Woking Football Club

Lighting Strategy

18th November 2019

dpa lighting consultants

“RIGHT LIGHT, RIGHT PLACE, RIGHT TIME”™

TABLE OF CONTENTS

Extract from www.wokingcommunitystadium.co.uk (190712-Our-Plans-v1.pdf)

1.0 - INTRODUCTION

1.1 - About dpa lighting consultants

dpa lighting consultants were established in 1958 pioneering the discipline in the United Kingdom. The practice now has three offices in the UK and two offices overseas.

We are at the forefront of encouraging the development of high quality and environmentally sensitive lighting solutions.

dpa are independent consultants working across all aspects of lighting design from planning and environmental assessments, to lighting scheme design for residential, commercial and industrial projects.

We have been involved in numerous environmental impact lighting assessments for planning submissions, lighting strategies and lighting master planning.

We have stood as Expert Witnesses for both planning authorities and applicants, hence we are knowledgeable in this type of work and can provide advice accordingly.

1.2 - The Brief

dpa lighting consultants were instructed by Woking Football Club on 28th August 2019 to produce a lighting strategy for the proposed new Woking Football Club stadium and surrounding development, which is to form part of an environmental impact assessment.

The study area includes exterior artificial illumination to the following areas:

- New football stadium – playing surface (pitch) and spectator areas
- Circulation lighting around the outer perimeter of the stadium
- On site car parking
- Associated hard and soft landscaping

Basic objectives of floodlighting the pitch area:

- To facilitate a high level of performance by the players
- To enable spectators, both present and remote, to clearly see the action on pitch
- To enable sport to be played after dark
- To create a safe environment for both players and spectators
- To create a comfortable visual environment for both players and spectators

Extract from www.wokingcommunitystadium.co.uk (190712-Our-Plans-v1.pdf)

1.3 - Survey

Please refer to the surveys of the existing baseline condition carried out by others.

1.4 - Baseline Data

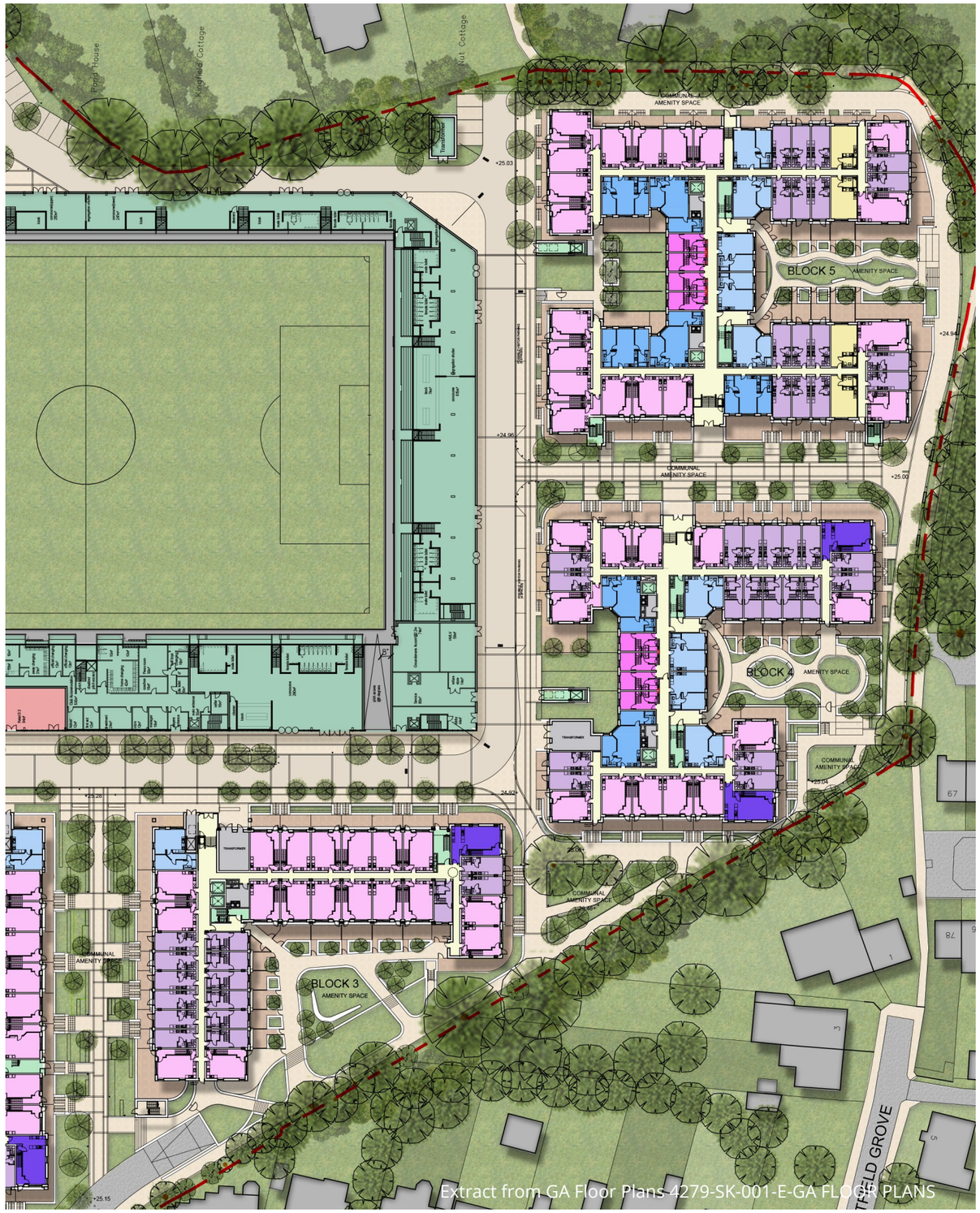
The scope of the proposed stadium development and surrounding buildings has been taken from the drawings provided and data provided by Woking Football Club. We have reviewed the site plans issued to us along with freely available maps and aerial photography so as to inform our lighting strategy.

CAD Drawings Package Ref. 4279 Provided by Holms Miller:
- GA Floor Plans 4279-SK-001-E-GA FLOOR PLANS A1@1:500
- Cross Sections 4279-SK-010-A-CROSS SECTIONS A1@1:200
- West Stand Sections 4279-SK-011-#-WEST STAND SECTIONS A1@1:100

CAD Drawings Package Ref. LRW_7884 Provided by Leach Rhodes Walker:
- Proposed Ground Level PlanLRW_7884_L(00)079H Proposed Ground Level (Colour) A1@1:500
- Block Elevations LRW_7884_L(00)Block Elevations-190801 A1@1:200
- Masterplan Elevations LRW_7884_L(00)Masterplan Elevations-190731 A1@1:500
- Sketchup 3D Model Proposed Context

In addition to these documents we have assessed a number of resources and guidance from regulatory bodies and standards agencies to ensure our proposals conform to best practice:

- Institute of Lighting Professionals (ILP) - Guidance Notes for the Reduction of Obtrusive Light GN01:2011
- The Society of Light & Lighting (CIBSE) – Lighting Guide 4: Sports Lighting 2006
- English Football League - Membership Criteria (Regulation 8)
- The FA - The FA Guide to Floodlighting 2013
- Sport England – Artificial Sports Lighting 2012
- UEFA - UEFA Stadium Lighting Guide 2016
- FIFA Resources (FIFA) - Lighting & Power Supply



Extract from GA Floor Plans 4279-SK-001-E-GA FLOOR PLANS

2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT

The documentation listed in Section 1.0 details the proposals for the various elements of the development. We point out what we believe to be the appropriate lighting standard to follow for each part of the proposed development, together with our comments on the effects of the particular lighting approaches suggested.

2.1 - Floodlighting to Main Pitch

Woking Football Club estimates the usage of the main pitch to be approximately 23 days per year and 3.5 hours per session.

The lighting would be operational no later than 22.30 hours from Monday to Saturday and 21.00 hours on Sundays. This means that lighting could be required all year round as required depending on prevailing ambient lighting conditions.

From our proposed lighting strategy, we suggest that the lighting is required to conform to the CIBSE, LG4:2006 recommendations for 'Class I' Play (Maintained Average Illuminance: 500lux, Min/Average Uniformity: 0.7, Unified Glare Rating: 55, Colour Rendering Index: 70). This would satisfy the demands of Category B of the Football Associations National Ground Grading document, which are at or above the requirements associated with Woking FC's current position within the league system and therefore represent a reasonable assumed level of lighting provision for future needs.

Areas to be considered as part of the playing area for the purpose of floodlighting:

- The principal pitch playing area
- The volume of the playing area up to 7 metres above the pitch surface
- The safety and runoff zones

The integration of approximately 32no. high quality artificial lighting projectors with good optical control using cut-off lanterns from a 22.5 metre mounting height above pitch level, can satisfy the guidelines. The projectors would be mounted on a total of 8no. structural gantries, 4no. gantries located above the roof line on both the east and west stands at the same height above pitch level. The design proposed requires the lighting not to be directed above horizontal and therefore producing a minimum level of light pollution or light spill to adjacent areas. Therefore, the artificial lighting can be designed so as to satisfy the functional criteria for the playing area and also provide good mitigation against unwanted environmental effects.

To ensure obtrusive light is kept to a minimum we recommend that the CIBSE recommendations for obtrusive light limitations for Environmental Zone E3 (suburban / medium district brightness) to be followed. Particular care should be taken to minimize light trespass through windows of the nearby residential developments to the south and west of the stadium and the existing residential area to the north and east. If the installation is designed to comply with CIBSE guidelines for obtrusive light for Zone E3, we believe good mitigation against unwanted environmental effects will have been addressed.

Whilst the pitch playing area is proposed to be lit for competition 'Class I' Play (SLL/CIBSE) we recommend the use of luminaires that provide sufficient quality of light and specification for basic television recording and broadcast. This includes specifications for high CRI (Colour Rendering Index), colour consistency and flicker free lighting, compliant with international sport federation regulations (SLL 2006). Infrastructure for mounting the proposed floodlighting fixtures should be designed to also accommodate any additional luminaires to meet TV broadcasting lighting levels. Whilst not proposed to be installed as part of the development, any future inclusion of additional broadcast lighting would be infrequently used for one off outside broadcasts, whilst typical matches would require only 'Class I' illumination. All lighting installed including any additional broadcast luminaires will also need to meet the same CIBSE recommendations for obtrusive light limitations for Environmental Zone E3.

KEY ADVANTAGES of OmniBlast Gen2:

- Cost-effective and efficient solution to maximise energy and maintenance savings
- Compliant with international sport federation regulations
- Flexibility: modular approach for high-power applications
- Compliant with UHD/HD/4K broadcast and super slow motion replays (flicker-free)
- High Colour Rendering Index (90 CRI) and Television Colour Consistency (TLCI >85+)
- Instant on/off and entertainment mode (optional to create dramatic/theatrical effects)
- Optimised glare control
- Sport optics based on BlastFlexTM technology offering a wide range of beams: very narrow to asymmetric beams
- Inclination angle adjustable on-site for each LED and/or the complete bracket

Recommended Flood Lighting Solution:

Urbis Schreder OmniBlast Gen2

LED Floodlighting Solution Designed for Stadium Floodlighting with high lighting quality suitable for TV broadcast.

See 'Omniblast Gen2.pdf' for technical details.

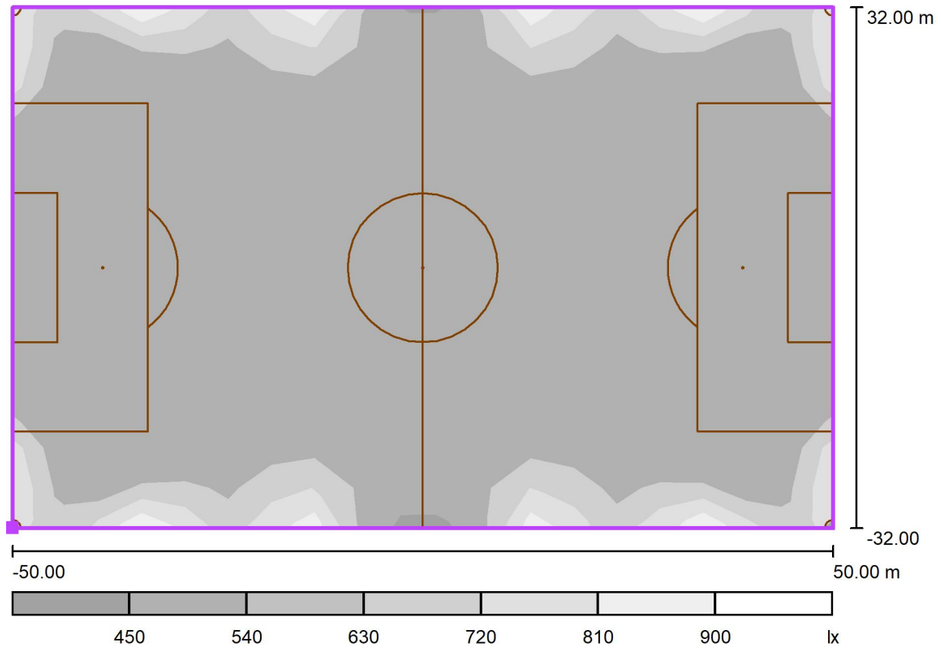
Detailed design and product specifications to be confirmed within the detailed design process, at a later date.

