

## 16 LIGHTING

### 16.1 INTRODUCTION

#### 16.1.1 Company

WYG

#### 16.1.2 Author

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Nathan has over 7 years' experience undertaking lighting assessments including light surveys and modelling using DIALUX light modelling software for various schemes both within and outside the UK.

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Nigel has over 18 years' experience managing, coordinating and directing lighting assessments for major sports, residential and highways schemes, both within and outside the UK.

#### 16.1.3 Chapter Purpose

This chapter of the ES assesses the likely significant effects of the proposed development on the environment in terms of artificial lighting. The chapter and its supporting appendices describe the planning policy context, the assessment methodology, the baseline conditions at the application site and surroundings, the likely significant effects, the mitigation measures required to prevent, reduce or offset any significant adverse effects, the likely residual effects after these measures have been employed and the cumulative effects. In summary, the objectives of the chapter are to:

- Assess the impact of lighting from the proposed development during the construction phase;
- Assess the impact of lighting from the completed proposed development during the operational phase;
- Identify any mitigation measures associated with the construction and operational phase.

#### 16.1.4 Chapter Updates for Revised 2020 Submission

In accordance with the methodology outlined in Chapter 2, a Level 2 update has been undertaken. This ES chapter relating to lighting has been reviewed against the following aspects and for each it has been confirmed that there are no amendments required to the content of the chapter:

- Baseline data validity: There have been no relevant changes to the baseline data, and the results of the lighting survey presented in Section 4.0 of the technical report remain valid;
- Legislation/policy revisions: There have been no related updates to legislation/policy that have affected either the methodology or findings of this assessment; and

- Amendments to construction methodology: The changes to the proposed construction methodology do not affect the findings of the lighting assessment.

However, due to:

- the relevance and scale of the proposed development amendments, including amendments operational lighting which has been updated following changes to the lighting design and the relocation of the proposed chiller compound to the northwest corner of the stadium;

- addition of new cumulative schemes

- statutory consultee comments;

limited technical assessment (a 'Level 2' Update) has been undertaken to confirm the validity of the previous conclusions.

Where relevant, clarification responses are detailed within Appendix 16.1 and in Section 16.2.5 within this chapter.

As a consequence of the above factors, and having reviewed the assessment information, it is considered that the previously reported mitigation measures remain valid and the residual effects previously identified have remained the same.

The sections that have been updated are detailed below:

- Section 16.2.6
- Section 16.2.11
- Section 16.3.1
- Section 16.4.1
- Section 16.6.1-4

#### 16.1.5 Section 16.7.1 Appendices

- Appendix 16.1 Lighting Technical Assessment

### 16.2 METHODOLOGY

#### 16.2.1 Legislation, Policy and Guidance

Legislation, planning policy and guidance relating to developments and their potential effects on lighting are set out below.

#### 16.2.2 Liverpool Unitary Development Plan (2002)

The Unitary Development Plan (UDP) remains the statutory development plan for the city until the new local plan is adopted. UDP Policy HD28 – *Light Spillage* details that the City Council requires developers to take account of the following principles in schemes where external lighting is required:

- i. the lighting scheme proposed is the minimum required for security and working purposes to undertake the task, and
- ii. light spillage and potential glare is minimised particularly to:

- residential and commercial areas
- areas of wildlife interest and
- areas whose open landscape qualities would be affected, particularly those open areas on the urban fringe.

#### 16.2.3 National Planning Policy

The National Planning Policy Framework (NPPF) [1] (February 2019) is a material consideration in determination of planning applications. The NPPF states:

*'By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'*

The Planning Practice Guidance (PPG) [2] supports the NPPF and with respect to lighting details that:

*"for maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time".*

In light of the PPG guidance, the assessment has considered the following implications of the proposed lighting design:

- "Does a new development proposal, or a major change to an existing one, materially alter light levels outside the development and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?"
- Does an existing lighting installation make the proposed location for a development unsuitable? For example, this might be because:
  - the artificial light has a significant effect on the locality;
  - users of the proposed development (e.g. a hospital) may be particularly sensitive to light intrusion from the existing light source.
- Does a proposal have a significant impact on a protected site or species e.g. located on, or adjacent to, a designated European site or where there are designated European protected species that may be affected?
- Is the development in a protected area of dark sky or an intrinsically dark landscape where it may be desirable to minimise new light sources?
- Are forms of artificial light with a potentially high impact on wildlife (e.g. white or ultraviolet light) being proposed close to sensitive wildlife receptors or areas, including where the light shines on water?
- Does the proposed development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies (because it may change natural light, creating polarised light pollution that can affect wildlife behaviour)?"

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If the answer to any of the above questions is ‘yes’, consideration should be made for:

- where the light shines;
- when the light shines;
- how much light shines; and
- possible ecological impact.

With regards to access to daylight and sunlight when considering new development, the planning practice guidance states:

“Account should be taken of local climatic conditions, including daylight and sunlight, wind, temperature and frost pockets”.

16.2.4 Liverpool City Council Local Plan

The Liverpool City Council (LCC) Local Plan 2013-2033 [4] (submission draft 2018) is also a material consideration in determining the application albeit full weight cannot be given to the plan until it has been subject to examination and adopted.

Draft policy R1 Air, Light and Noise Pollution details that:

“1. Development proposals which are likely to have a pollution impact should demonstrate that:

- a. Appropriate measures are incorporated to avoid pollution to air, water and soil;
- b. The impact of noise, vibration and lighting will not be significant;
- c. The proposal will not undermine the achievement of Air Quality Management Area (AQMA) objectives; and
- d. It will not lead to a significant decline in air quality

2. Where existing uses adversely affect the environment through noise, vibration, dust, smoke, fumes, smell, vehicle obstruction or other environmental problems the City Council will:

- a. Refuse planning permission for proposals which would result in a consolidation or expansion of uses giving rise to environmental problems.
- b. Impose appropriate conditions on any permission which may be granted and/or obtain legal agreements in relation to such a permission in order to regulate uses.

3. New development proposals close to existing uses which are authorised or licenced under pollution control legislation, and which are a potential nuisance to the proposed development, will not be permitted unless the City Council is satisfied that sufficient measures will be taken by the developer to protect amenity and environmental health.

4. Where appropriate Major developments should incorporate measures to reduce and minimise air pollution.”

16.2.4.1. Other Relevant Guidance

Other relevant guidance has been used to enable the assessment of the proposed development. This guidance includes:

- Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Professionals, 2020 [5];
- Guidance Note 08/18 Bats and Artificial Lighting in the UK, The Institution of Lighting Professionals 2018 [6];
- National Planning Policy Framework, Ministry of Housing, Communities & Local Government, 2019 [1];
- Planning Practice Guidance on Light Pollution, Department for Communities and Local Government, 6<sup>th</sup> March 2013, ID 31-007-20140306 [2];
- Environmental Protection Act, 1990 [7];
- Statutory Nuisance from Insects and Artificial Light, Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005, DEFRA 2006 [8];
- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, British Standards Institute, 2007 [9];
- BS EN 13201-4: Road Lighting – Methods of Measuring Lighting Performance, 2003 [10];
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, British Standards Institute, 2013 [11];
- PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments, ILP, 2013 [12].
- Liverpool Maritime Mercantile City World Heritage Site Supplementary Planning Document (SPD) (2009); and
- Sports Grounds Safety Authority Green Guide 2018.

16.2.5 Consultees & Scoping

16.2.5.1. Scoping Consultation

The lighting assessment methodology within the EIA scoping report was submitted to LCC and relevant parties in May 2017 with the scoping opinion provided in June 2017.

A summary of comments relating to lighting is provided in Table 16.1.

Table 16.1

Summary of Responses to Lighting

SCOPING OPINION COMMENTS	FURTHER INFORMATION
Air quality, noise and lighting assessments are proposed to inform the EIA. These assessments should consider impacts upon statutory designated nature conservation sites	Ecological receptors surrounding the site have been assessed within the assessment.

