



HALEWOOD GRACE PARK

Lighting Impact Assessment
December 2025

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Knowsley Metropolitan Borough Council

Grace Park, Halewood

Lighting Impact Assessment

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Signature	</					

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Abbreviations

The table below offers a full list of acronyms and abbreviations used throughout this report.

Acronym	Description
BSI	British Standards Institute
CCT	Correlated Colour Temperature
CIBSE	Chartered Institute of Building Services Engineers
Cd	Luminance Unit (Candela)
CRI	Colour Rendering Index
DALI	Digital Addressable Lighting Interface
Eav	Maintained Average Illuminance
ILP	Institute of Lighting Professionals
IP	Ingress Protection
K	Colour Temperature Unit (Kelvin)
LED	Light Emitting Diode
Lx	Illuminance Level Unit (Lux)
MF	Maintenance Factor
Ra	Colour Rendering Index
SLL	Society of Light and Lighting
UFR	Upward Flux Ratio
ULR	Upward Light Ratio
Uo	Uniformity

Acronym	Description
ha	Hectare
CCTV	Closed Circuit Television
LUF	Levelling Up Fund
SuDs	Sustainable Drainage System
AFFL	Above Finished Floor Level
MUGA	Multi-Use Games Area

1. Introduction

1.1 The Site

This report has been produced by WSP on behalf of Knowsley Metropolitan Borough Council (herein referred to as KMBC in support of the following full planning application):

“Full planning permission for the external landscape and public realm works including the creation of two artificial grass playing pitches with associated fencing and infrastructure, a flexible use civic plaza, a clubhouse with changing facilities and café facilities, a car park with associated EV charging points, floodlighting, CCTV, general landscaping improvements, including a shared use pedestrian/cycle route, further circulation routes in addition to the shared route, acoustic fencing, a feature play area, sustainable drainage works, and an area of hardstanding to include a temporary construction compound.”

Grace Park (herein referred to as 'the site') is a community space located off Leather's Lane and Wood Road in Halewood in Knowsley. The site is owned by KMBC and managed in part by Halewood Town Council (Wood Road Fields) and partly by Halewood Town Junior Football Club (Greengates Playing Field). Delivering improvements to Grace Park are an essential part of the Council's Halewood Levelling Up Fund (LUF) Investment Programme.

The site incorporates a number of functions and activities, including an existing children's play area, public park and playing fields for Halewood Town Junior Football Club (a local junior football club).

The application site is shown on the submitted site location plan (Ref: 70119719_WSP_LUD_GRP_DR_LA_0002 - P03). The site measures approximately 7.1 ha in size.

The proposals are being brought forward following KMBC's successful bid in securing £15.356m LUF in January 2023. The funding is designed to "level up" areas across the UK and support local growth. The LUF funding is designed to "level up" areas across the UK and support local growth. The funding proposal submitted to the Council includes an expansion of the local district centre, improvements to greenspace and leisure facilities, as well as funding improvements to walking and cycling connectivity to employment areas and throughout the district. The funding aims to revitalise the district centre of Halewood, investing into local infrastructure that will improve the everyday lives of the local community. As well as meeting the needs of the growing population and complement housing developments in the East of Halewood, the Levelling Up bid was developed to address significant health inequalities, tackle the Climate Emergency, all of which are critical if KMBCs are to truly 'level up' Halewood. The improvements contained within the

proposals for Grace Park are an essential part of the Levelling Up proposals and associated investment.

Full details of the application proposals are included in the submitted Planning Statement and Design and Access Statement, but in summary, the proposals for Grace Park include:

- Improvements to Greengates Playing Fields. Replacing the two existing pitches with two higher quality All-Weather football pitches that can be used throughout the year, as well as being available for use by the wider community. One of the all-weather pitches will be full size, and the other will be a '5 v 5 mini soccer' pitch.
 1. The proposals also include a clubhouse which will serve users of the new pitches and incorporate a community food and hot/cold beverage offering as well as a social area to encourage community integration.
 2. The club house will include provision such as changing rooms, toilets and a viewing area for parents.
- Improvements to recreational and landscape features of Grace Park. Cycle paths and associated cycle stands will be created, as well as a new children's play area, and a car park which will provide 32 bays, which includes 5 accessible parking bays and 10 EV charging bays, for those using the new football facilities and wider park;
- Visually attractive, low-level fencing is also proposed around the perimeter of the site with various entrance points proposed;
- Buffer planting is also proposed throughout the site, including an abundance of amenity lawn area alongside a biodiverse meadow which will link to the shared use pedestrian/cycle route which runs central to the site via a Boardwalk;
- A fenced play area providing inclusive play equipment and accessible play pieces;
- A flexible use Civic Plaza;
- Public amenity space including a picnic area and public meeting spaces;
- Separate SuDS infrastructure has been identified within the development proposals which are strategically located to form an important feature of the site, with six swales being proposed along the shared-use active travel route and much larger SuDS area proposed to the north of the site. These areas have been sensitively designed to ensure that they can be viewed in the context of the wider site and appropriately drain the proposed development in a visually attractive manner.

1. Introduction

1.2 Aim of Document

WSP have been appointed to provide a lighting impact assessment for Grace Park. This report will provide a technical lighting brief with proposed lighting design recommendations for managing and controlling the obtrusive effects of the exterior lighting and the impact that the lighting will have upon the nearby residential area and will support the planning application.

The technical aspect of the report will outline all relevant design standards applicable to controlling and managing the exterior lighting. It will recommend specific design criteria and design requirements which will be in keeping with the identified environmental zone.

The document outlines:

- Lighting considerations and strategy.
- Design criteria with recommended standards and guidance.
- Illuminance criteria for each area.
- Recommendations on obtrusive light & unwanted light pollution.
- Recommendations on optical control and the sensitivity of the design in relation to the residential properties and wildlife.
- Overview of illumination levels outlined within the technical appendices.
- Conclusion of findings from the Lighting Calculations.

1.3 Approach

WSP has prepared this report in order to review and assess the proposed exterior lighting for Grace Park, with careful consideration of light levels and obtrusive light onto neighbouring houses and buildings.

Particular focus will be placed upon the site boundaries including those at Leather's Lane, Beechwood Avenue, Wood Road and Dunacreway to minimise obtrusive light falling within the neighbouring properties.

The proposed lighting scheme will seek to ensure that the landscape lighting along with the additional sports lighting will be carefully and sensitively located to minimise obtrusive light. Illumination will also support the safety and wellbeing of visitors using the site.

The lighting strategy has been designed to encourage movement and fitness activities throughout the site. The lighting should create a welcoming atmosphere but also provide suitable light levels for safe passage and the required use of the site. Vertical illumination will also be considered to ensure facial recognition is achieved for safety and security.

The lighting scheme will comply with all relevant recommendations and guidance from the Institute of Lighting Professionals (ILP), the Society of Light and Lighting (SLL) and guidance developed by the British Standards Institute (BSI). All of these standards are summarised within the report.

The strategy provides indicative lighting layouts with proposed luminaire typologies, locations and positioning. Lighting design calculations have been based on the luminaire typology included in the area by area description to ensure a safe level of uniform lighting is achieved within each area of the site.

2. Lighting Strategy

2.1 Challenges

The proposed lighting strategy will address the various key design challenges which must be balanced within the overall scheme by offering technical lighting solutions throughout.

Security:

Well designed lighting can help maintain a safe and secure environment and deter crime and antisocial behaviour. Providing sufficient vertical illumination will aid CCTV surveillance and enhance facial recognition.

Accessibility:

All design should be fully inclusive and therefore attention should be considered within the lighting scheme to provide a design usable for all.

Flexibility:

All exterior spaces should offer a future-ready approach, by offering longevity to the design and the potential to expand should it need to in the future.

Sustainability:

Luminaires selected for the site will use efficient light sources, offer circular economy initiatives where available, or have been designed with a substantial progress towards circularity. This will ensure the lighting installations are energy efficient with consideration of their long term environmental impact. A dedicated lighting control system will also be provided to optimise light levels, further increasing the efficiency and longevity of the design.

Maintenance:

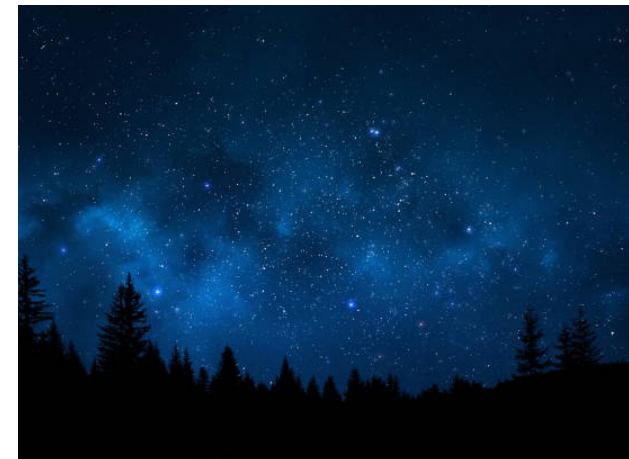
A key benefit of LED lighting is long lifespan. However, regular maintenance is required to ensure the longevity of the fittings, whilst also maintaining a consistent level of light, as the lighting equipment can become dirty over time. Fitting placement and technical requirements such as hinged columns are key elements to avoid unwanted risk or disruption to the site.



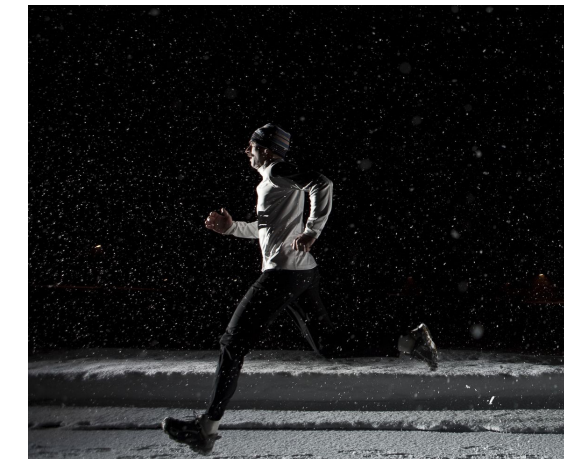
Recreation



Function



Environment



Activity



Accessibility/Maintenance



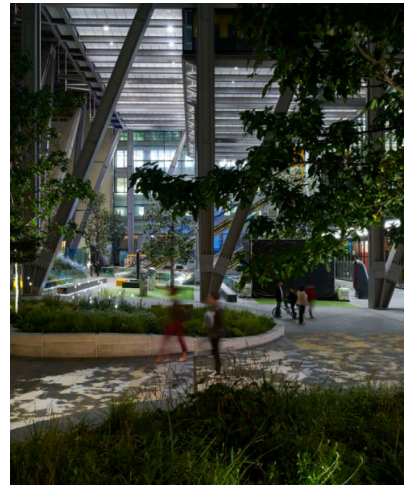
Security

2. Lighting Strategy

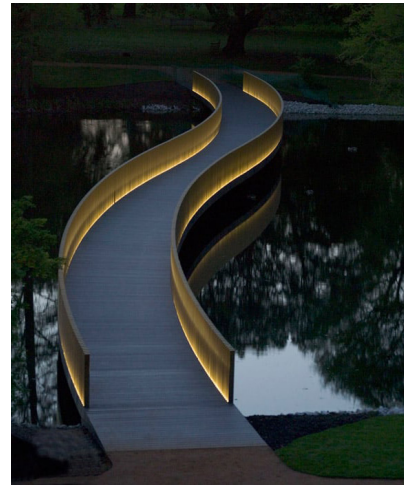
2.2 Qualities of Light



MF Pavilion, Mexico



St Helens Square, London



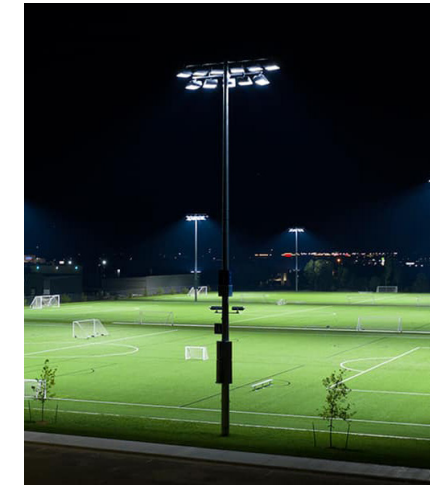
Kew Gardens, London



The Pista 500, Italy



Place Antonin Poncet Lyon, France



Sports Field, London

Lighting has often been seen as a way to extend the day, however, the night-time environment should be considered in its own right for its own unique qualities, which creates opportunities to use light to enhance and inform spaces by using the following tools:

Intensity:

How much light falls on a surface (illuminance) and how bright surfaces appear (luminance) are the main points of measuring within lighting design. How luminaires are specified for their output is key to the design composition.

Colour:

Light and its colour and how it is used is fundamental, whether that is the hue/saturation of a coloured source or even in the subtleties of white light itself. This strategy outlines how colour could be used throughout and how it enhances the textures of materials.

Scale:

Perception of space can be altered through light, spaces can feel smaller or larger dependant on the balance of light within the space. The scale and form factor of light fittings should be carefully considered to fit within the overall architecture of the space.

Verticality:

The use of vertically illuminated surfaces is extremely important and brings together a fully-rounded and positively lit space which offers comfort and enhances the feeling of safety to the users of the space.

Balance:

Through the careful composition of light, its intensity, contrast and direction all combine to offer a space filled with life.

Darkness:

Spaces which are filled with a bright uniform level of light often appear cold and dull. The true balance is that of light and shade; creates depth, life and tone. It informs nuances within the architectural forms and landscape. Providing spaces within spaces allows users to feel safe and offers areas to sit and dwell. It removes users from the busy open spaces into areas of contemplation.