Available from:
Urbis Schreder Ltd
Tel. 01256 354446
Email. mark.searle@schreder.com

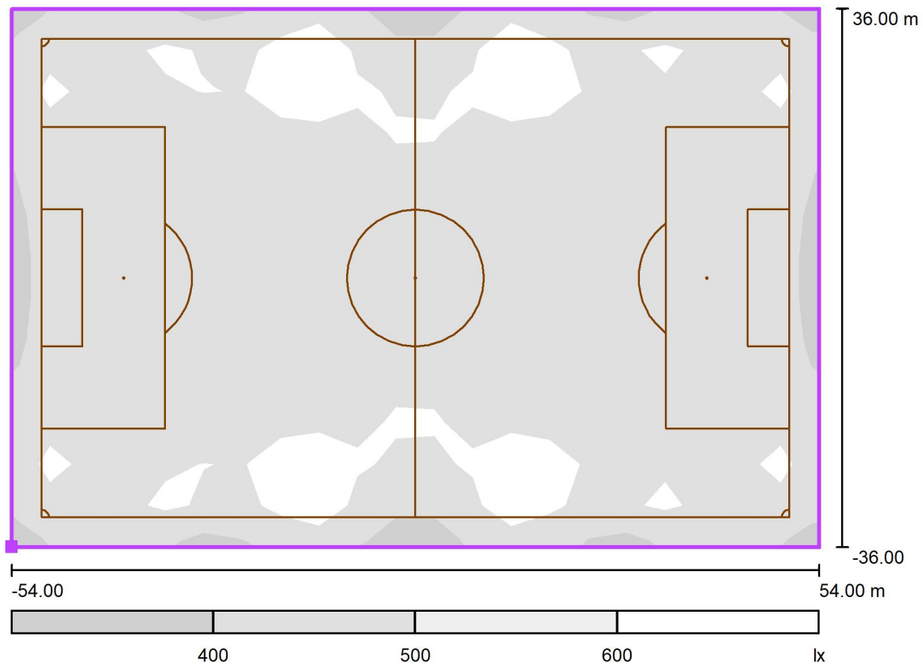
Example Urbis Schreder OmniBlast Gen2 Projector

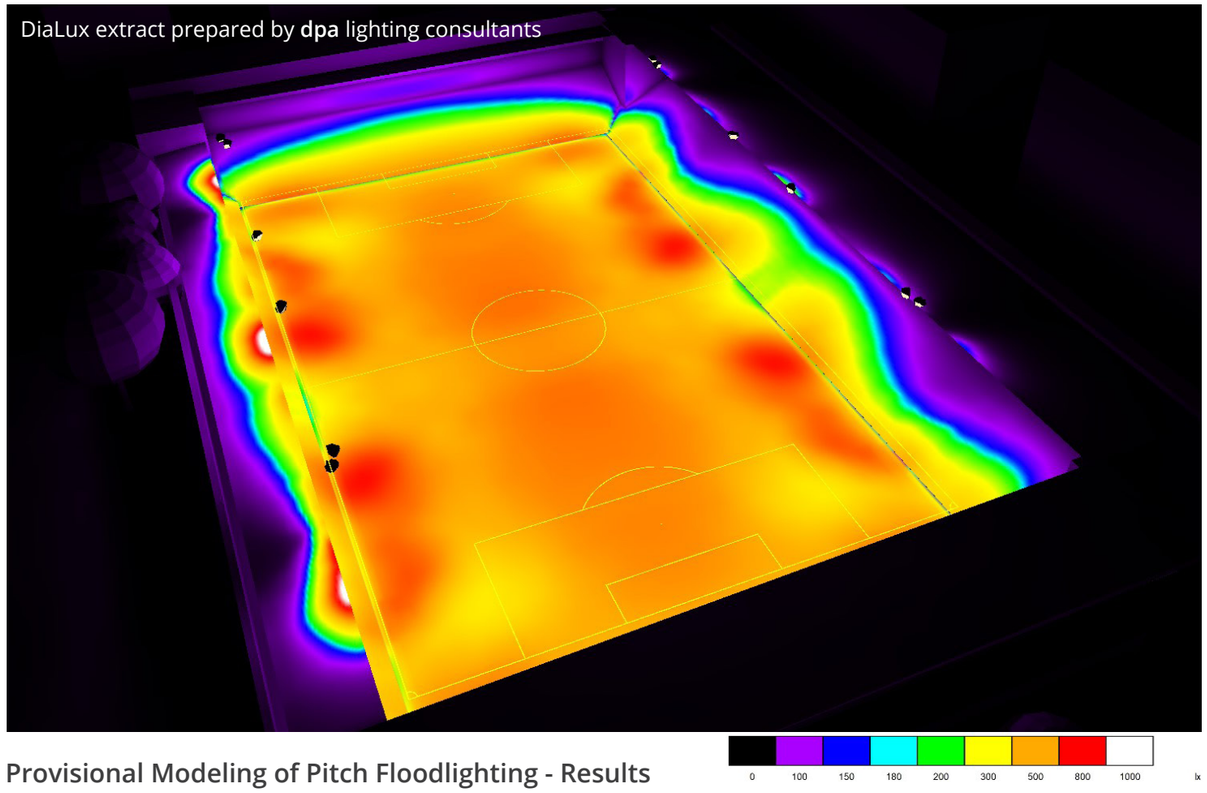
2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT

Pitch Illumination Playing Pitch Area (PA)



Pitch Illumination Total Area (TA)





Provisional Modeling of Pitch Floodlighting - Results

dpa has worked directly with the manufacturer Urbis Schreder to define a suitable provisional specification and **dpa** has provided provisional light modeling to assess the requirements for floodlighting and ensure the provisional design meets sporting illumination standards. The detailed lighting design can reflect any additional lighting required for full broadcast lighting, if requested.

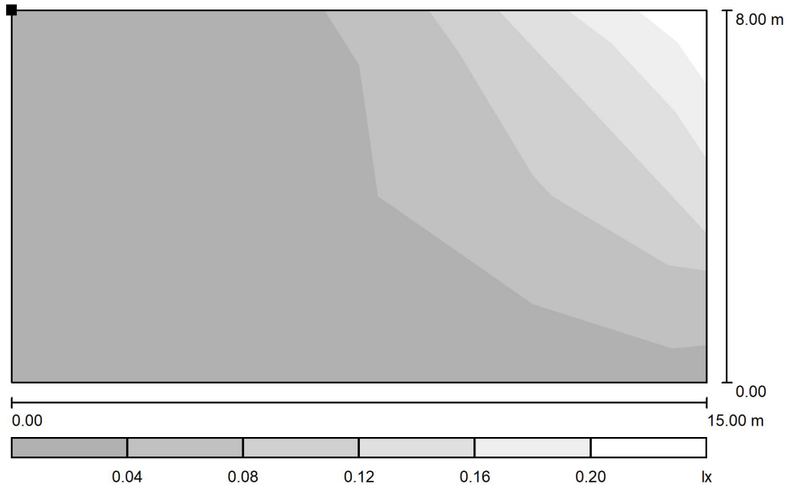
The extract to the left is from the document 'Woking Football Club Stadium Report.pdf', Appendix A.

The following table summarises the results against the standards set out in the CIBSE, LG4:2006 recommendations for 'Class I' Play and the English Football League recommendations for floodlighting in 'Membership Criteria (Regulation 8)':

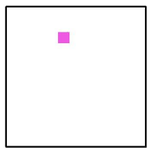
	Horizontal Average Illuminance (Lux)	Illuminance Average Uniformity	Colour Rendering Index (CRI)	Glare Rating	Broadcasting Ready
CIBSE Class I	500	0.7	70	55	No
Proposed Design – Total Area	545	0.6	90	<50	Yes
Proposed Design – Principal Pitch Area	565	0.7	90	<50	Yes
Pass / Fail	Pass	Pass	Pass	Pass	Pass

Residential Receptor 1 - Elm View

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.

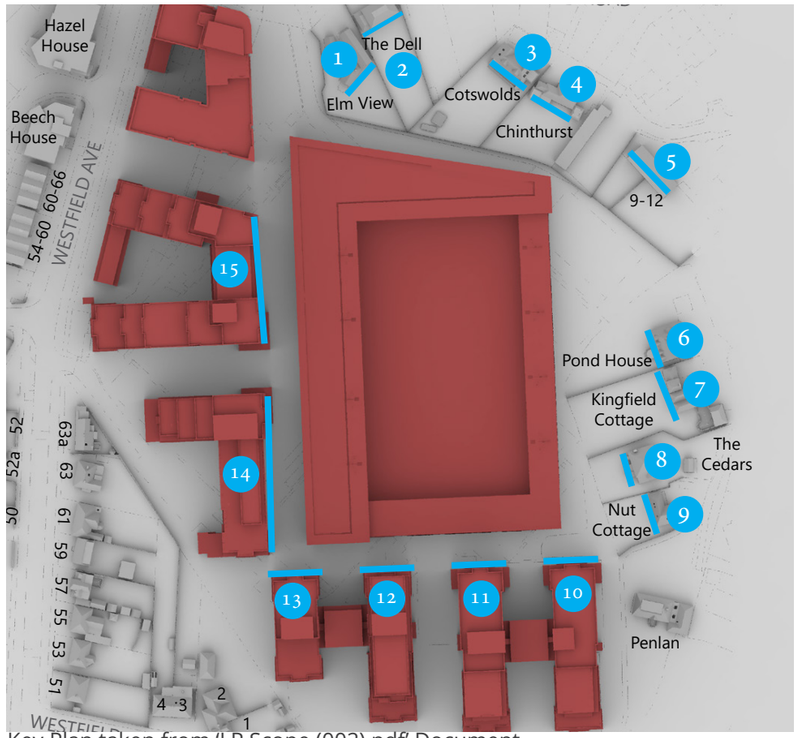


Position of surface in external scene:
Marked point:
(-243.004 m, 213.049 m, 8.151 m)

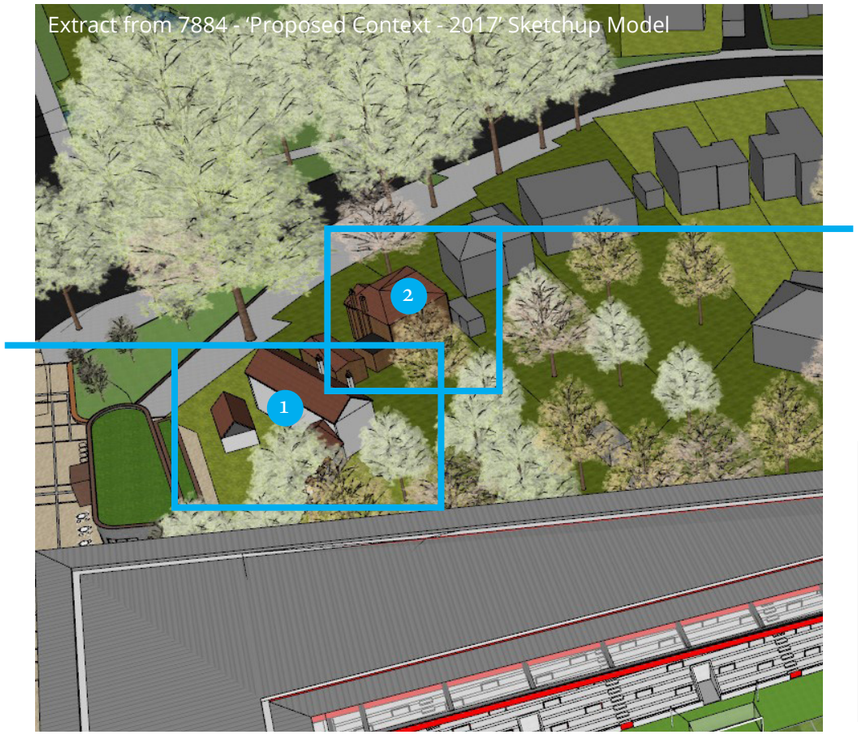


Grid: 4 x 2 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
0.05	0.03	0.21	0.540



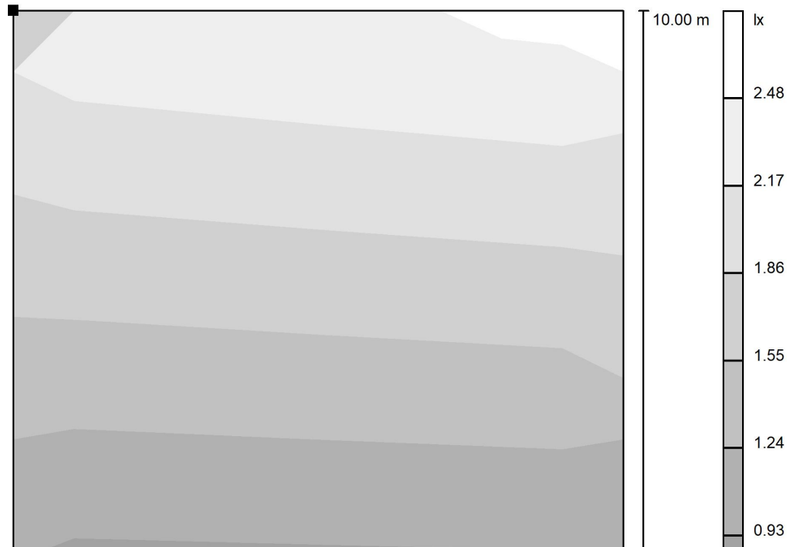
Key Plan taken from 'LP Scope (002).pdf' Document