In addition, both Historic England and Liverpool City Council were engaged at pre-application stage and consulted on the proposed lighting arrangements by Buro Happold.

16.2.5.2. Planning Application Consultation

Following submission of the previous lighting ES chapter and technical report (December 2019) the following comments relating to lighting where received from Dr Ian Rushforth, Senior Environmental Officer at Liverpool City Council:

“I have studied the details in respect of lighting for the site once it is operational, and I am satisfied that there will not be an adverse impact from light overspill affecting nearby residents.”

Following submission of the previous lighting report (December 2019) the following comments regarding lighting where received from Natural England:

“Lighting: We disagree that impacts associated with lighting are ruled out at this stage based on the limited evidence and justification provided here to support the conclusions made. Further consideration to measures to limit light spill to surrounding habitats is required. The visual disturbance of lighting at this site is likely to be considerably more than the baseline lighting on the site, we question how this will impact upon supporting habitat and SPA bird behaviours such as roosting and foraging.”

In response to this comment, further justification for this position is set out below.

In relation to the construction phase, the working hours at the application site are proposed to be 07:00-19:00 Monday-Friday and 007:00-13:00 on Saturdays. During the winter months there may be the need for some task lighting using temporary light fixings beyond standard working hours during specific small-scale/short timeframe works (i.e. power float finishing of concrete slabs). However, by keeping all lights onsite low level and angled into the application site (a measure that will be included within the CEMP in due course), it is not anticipated that construction lighting will affect any of the scoped in features of the designated site. Therefore, no disturbance to qualifying features as a result of construction lighting is anticipated during the construction phase of works.

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The results of the assessment of potential lighting effects on ecological receptors during the operational phase of the scheme are set out section 16.6 of this chapter. In the absence of any specific guidance regarding ecological receptors, impacts are considered potentially significant where predicted illuminance significantly exceeds 2 lux at ecological receptors in line with the ILP criteria. This assessment has determined that operational lighting will exceed 2 lux at only six of the 42 locations considered: at Nelson Dock to the south and at the entrance to Sandon Half-Tide Dock to the north of the application site.

No guidance is currently available regarding light levels which may cause disturbance to wintering birds such as the scoped in qualifying features of the relevant designated sites. However, "The Impact of artificial Light on waterfowl behaviour" (BTO 1990) (document provided by MEAS), indicates that water birds that forage within estuarine habitats may benefit from artificial lighting as this has the potential to increase foraging time.

Given that the event day scenario is only expected to occur fewer than 32 times a year including football matches (depending on Everton's progress in Domestic and European cup competitions – not all games in the evening) and concerts, the overall impact of lighting on ecological receptors from event day lighting is not considered significant. In addition, non-event day lighting along the western, southern and northern boundary levels will not exceed ILP criteria of 2 lux Except for the entrance to Sandon Half-Tide Dock, the results do show that the locations surrounding this area and further back into the dock (beyond 5m from this location) will be below 2 lux.

Such lighting is therefore considered unlikely to cause displacement or disturbance to the scoped in features of the designated sites. Furthermore, such lighting effects have the potential to enhance foraging/hunting success and therefore benefit notifiable features in accordance with the above BTO study.

It is therefore unlikely that the operational phase of the proposed development will adversely affect the conservation status of the scoped in qualifying features of the designated sites as a result of lighting on site.

Therefore, significant adverse effects on these designated sites as a result of this impact pathway are not anticipated.

### 16.2.6 Consideration of Climate Change

Climate change is unlikely to affect or be affected by lighting associated with the proposed development and has therefore not been considered within this ES Chapter. LED lighting has been used where possible to reduce energy consumption.

### 16.2.7 Consideration of Human Health

The impact on human health from lighting forms an integral part of the relevant ILP methodology used within this assessment and is detailed within the relevant policy and guidance above.

### 16.2.8 Consideration of Risk of Major Accidents and/or Disasters

Major accidents and/or disasters are not considered to be relevant in terms of lighting and has therefore not been considered within this ES Chapter.