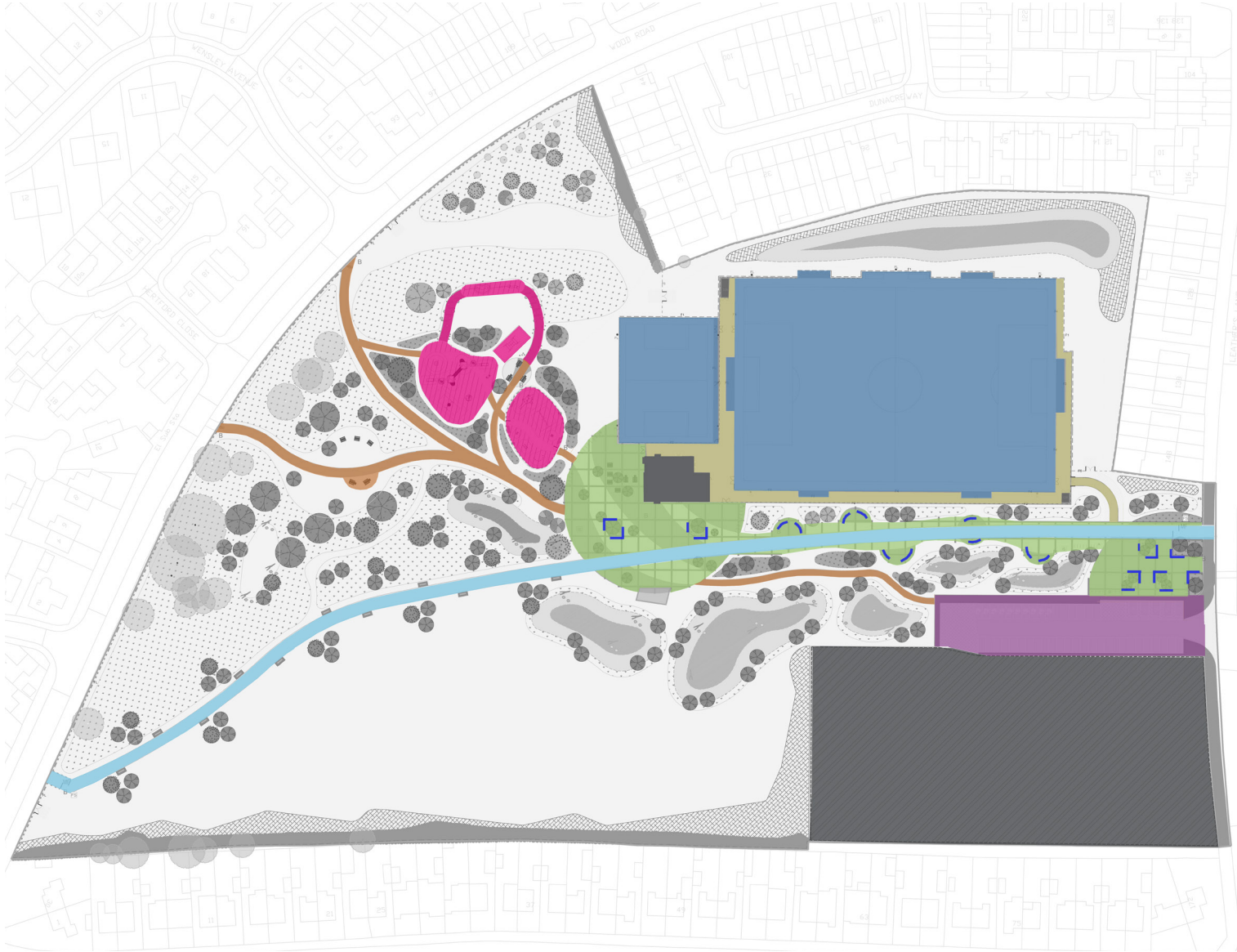
3. Proposed Architectural Lighting

3.1 Lighting Master Plan - Indicative Luminaire Type

The suggested luminaire type for each area is described as:

Key:

-  Main Pedestrian & Cycle Route - Column lighting
-  Secondary Pedestrian Entrance - Low level bollard lighting
-  Car Park - Column lighting
-  Public Meeting Space & Entrance Plaza - Column lighting & low level bollard lighting
-  Feature & Active Play Areas Mix of low level bollard lighting & column lighting
-  All Weather Pitch & Mini 5v5 Football Pitch Column mounted floodlighting
-  Football Pitch Walkway - Low level bollard lighting
-  Opportunity for feature lighting - Low level feature lighting to benches
-  By Others



Grace Park - Indicative Luminaire Type

3. Proposed Architectural Lighting

3.2 Lighting Master Plan - Indicative Luminaire Locations



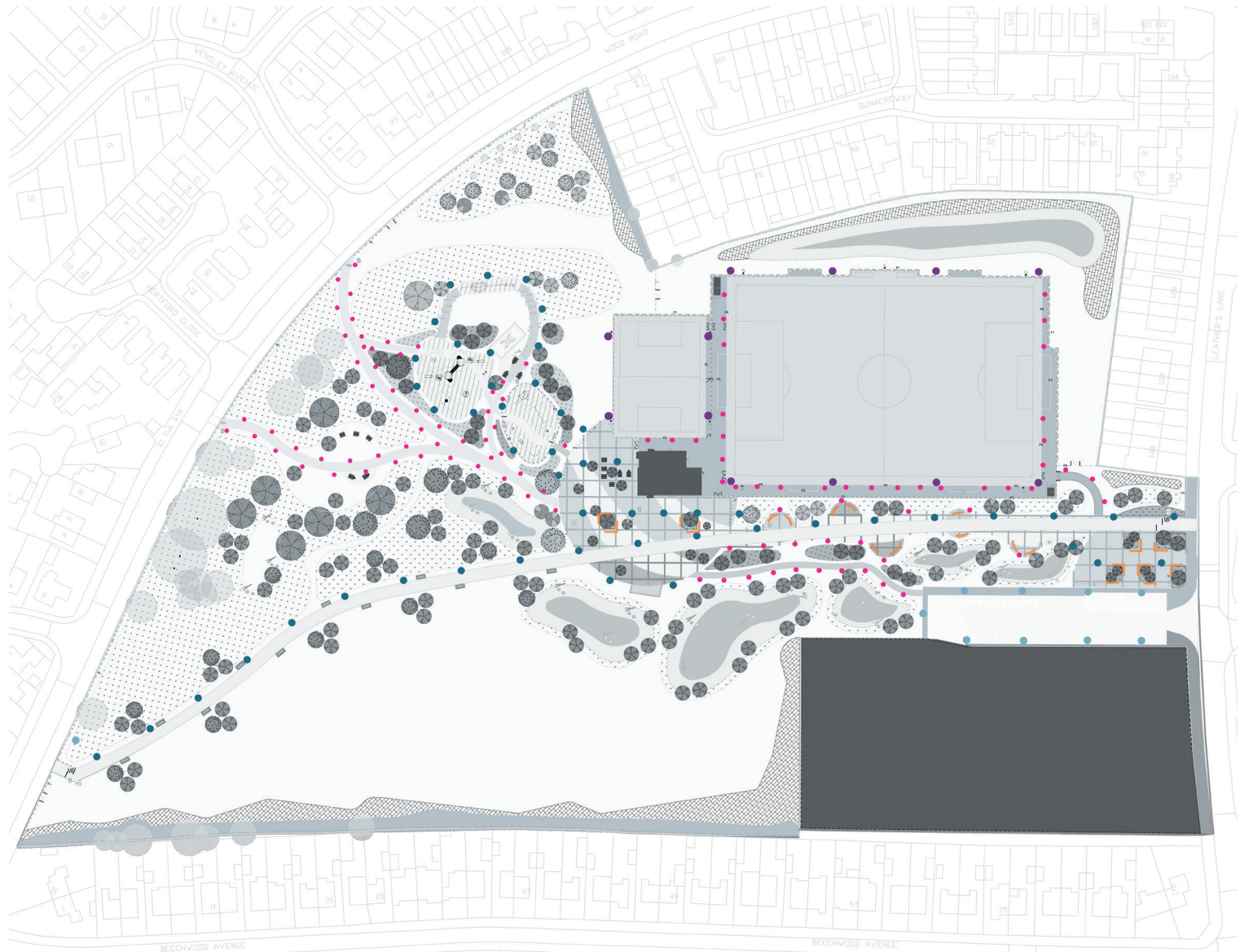
Low level bollard lighting



Column lighting for carpark



Column lighting for main pathways



Grace Park - Indicative Luminaire Locations



Floodlighting at football pitches



Opportunities for feature lighting

3. Proposed Architectural Lighting

3.3 All Weather Pitch & Mini 5v5 Football Pitch

Column mounted floodlights will be selectively placed around the multi-use games area - All Weather Pitch and Mini 5v5 Pitch to allow the field to be lit to the relevant lighting criteria and illuminance.

The placement, angle and direction of all luminaires will be carefully considered to minimise the impact of obtrusive light onto neighbouring properties. In addition, provisions will be made for suitable accessories, such as shields or louvres, to further reduce any potential back-spill from the floodlights.

Illuminance Criteria:

200 lux, 0.6Uo | BS EN 12193: 2018 & LG 4 Sports Lighting Table 3.21.

Indicative Luminaire Type:

Column mounted floodlights.

Lighting Control:

Manual control (to be controlled from the proposed clubhouse).

Note:

- All luminaires to be switched off during daylight hours.
- Interior general and emergency lighting for the Sports Pavilion as well as building mounted general lighting to be provided by others but to adhere with the design principles described in this report.

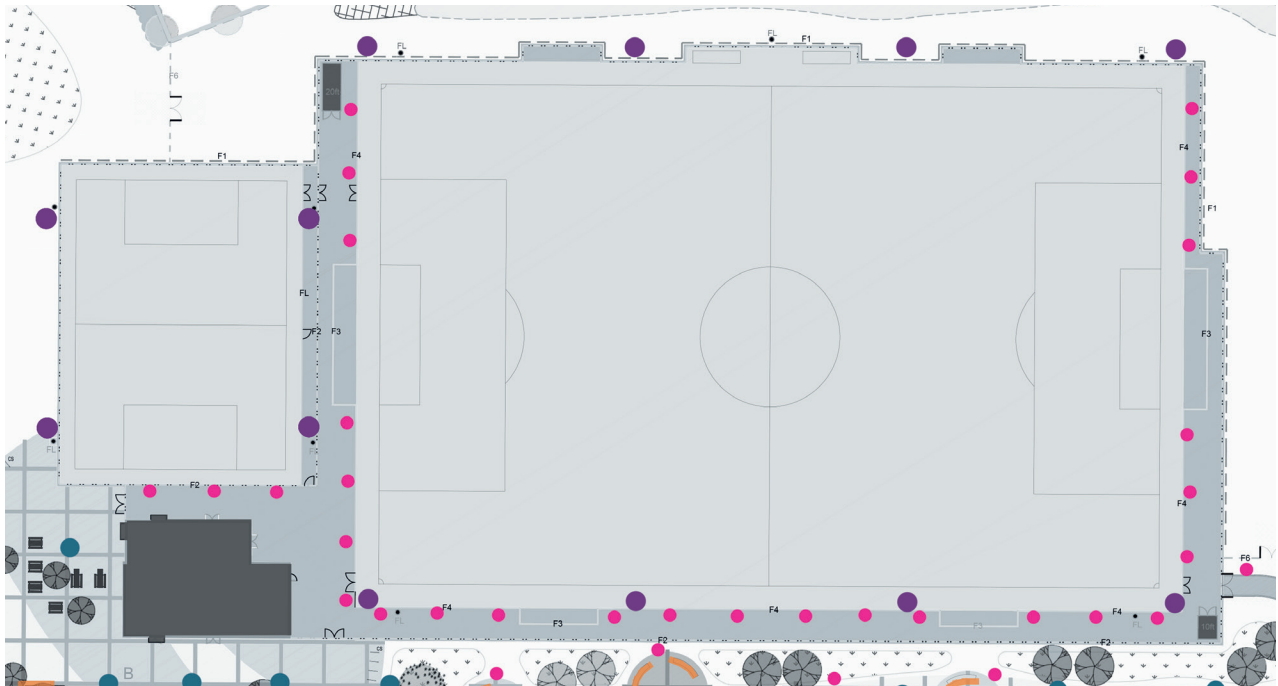


Luminaire Reference: A

Description: High performance LED floodlight 60° asymmetric 264 LEDs

Product: Thorn Champion

Height: 8m & 15m (5v5 mini football) and 15m (full size pitch) high columns



Lighting Plan - All Weather Pitch & Mini 5v5 Football Pitch



Column mounted floodlights

3. Proposed Architectural Lighting

3.4 Main Pedestrian & Cycle Route

Lighting to the main pedestrian pathway and cyclist entrance will provide a safe, welcoming and usable space during the hours of darkness. Functional lighting columns to the pedestrian pathway and cycleway will provide sufficient light levels and uniformity to the space. 4m high lighting columns will be carefully placed to achieve the required illuminance criteria while minimising spill light to the surroundings and provide a low-glare environment.

The locations of the lighting columns will be coordinated with the wider design team to ensure that the walkway and cycleways are free of obstruction, whilst also providing a safe and usable space for visitors. There is also an opportunity to integrate CCTV equipment to the lighting columns and eliminate the need for additional columns for security purposes. This shall be coordinated with the dedicated security consultants.

Illuminance Criteria:

P5 Class: 3,00lx average, 0.60lx minimum | BS 13201-2: 2015 Table 3 & BS EN 12464-2: 2014 Table 5.1.

Indicative Luminaire Type:

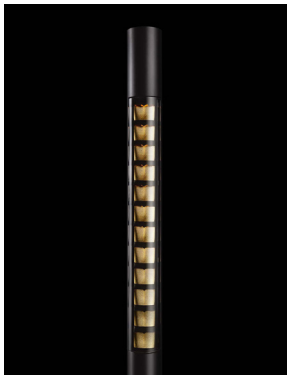
4m high lighting column - Selux Line.

Lighting Control:

Photocell, timeclock and step dimming.

Note:

All luminaires to be switched off during daylight hours.