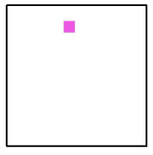
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	0.05	0
Pass / Fail	Pass	Pass

Residential Receptor 2 - The Dell

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-229.179 m, 238.838 m, 10.020 m)



Grid: 2 x 2 Points

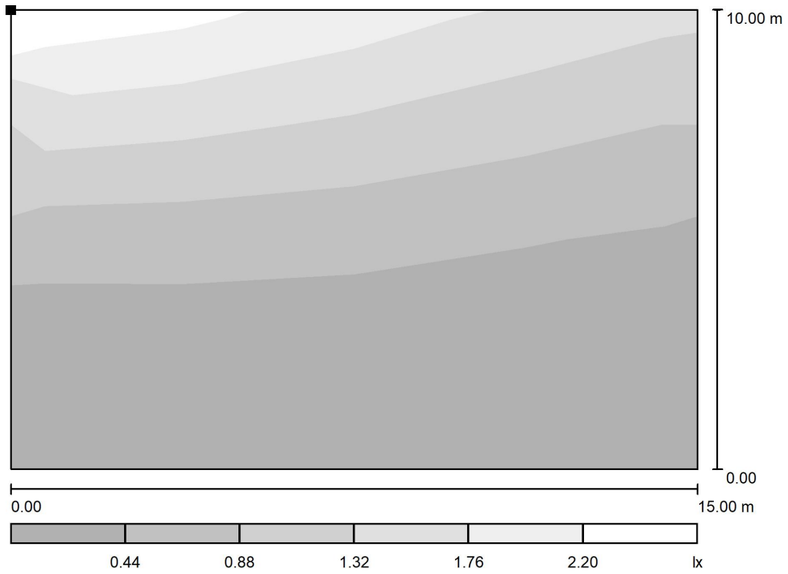
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
1.60	0.88	2.41	0.549

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	1.6	0
Pass / Fail	Pass	Pass

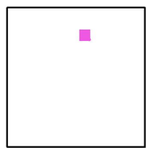
2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT

Residential Receptor 3 - Cotswolds

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.

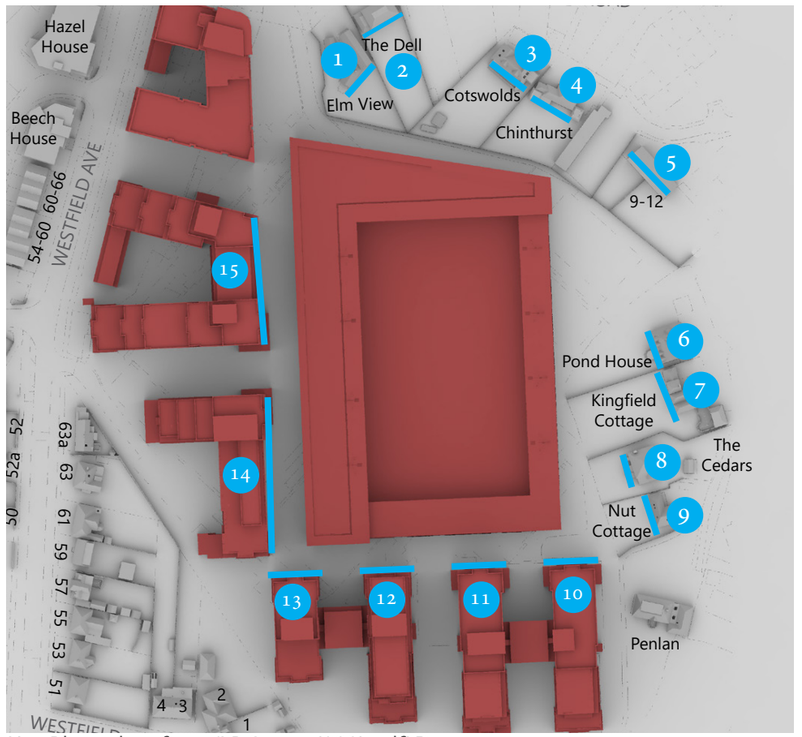


Position of surface in external scene:
Marked point:
(-185.379 m, 221.297 m, 10.302 m)

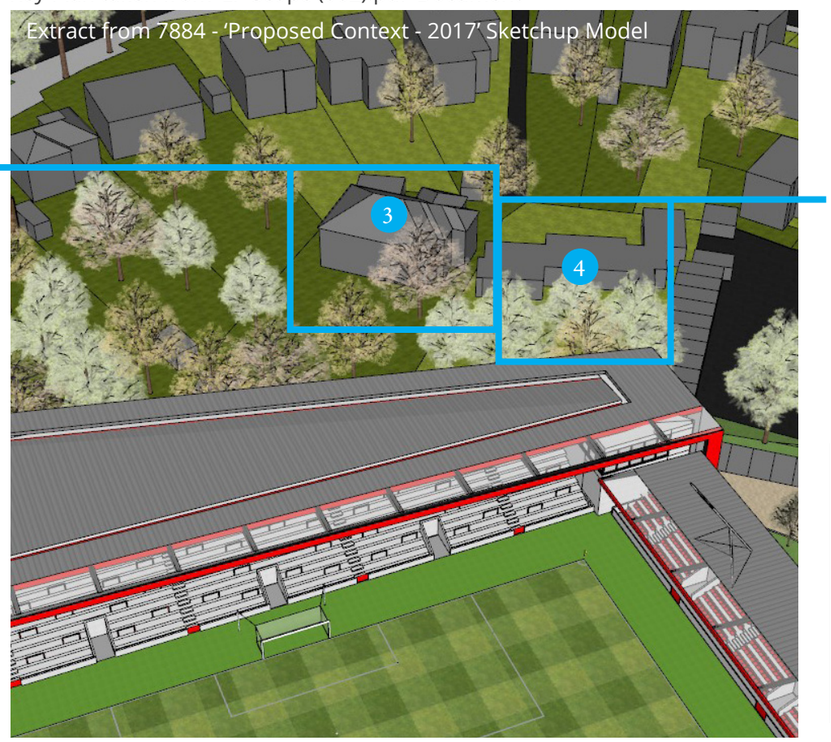


Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
0.70	0.09	2.28	0.126



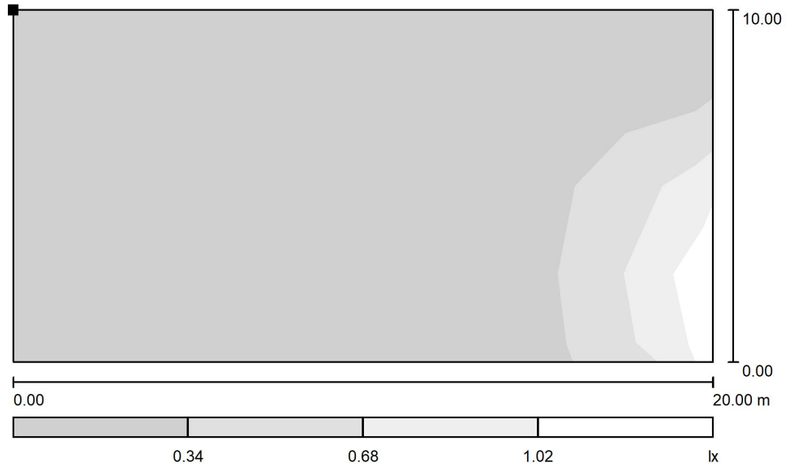
Key Plan taken from 'LP Scope (002).pdf' Document



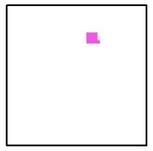
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	0.7	0
Pass / Fail	Pass	Pass

Residential Receptor 4 - Chinthurst

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-168.452 m, 207.935 m, 9.808 m)



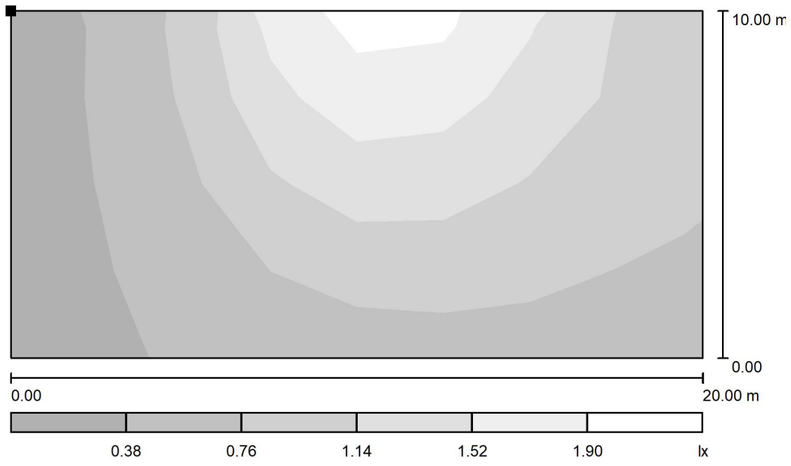
Grid: 8 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
0.16	0.05	1.73	0.321

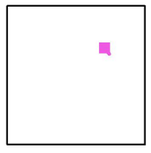
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	0.16	0
Pass / Fail	Pass	Pass

Residential Receptor 5 - 9-12

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.

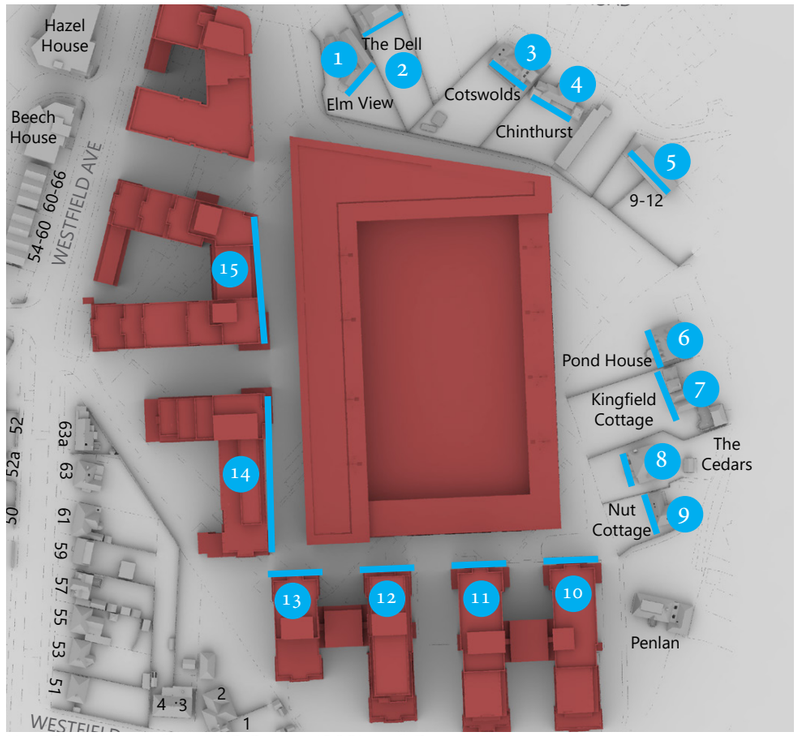


Position of surface in external scene:
Marked point:
(-131.178 m, 181.297 m, 10.302 m)

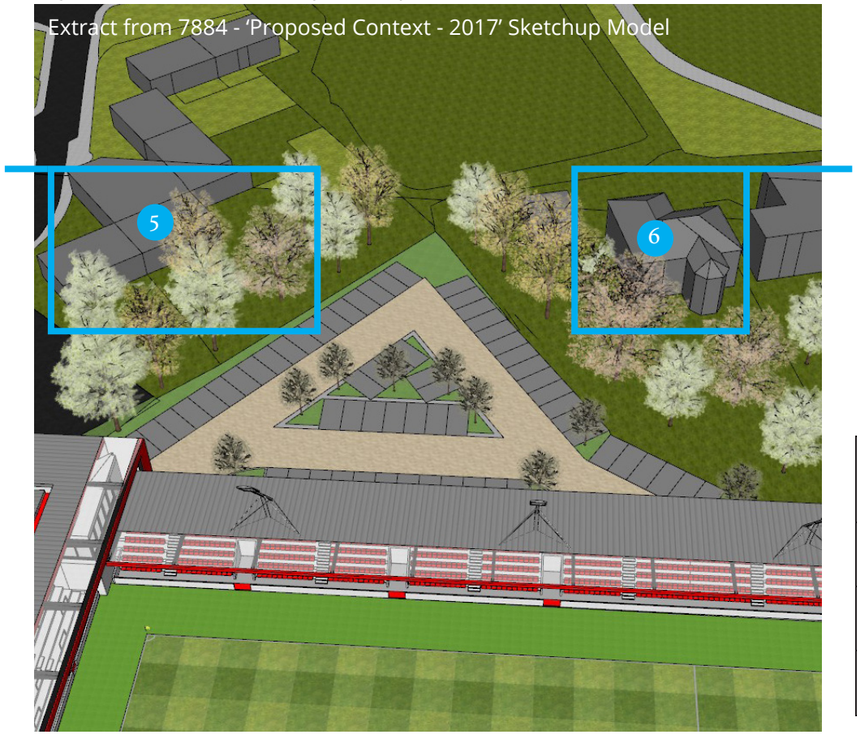


Grid: 8 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
0.95	0.30	2.21	0.312