### 16.2.9 Alternatives

A comprehensive alternative sites assessment has been undertaken and is addressed within Chapter 5 Alternatives and Design Evolution. An alternative future baseline scenario has been included within the assessment for comparison purposes as stated in Chapter 2 EIA Methodology.

### 16.2.10 Assessment of Baseline Conditions & Receptor Sensitivity

A baseline lighting survey was undertaken on the 30<sup>th</sup> April 2018. An initial survey was undertaken between 23:45 hours and 00:45 hours to establish the existing pre-curfew lighting conditions.

The survey was conducted using a Digital Lux Meter which meets CIE photopic spectral response, with a maximum resolution of 0.01 lux. The survey was undertaken with a meter resolution of 0.01 lux.

Full details of the light monitoring survey are presented in Section 4.0 of the lighting Technical Report (Appendix 18.1).

Existing light sources surrounding the site are predominantly street lighting. Lighting was noted along Regent Road, with adjoining roads along the A5054 and Water Street also containing their own street lighting. There are also lighting sources noted within Bramley Moore Dock.

A number of existing and committed key receptors have been selected to enable an assessment to be undertaken for the potential lighting effects from the construction and operational phase of the proposed development.

**Table 16.2**

Existing and Committed Sensitive Residential Receptor Locations

REF.	DESCRIPTION	HEIGHT (M)
R1	Titanic Hotel Liverpool	4.0
R2	57 Regent Street	4.0
R3	65 Regent Street	4.0
PR1	Northern facade western block – Liverpool Waters Development	4.0

REF.	DESCRIPTION	HEIGHT (M)
PR2	Northern facade western block – Liverpool Waters Development	4.0
PR3	Eastern facade western block – Liverpool Waters Development	4.0
PR4	Eastern facade western block – Liverpool Waters Development	4.0
PR5	Northern facade southern block – Liverpool Waters Development	4.0
PR6	Northern facade central block – Liverpool Waters Development	4.0
PR7	Northern facade central block – Liverpool Waters Development	4.0
PR8	Western facade eastern block – Liverpool Waters Development	4.0
PR9	Northern facade eastern block – Liverpool Waters Development	4.0
PR10	Eastern facade eastern block – Liverpool Waters Development	4.0
PR11	Regent Road/Blackstone Street Hotel (Bramley Hotel) (LPA ref. 20F/0217 – proposed hotel opposite to the Bramley-Moore Dock site)	4.0

The heights for the above receptors are assumed first floor window heights. All other cumulative schemes included within the scope of the EIA (listed in Table 2.7, Chapter 2, ES Volume II) are considered to be located too far away from the application site to result in lighting effects from the proposed scheme and have therefore been scoped out of the assessment.

For the purposes of the assessment, ecological receptor locations have been included surrounding the quay sides, with individual receptors spaced out along the rows at heights of 0.75, 1.5m and 5.0m and different distances from the proposed development as detailed in table 16.3.

**Table 16.3**

Existing Sensitive Receptor Locations (Ecological Lighting Assessment)

REF.	DESCRIPTION	HEIGHT (M)
Eco 1	River Mersey 160m from the site	0.75 / 1.5 / 5.0
Eco 2	River Mersey 160m from the site	0.75 / 1.5 / 5.0
Eco 3	River Mersey 160m from the site	0.75 / 1.5 / 5.0
Eco 4	River Mersey 160m from the site	0.75 / 1.5 / 5.0
Eco 5	River Mersey 170m from the site	0.75 / 1.5 / 5.0
Eco 6	River Mersey 140m from the site	0.75 / 1.5 / 5.0
Eco 7	River Mersey 140m from the site	0.75 / 1.5 / 5.0
Eco 8	River Mersey 109m from the site	0.75 / 1.5 / 5.0
Eco 9	River Mersey 120m from the site	0.75 / 1.5 / 5.0
Eco 10	Sandon Half-Tide Dock 80m from the site	0.75 / 1.5 / 5.0
Eco 11	Sandon Half-Tide Dock 70m from the site	0.75 / 1.5 / 5.0
Eco 12	Sandon Half-Tide Dock 70m from the site	0.75 / 1.5 / 5.0
Eco 13	Nelson Dock 50m from the site	0.75 / 1.5 / 5.0