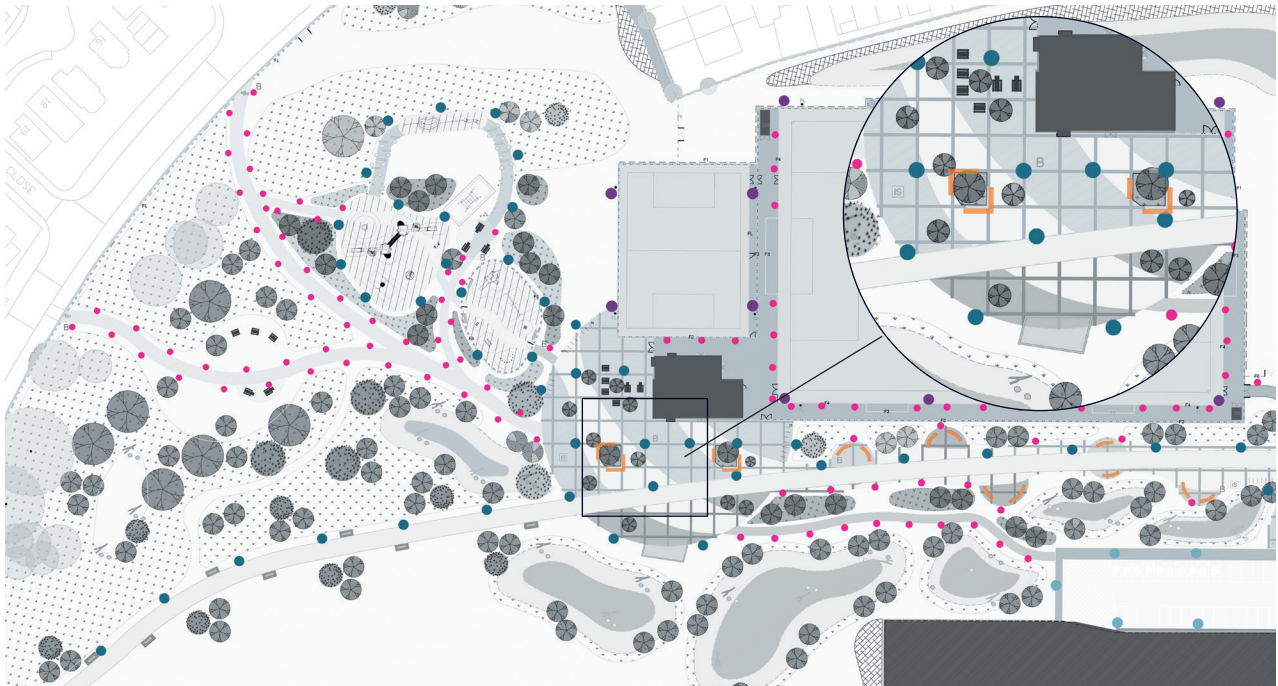


Luminaire Reference: D & E

Description: Asymmetric, Dark Sky approved lighting column.

Product: Selux Line

Height: 4m high lighting column



Lighting Plan - Main Pedestrian & Cycle Route



Place Antonin Poncet Lyon, France



Strategic placement of column lighting on pathway & cycleway

3. Proposed Architectural Lighting

3.5 Secondary Pedestrian Entrance

Alike to the main pedestrian pathways, the secondary pedestrian entrance will be lit to ensure a safe, welcoming and usable space is created during the hours of darkness.

Functional low level bollard lighting to these routes will provide sufficient light levels and uniformity at a lower more personal scale. Lighting bollards will be selectively placed throughout the pathway to achieve the required illuminance criteria while minimising obtrusive light.

The locations of the bollard lighting will be coordinated with the wider design team to ensure that the walkway and cycleways are free of obstruction, while also providing a safe and usable space for visitors.

Illuminance Criteria:

P6 Class: 2.00lx average, 0.40lx minimum | BS 13201-2: 2015 Table 3 & BS EN 12464-2: 2014 Table 5.1.

Indicative Luminaire Type:

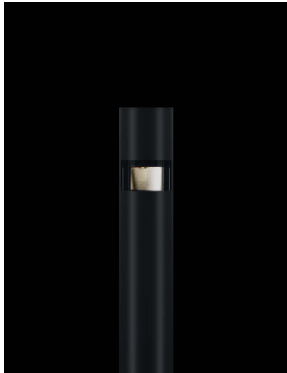
Low level pedestrian scale lighting bollard - Selux Line.

Lighting Control:

Photocell, timeclock and step dimming.

Note:

All luminaires to be switched off during daylight hours.

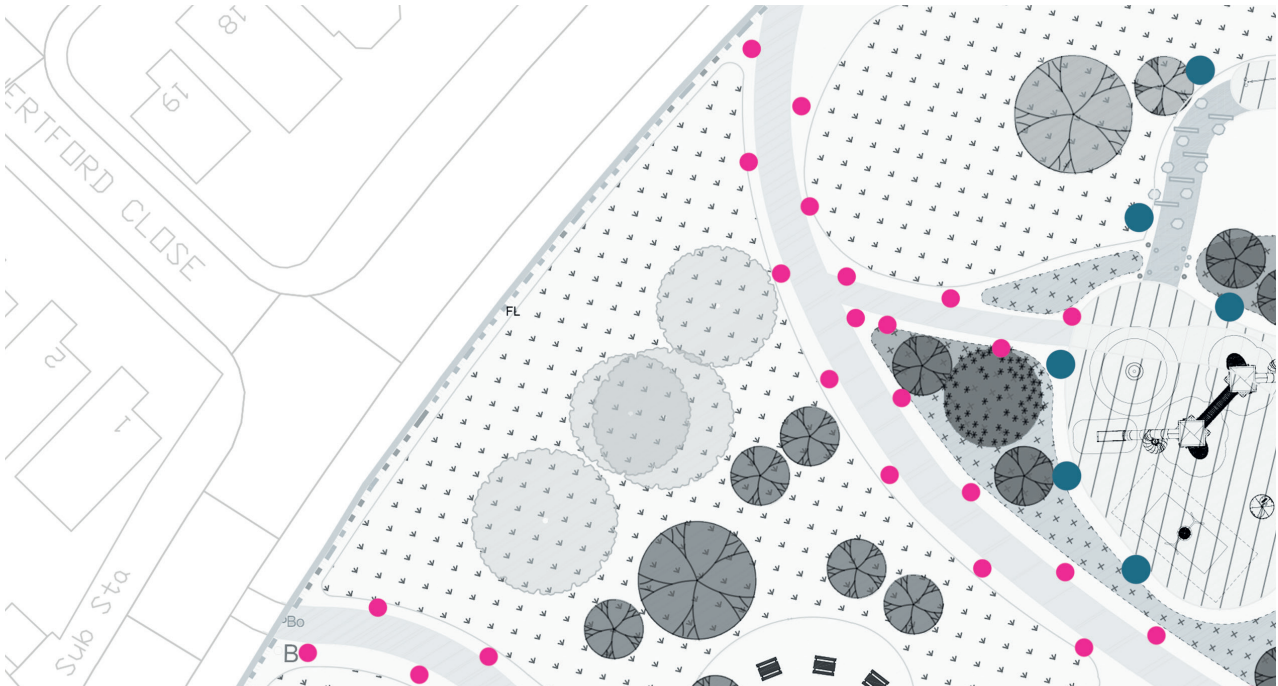


Luminaire Reference: F

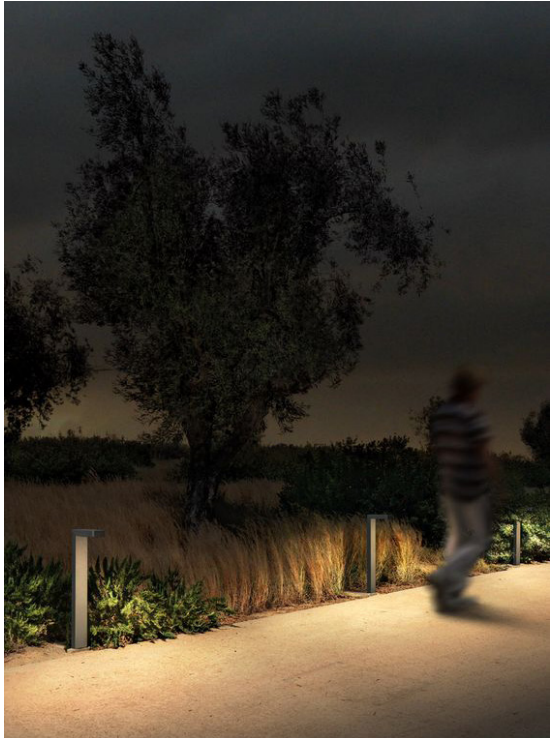
Description: Asymmetric, Dark Sky approved bollard

Product: Selux Line

Height: 1.2m high bollard



Lighting Plan - Secondary Pedestrian Entrance



The Pista 500, Italy



Low level lighting allows for a more human scale level of light

3. Proposed Architectural Lighting

3.6 Public Meeting Space & Entrance Plaza

A mix of low and high level lighting will be selectively placed throughout the public meeting space and entrance plaza to provide sufficient light levels. Feature lighting will also be incorporated within planting and landscape elements this will be coordinated with the Landscape Architects at the next stage of the project.

Illuminance Criteria:

5 Lux average, 0.25Uo | BS EN 12464-2: 2014 Table 5.1.

Indicative Luminaire Type:

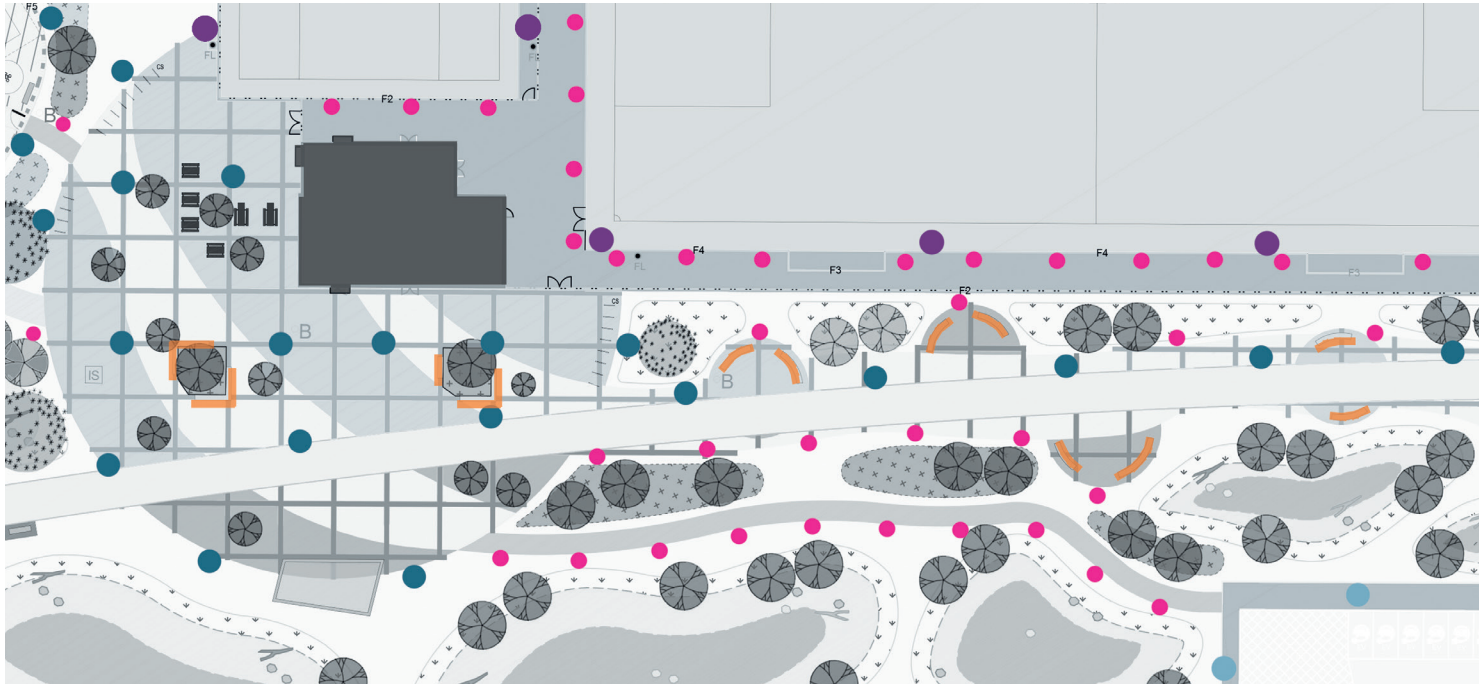
Column lighting, bollard luminaires and low level linear lighting to seating areas.

Lighting Control:

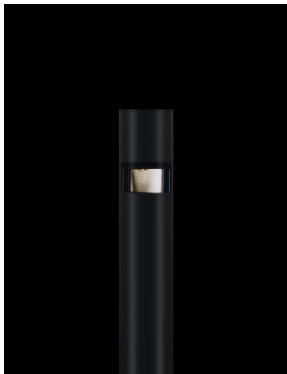
Photocell, timeclock and step dimming.

Note:

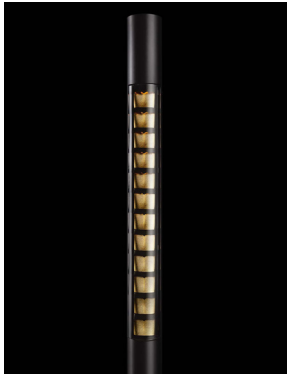
All luminaires to be switched off during daylight hours.



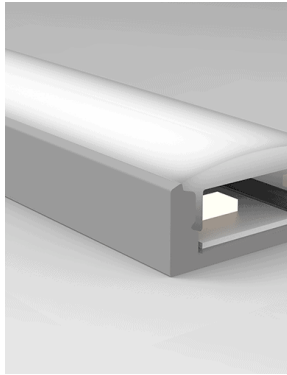
Lighting Plan - Public Meeting Space & Entrance Plaza



Luminaire Reference: F
Description: Asymmetric, Dark Sky approved bollard
Product: Selux Line
Height: 1.2m high bollard



Luminaire Reference: D & E
Description: Asymmetric, Dark Sky approved lighting column.
Product: Selux Line
Height: 4m high lighting column



Luminaire Reference: N/A
Description: Linear LED lighting
Product: Architectural FX



Low level lighting integrated to benches



Column lighting to achieve light levels

3. Proposed Architectural Lighting

3.7 Car Park

Functional multi-head and single head lighting columns will be strategically placed throughout the car park to ensure a usable and safe space is created.