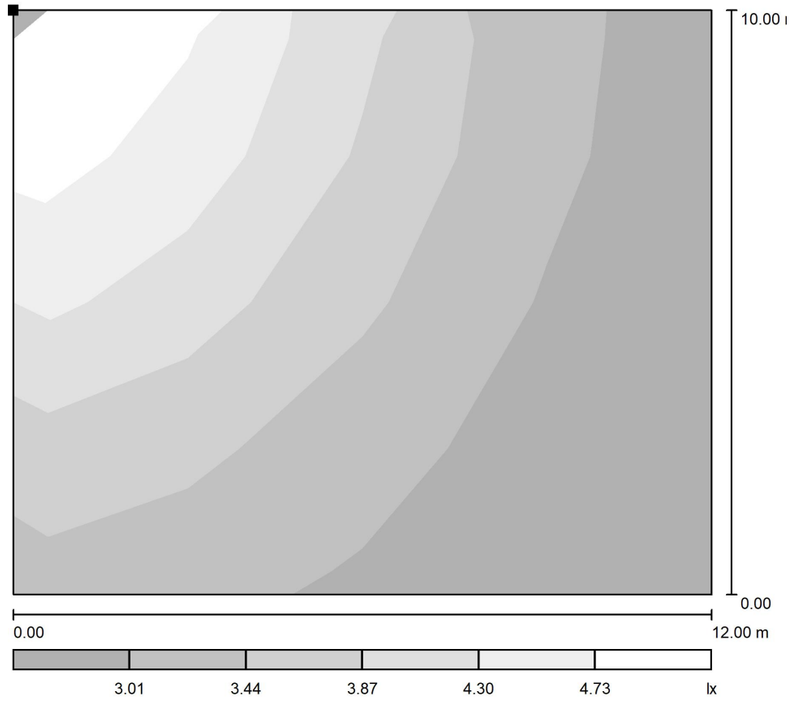
Key Plan taken from 'LP Scope (002).pdf' Document



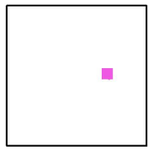
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	0.95	0
Pass / Fail	Pass	Pass

Residential Receptor 6 - Pond House

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-126.233 m, 111.658 m, 10.302 m)



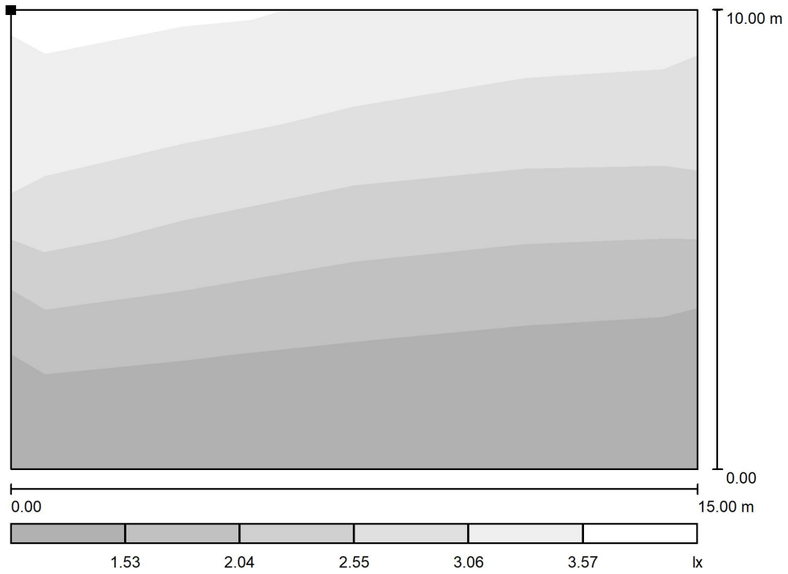
Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
3.51	2.70	4.86	0.769

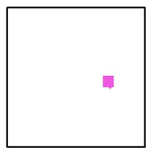
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	3.51	0
Pass / Fail	Pass	Pass

Residential Receptor 7 - Kingfield Cottage

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



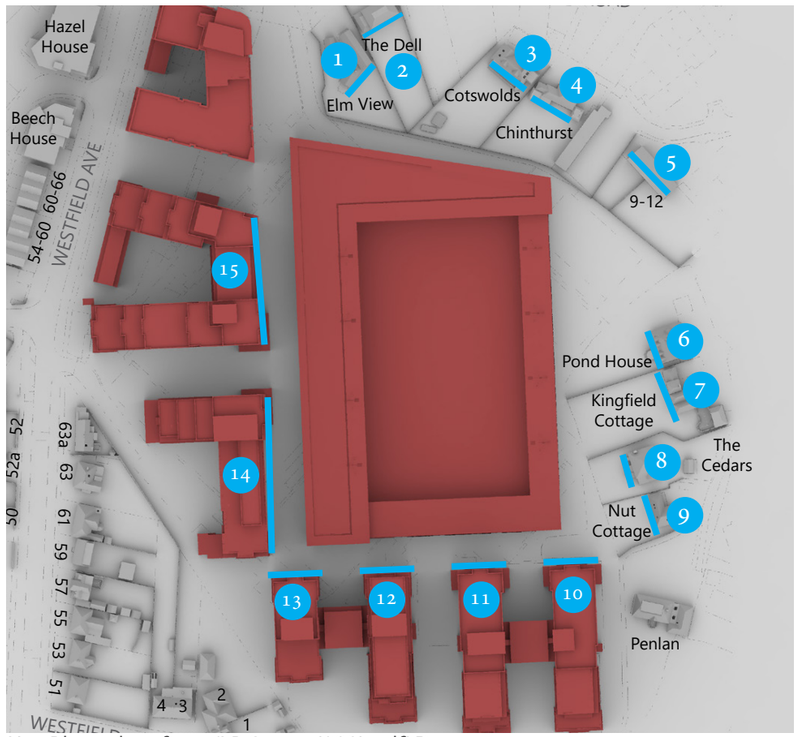
Position of surface in external scene:
Marked point:
(-120.568 m, 95.185 m, 10.302 m)



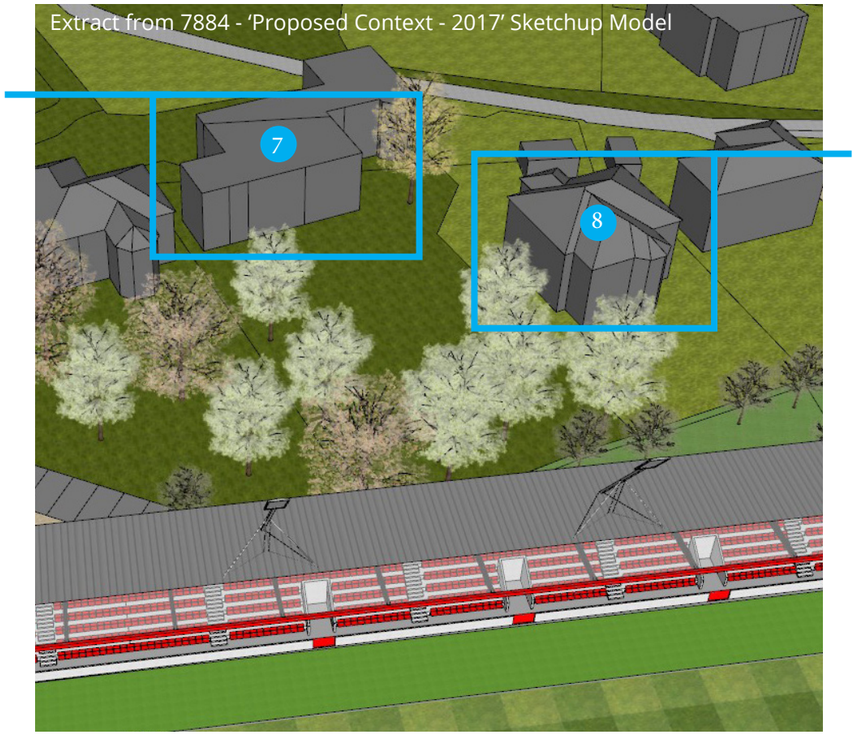
Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
2.24	1.15	3.68	0.512

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	2.24	0
Pass / Fail	Pass	Pass

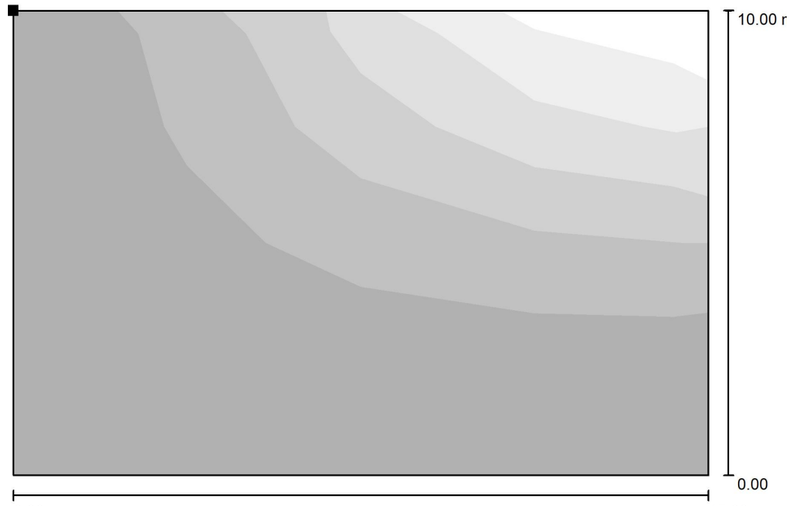


Key Plan taken from 'LP Scope (002).pdf' Document

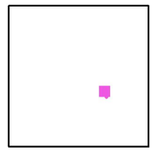


Residential Receptor 8 - The Cedars

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-139.123 m, 65.347 m, 10.302 m)



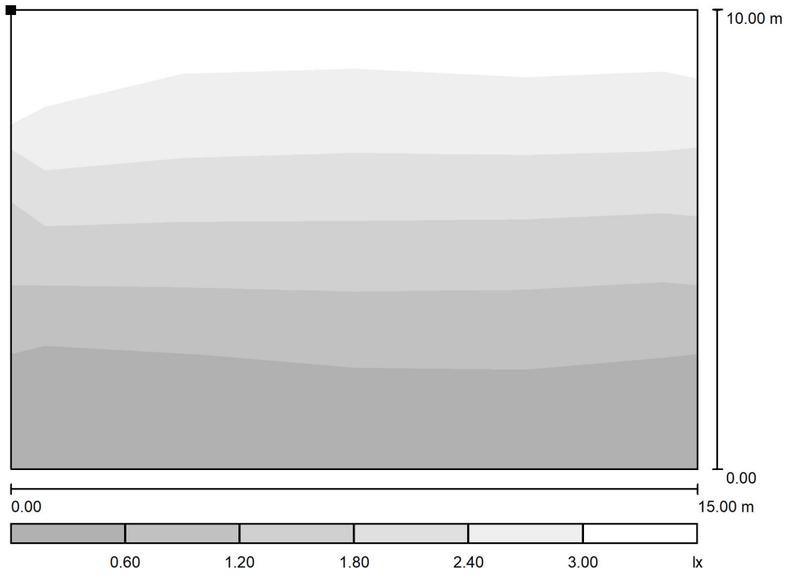
Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
1.76	0.19	6.53	0.108

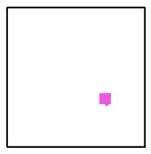
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	1.76	0
Pass / Fail	Pass	Pass

Residential Receptor 9 - Nut Cottage

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.

