248 235 214 191 168 177 200 228 250 260 261 256 256 261 260 250 228 200 177 190 210 235 254 269 268 264 264 268 269 254 235 210 190 204 222 236 251 265 271 274 274 271 265 251 236 222 204 216 234 241 250 256 264 268 268 264 256 250 241 234 216 220 239 251 250 254 252, 250 250 252 254 250 251 239 220 216 231 249 258 249 241 236 236 241 249 258 249 231 216 204 215 230 246 247 234 228 228 234 247 246 230 215 204 190 200-206 207 222 232 225 225 232 222 207 206 200 190 -35 -25 -15 15 X(m) BVP527 T30 50K A35-NB +LT Average Min/Ave Min/Max Project maintenance factor 0.70 0.59 234 0.86

| LIGHTING CRITERIA                        |  |  |                           |                            |                                |                       |
|--|--|--|---------------------------|----------------------------|--------------------------------|-----------------------|
| Level of play                            | Maintained<br>average<br>horizontal<br>illuminance <sup>a),b)</sup><br>(Ē <sub>mh</sub> )<br>lux | Minimum horizontal<br>uniformities <sup>c)</sup> |                           | Maximum<br>glare<br>rating | Minimum<br>colour<br>rendering | Maximum<br>uniformity |
|  |  | $(U_1)$  | ( <i>U</i> <sub>2</sub> ) | (GR <sub>max</sub> )       | $(R_{\rm a min})$              | gradient              |
| Recreational level                       |  |  |                           |                            |                                |                       |
| Touch and tag                            | 50   | 0.3  | N/A                       | N/A                        | 65                             | N/A                   |
| Amateur level                            |  |  |                           |                            |                                |                       |
| Ball and physical training <sup>e)</sup> | 50   | 0.3  | N/A                       | N/A                        | 65                             | N/A                   |
| Club competition<br>and match practice   | 100  | 0.5  | 0.3                       | 50                         | 65                             | N/A                   |
| Semi-professional level                  |  |  |                           |                            |                                |                       |
| Ball and physical training <sup>e)</sup> | 50   | 0.3  | N/A                       | N/A                        | 65                             | N/A                   |
| Match practice                           | 100  | 0.5  | 0.3                       | 50                         | 65                             | N/A                   |
| Semi-professional competition            | 200  | 0.6  | 0.4                       | 50                         | 65 <sup>d)</sup>               | N/A                   |
| Professional level                       |  |  |                           |                            |                                |                       |
| Ball and physical training <sup>e)</sup> | 100  | 0.5  | 0.3                       | 50                         | 65                             | N/A                   |
| Match practice                           | 200  | 0.6  | 0.4                       | 50                         | 65                             | N/A                   |
| Professional competition                 | 500  | 0.7  | 0.5                       | 50                         | 65 <sup>d)</sup>               | 20% per<br>5 m        |

TABLE1

a) For the height above the plaving surface at which the illuminance is to be measured refer to Clause 6.3.1





Bad Uniformity, Incorrectly aimed

Good Uniformity, Correctly Aimed





### Poor Uniformity- This is the finished product

# Good Uniformity, Correctly Aimed

| Min lux     | 91.00     |  |
|-------------|-----------|--|
| Max lux     | 179.00    |  |
| Calculate   | 124 74    |  |
| Average lux | 124.74    |  |
| Maintenance | ce 100 77 |  |
| Factor 0.88 | 109.77    |  |
| Adjusted    | 106.00    |  |
| Ave Lux     | 100.00    |  |
| Min / Avg   | 0.73      |  |
| Min / Max   | 0.51      |  |
| Complies    | Vee       |  |
| (Y/N)       | res       |  |
|             |           |  |