The functional architectural lighting columns will provide sufficient light levels and uniformity across these areas to achieve the required illuminance criteria whilst minimising obtrusive light.

Illuminance Criteria:

10 lux, 0.25Uo | BS EN 12464-2: 2014 Table 5.9.

Indicative Luminaire Type:

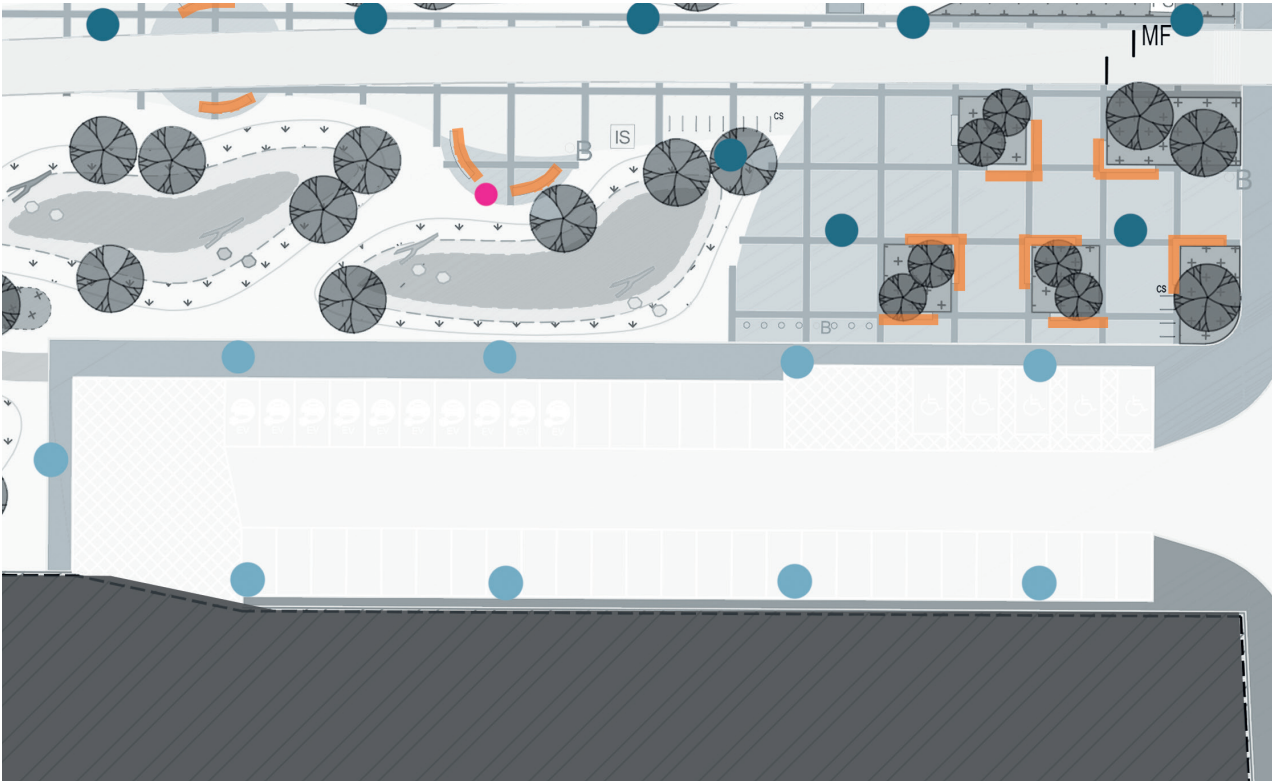
4m high lighting column - WE-EF

Lighting Control:

Photocell, timeclock and step dimming.

Note:

All luminaires to be switched off during daylight hours.



Lighting Plan - Car Park



Luminaire Reference: G & H
Description: Asymmetric, forward throw lighting column
Product: WE-EF - AFL110 LED with 430-0029 backlight shield
Height: 4m high lighting column



Car park lighting architectural lighting columns



Utilising multi-head lighting columns for car park

3. Proposed Architectural Lighting

3.8 Feature & Active Play Areas

A mix of low and high level lighting will be selectively placed throughout the feature and active play areas to provide sufficient light levels for appropriate tasks to be efficiently carried out in a safe environment.

Illuminance Criteria:

10 lux average, 0.25Uo.

Indicative Luminaire Type:

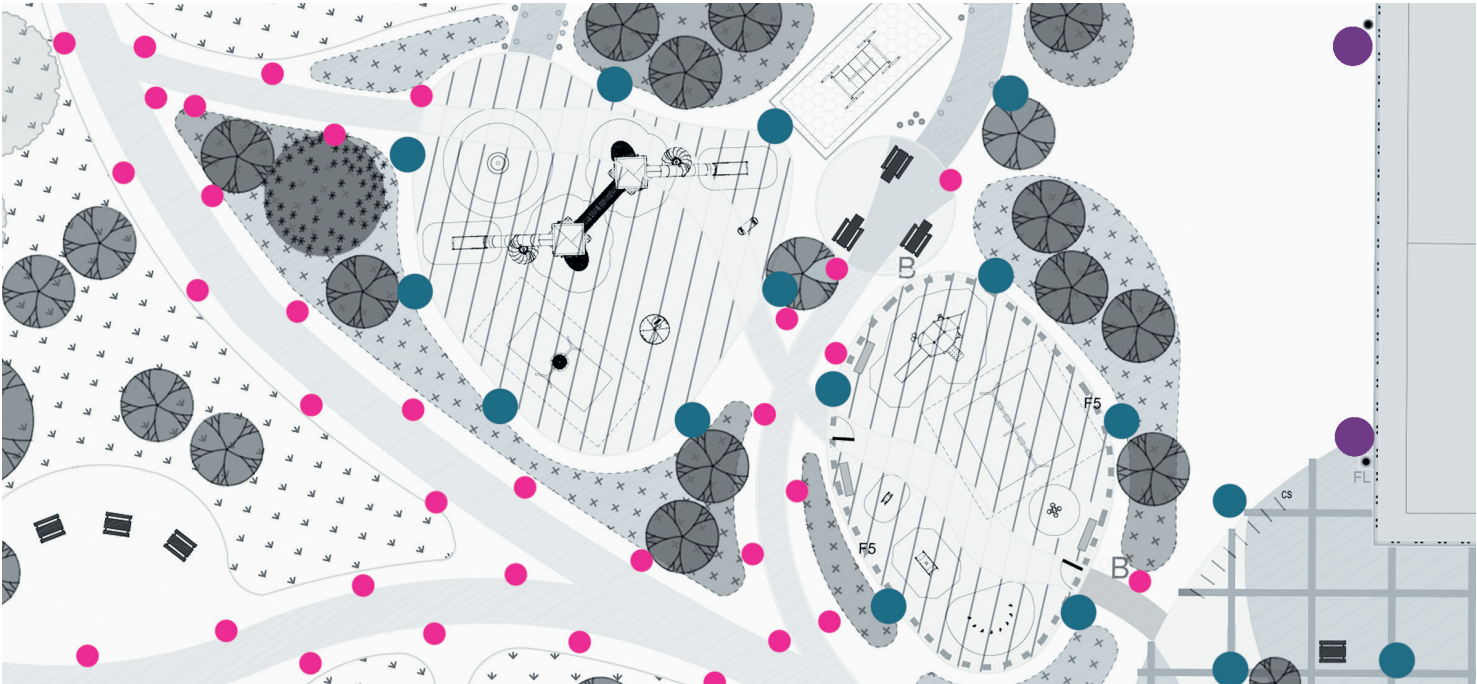
High and low level lighting.

Lighting Control:

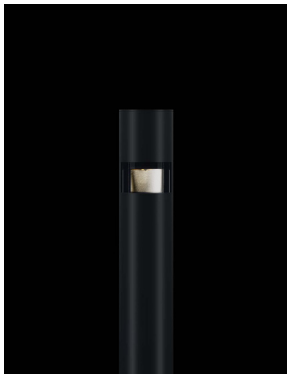
Photocell, timeclock and step dimming.

Note:

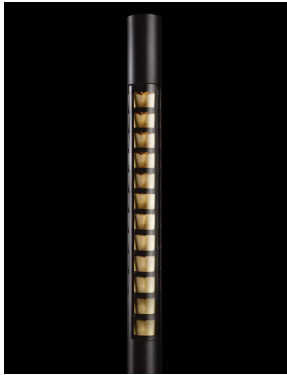
All luminaires to be switched off during daylight hours.



Lighting Plan - Feature & Active Play Areas



Luminaire Reference: F
Description: Asymmetric, Dark Sky approved bollard
Product: Selux Line
Height: 1.2m high bollard



Luminaire Reference: D & E
Description: Asymmetric, Dark Sky approved lighting column.
Product: Selux Line
Height: 4m high lighting column



A combination of high & low level lighting

4. Design Criteria & Guidance

4.1 Technical Standards & Guidance

The project lighting design criteria has been developed to lighting regulations and guidelines developed by the British Standards Institute (BSI), the Institute of Lighting Professionals (ILP) and the Society of Light and Lighting (SLL/ CIBSE) to ensure that the project conforms to responsible energy use, appropriate light levels, visual comfort and is easily maintainable.

The lighting will be designed using the following documents for guidance and best practice:

- **BS EN 12464-2: 2014:** Light & Lighting - Lighting of Outdoor Workplaces.
- **BS 5489-1: 2020:** Lighting of Roads and Public Amenity Areas.
- **BS 13201-2: 2015:** Road Lighting - Performance Requirements.
- **BS 12193: 2018:** Light & Lighting - Sports Lighting.
- **BS 8300-1: 2018:** Part 1 External Environment - Code of Practice.
- **BS 8300-2: 2018:** Design of an Accessible and Inclusive Building Environment.
- **SLL Code for Lighting 2022.**
- **SLL Lighting Guide LG 04:** Sports Lighting (2023).
- **SLL Lighting Guide LG 06:** The Exterior Environment (2016).
- **SLL Lighting Guide LG 14:** Control of Electric Lighting (2023).
- **ILP GN01-21:** Guidance Notes on Obtrusive Lighting.
- **ILP GN08-23:** Bats and Artificial Lighting at Night.
- **Sports England Design Guidance Notes** - Creating a Sporting Habit for Life (2012).
- **The FA Guide to Floodlighting** - Building, Protecting & Enhancing Sustainable Football Facilities.

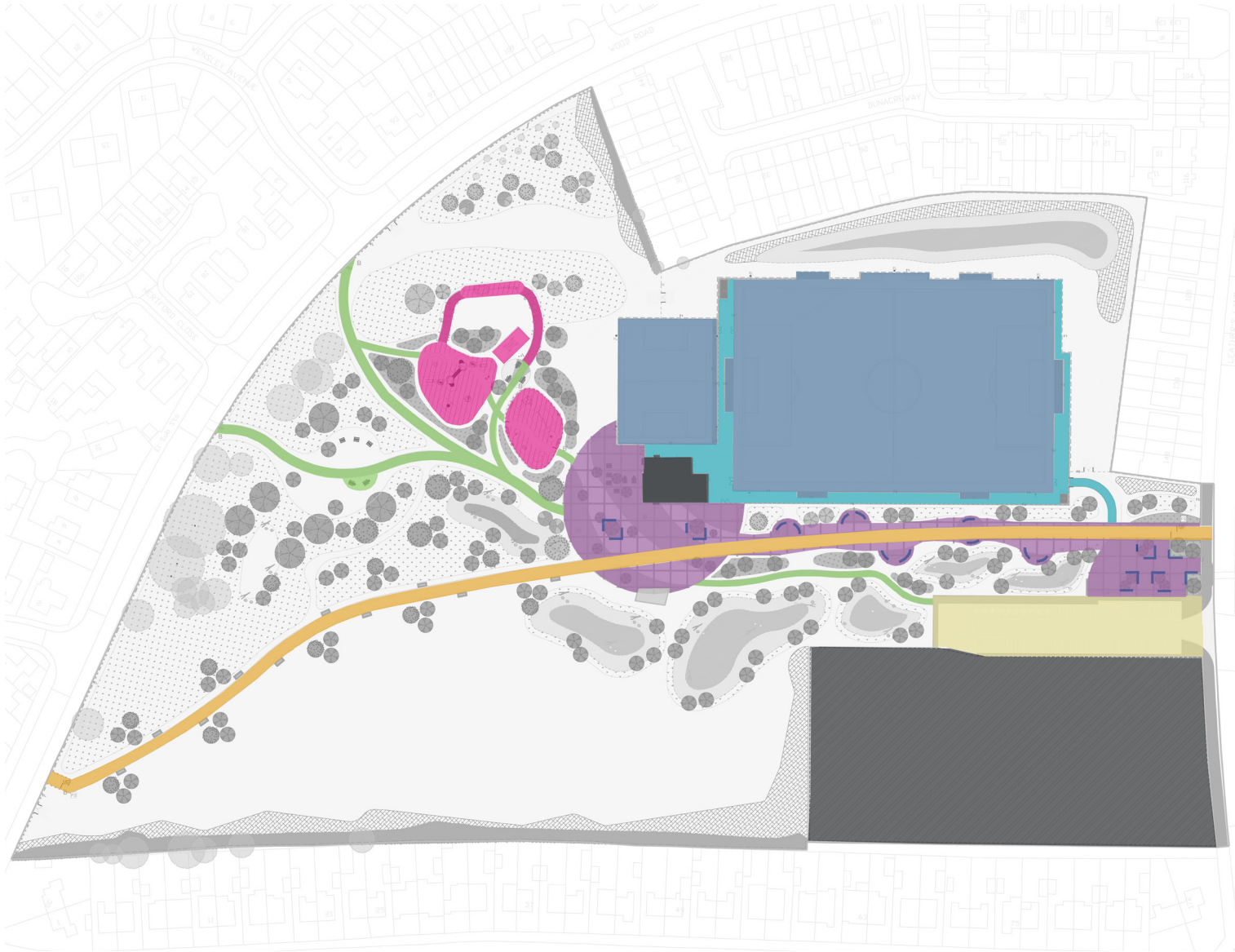
4. Design Criteria & Guidance

4.2 Illuminance Level Plan

The following illuminance plan has been created to show best practice illuminance and uniformity levels in relation to the current landscape layout. As a result, the lighting scheme will be sensitive to its surroundings and provide the relevant levels of illuminance and uniformity for safety and security.

