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1 Introduction

1.01 Edmond Shipway LLP have been requested to prepare a detailed design for the external lighting scheme at the proposed site of the new build Tibshelf School in Alfreton, Derbyshire.

1.02 This document summarises the information taken from a fully designed, comprehensively and accurately scaled, 3D parametric model with computer calculated illuminations levels not only on the ground level of the proposed site but also on the first floor bedroom windows of three houses selected at different distances from the school buildings on the adjacent housing estate street; the closest house, the house furthest away and a house centred at a distance between the two. This process reviews the baseline conditions in a worst case scenario and the impact that the lighting will have on the surrounding area and residential properties and assesses whether the proposed lighting scheme is suitable for the intended use and whether all applicable regulatory requirements are met.

2 Environment

2.01 The site is located at the corner of Doe Hill lane, Alfreton, Derbyshire, DE55 5PP and shall include all weather pitches for the use of the local community.
Ordinance Survey Map Extract
Site location plan
2.02 There is a residential housing estate to the east of the site separated by Doe Hill lane, which has general street lighting. The site is also neighboured by the B6014 on the south side of the site with the north and west sides being surrounded by open fields.

2.03 Where the site borders the residential properties there is fencing along the full length of the adjoining properties at the boundary with the addition of complimentary trees adjacent to the fence to improve the visual appearance of the site and minimise the illuminated appearance of the site.

3 External Lighting

3.01 The external lighting that serves the site can be divided into two main different area types:

- Car park lighting, building lighting and access paths
- Sports pitch lighting

3.02 Vehicle approach and car parking will be at the south of the site from the B6014. The lighting here is 10 meter tall column mounted floodlights, Thorlux Starguard, that cast light in a downwards direction and are strategically selected, located and directed to avoid spill of light beyond the boundary of the property. The luminaires feature an advanced light distribution design that maximizes useful light output and minimizes unwanted light output and is specifically tailored to car park illumination with a very highly controlled illumination spread.

3.03 The lighting in the car park is mostly blocked by the surrounding buildings and will have a very minor contribution to overall local lighting impact.

3.04 The west, south and east elevations of the main school building will have building mounted lights, Thorlux Piazza II, strategically placed to cast light in a downwards direction which illuminate the building and immediately surrounding walkways with minimal light overspill.

3.05 The north elevation of the main school building will have no luminaires, as the light from buildings directly adjacent should provide sufficient illumination.

3.06 The north elevation of the building overlooks four smaller separate buildings which will include a partially covered walkway for the students use to keep the worst of the weather away. The buildings will be closely spaced and in later months of the year will cut off the majority of direct sunlight so this area has been additionally lit to provide a safe environment for students. The luminaires, wall mounted architectural style Thorn Piazza II, will be almost fully enclosed by the surrounding buildings and will have a very minor contribution to overall local lighting impact.

3.07 The site will feature two illuminated sports pitches which will be partially shielded from the local housing by the school buildings. The sports pitches feature 15 meter tall column mounted floodlights, Thorlux Olympian, that cast light in a downwards direction and are strategically selected, located and directed to avoid spill of light beyond the boundary of the pitches. The luminaires feature an advanced light distribution design that maximizes useful light output and minimizes unwanted light output and is specifically tailored to sports pitch illumination with a very highly controlled illumination spread.
3.08 The entrance and exit path to the school will be illuminated by attractive, minimalist, 3 meter columns, Thorn Avenue Virtual CL 2, with an upwards facing light source with a curved reflector giving a small pool of light on the floor around the column. The light source is shielded from direct view and all of the produced light is distributed downwards.

3.09 All lighting will be controlled by photocell and time clocks with manual override where required. It is envisaged the lighting will not run through the night to minimise the impact on the local housing. The CCTV system will be linked to the lighting system to bring on lighting adjacent to entrance doors as appropriate at night but this will only be as detectors are triggered and should be very occasional.

3.10 Luminaires over 6.0M will be fitted with purpose-made proprietary shields to limit glare and light-spill.

4 Baseline Conditions

4.01 The potential impacts that the lighting described in section 3 has on the surrounding environment are as described in the paragraphs that follow.

Visual impact during hours of daylight
This is the visual intrusion the lighting installation makes in relation to the surroundings when the lighting is not in operation.

Visual impact during evening and night-time operation
A lighting installation can have a significant effect on the appearance of a site during the hours of darkness. A poorly designed lighting scheme can result in:

- Sky glow – The brightening of the night sky above towns and cities
- Glare – Uncomfortable brightness contrast when viewed against a dark sky
• Light Trespass – The spill of light beyond the boundary of the property

The main causes for obtrusive light are over-lighting of areas, inappropriate choice of luminaires and improper optical control of distribution, or excessive tilt of fittings resulting in direct upward light into the sky.

4.02 In order to demonstrate that exterior layout has been installed in consideration of reducing the impact of lighting on to the environment and neighbouring properties, a lighting scheme photometric calculation has been included to illustrate the general lighting levels, the extent of the overspill lighting which is expected to occur in each area and the immediate impact on the adjacent housing.

4.03 Sensitive receptors to light have been identified and consideration given to the areas and features of the landscape as described in earlier sections.

4.04 Sensitive receptors, with reference to the site are identified as are the residents located around the perimeter, at the east of the site along Doe Hill lane.