5

FIGURE 3.2 EXCATION AND HEIGHT OF CALCULATION POINTS FOR LIMIT FOR  $E_V$  AND / FOR ZONES A0 TO A4



DIMENSIONS IN METRES

FIGURE 3.1 (in part) EXAMPLE SHOWING APPLICATION OF LIMITS FOR *E*<sub>V</sub> AND *I* FOR ZONES A0 TO A4



### Poor Spill Light



## Spill Light Complying

### AS 4282:2019

NZS 4282:2019

#### TABLE 3.1

#### ENVIRONMENTAL ZONES

# **MOST PROJECTS WILL** BE Zone A2 and A3 **IDEAL OUTCOME FOR** LUMINOUS **INTENSITIES CONTROL IS LEVEL 1 CONTROL**

| Zones | Description  | Examples  |  |
|-------|--|---|--|
| A0    | Intrinsically dark   | UNESCO Starlight Reserve. IDA Dark Sky Parks.<br>Major optical observatories<br>No road lighting -unless specifically required by the<br>road controlling authority |  |
| A1    | Dark   | Relatively uninhabited rural areas<br>No road lighting - unless specifically required by the<br>road controlling authority  |  |
| A2    | Low district brightness  | Sparsely inhabited rural and semi-rural areas   |  |
| A3    | Medium district brightness   | Suburban areas in towns and cities  |  |
| A4    | High district brightness   | Town and city centres and other commercial areas<br>Residential areas abutting commercial areas   |  |
| TV    | High district brightness   | Vicinity of major sports stadium during TV broadcasts   |  |
| V     | Residences near traffic routes   | Refer AS/NZS1158.1.1  |  |
| R1    | Residences near local roads with significant setback                       | Refer AS/NZS 1158.3.1   |  |
| R2    | Residences near local roads  | Refer AS/NZS 1158.3.1   |  |
| R3    | Residences near a roundabout or<br>local area traffic management<br>device | Refer AS/NZS 1158.3.1   |  |
| RX    | Residences near a pedestrian crossing                                      | Refer AS/NZS 1158.4   |  |

NOTE: Recreational areas are not considered commercial.

### AS 4282:2019

25

AS/NZS 4282:2019

#### TABLE 3.2

#### MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

| Zones | Vertical illuminance levels<br>(E <sub>v</sub> )<br>lx |        | Threshold increment ( <i>TI</i> ) |   | Sky glow           |  |
|-------|--|--------|-----------------------------------|---|--------------------|--|
|       | Non-curfew   | Curfew | %                                 | Default<br>adaptation level<br>(L <sub>ad</sub> ) | Upward light ratio |  |
| A0    | See Note 1   | 0      | N/A                               | N/A   | 0                  |  |
| A1    | 2  | 0.1    | N/A                               | N/A   | 0                  |  |
| A2    | 5  | 1      | 20%                               | 0.2   | 0.01               |  |
| A3    | 10   | 2      | 20%                               | 1   | 0.02               |  |
| A4    | 25   | 5      | 20%                               | 5   | 0.03               |  |
| TV    | See Table 3.4  | N/A    | 20%                               | 10  | 0.08               |  |
| V     | N/A  | 4      | Note 2                            | Note 2  | Note 2             |  |
| R1    | N/A  | 1      | 20%                               | 0.1   | Note 3             |  |
| R2    | N/A  | 2      | 20%                               | 0.1   | Note 3             |  |
| R3    | N/A  | 4      | 20%                               | 0.1   | Note 3             |  |
| RX    | N/A  | 4      | 20%                               | 5   | Note 4             |  |

#### NOTES:

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

2 Refer to AS/NZS 1158.1.1.

3 Refer to AS/NZS 1158.3.1.

4 Refer to AS/NZS 1158.4.

5 N/A means 'Not Applicable'.

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

#### TABLE3.3

#### MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE

| Zono | Luminous intensity (1), cd |               |        |  |  |
|------|----------------------------|---------------|--------|--|--|
| Zone | Non-curfew L1              | Non-curfew L2 | Curfew |  |  |
| A0   | See Note                   | See Note      | 0      |  |  |
| A1   | 2 500                      | 5 000         | 500    |  |  |
| A2   | 7 500                      | 12 500        | 1 000  |  |  |
| A3   | 12 500                     | 25 000        | 2 500  |  |  |
| A4   | 25 000                     | 50 000        | 2 500  |  |  |
| TV   | 100 000                    | 150 000       | 0      |  |  |

NOTE: For A0, Ashall be as close to zero as practicable without impacting safety considerations.

L1- Level 1 Control

### Power Supply Requirements Do you have enough power onsite for the extra lights?





Example of existing 100amp Power supply

New Custom Switchboard and 200amp Power Supply

Geotechnical Information, Should you have a Geotech when requesting quotes from contractors?

YES!

























CERTIFICATION AND TESTING, HAND OVER DOCUMENTS

N CCEW, Certificate of compliance for electrical

Certificate of compliance for the lighting AS2560.2.3

Certificate of compliance for the spill light AS4282

Structural certification on the footing

**Operational manual** 

DATA Sheets of the LED or MH Floodlights

GA Drawings of the poles

As-Built Lighting Design, as installed

As-Built Conduit and cable layout

NATA Certificate for the illuminance meter, every 12months



# QUESTIONS

### **END OF PRESENTATION**

## Luminous Intensities

IDEAL OUTCOME FOR LUMINOUS INTENSITIES CONTROL IS LEVEL 1 CONTROL

# DA Process, Do I require a development application?

New Projects, no lighting on the site?

Upgrade Project, existing lighting is either in poor condition or not fit for purpose