Key:

-  Main Pedestrian & Cycle Route -
P5 Class: 3.00lx average, 0.60lx minimum | BS 13201-2:2015 Table 3 & BS EN 12464-2: 2014 Table 5.1
-  Secondary Pedestrian Entrance -
P6 Class: 2.00lx average, 0.40lx minimum | BS 13201-2:2015 Table 3 & BS EN 12464-2: 2014 Table 5.1
-  Public Meeting Space & Entrance Plaza -
5 Lux average, 0.25Uo | BS EN 12464-2: 2014 Table 5.1
-  Carpark
10 lux, 0.25Uo | BS EN 12464-2: 2014 Table 5.9
-  Feature & Active Play Areas
10 lux average, 0.25Uo
-  All Weather Pitch -
200 lux, 0.6Uo | BS EN 12193: 2018 & LG 4 Sports Lighting Table 3.21
-  Football Pitch Walkway -
5 lux, 0.25Uo | BS EN 12464-2: 2014
-  Feature Landscape Elements - Benches
N/A
-  By Others
N/A



Grace Park - Illuminance Level Plan

4. Design Criteria & Guidance

4.3 Light Pollution & Obtrusive Light

Light pollution, or obtrusive light, can create serious physiological and environmental problems. Light pollution can be classified as:

Sky glow: The brightness of the night sky above the occupied area.

Glare: The discomfort created by a light source in contrast to the background.

Light trespass: The spill of light beyond the site boundary on which the light source is intended to be.

Light ingress: The passage of light into properties from external light sources. Obtrusive light can be a problem for both humans and wildlife as well as waste energy and contribute to CO2 emissions.

During the design phase of a lighting installation, consideration of the following measures to reduce the occurrence of obtrusive light should be taken:

- **Over-lighting:** This can be avoided by conducting detail lighting calculations and selecting the correct lighting equipment for the appropriate application. Appropriate lighting controls can also ensure that light levels are kept within the desired limits.
- **Luminaire technology:** Careful consideration to the selection of the luminaires and light sources to minimise any unwanted light. Luminaires with a controlled light distribution will be utilised to ensure they illuminate only the intended areas.
- **Luminaire aiming:** All lighting equipment will be positioned to avoid uplight and carefully aimed towards the task area. This can be ensured during the commissioning stage.

The exterior illuminance levels are dependant upon the district brightness where the lighting is specified for. The district brightness is determined according to criteria described in the Institution of Lighting Professional (ILP) guidance notes and requires knowledge of the local area.

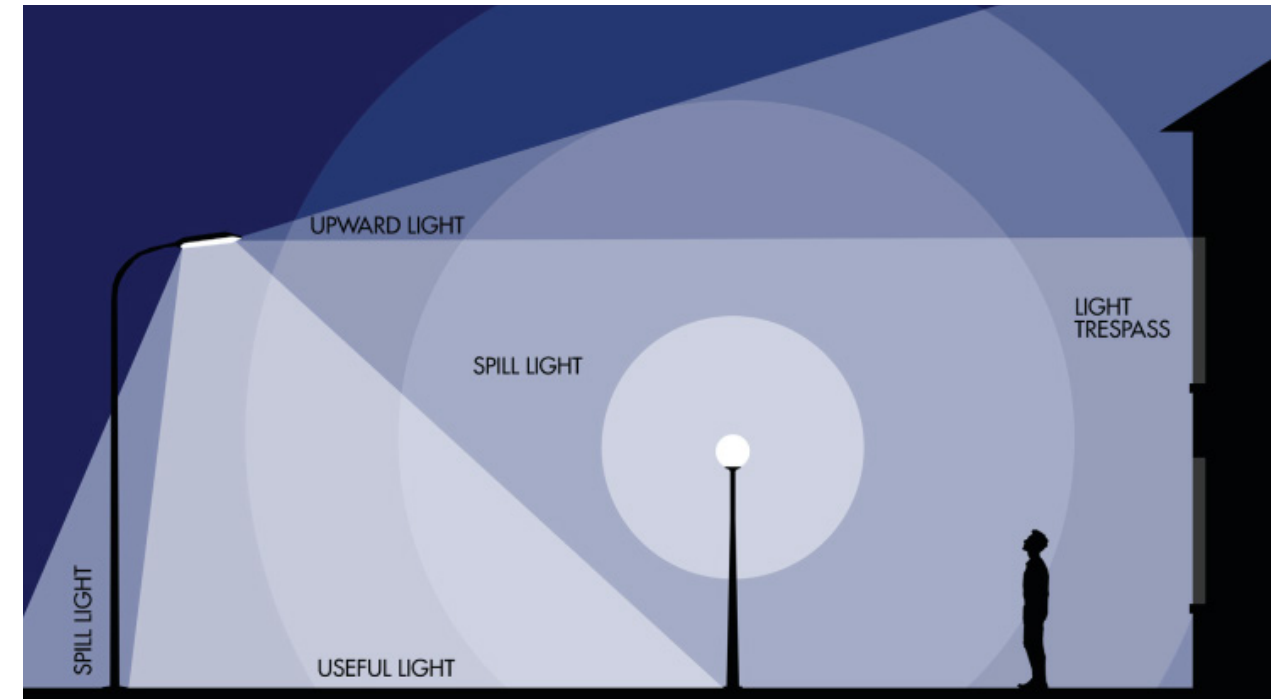


Figure 1: Bad example of obtrusive light (Blinded by the Light? - Dark Skies Commission).

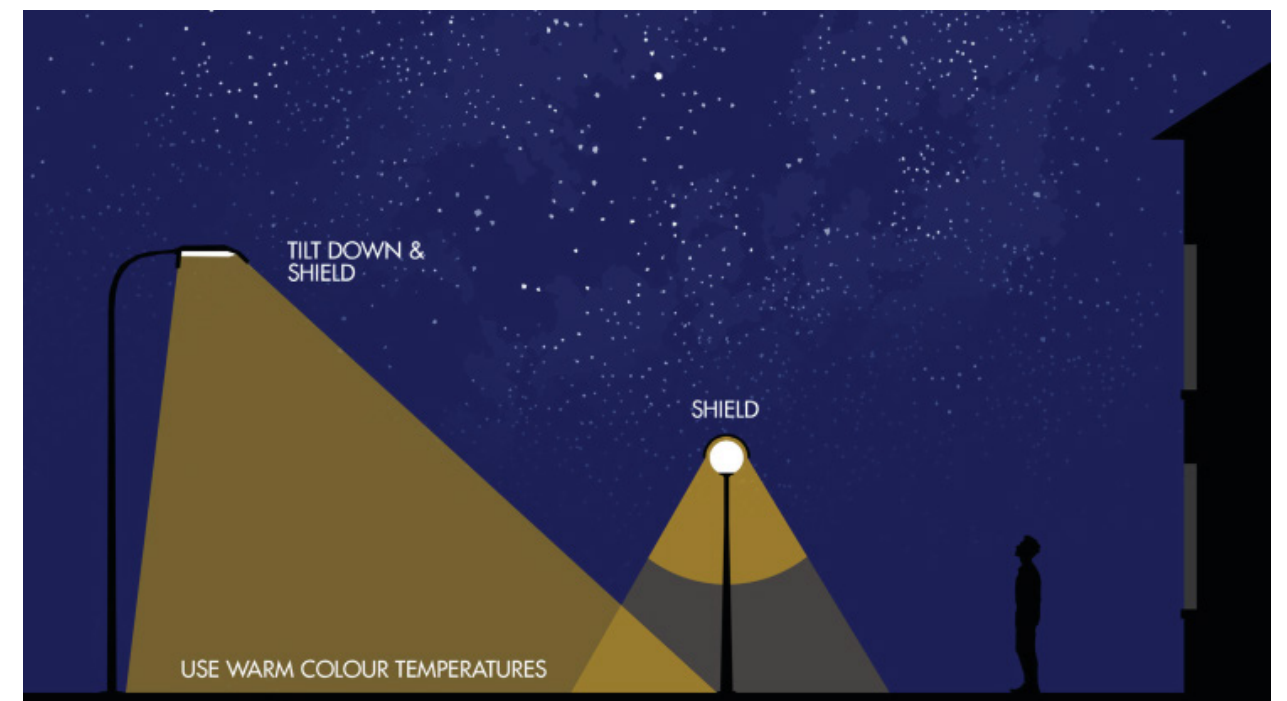


Figure 2: Good example of obtrusive light (Blinded by the Light? - Dark Skies Commission).

4. Design Criteria & Guidance

4.4 Obtrusive Light - Site Classification

The criteria used to provide a baseline for the impact of the lighting on the surrounding environment are taken from the ILP GN01 2021: Guidance Notes on Obtrusive Lighting.

The five potential zones are detailed in Table 1. It is assumed that the development will fall within Zone 3 of the ILP Environmental Zone guidance. Limitations imposed upon the exterior lighting within an E3 Environmental Zone are provided in the adjacent tables, taken from the ILP GN01 2021 Guidance document. Further guidance on the limitations of the effects of obtrusive light and how this can be calculated is provided in CIE 150:2017 2nd edition and the SLL/ CIBSE Lighting Guide 6: The Exterior Environment 2016.

The maximum values allowed of light intrusion into neighbouring buildings are stated pre and post curfew times. Curfew time is defined in GN01 2021 as the time after which stricter requirements will apply, often a condition of the use of lighting applied by the local planning authority. If not otherwise stated - 22:00 hours.

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Table 1 | ILP Guidance Note GN01 2021 - Environmental Zones

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

Table 2 | ILP Guidance Note GN01 2021 - Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Type of installation	Environmental zones				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR) / %	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	6	15

Table 3 | ILP Guidance Note GN01 2021 - Maximum values of upward flux ratio of installation

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0 Pre-curfew Post-curfew	0 0	0 0	0 0	0 0	0 0	0 0
	E1 Pre-curfew Post-curfew	0.29 d 0	0.63 d 0	1.3 d 0	2.5 d 0	5.1 d 0	2,500 0
	E2 Pre-curfew Post-curfew	0.57 d 0.29 d	1.3 d 0.63 d	2.5 d 1.3 d	5.0 d 2.5 d	10 d 5.1 d	7,500 500
	E3 Pre-curfew Post-curfew	0.86 d 0.29 d	1.9 d 0.63 d	3.8 d 1.3 d	7.5 d 2.5 d	15 d 5.1 d	10,000 1,000
	E4 Pre-curfew Post-curfew	1.4 d 0.29 d	3.1 d 0.63 d	6.3 d 1.3 d	13 d 2.5 d	26 d 5.1 d	25,000 2,500

Table 4 | ILP Guidance Note GN01 2021 - Limits for luminous intensity of bright luminaires

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Table 5 | ILP Guidance Note GN01 2021 - Maximum values of vertical illuminance on premises

4. Design Criteria & Guidance

4.5 Colour Temperature

Light used within the scheme should not only provide the illuminance required for navigating the site but also enhance the material and surface quality.

Each area has its own unique appearance, personality and required use, therefore, should be lit to play upon their juxtaposition and material quality but also convey a sense of belonging upon the overall environment.

A subtle colour story is woven throughout, underpinning each of the areas qualities. Where possible a warm colour temperature has been suggested throughout the site, reducing the blue wavelength and in turn being kinder to fauna and flora.

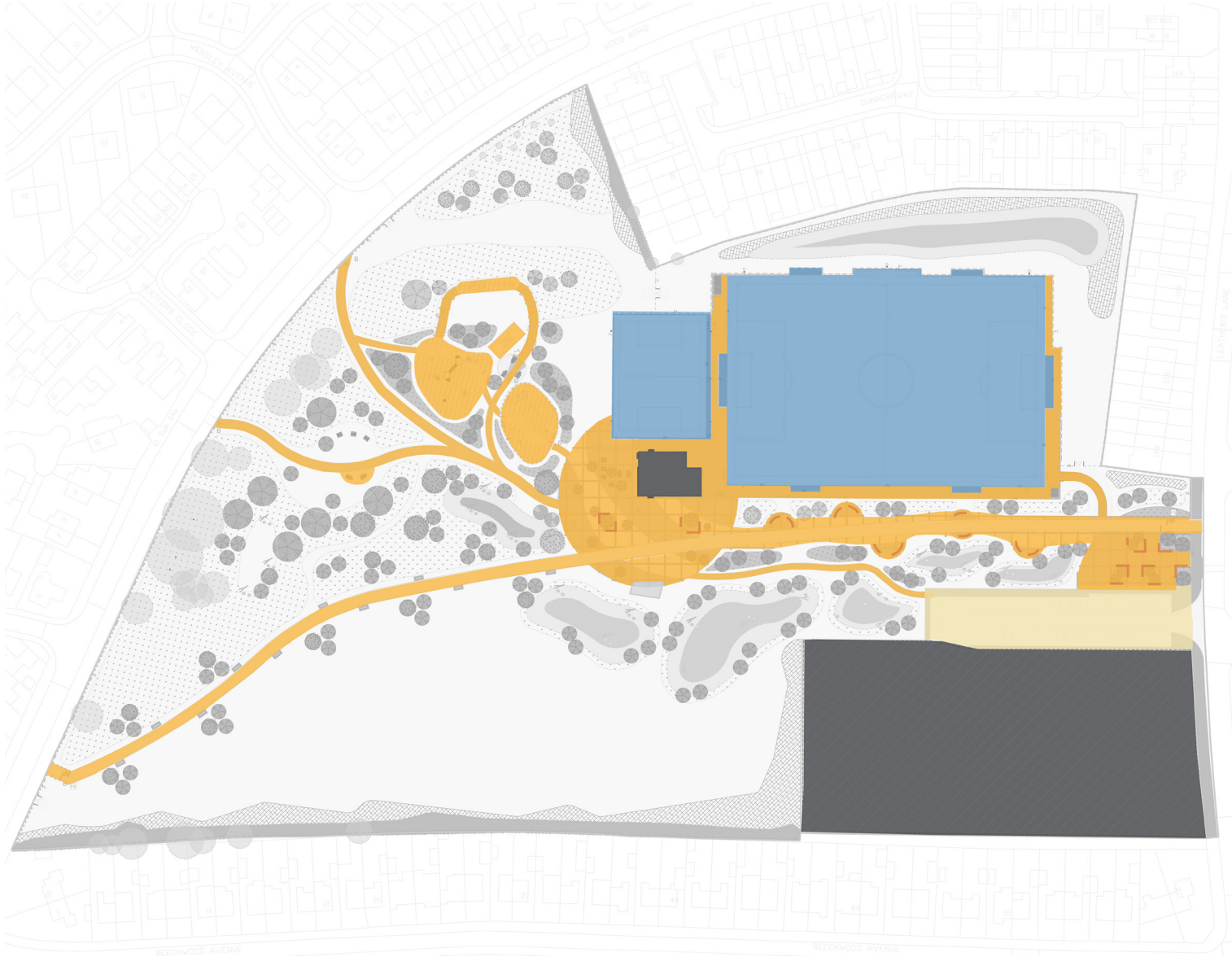
A colour temperature range from a warm 2200K to a cool 4000K has been suggested for appointed areas within the scope area.