4.05 Given that the immediate surrounding area consists of grassed areas and residential properties, together with general street lighting, using data from the ILE guidance notes for the reduction of light pollution (see table below) the area is expected to be classified as E3 - Urban.

| TABLE 1 – OBTURSIVE LIGHT LIMITATIONS FOR EXTERIOR LIGHTING INSTALLATIONS |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Environmental Zone | Sky Glow ULR [Max %] | Light into Windows E [Lux] (1) | Source Intensity T [kcd] (2) | Building Luminance Before curfew (3) | |
| | Before curfew | After curfew | Before curfew | After curfew | Average, L [cd/m²] | Maximum L [cd/m²] |
| E1 | 0 | 2 | 1 | 0 | 0 | 0 |
| E2 | 2.5 | 5 | 1 | 0 | 0.5 | 5 |
| E3 | 5.0 | 10 | 2 | 30 | 1.0 | 10 |
| E4 | 15.0 | 25 | 5 | 30 | 2.5 | 60 |

Table from ILE for reduction of light pollution showing guideline on technical limits

4.06 The lighting scheme assessment results show that the light into Windows Ev (Lux) will be less than 0.48 Lux after curfew, 25% of the maximum value, which falls well within the Institute of lighting Engineers (ILE) guidance notes for the reduction of light pollution.

4.07 The lighting scheme photometric calculation data referred to in this section is included at the rear of this document.

5 Conclusion

5.01 With respect to identified sensitive receptors, the desk top assessments on the site and the external lighting indicate that overall light pollution levels are not majorly influenced by the site conditions.

5.02 The 3D parametric model with computer calculated illuminations levels review process shows that the baseline conditions in a worst case scenario and the impact that the lighting has on the surrounding area and residential properties shows the proposed lighting scheme is suitable for the intended use and shows that all applicable regulatory requirements are exceeded by a large margin.

5.03 In summary it is our considered opinion that the external lighting to the site has a minimal impact on the immediate environment with respect to lighting pollution.
6 Appendix

Lighting Assessment
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### Exterior Scene 1 / Luminaire parts list

<table>
<thead>
<tr>
<th>Pieces</th>
<th>Luminaire</th>
<th>Article No.</th>
<th>Luminous Flux</th>
<th>Wattage</th>
<th>Classification</th>
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<td>OLY12960</td>
<td>220000 lm</td>
<td>2085.0 W</td>
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<td>30 75 99 100 80</td>
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<td>17</td>
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<td>STG10998</td>
<td>19000 lm</td>
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<td>43</td>
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<td>38 76 95 94 46</td>
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Exterior Scene 1 / Luminaires (layout plan)

Luminaire Parts List

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<tr>
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<th>Pieces</th>
<th>Designation</th>
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Exterior Scene 1 / Calculation Grid (Coordinates List)

List of the Calculation Grids

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Scale 1 : 4628
Exterior Scene 1 / External lighting Scene / Planning data
Exterior Scene 1 / External lighting Scene / 3D Rendering
Exterior Scene 1 / External lighting Scene / False Colour Rendering
Exterior Scene 1 / External lighting Scene / Bedroom window close distance / Value Chart (E, Perpendicular)

Position of surface in external scene:
Marked point:
(508.587 m, 276.304 m, 4.867 m)

Values in Lux, Scale 1 : 8

Grid: 1 x 1 Points

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<thead>
<tr>
<th>E_{av} [lx]</th>
<th>E_{min} [lx]</th>
<th>E_{max} [lx]</th>
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<th>E_{min} / E_{max}</th>
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<td>0.48</td>
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Exterior Scene 1 / External lighting Scene / Bedroom window medium distance / Value Chart (E, Perpendicular)

Position of surface in external scene:
Marked point:
(579.271 m, 424.169 m, 4.864 m)

Values in Lux, Scale 1 : 8

Grid: 1 x 1 Points

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<th>$E_{av}$ [lx]</th>
<th>$E_{min}$ [lx]</th>
<th>$E_{max}$ [lx]</th>
<th>$u_0$</th>
<th>$E_{min} / E_{max}$</th>
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<td>0.25</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Exterior Scene 1 / External lighting Scene / Bedroom window far distance / Value Chart (E, Perpendicular)

Position of surface in external scene:
Marked point:
(611.477 m, 534.569 m, 4.864 m)

Values in Lux, Scale 1 : 8

Grid: 1 x 1 Points

<table>
<thead>
<tr>
<th>$E_{av}$ [lx]</th>
<th>$E_{min}$ [lx]</th>
<th>$E_{max}$ [lx]</th>
<th>$u_0$</th>
<th>$E_{min} / E_{max}$</th>
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<tr>
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<td>0.13</td>
<td>0.13</td>
<td>1.000</td>
<td>1.000</td>
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</table>
Exterior Scene 1 / External lighting Scene / Calculation Grid 4 / Isolines (E\(,\))

Position of surface in external scene:
Marked point: (131.800 m, 205.800 m, 0.000 m)

Grid: 100 x 100 Points

\[
\begin{array}{cccccc}
E_{\text{av}} [\text{lx}] & E_{\text{min}} [\text{lx}] & E_{\text{max}} [\text{lx}] & u0 & E_{\text{min}} / E_{\text{max}} \\
19 & 0.00 & 671 & 0.00 & 0.00 \\
\end{array}
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