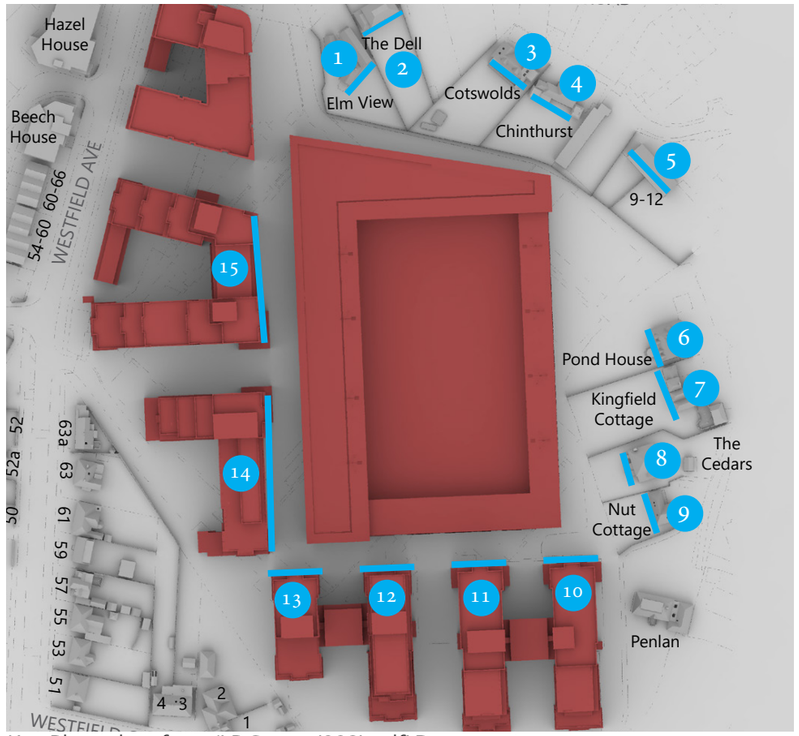


Position of surface in external scene:
Marked point:
(-129.283 m, 47.969 m, 10.302 m)

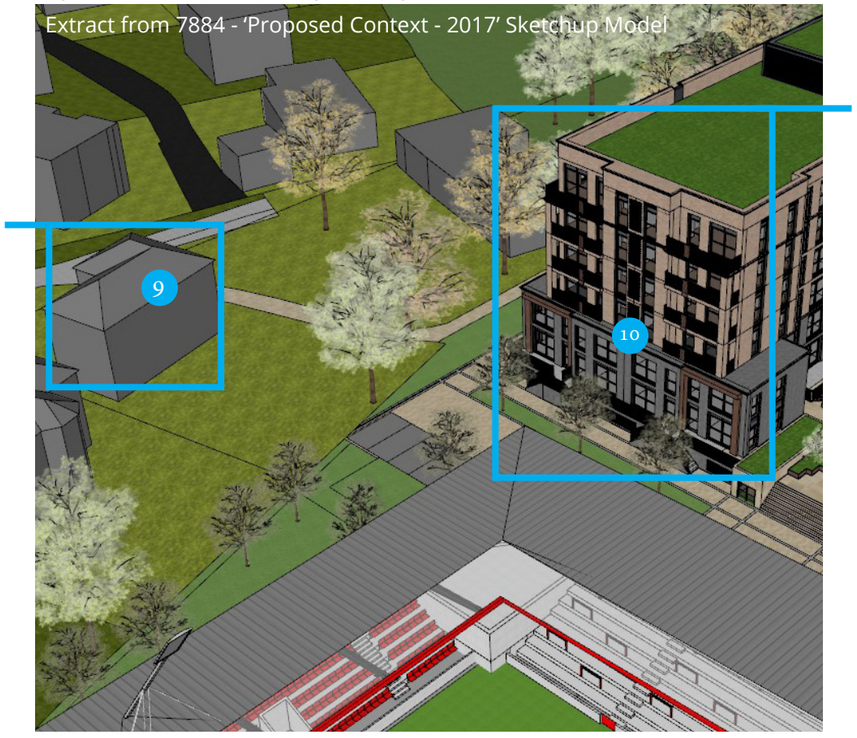


Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
1.67	0.30	3.31	0.179



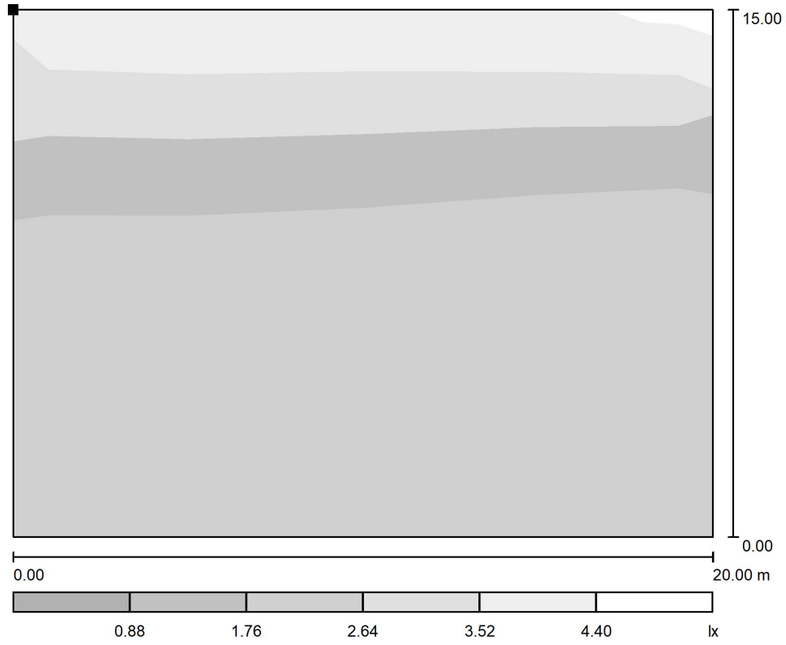
Key Plan taken from 'LP Scope (002).pdf' Document



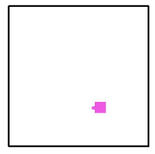
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	1.67	0
Pass / Fail	Pass	Pass

Residential Receptor 10 - Block 5 (East)

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-150.520 m, 21.346 m, 16.156 m)



Grid: 4 x 4 Points

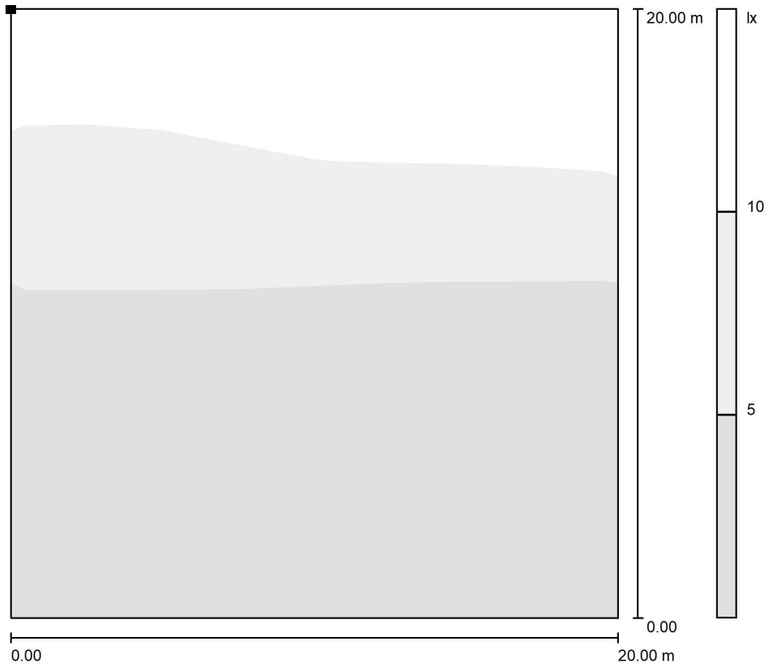
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
1.38	0.10	4.52	0.075

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	1.38	0
Pass / Fail	Pass	Pass

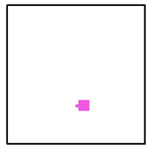
2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT

Residential Receptor 11 - Block 5 (West)

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



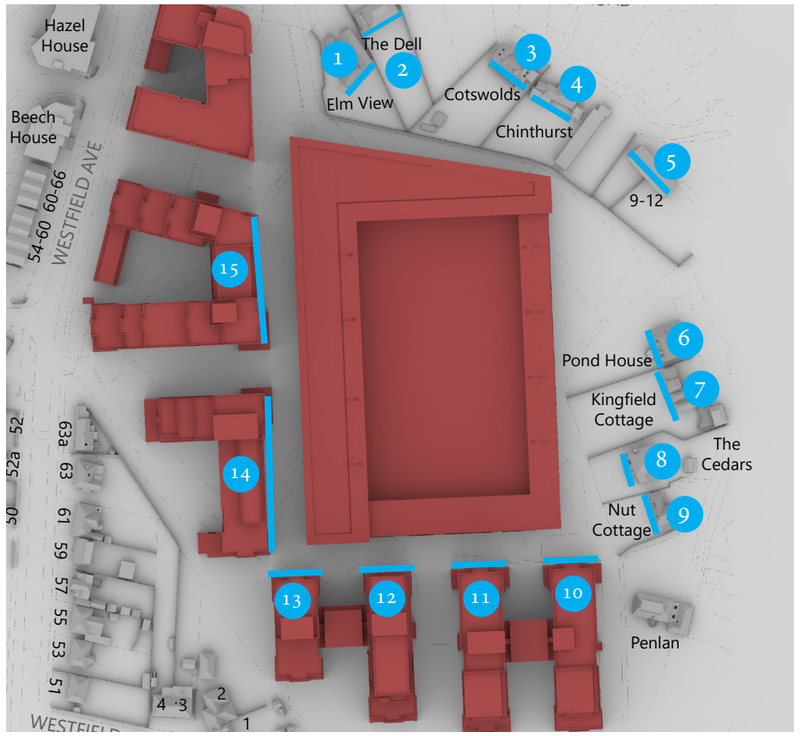
Position of surface in external scene:
Marked point:
(-188.047 m, 21.404 m, 21.789 m)



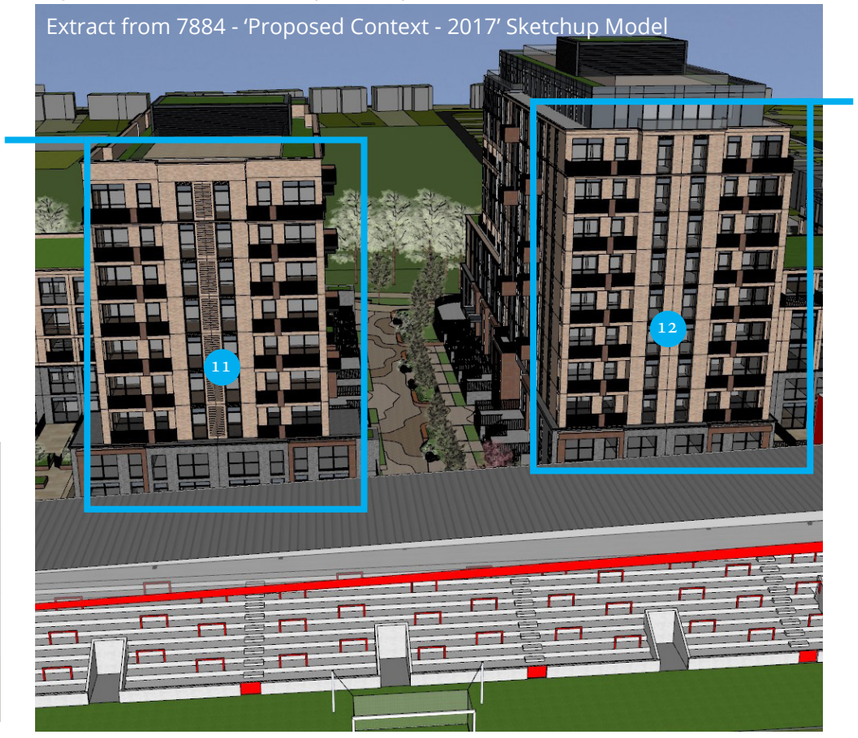
Grid: 8 x 8 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
4.82	0.11	11	0.024

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	4.82	0
Pass / Fail	Pass	Pass

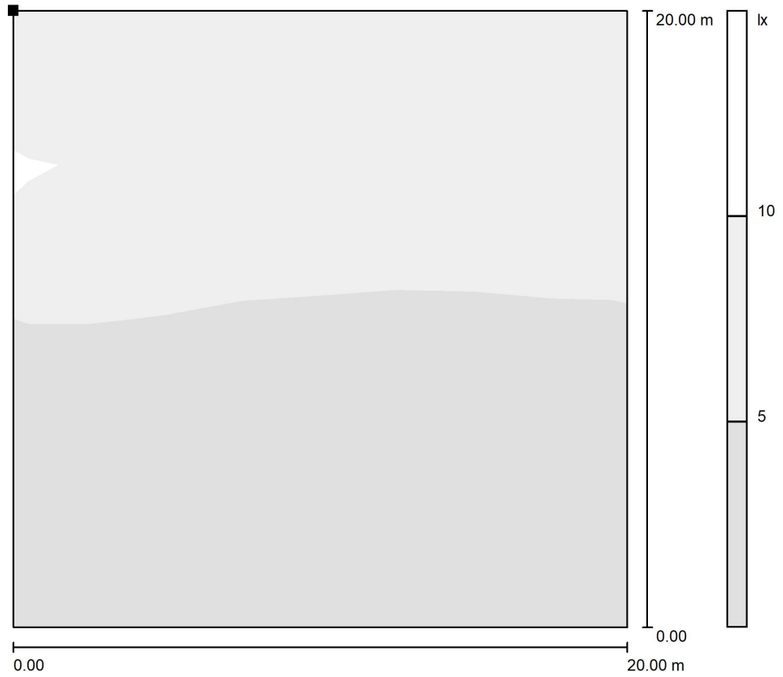


Key Plan taken from 'LP Scope (002).pdf' Document

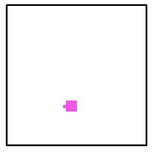


Residential Receptor 12 - Block 4 (East)