All areas, with the exception of sports lighting, will adopt warmer colour temperatures, as warmer light is less intrusive to surrounding sensitive receptors, including nearby residential properties and local wildlife. Warmer light sources contain lower levels of short-wavelength blue light, which reduces perceived glare, while also minimising disturbance to wildlife and natural nocturnal behaviours.

The suggested colour temperature for each area is described as:

Key:

- 2200K
- 2700K or warmer
- 4000K
- N/A



Grace Park - Colour Temperature Plan

4. Design Criteria & Guidance

4.6 Safety & Security

The safety of pedestrians and cyclists is always a fundamental design consideration, therefore, a balanced approach must be taken when considering safety within the night-time environment. Many research papers have been developed to show that high levels of brightness do not necessarily equal safe environments.

Areas that are illuminated with a blanket level of high output light have a tendency to make the public feel uncomfortable due to the lack of nuance and focal points in the lighting design. This can have a negative effect on the space and deter people to explore further.

In order to create a safe environment, the various areas must be considered holistically. Lighting should be developed in layers offering good illumination both vertically and horizontally enriching the space. This will aid in wayfinding and provide focal points to allow visitors and residents to move unaided in a safe, well balanced area.

The quality of light used at night is fundamental to the operation of good imagery for CCTV. The following are aspects which will be closely considered for light placement and specification.:

- High Colour Rendering (CRI) properties, 80 CRI or above.
- Shielded/deep recessed light sources where possible to minimise glare.
- Avoid direct light adjacent or in direct view of the camera lens.
- Vertical illuminance to provide accurate facial recognition.
- Luminaires mounted at pedestrian scale, and to provide good facial recognition.
- Ensure light coverage of area and avoid areas of darkness.

Good vertical illumination is necessary to give the observer a bright and open spatial impression, to see the objects in the field of view, allowing their identification hence increasing the feeling of safety particularly in the external environment at night.

The semi-cylindrical illuminance, is the parameter which in lighting assesses the light falling on a semi-cylinder which abstractly represents a persons face. This allows the face identification of people approaching each other. This parameter is of extreme importance in an area with higher crime rates.

As stated it is important that all members of the public should feel safe, confident and comfortable using the site at night. This is particularly true for women and girls who will use the space during the hours of darkness.

4. Design Criteria & Guidance

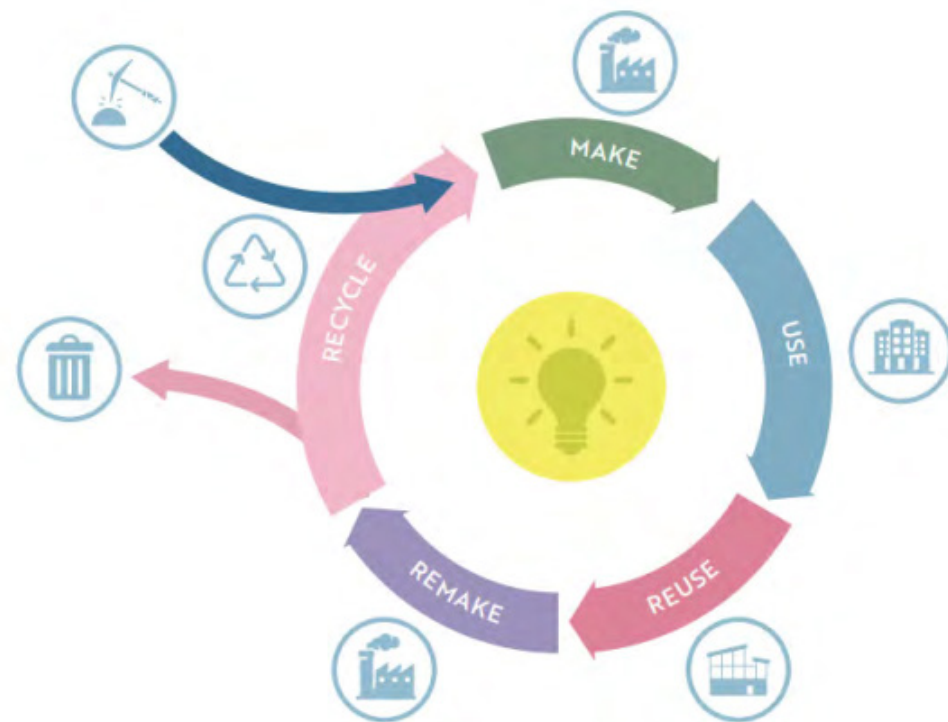
4.7 Circular Economy & Sustainability

When selecting luminaires for any lighting scheme, the manufacturers’ approach to the circular economy and re-purposing of their lighting fixtures should be considered by the lighting designer. This includes where they source luminaire materials, their location, how luminaires are shipped and CO2 emissions.

By using criteria set-out in CIBSE TM66:2021 we can assess the specification for its compliance to circular economy.

Utilising the Circular Economy Assessment Method (CEAM) allows specifiers to engage with the manufacturer through the Circular Economy Assessment Method for manufacturing (CEAM-Make) which provides performance information and its supporting ecosystem in terms of circular economy.

The products are given a score from 0-4 (from ‘zero’ (0) to ‘hero’ (4) as outlined in the table below, providing a clear assessment for specifiers.



The circular economy model - CIBSE TM66:2021

Score	Evidence	Action toward circular economy
0	No evidence	No evidence has been seen. Any product, material or service displaying typical linear economy principals is to be allocated 0 marks.
1	Some positive evidence	Design elements have been considered, and evidence provided.
2	Positive evidence	Design elements/attributes have been incorporated into the product or service offered.
3	Excellent positive evidence	Design elements/attributes have been incorporated into the product or service offered, and services align with circular economy goals.
4	Outstanding	Design elements/attributes and services align with circular economy goals and deliver ecological regeneration or are regenerative to communities or via social responsibility.

CEAM: evidence and action towards a circular economy - CIBSE TM66:2021

4. Design Criteria & Guidance

4.8 Lighting Control

An effective tool in limiting obtrusive light is the use of appropriate lighting controls. Lighting control technologies are rapidly advancing, and LED light sources allow greater flexibility in terms of dimming and switching. Smart technologies and sensors should be incorporated in a lighting installation to provide a high degree of control. The following measures should be implemented by the site operator to further reduce the impact of artificial lighting if required:

- **Step dimming:** Whereby external lighting runs at the predetermined dimming values in peak times and dims to a lower level late at night.
- **Curfew switch-off:** The sports lighting and other areas where appropriate will be switched off. It is recommended that all lighting types that do not form part of the security, maintenance lighting and any form of maintained emergency lighting shall be switched off post curfew.
- **Manually operated 'event' lighting:** For areas that may be intermittently used for events, the local task lighting could be manually controlled to run only when needed. This could be as simple as a local timer switch or could incorporate smart technology such as an app or an online booking system. This allows additional lighting to be utilised for extra amenity only when needed.
- **Motion Detection:** Luminaires with motion detection capability allow luminaires to be dimmed down if motion is not detected for predetermined periods and increase when motion is detected.

The calculation results have demonstrated compliance post curfew through the switching off of all sports luminaires. Any additional luminaires that can be turned off post curfew will further reduce the impact of obtrusive lighting to neighbouring properties.

The above lighting control strategies will reduce the in-use lighting power load and obtrusive light levels, therefore reducing light spill and glare to surrounding areas and helping to minimise disturbance to nearby residents and nocturnal wildlife, working towards a reduced overall environmental impact of the lighting scheme.

5. Obtrusive Light Assessment

5.1 Introduction & Assumptions

The purpose of this section of the report is to describe the lighting assessment methodology, the design assumptions and key considerations for the lighting design proposals as well as provide calculation results and evidence of compliance against the ILP GN01-21 Guidance Note on Obtrusive Lighting. The ILP document states that the “good lighting practice is the provision of the right light, at the right time, in the right place, controlled by the right system” (ILP GN01, pg.3).

A thoughtfully designed lighting installation can transform a space after dark, enabling safe and effective use while supporting activities that might not otherwise be possible. While road lighting often dominates most developments, other types of lighting play key roles, including amenity lighting in central areas, sports lighting, decorative lighting and security lighting for various applications.

Mitigation Measures:

The following general mitigation measures have been adopted where possible in the proposed lighting design and design strategies:

- Select the lowest possible illuminance criteria to avoid over-lighting while ensuring good facial recognition.
- Correlated Colour Temperature (CCT) to be 3000K or lower (with the exception of the sports lighting at 4000K).
- DarkSky (International Dark Sky Association) approved suppliers and luminaires are used (luminaires with restricted upward-directed light).
- Lighting controls to enable the switching off groups of luminaires when not required or post-curfew.
- Amenity and sports lighting will be aimed downwards only (zero tilt), to minimise upward flux ratio of the installation.
- Luminaires, particularly sports lighting, to be aimed away from residential properties where possible, to reduce the luminous intensity of bright luminaires.

Calculations:

The following calculation assumptions apply:

- The lighting calculations are based on the specific luminaires shown in the area-by-area section of the report; however, this doesn't preclude viable alternative products being selected at the next stage of the design.
- The maintenance factor applied to the lighting scene is 1, to ensure the worst-case scenario (day 1) of the lighting installation.
- It is assumed that the pre-curfew lighting consists of both amenity and sports lighting switched on, whereas post-curfew denotes that sports lighting will be switched off.
- The lighting calculation does not consider variations in landscape levels and assumes that all luminaire mounting heights have the same reference plane.
- Existing and/or surrounding lighting is excluded from the lighting calculations.
- The sports lighting design was provided by a luminaire supplier. WSP Lighting has recreated, adopted the design and verified the calculation results.
- The vertical calculation surfaces on premises are assumed to be 5m tall, starting from 1m AFFL, based on average height of a two-storey dwelling in the UK.
- Due to the lack of survey information for existing surrounding dwellings, the luminous intensity calculation point has been placed centrally to each dwelling's elevation.
- The following reflectance values have been utilised in the model: Site floor 20%, Buildings 40%.

The area identified on plan as 'Temporary Contractors Compound' is currently out of scope for this report. WSP will not be providing any permanent or temporary lighting to this area, as all temporary construction lighting remains the responsibility of the contractor. It is recommended, however, that any temporary lighting installed during construction adheres to the principles outlined within this report, ensuring that obtrusive light remains within the stated limits and that artificial lighting does not have any adverse impacts on nearby residents or wildlife.

5. Obtrusive Light Assessment

5.2 Summary of Results

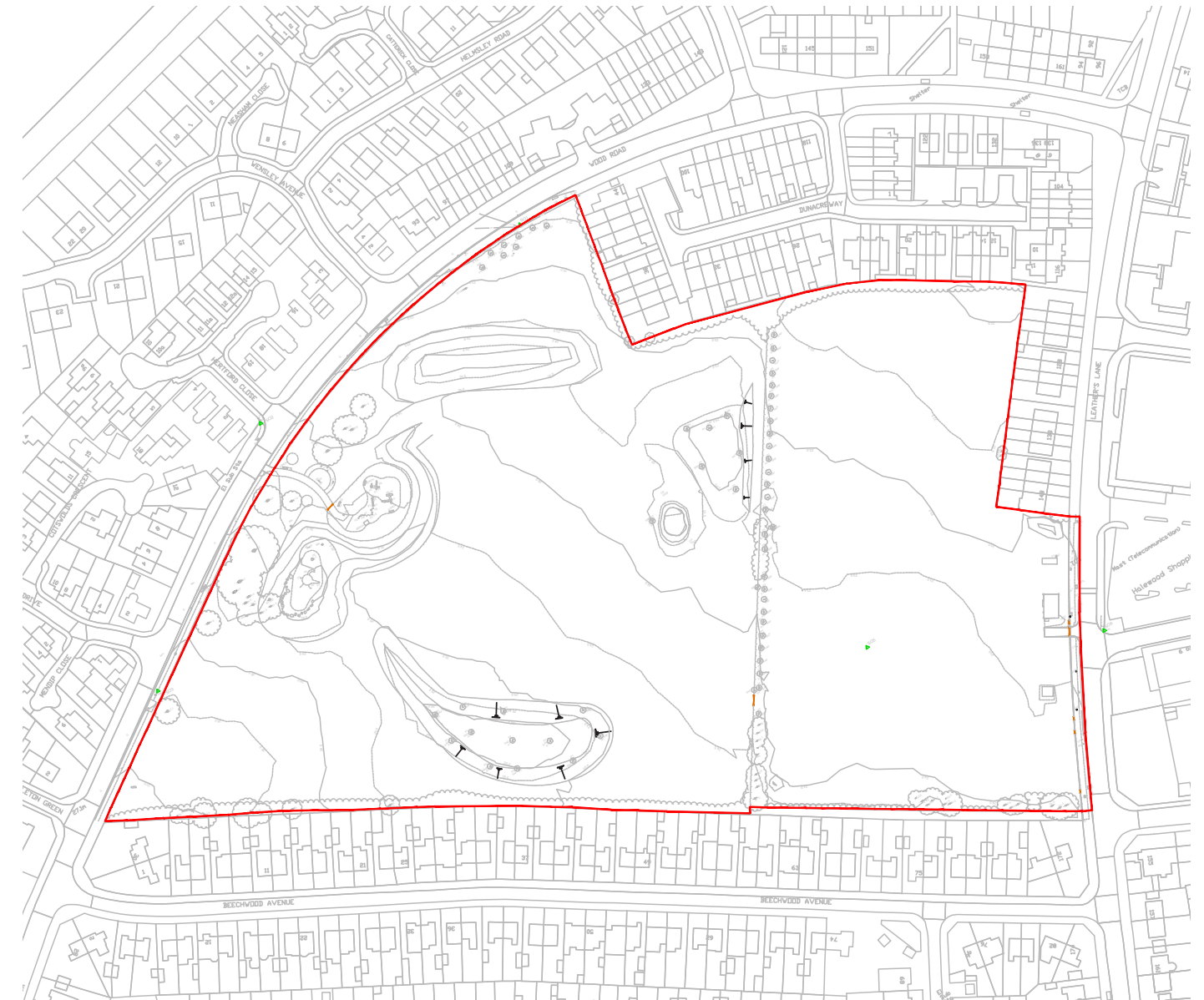
The following pages provide a summary of the calculated results of the Grace Park development.