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REF.	DESCRIPTION	HEIGHT (M)
Eco 14	Nelson Dock 50m from the site	0.75 / 1.5 / 5.0
Eco 15	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 16	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 17	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 18	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 19	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 20	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 21	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 22	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 23	River Mersey 50m from the site	0.75 / 1.5 / 5.0
Eco 24	Sandon Half-Tide Dock 30m from the site	0.75 / 1.5 / 5.0
Eco 25	Sandon Half-Tide Dock 30m from the site	0.75 / 1.5 / 5.0
Eco 26	Sandon Half-Tide Dock 30m from the site	0.75 / 1.5 / 5.0
Eco 27	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 28	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 29	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 30	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 31	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 32	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 33	River Mersey 15m from the site	0.75 / 1.5 / 5.0
Eco 34	Sandon Half-Tide Dock 12m from the site	0.75 / 1.5 / 5.0
Eco 35	Sandon Half-Tide Dock 8m from the site	0.75 / 1.5 / 5.0
Eco 36	Sandon Half-Tide Dock 10m from the site	0.75 / 1.5 / 5.0
Eco 37	Sandon Half-Tide Dock 10m from the site	0.75 / 1.5 / 5.0
Eco 38	Nelson Dock 10m from the site	0.75 / 1.5 / 5.0
Eco 39	Nelson Dock 10m from the site	0.75 / 1.5 / 5.0
Eco 40	Nelson Dock 13m from the site	0.75 / 1.5 / 5.0
Eco 41	Bat Roost within the Hydraulic Tower	5.0
Eco 42	Bat Roost within the Hydraulic Tower	5.0

Table 16.4 sets out the scale of sensitivity that has been applied to receptors identified and considered within this assessment. For the purposes of this assessment, the sensitivity of each the assessed receptors are summarised in table 18.4 below. Following consultation with the project ecologists, the bird species found within Nelson Dock and Sandon Half-Tide Dock are considered less sensitive to changes in light levels and given the approved Liverpool Waters scheme (LPA ref. 19NM/1121 – latest variation of original outline permission ref. 100/2424) will change the lighting status of this

dock in the future, ecology receptors within Nelson Dock have been classed as Medium sensitivity.

Table 16.4  
Methodology for Assessing Sensitivity of Lighting

SENSITIVITY	EXAMPLE OF RECEPTOR
High	■ Residential properties within ILP Environmental Zone E0 & E1.
	■ Ecological receptors on the River Mersey and within the Hydraulic Tower.
	■ Intrinsically dark landscapes (ILP Environmental Zone E0 & E1).
Medium	■ Residential properties within ILP Environmental Zone E2.
	■ Ecological receptors in Nelson Dock and Sandon Half-Tide Dock.
	■ Low district brightness area (ILP Environmental Zone E2) e.g. small town centres or urban locations.
Low	■ Residential properties within ILP Environmental Zone E3 & E4.
	■ High district brightness area (ILP Environmental Zone E3 & E4) e.g. Town/city centres with high levels of night-time activity.

16.2.11 Assessment of Magnitude

The Lighting assessment has taken a modified approach to the framework methodology set out in Chapter 2 of the ES. Further details of how this is applied to lighting assessments and any significant variations to the framework method have been described in the following sub-sections.

16.2.12 Assessment Criteria

Baseline light conditions were determined during a survey of the existing application site and surroundings. The assessment methodology is qualitative and desk-based looking at the likely effects of the proposed development during construction and operational phases to enable the obtrusive light from the proposed development to be assessed at sensitive receptors.