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-223.561 m, 22.366 m, 23.717 m)



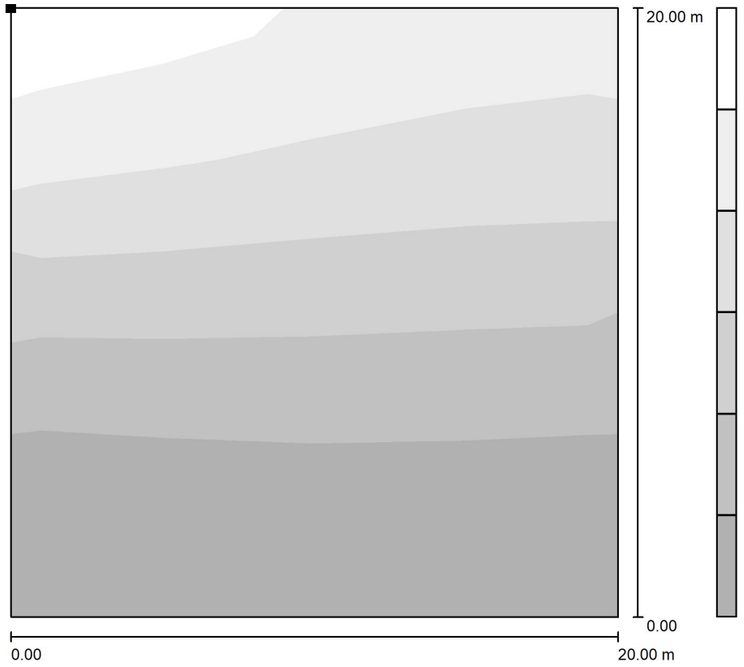
Grid: 8 x 8 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
4.56	0.15	11	0.033

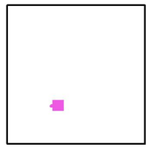
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	4.56	0
Pass / Fail	Pass	Pass

Residential Receptor 13 - Block 4 (West)

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



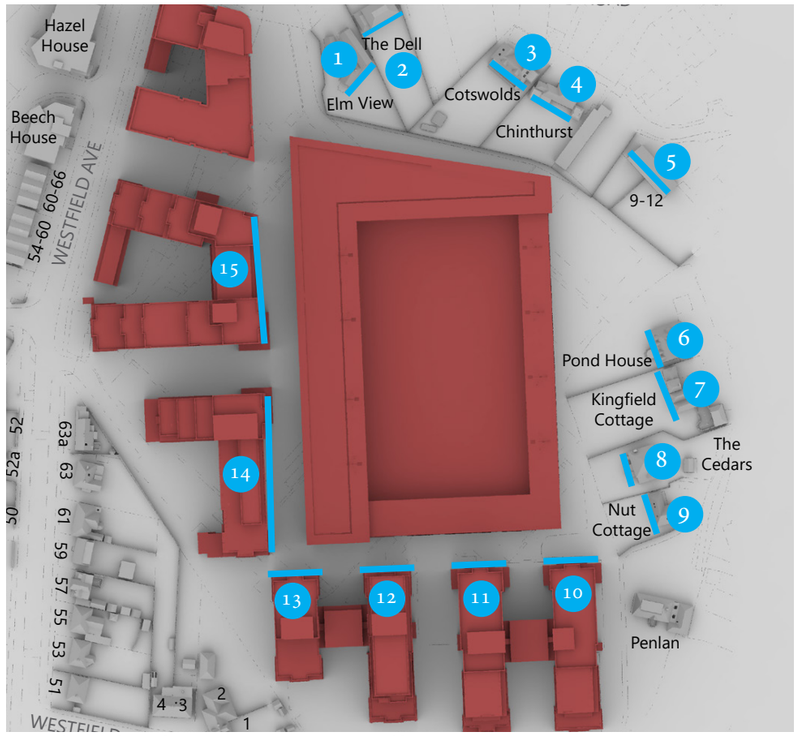
Position of surface in external scene:
Marked point:
(-259.230 m, 21.164 m, 21.428 m)



Grid: 4 x 4 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
2.73	0.32	6.22	0.116

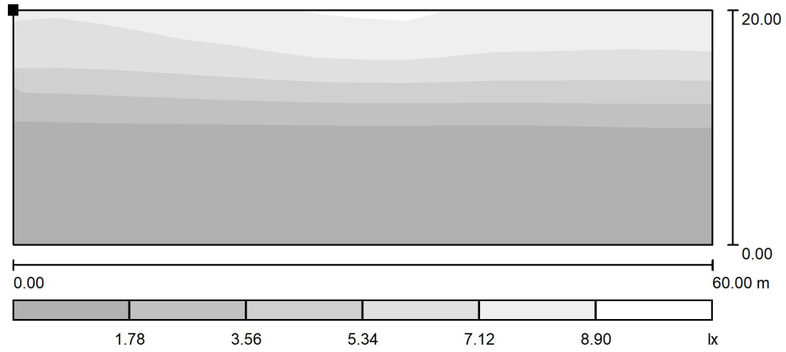
Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	2.73	0
Pass / Fail	Pass	Pass



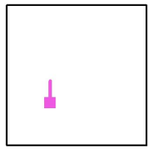
Key Plan taken from 'LP Scope (002).pdf' Document

Residential Receptor 14 - Block 3

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



Position of surface in external scene:
Marked point:
(-282.102 m, 31.887 m, 19.473 m)



Grid: 16 x 8 Points

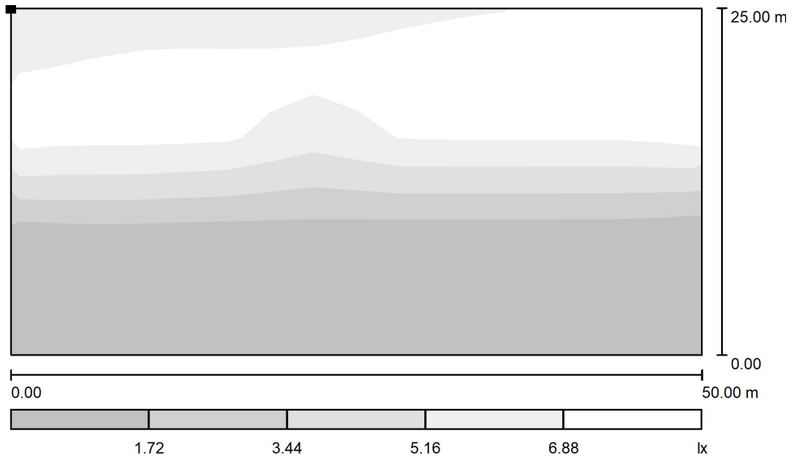
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
3.03	0.07	8.97	0.024

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	3.03	0
Pass / Fail	Pass	Pass

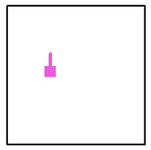
2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT

Residential Receptor 15 - Block 2

Light modelling data shows that the provisional specification for pitch floodlighting does not adversely effect this residential receptor.



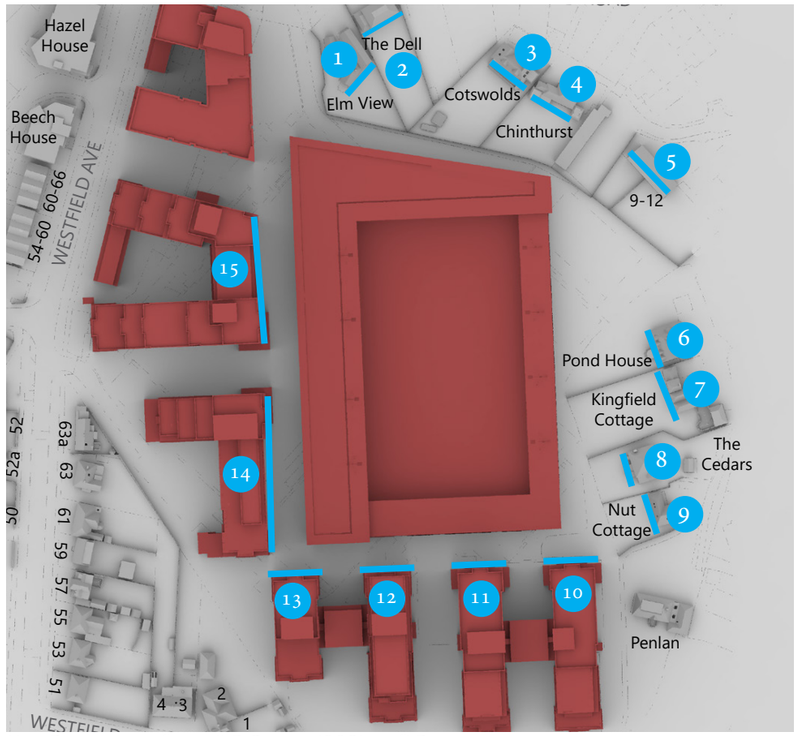
Position of surface in external scene:
Marked point:
(-281.167 m, 116.237 m, 24.101 m)



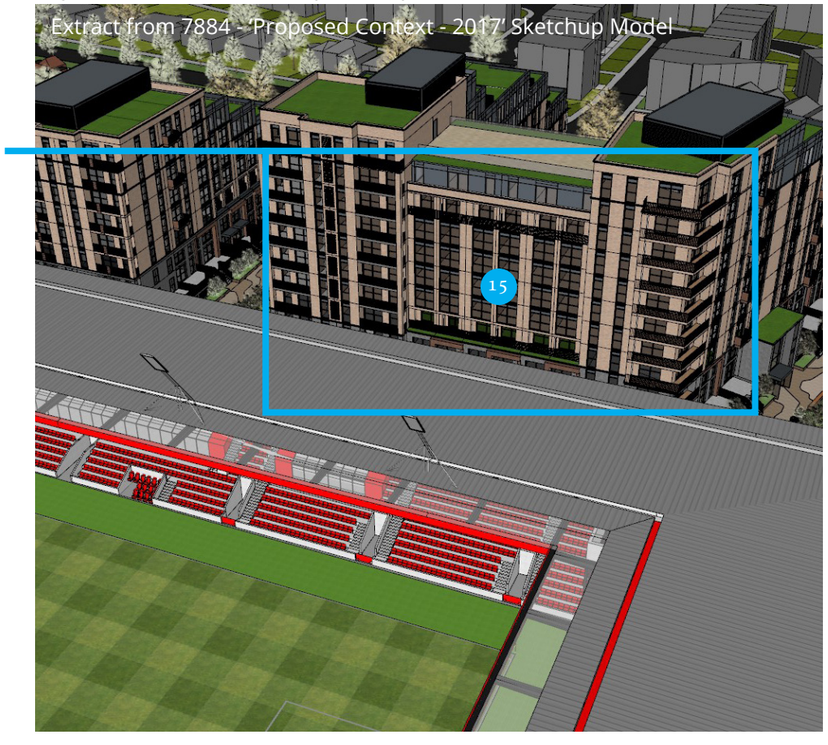
Grid: 16 x 8 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
3.88	0.12	8.69	0.030

Assumed Curfew 22:30hrs (Mon-Sat) 21:00hrs (Sun)	Light Intrusion **Pre Curfew** Average (Lux)	Light Intrusion **Post Curfew** Average (Lux)
ILP / CIBSE Target (Zone E3)	10	2
Proposed Design (Average)	3.88	0
Pass / Fail	Pass	Pass



Key Plan taken from 'LP Scope (002).pdf' Document



Extract from 7884 - 'Proposed Context - 2017' Sketchup Model

Extract from www.wokingcommunitystadium.co.uk (190712-Our-Plans-v1.pdf)

2.2 Lighting to Car Park

It is proposed that the car park areas be illuminated to provide a safe and secure environment for users of the development.

In our opinion, the lighting levels should reflect those presented in the British Standards for lighting of car parks with Medium Traffic (BS 12464-2:2007 table 5.9) and obtrusive light controlled by the levels controlled by Environmental Zone E3 (suburban / medium district brightness) (BS 12464-2:2007 chapter 4.5). Apart from the use of horizontal cut-off (HCO) luminaires with good optical control, as stipulated by Environmental Zone E3, we would recommend consideration to be given to the mounting heights of the car park lighting. Mounting this lighting at a height of no more than 4-6 metres would minimize the day-time visual impact.