Compliance with the technical parameters outlined in ILP GN01 2021 Guidance Notes on The Reduction of Obtrusive Light: Environmental Zones has been achieved.

The vertical calculations have been placed to match the site conditions and property boundaries that are at risk of being affected by light intrusion.

Luminous intensity calculation points were mounted at 3m, while the vertical points for illuminance levels of neighbouring dwellings were assumed to be 5m tall, starting from 1m AFFL, based on average height of a two-storey dwelling in the UK.

Luminaires have been selected to comply with the sky glow limitations outlined in ILP GN01 Table 6, achieving a luminaire upward light ratio of no more than 0.5%. The overall site provides compliance to the required upward flux ratio parameters, achieving less than 2% across the site for both sports and amenity lighting.



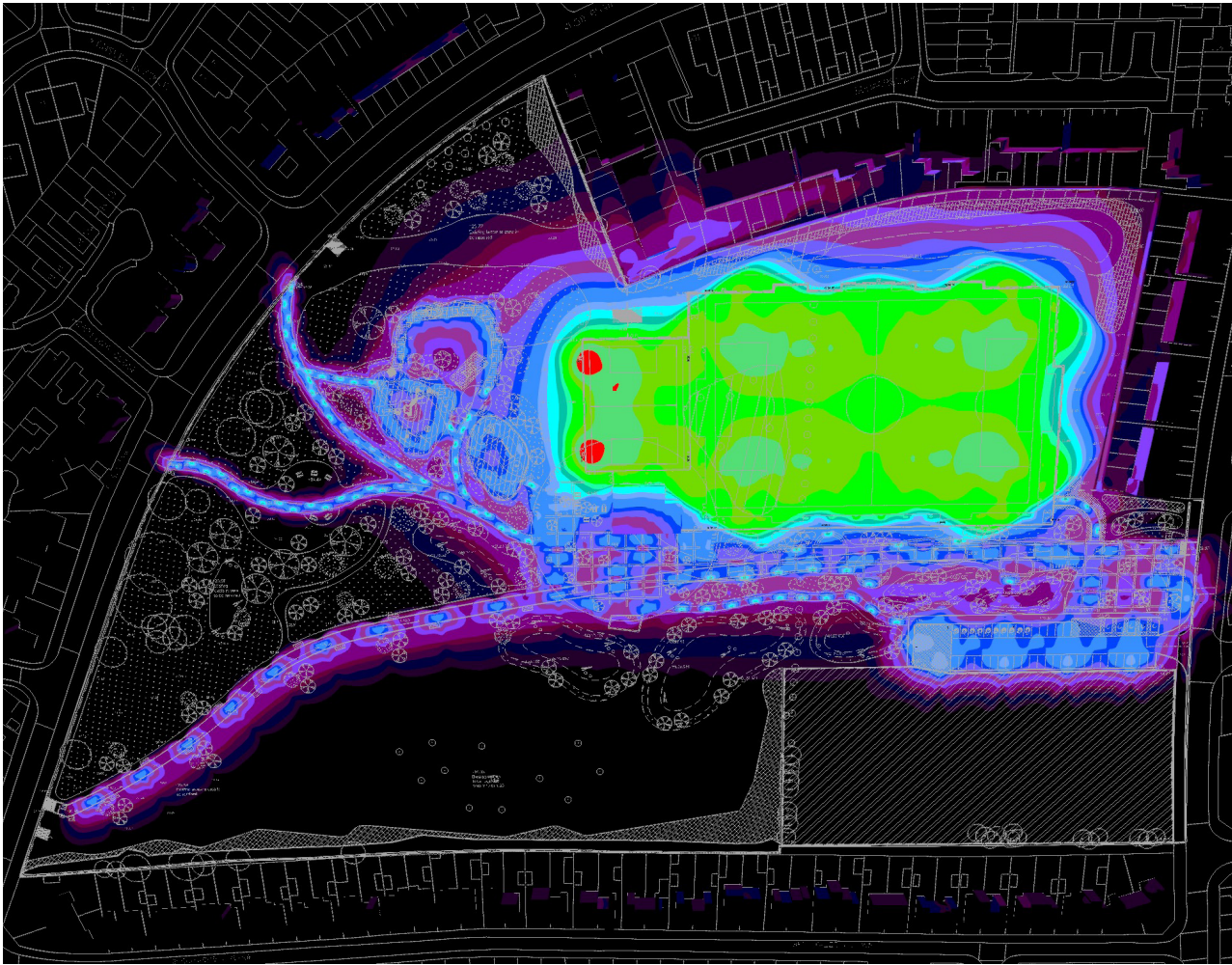
Halewood Leisure Centre - Site Boundary

5. Obtrusive Light Assessment

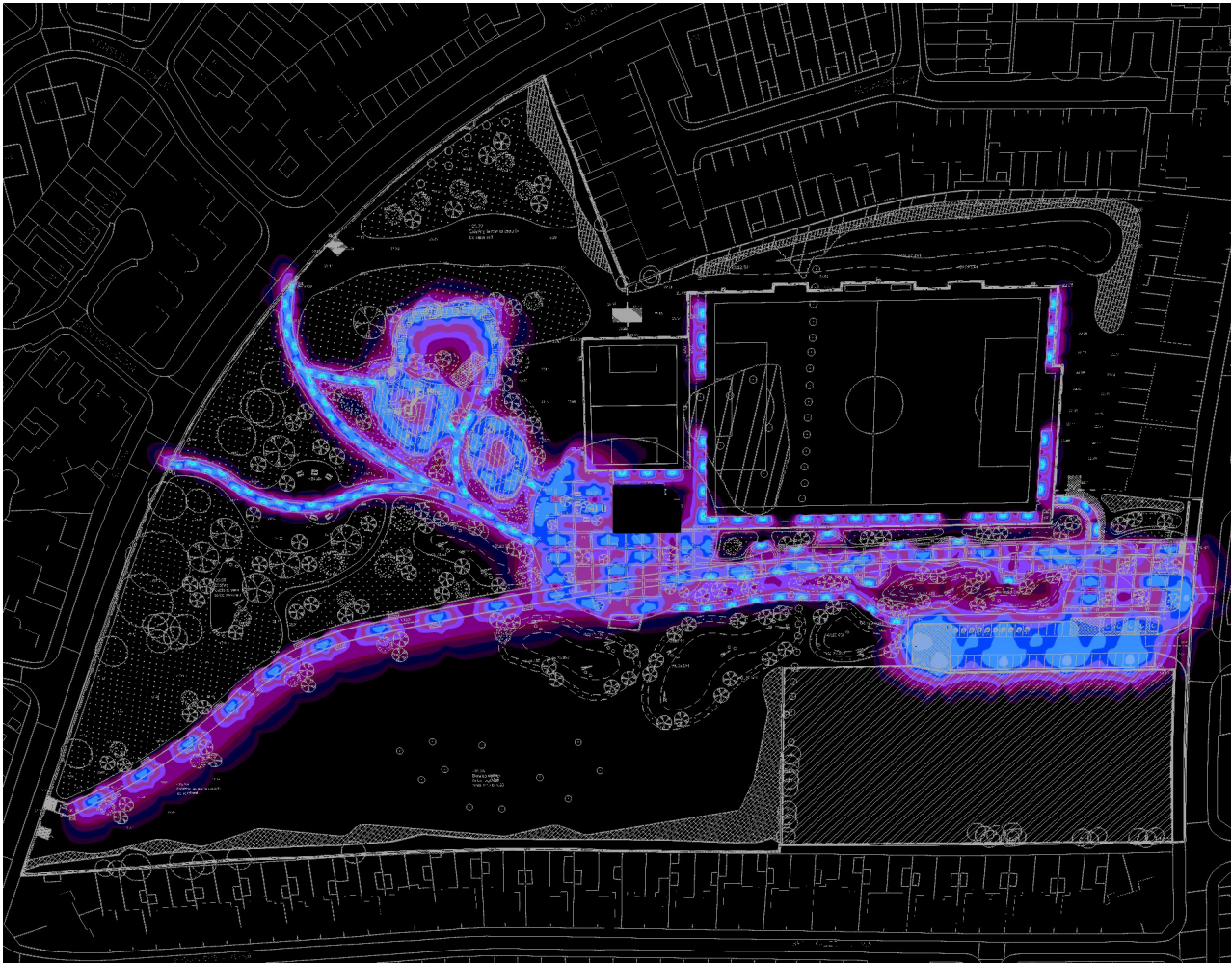
5.3 Calculation Overview

The proposed scheme provides targeted illumination from luminaires with precise optical control to levels in accordance with British Standards. As evidenced by the false colour illuminance plot, care has been taken to ensure minimal obtrusive light beyond the immediate target area.

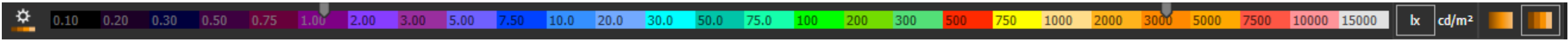
The light coverage (illuminance) is shown in the false colour plot on this page along with a lux level key. It should be noted that this calculation considers the worst-case scenario with all external lighting operating concurrently. The calculation does not consider any contribution from existing surrounding lighting.



False colour view from calculation model - pre-curfew



False colour view from calculation model - post-curfew



Lux level key from calculation model

5. Obtrusive Light Assessment

5.4 Light Intrusion Results

The following table demonstrate the lighting calculation results against the maximum values of vertical illuminance on premises. The limits apply to nearby dwellings or potential dwellings and specifically windows. The reported values describe the cumulative effect of all lighting installations.

Limitations of Illumination on Surrounding Premises Light Intrusion/Nuisance Application Conditions - Environmental Zone 3				
Light Intrusion - Calculation Surfaces	Calculation Surface Number	Pre-curfew Max Target 10 (lx)	Post-curfew Max Target 2 (lx)	Compliance
	LI-1	0.12	0.01	Yes
	LI-2	0.19	0.01	Yes
	LI-3	0.10	0.02	Yes
	LI-4	0.23	0.02	Yes
	LI-5	0.07	0.01	Yes
	LI-6	0.13	0.03	Yes
	LI-7	0.29	0.02	Yes
	LI-8	0.22	0.03	Yes
	LI-9	0.30	0.03	Yes
	LI-10	0.40	0.05	Yes
	LI-11	0.51	0.09	Yes
	LI-12	0.51	0.05	Yes
	LI-13	0.54	0.05	Yes
	LI-14	0.47	0.08	Yes
	LI-15	0.50	0.07	Yes
	LI-16	0.82	0.12	Yes
	LI-17	0.79	0.04	Yes
	LI-18	0.81	0.04	Yes
	LI-19	0.94	0.04	Yes
	LI-20	9.55	0.06	Yes
	LI-21	6.68	0.05	Yes
	LI-22	5.43	0.03	Yes
	LI-23	4.53	0.04	Yes
	LI-24	3.11	0.04	Yes
	LI-25	2.42	0.02	Yes
	LI-26	1.44	0.02	Yes

Table continued				
Light Intrusion - Calculation Surfaces	Calculation Surface Number	Pre-curfew Max Target 10 (lx)	Post-curfew Max Target 2 (lx)	Compliance
	LI-27	1.38	0.02	Yes
	LI-28	2.15	0.03	Yes
	LI-29	0.50	0.02	Yes
	LI-30	3.22	0.04	Yes
	LI-31	4.04	0.06	Yes
	LI-32	4.63	0.13	Yes
	LI-33	0.60	0.05	Yes
	LI-34	0.34	0.02	Yes
	LI-35	0.50	0.03	Yes
	LI-36	0.48	0.03	Yes
	LI-37	0.55	0.03	Yes
	LI-38	0.59	0.04	Yes
	LI-39	0.67	0.04	Yes
	LI-40	0.62	0.04	Yes
	LI-41	0.61	0.04	Yes
	LI-42	0.64	0.04	Yes
	LI-43	0.75	0.04	Yes
	LI-44	0.76	0.05	Yes
	LI-45	0.59	0.03	Yes
	LI-46	0.60	0.03	Yes
	LI-47	0.57	0.03	Yes
	LI-48	0.41	0.04	Yes
	LI-49	0.54	0.03	Yes
	LI-50	0.35	0.04	Yes
	LI-51	0.38	0.03	Yes
	LI-52	0.22	0.03	Yes
	LI-53	0.25	0.03	Yes
	LI-54	0.21	0.03	Yes
	LI-55	0.19	0.03	Yes
	LI-56	0.16	0.03	Yes
	LI-57	0.40	0.03	Yes
	LI-58	0.8	0.03	Yes