The ILP has developed an Environmental Zone classification system for the categorisation of residential (human) receptor locations. This is summarised in Table 16.5

Table 16.5.  
Environmental Zone Classification

CATEGORY	DESCRIPTION	EXAMPLES
E0	Dark landscapes	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Intrinsically dark landscapes	National Parks, Areas of Outstanding National Beauty, etc
E2	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3	Medium district brightness	Small town centres or urban locations

CATEGORY	DESCRIPTION	EXAMPLES
E4	High district brightness areas	Town/city centres with high levels of night-time activity

For each Environmental Zone, obtrusive light limitations for exterior lighting installations have also been determined. These are summarised in Table 16.6.

Table 16.6  
Obtrusive Light Limitations for Exterior Lighting Installations

ENVIRONMENTAL ZONE	LIGHT TRESPASS (INTO WINDOWS) EV (LX) <sup>(B)</sup>	
	PE-CURFEW	POST-CURFEW
E0	0	0
E1	2	1 <sup>(d)</sup>
E2	5	1
E3	10	2
E4	25	5

The ILP pre- (07:00-23:00) and post- curfew criteria (23:00-07:00) apply year-round as the curfew is used to assess the impact of obtrusive light at windows at times when people are most sensitive, i.e. when they’re trying to sleep. As this does not see a significant variation throughout the year it remains constant despite the differing hours of daylight.

The assessment determined the lighting levels and Environmental Zone classification in the vicinity of the proposed development through a baseline survey. These were subsequently compared with the relevant pre- and post-curfew light trespass limitations.

Modelling of the indicative lighting scheme was undertaken and predicted obtrusive light values compared with the guidelines detailed within Table 16.6

Both the pre-curfew and post-curfew conditions have been assessed, though it is understood that only limited lighting will be required during post-curfew periods. As the requirement for lighting during a match day / major event (concert; other sporting event) is greater to aid with security, safety and wayfinding due to there being greater footfall, both an event day and non-event day scenario have been assessed. Table 5.1 in the lighting technical report shows the different lighting configurations for event and non-event days

The potential environmental effects of the proposed development are identified, in so far as current knowledge of the application site and proposed development allows. The significance of potential environmental effects is assessed according to their magnitude and the sensitivity of the receptors.

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Magnitude (scale of change) is determined by considering the predicted deviation from approved baseline conditions and relation to relevant guidelines. Quantifiable assessment of magnitude has been undertaken using the criteria detailed in Table 16.7

Table 16.7  
Methodology for Assessing the Magnitude of Impact

MAGNITUDE	LIGHTING LEVEL CRITERIA
Negligible	No increase or decrease in the level of light spill onto surrounding areas and illuminance levels at the windows of residential receptors and would cause no discernible effect to current baseline conditions.
Minor	A minor increase in the level of light spill and glare on to surrounding areas and illuminance levels at the windows of residential receptors would cause a minor perceptible change in baseline conditions which are slightly above recommended ILP guidance levels but where current uses could still be maintained. For ecological receptors this would be an illuminance level over 2 Lux.
Moderate	An increase in the level of light spill and glare on to surrounding areas and illuminance levels at the windows of residential receptors that would still result in a noticeable effect on baseline conditions in excess of the recommended ILP Pre- & Post-curfew guidance levels. When assessed against event lighting as there is potential lighting from events will extend past 23:00 - however will not be on throughout the night and for only 32 times a year (maximum football).
Major	A major increase in the level of light spill and glare on to surrounding areas and illuminance levels at the windows of residential receptors and would result in a major effect on baseline conditions significantly in excess of the recommended ILP guidance levels. When assessed against non-event conditions as these have the potential to be on throughout the night

The assessment of significance within this chapter is determined by combining the magnitude of impact with the sensitivity of the receptor.

16.2.13 Assessment of Significance

The assessment of significance within this chapter is determined by combining the magnitude of impact with the sensitivity of the receptor. Table 16.8 shows how the interaction of magnitude and sensitivity can be combined to determine the significance of an environmental effect.

If a significance of effect is negative then the resulting effect is described as being adverse, whereas if a significance of effect is positive the resulting effect is classed as being beneficial.