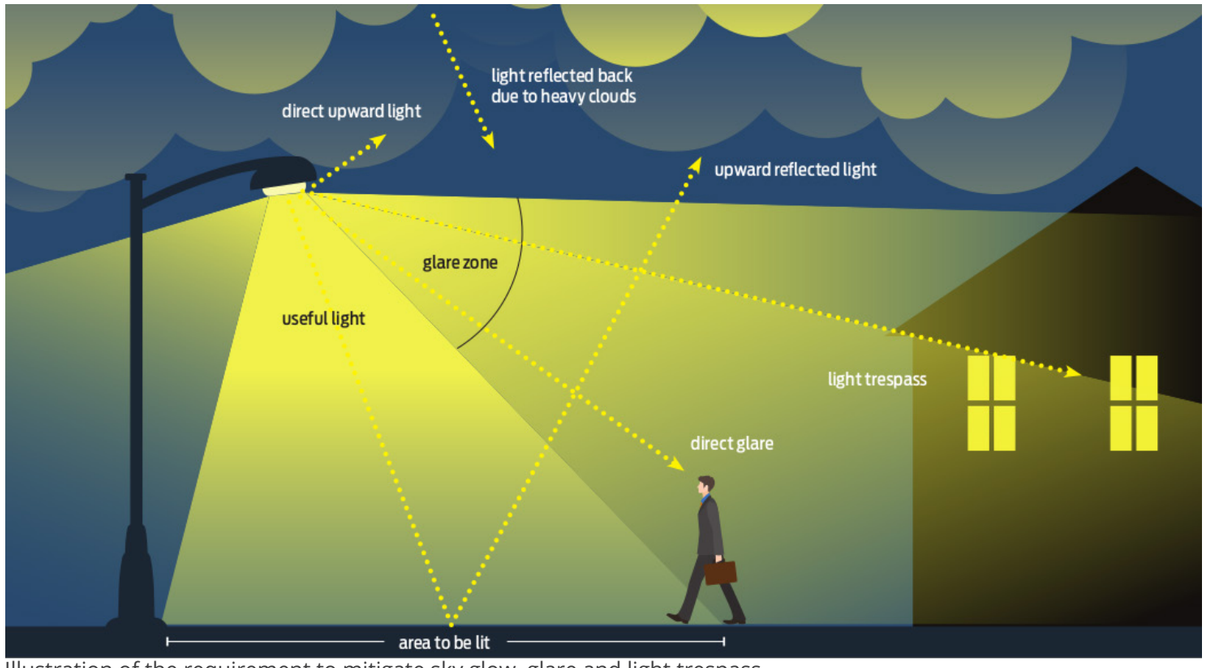
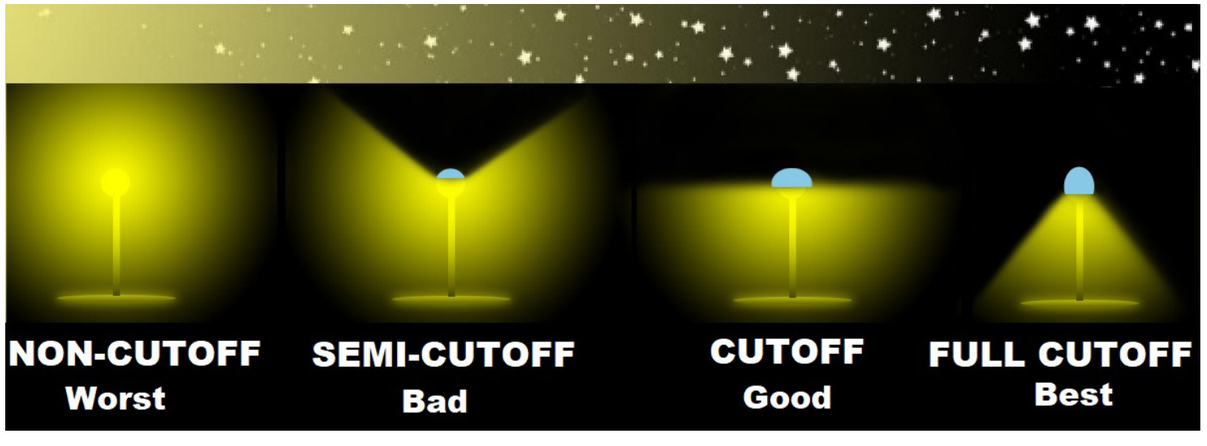
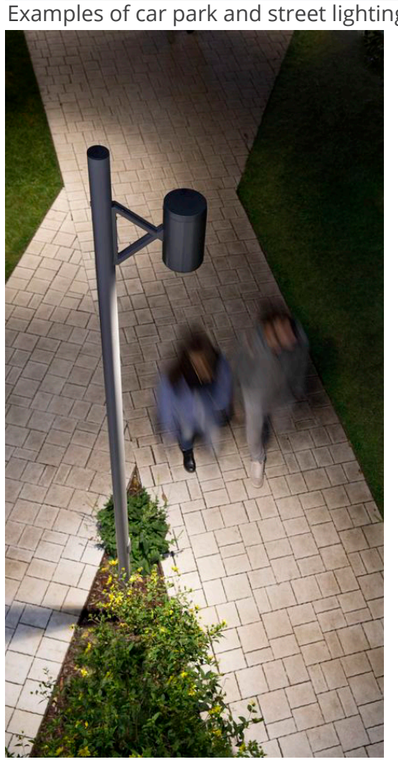
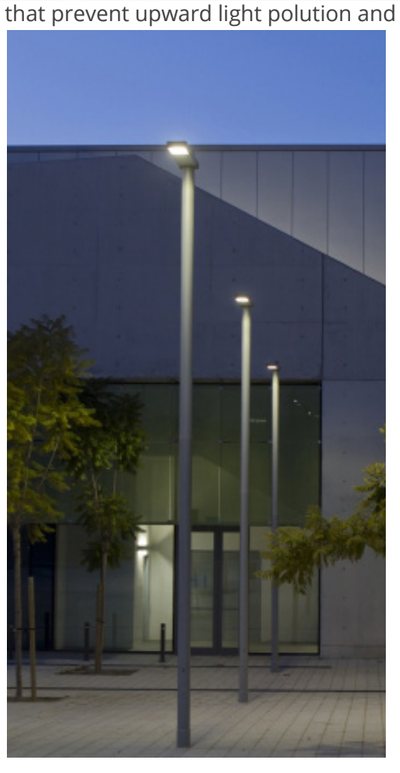


Illustration of the requirement to mitigate sky glow, glare and light trespass



Examples of car park and street lighting that prevent upward light polution and reduce glare:





2.3 Building Façade, Pathway, Circulation, Signage and Security Lighting

Applying a common sense approach is required to ensure that any lighting does not use higher brightness light sources than necessary, is not spilling in to areas where it serves no function or is operational at times when it serves no purpose.

Lighting to the façade of the main stadium building, pathways, car parks or exterior of the surrounding residential development must be designed in such a way so as to avoid any uncontrolled light that will contribute to light pollution, glare or sky glow.

Façade lighting should not be directed upwards, instead a suitable design for façade illumination should include concealed light sources and the direction of the emitted light should not exceed 90° or be excessively bright so as to prevent glare or sky glow.

Street lighting should comprise of street lamps that direct the lighting efficiently downwards to the specific area to be illuminated. Careful choice of optics and full cut-off designs should be used to prevent any light being directed upwards or close to horizontal.

No up lighting should be used to facades, trees or street furniture to prevent unnecessary glare or reduce sky glow, unless there is an adjacent built surface to terminate the path of light. Lighting for bollards, benches or wall lighting should all be directed downwards and where possible the light source should be of a concealed type. Overleaf - images of low glare street lighting effects.

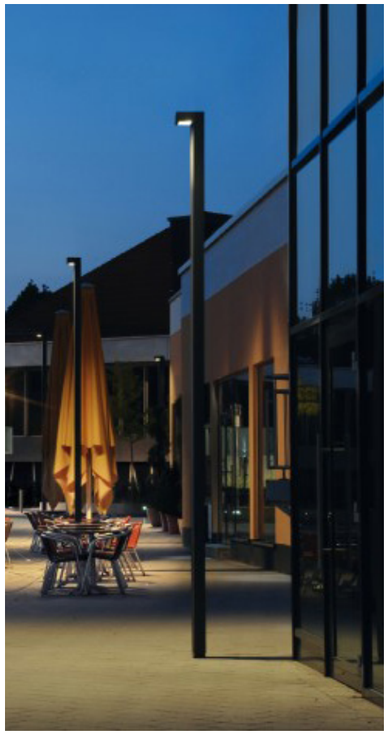
The type and position of any proposed illuminated signage, displays, screens or illuminated hoardings must be carefully considered for their individual impact on the local environment. This includes conformity to any relevant regulations and consideration to residents that may be affected by the extra light. It is recommended that any illuminated signage be significantly dimmed or switched off automatically after 23:00 hours. Any signage that causes sudden changes of light intensity such as digital signage displays can be a nuisance to residents.

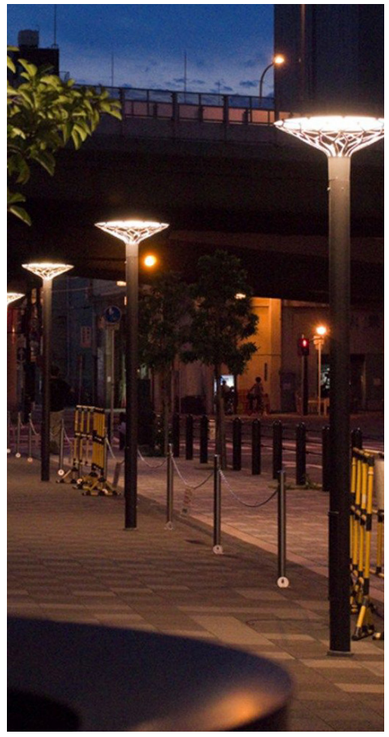
Motion activated security lighting should be avoided as sudden changes in brightness can cause a nuisance to residents and users of the area. Instead a suitable lighting design for the circulation and curtilage should provide a suitable background level of illumination for safety and security around the site. Any additional lighting required should be controlled according to the control advice in Section 2.5 ‘Lighting Control’.

All of the above measures are required to prevent excessive or unnecessary lighting which would otherwise contribute to light pollution, annoyance or energy inefficiency. A carefully designed lighting solution including careful choice of luminaires, positioning and control strategy will improve the experience of users and residents, reduce energy consumption and prevent adverse environmental impacts.

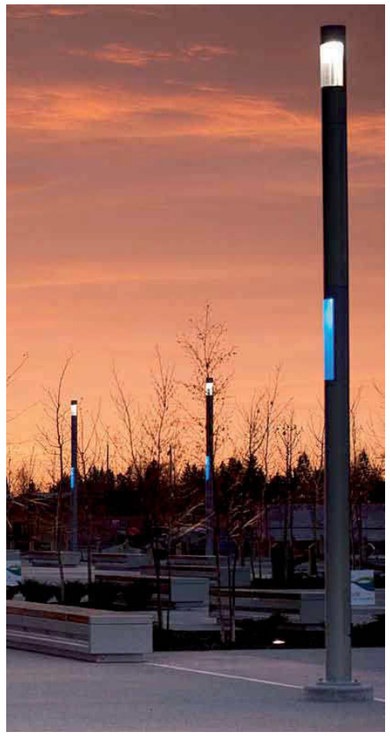
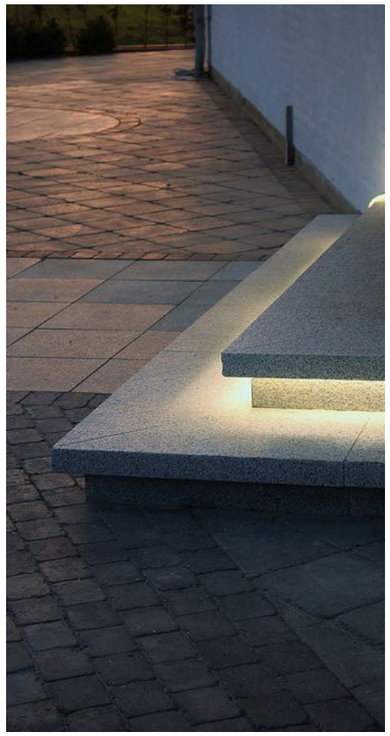
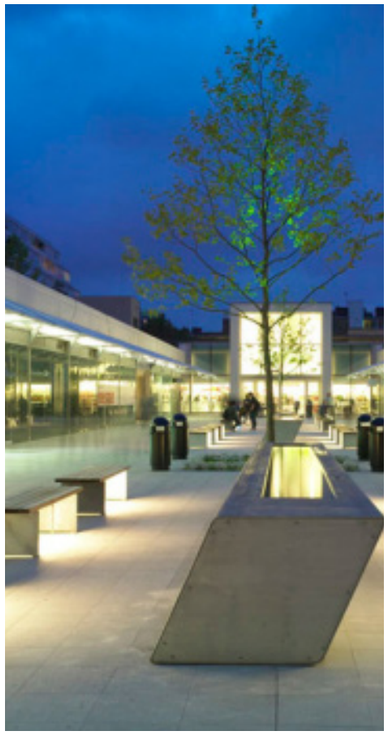
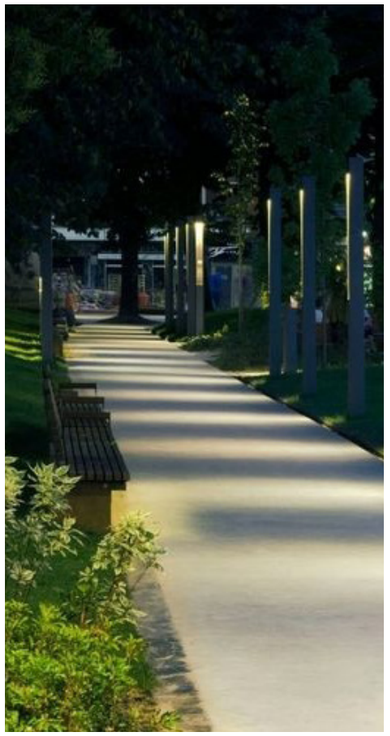
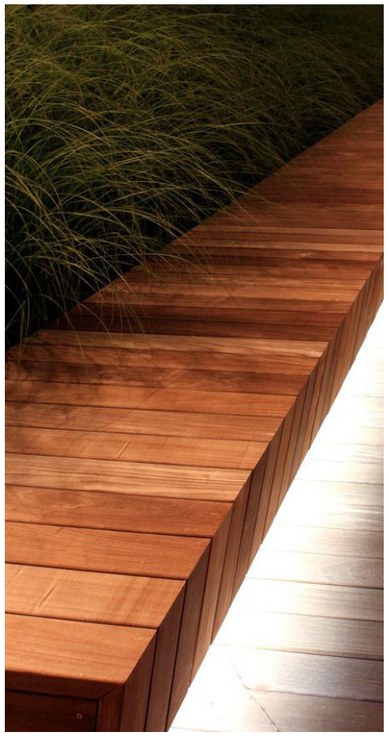
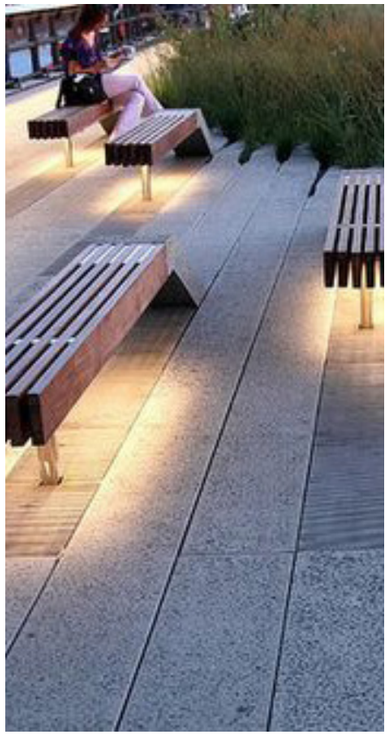
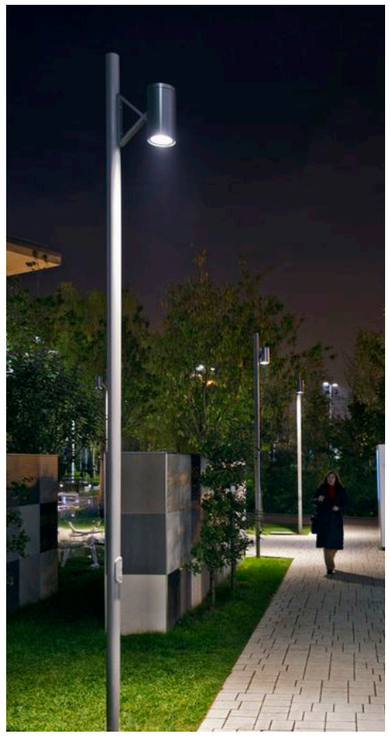
Example of stadium facade lit downwards to prevent excess light polution:

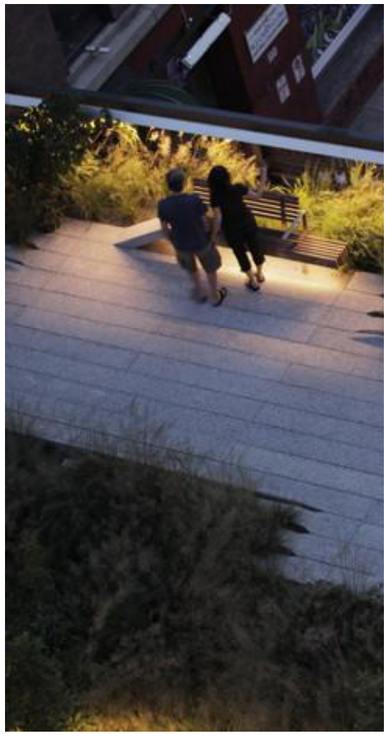
Examples of low glare street lighting that help reduce sky glow:





2.0 - PROPOSED LIGHTING TO THE DEVELOPMENT



2.4 Internal Lighting to Stadium

The internal lighting within the stadium envelope can, if not effectively controlled, provide an unwanted source of light pollution. Bare light sources should not be visible through windows when viewed from the outside and lighting controls arranged so all lighting is easily turned off when not required, automatically turned off or significantly reduced in output when outside of operational hours.

This also applies to any internal signage, displays, screens or hoardings. If internal lighting is to be required after 23:00 hours other methods of lighting control such as blinds should be used to prevent egress of light from internal lighting through window openings. This is especially critical where retail or office space is located directly opposite residential dwellings where light trespass is likely to occur.

2.5 Lighting Control

The lighting to the pitch be switched off or the lit intensity reduced to Mode 4 (see below) no later than 22:30 hours Monday to Saturday and 21:00 hours on Sundays.

The use of Pitch Illuminance Switch Mode (PISM) allows for more suitable levels of lighting depending on the usage of the pitch area. This further reduces any undesirable effects of light spill or sky glow by reducing the output of the floodlighting system depending on the requirements of the activity:

- Mode 1 : Full Match Mode (full 'Class II' illumination for match play)
- Mode 2 : Match Continuity Mode (reduced illumination used in event of power failure)
- Mode 3 : Training Mode (a lower level 'Class III' illumination for non-match use)
- Mode 4 : Maintenance Mode (basic illumination for maintenance)

The surrounding pedestrian plaza, walkways and car parks will need to be lit for convenience, safety and security throughout the hours of darkness. After 23.00 hours Monday to Saturday and 21.00 hours on Sundays, the overall lighting levels to these areas are suggested to be significantly reduced automatically whilst maintaining a safe minimum level of illumination. Additional measures such as motion enhanced lighting can smoothly, subtly and unobtrusively slightly raise the street lighting levels around areas of detected activity. Lighting to circulation areas should automatically respond to ambient light levels to save energy when not required due to variations in natural light levels at dawn and dusk. All exterior lighting should dim smoothly and no motion activated or automated exterior lighting should come on or off abruptly which could cause nuisance or disturbance to nearby residents.

All suggestions above are intended to improve safety and security whilst also reducing overall emissions of light, light trespass or disturbance to residents of nearby housing.

2.6 Mitigation by Landscaping

We believe the proposed landscaping within the site together with the lower height and location of the stadium in relation to the residential developments surrounding to the south and west will help to screen the night time impact of the lighting emitted from the stadium pitch installations. The screening to the north and east will become more apparent overtime as the trees grow and mature. This will also help obscure the daytime prominence of the stadium lighting gantries when viewed from the northern and eastern fringe residential area.

Extract from www.wokingcommunitystadium.co.uk (190712-Our-Plans-v1.pdf)

3.0 - CONCLUSION

dpa lighting consultants were instructed by Woking Football Club on the 28th August 2019 to provide a suitable strategy for lighting the main stadium venue and surrounding curtilage. This strategy is to be made with due consideration for the environmental impact of the lighting associated with the new Woking Football Club stadium and surrounding residential development.

3.1 Sky Glow / Light Pollution

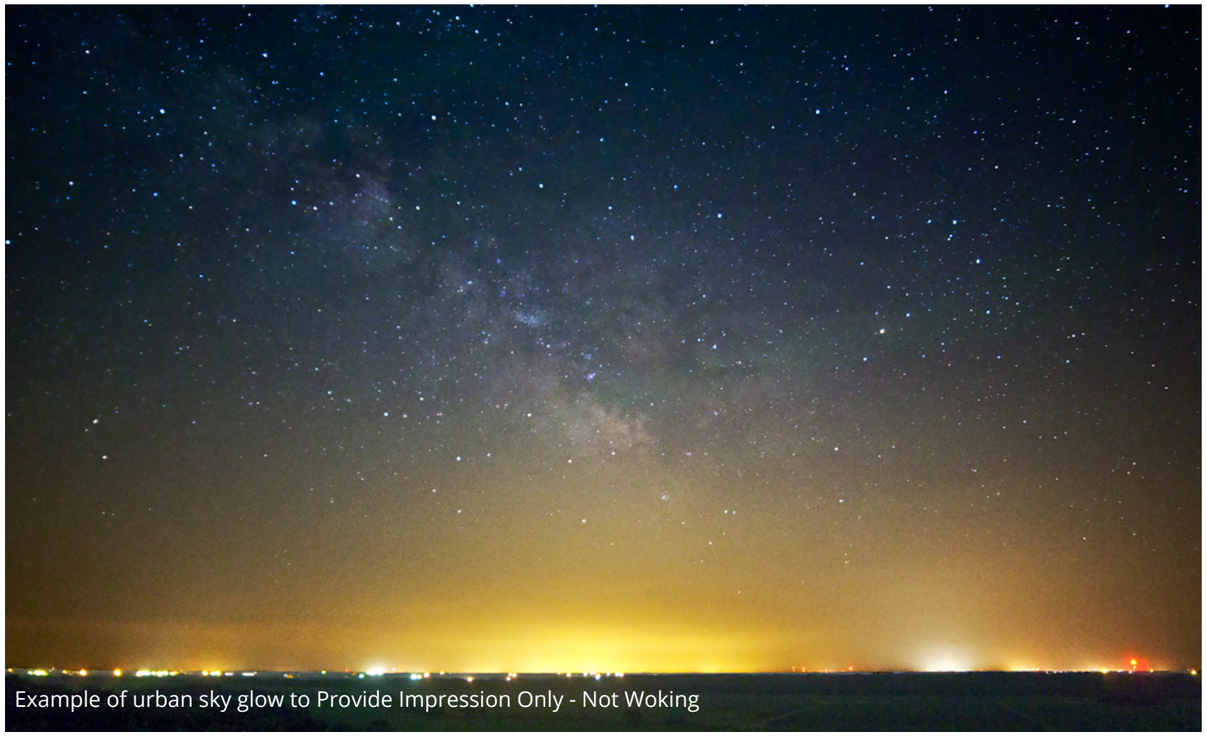
Even when the lighting design adheres to appropriate guidelines with respect to minimising any direct upward light components and spill light there will be upward reflected light due to the reflectance of the area to be illuminated (for example, the pitch surfaces or car park surfaces etc.). This upward reflected light would cause sky glow (i.e. a brightening of the night sky in the vicinity of the development) that will be exacerbated in times of increased humidity in the atmosphere.

The production of sky glow from floodlighting installations is inevitable. Sky glow is a negative environmental effect, although the perceived magnitude of the effect depends on the context. In the case of the new stadium, this is located in an urban environment and therefore the overall perceived magnitude of the effect would be masked to some extent by the existing sky glow produced by the neighbouring conurbation, from light sources associated with streets and building lighting etc.

The proposed development is located on the edge of a large urban area with both industrial and residential developments nearby. Our observations suggest that there are medium to high levels of background illumination to the immediate vicinity during the hours of darkness.

The geographical location of the site (i.e. on an area of relatively low elevation) is such that the site is viewable from a limited number of locations and viewing angles. In our opinion, the sites topographical location mitigates the negative environmental impact associated with the proposed lighting as the number of individuals potentially affected by the proposed lighting (and the daytime view of the lighting equipment) is reduced significantly.

Furthermore, the impact of the sky glow will differ between viewing locations, which will mean that other sources of sky glow such as that produced by Woking town will be viewed in proximity on the horizon and will be more apparent. Due to the close proximity to other lit areas and low-lying location within the landscape, the sky glow addition of reflected light when the pitch is lit will not be of a magnitude to be considered detrimental to the landscape.



Example of urban sky glow to Provide Impression Only - Not Woking

Impression of Local Sky Glow Overlay - Not Actual Data

3.2 Residential Development

There are significant proposed multiple dwelling unit residential developments immediately surrounding the south and west sides of the proposed stadium which are the primary receptors for obtrusive light from the stadium floodlighting, façade and circulation street lighting around the site.

All measures suggested are intended to reduce the impact of artificial lighting on these receptors and all aspects of the lighting strategy are to be designed to reduce light intrusion, glare or light trespass. All precautions taken within CIBSE recommendations for obtrusive light limitations for Environmental Zone E3 (suburban / medium district brightness) protect these residential receptors from excess light as a nuisance.

3.3 Flora and Fauna

dpa lighting consultants are not experts on the effect of light on the local ecology including flora, fauna and wildlife. As such, we would advise that professional opinion be sought regarding any potential impact of the lighting proposals in this respect.

3.4 Final Statement

All developments generate environmental impacts, both adverse and beneficial. In our opinion, if the finished lighting installation, in particular the floodlighting to the stadium pitch and circulation street lighting, is implemented in line with the recommended guidelines, taking into consideration the geographical location and environmental context together with mitigation by lighting control and hours of operation, these factors will combine to produce an acceptable negative environmental impact.

Extract from www.wokingcommunitystadium.co.uk (190712-Our-Plans-v1.pdf)

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