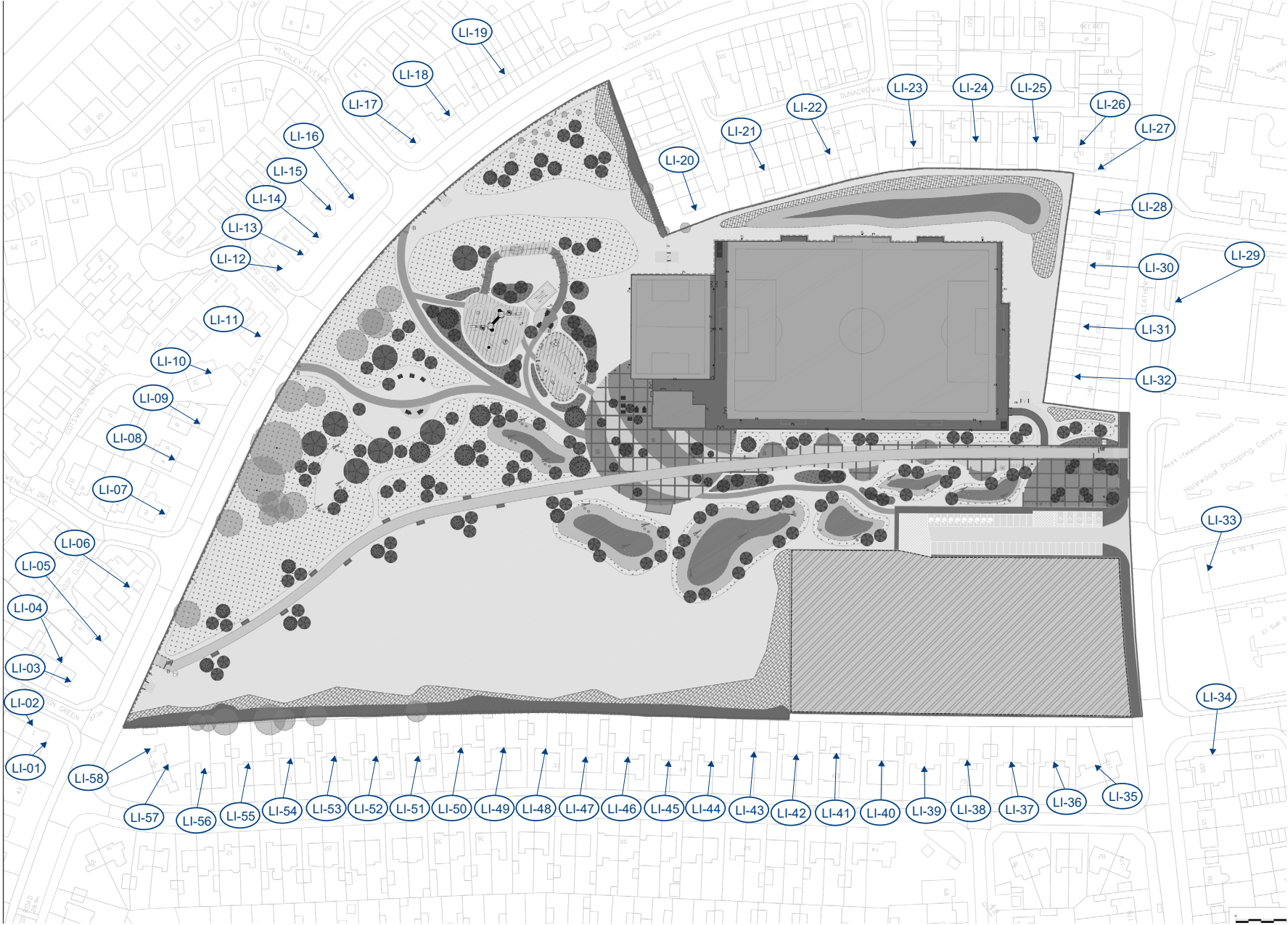
Table 6 | Limitations of Illumination on Surrounding Premises



5. Obtrusive Light Assessment

5.4 Light Intrusion Results

The following plan shows the location of the calculation surfaces used in the obtrusive light study.



Grace Park - Light Intrusion Calculation Surfaces

5. Obtrusive Light Assessment

5.5 Luminous Intensity Results

The following table demonstrates the luminous intensity results of bright luminaires and depend on the viewing distance, or the distance between luminaires and dwellings/observer and the projected area of the luminaire (surface of the luminaire which emits light). As the lighting design consists of various luminaire typologies, the assessment results consider the worst-case scenario where possible, luminaires that are in close proximity to dwellings and have the largest apparent surface of their light source seen from the observer position.

Table 4 of the ILP GN01 (section 4.4 of this report) shows the maximum values for the luminous intensity of luminaires in designated directions, where the views of bright surfaces of light sources are likely to be a nuisance to occupants of premises. As all luminaires are mounted on columns and very close to each other, the assumption is that all luminaires of each column form a cluster of luminaires and can be treated as a single light source when viewed from a distance. Therefore, the values of Ap>0.5 will be referenced as maximum luminous intensity in candelas.

Limitations of Bright Luminaires in the Field of View Light for the Luminous Intensity of Bright Luminaires Application Conditions - Environmental Zone 3				
Light Intrusion - Calculation Surfaces	Calculation Surface Number	Pre-curfew Max Target 10000 (cd)	Post-curfew Max Target 1000 (cd)	Compliance
	IN-1	282	2.40	Yes
	IN-2	306	2.26	Yes
	IN-3	353	2.36	Yes
	IN-4	301	1.46	Yes
	IN-5	389	2.43	Yes
	IN-6	434	2.52	Yes
	IN-7	440	2.53	Yes
	IN-8	506	2.58	Yes
	IN-9	503	2.53	Yes
	IN-10	586	2.63	Yes
	IN-11	665	2.77	Yes
	IN-12	653	2.74	Yes
	IN-13	709	2.79	Yes
	IN-14	881	2.56	Yes
	IN-15	1009	2.68	Yes
	IN-16	1092	2.75	Yes
	IN-17	1132	2.82	Yes
	IN-18	1185	2.89	Yes
	IN-19	1030	2.89	Yes

Table continued				
Light Intrusion - Calculation Surfaces	Calculation Surface Number	Pre-curfew Max Target 10000 (cd)	Post-curfew Max Target 1000 (cd)	Compliance
	IN-20	1072	3.12	Yes
	IN-21	1168	3.08	Yes
	IN-22	1386	2.99	Yes
	IN-23	4194	3.34	Yes
	IN-24	781	2.79	Yes
	IN-25	790	2.68	Yes
	IN-26	794	2.74	Yes
	IN-27	666	2.59	Yes
	IN-28	650	1.95	Yes
	IN-29	581	2.41	Yes
	IN-30	626	2.28	Yes
	IN-31	685	2.49	Yes
	IN-32	267	2.27	Yes
	IN-33	610	2.51	Yes
	IN-34	836	2.48	Yes
	IN-35	311	3.58	Yes
	IN-36	336	3.32	Yes
	IN-37	306	2.51	Yes
	IN-38	296	2.51	Yes
	IN-39	300	2.53	Yes
	IN-40	301	2.51	Yes
	IN-41	307	2.63	Yes
	IN-42	313	2.65	Yes
	IN-43	321	2.60	Yes
	IN-44	332	2.58	Yes
	IN-45	324	2.64	Yes
	IN-46	315	2.59	Yes
	IN-47	300	2.56	Yes
	IN-48	365	2.55	Yes
	IN-49	472	2.55	Yes
	IN-50	559	2.62	Yes
	IN-51	596	2.60	Yes
	IN-52	612	2.62	Yes
	IN-53	601	2.60	Yes
	IN-54	577	2.61	Yes
	IN-55	541	2.62	Yes
	IN-56	501	2.68	Yes
	IN-57	434	3.14	Yes
	IN-58	380	3.40	Yes

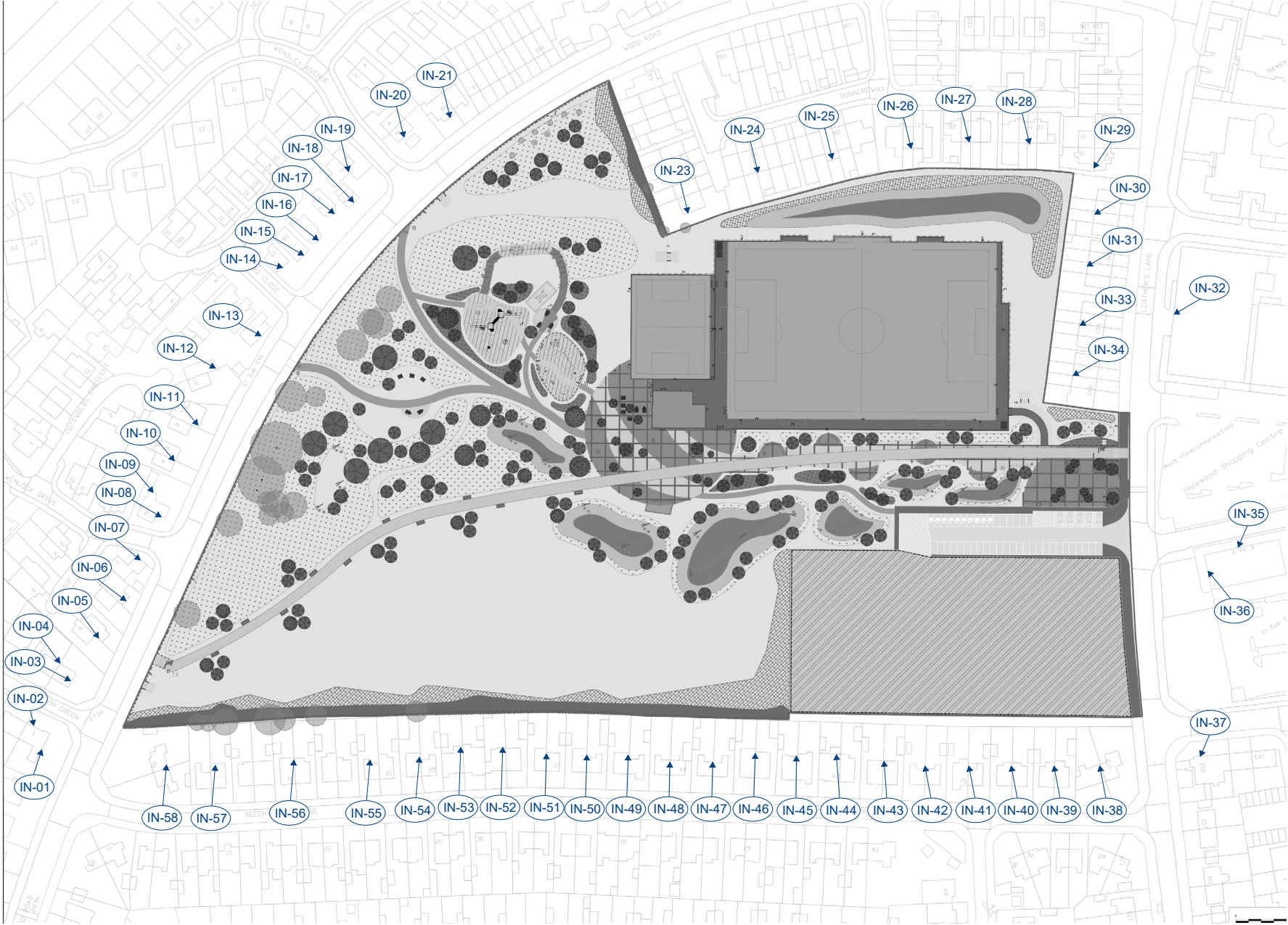
Table 7 | Limitations of bright luminaires in the field of view



5. Obtrusive Light Assessment

5.5 Luminous Intensity Results

The following plan shows the location of the calculation surfaces used in the obtrusive light study.



Grace Park - Luminous Intensity Calculation Surfaces

5. Obtrusive Light Assessment

5.6 Upward Light Ratio

The following table demonstrates the performance of the various luminaire typologies against the ILP GN01 Table 6 criteria of maximum values of upward light ratio (ULR) of luminaires. This is the first approach to limit the skyglow and each luminaire’s contribution.

Please note that the data of ULR for each luminaire typology is sourced by the manufacturer’s technical datasheets.

Limitations of Skyglow					
Maximum Values of Upward Light Ratio (URL) of Luminaires					
Upward Light Ratio (%)	Type	Luminaire References	Upward Light Ratio (%) Target	Luminaire Upward Light Ratio (%)	Compliance
	Sports Lighting	A	5	0	Yes
		B	5	0	Yes
		C	5	0	Yes
	Amenity Lighting	D	5	0.5	Yes
		E	5	0.5	Yes
		F	5	0.5	Yes
		G	5	0.5	Yes
		H	5	0.5	Yes

Table 8 | Limitations of Skyglow - Maximum values of upward light ratio (URL) of luminaires

5.7 Upward Flux Ratio

The following table demonstrates the criteria and the effect of both direct and reflected upward lighting of a whole installation, not just the individual luminaires.

The following assumption applies to the type of installation:

- Amenity: Public realm lighting only (sports lighting switched off)
- Sports: Sports lighting only (public realm lighting switched off)

The reason for the above assumption is to allow the design team to assess each installation independently and propose mitigation measures for each installation.

Limitations of Skyglow					
Maximum Values of Upward Flux Ratio of Installation					
Upward Light Ratio (%)	Type	Luminaire References	Upward Flux Ratio (%) Target	Installation Upward Light Ratio (%)	Compliance
	Sports Lighting	A	6	1.32	Yes
		B			
		C			
	Amenity Lighting	D	12	1.82	Yes
		E			
		F			
		G			
		H			

Table 9 | Limitations of Skyglow - Maximum values of upward flux ratio of installation

5. Obtrusive Light Assessment

5.8 Conclusion

This report provides a detailed analysis of the level of obtrusive light as a result of the planned improvements at Grace Park.

The calculations and the analysis have been carried out in accordance with the Institute of Lighting Professionals Guidance Notes on the Reduction of Obtrusive Light to assess the impact of the proposed artificial lighting to the neighbouring dwellings.

As part of this design process, a preliminary external lighting strategy has been developed and a lighting simulation has been completed to provide the results as presented at section 5 of this report.

Two scenarios have been considered in the obtrusive light study. Pre-curfew is deemed the worst performing scenario in terms of the impact of artificial lighting beyond the site boundary, whereas post-curfew values have negligible impact beyond the site boundary.

The calculation results indicate that compliance to the ILP GN01 2021 Guidance Notes on The Reduction of Obtrusive Light can be achieved by adhering to the design principles and mitigation measures described in this report.



Edinburgh

7 Lochside View
Edinburgh
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