Table 16.8  
Significance of Effects Matrix

MAGNITUDE OF EFFECT	SENSITIVITY OF RECEPTOR			
	High	Medium	Low	Negligible
Major	Major	Major-Moderate	Moderate	Minor
Moderate	Major-Moderate	Moderate	Minor	Negligible
Minor	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

For the purpose of this EIA, an effect will be considered to be significant in EIA terms where the significance of effect is assessed to be 'moderate' or higher.

16.2.14 Relevant Associated Development

An external waiting (corral) area is proposed on land owned by Merseytravel adjoining Sandhills rail station to manage pedestrian access to the station (north and south bound rail services) in the post-match period. The external waiting area will comprise hard surfacing, fencing and lighting. This scheme has the potential to increase baseline illuminance levels. However, based on the distance of Sandhills Station to the BMD site and nearby light-sensitive receptors, it is not expected for there to be any additional effects as a result of this scheme.

16.2.15 Assumptions/Limitations

In undertaking the light assessment of the application site and the wider surrounding area, there are a number of limitations and constraints affecting the outputs from this work. These include:

- The principles and products of the floodlighting for the pitch have been agreed. This assessment has been based on these details as provided.
- The model is only able to accurately represent the effects of solid structures such as buildings and walls on light obtrusion. Non-solid barriers such as trees and hedges cannot be accurately modelled and therefore the effects of these are dealt with qualitatively outside the model calculations.
- There is currently no fixed internal layout associated with the Liverpool Waters development (LPA ref. 19NM/1121 – latest variation of the original outline ref. 10O/2424). The approved parameters plan has been used to identify the receptors at the outline building facades. It should however be noted that as the approved scheme parameter blocks for the east and west quay of Nelson Dock straddle the application site boundary with Bramley-Moore Dock then a robust position has been adopted whereby the scheme block is reduced back to the application redline boundary between Nelson and Bramley-Moore Dock.

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16.3 BASELINE CONDITIONS

16.3.1 Existing Baseline – Construction and Operational Lighting

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
R1	Titanic Hotel Liverpool Environmental Zone E3	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
R2	57 Regent Street	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
R3	62 Regent Street	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
R4	Regent Road/Blackstone Street Hotel	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
Eco 41 -42	Ecological receptors within the Hydraulic Tower	High	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
Eco 10-14, 24-26 ,35-40	Ecological receptors within Nelson Dock & Sandon Half-Tide Dock	Medium	
Eco 1-9, 15-23, 27-34	Ecological receptors on the River Mersey	High	

16.3.2 Future Baseline

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
PR1-PR10	Committed Proposed Receptors at Liverpool Waters Development (LPA ref. 19NM/1121 – variation of original outline 100/2424) – Residential-led development of Nelson Dock (as part of Northern Docks Neighbourhood). Environmental Zone E3.  The only committed scheme surrounding the application site that will change the future baseline in the area is the approved Liverpool Waters Development (LPA ref. 19NM/1121 – variation of original outline permission 100/2424). Based upon the Lighting ES chapter for the Liverpool Waters Scheme the residual effect of light from the scheme during both the construction and operational phase on surrounding residential and ecological receptors was minor adverse to neutral. Therefore, the Environmental Zone E3 is not likely to change as a result of the Liverpool Waters Scheme.	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1
PR11	Committed Proposed Receptors at proposed hotel at Regent Road/Blackstone Street – opposite to the Bramley-Moore Dock site (LPA ref. 20F/0217)	Low (based on location within E3 lighting environmental zone)	Full details of the Lighting baseline monitoring and existing baseline levels are detailed within Section 4.0 of Appendix 16.1

16.4 POTENTIAL SIGNIFICANT IMPACTS

PHASE	DESCRIPTION	ADVERSE/BENEFICIAL
Construction E01-E42, R1-R3	Potential light pollution on surrounding properties and ecological receptors as the stadium is constructed is equal to the impact caused by the operational development and not exceeding this. Given that effects will be temporary and short-term and via the use of a CEMP will not exceed the operational effects assessed in this chapter, the construction phase effects have not been assessed further within this chapter.	Adverse
Operational E01-E42	Potential effects of light pollution from the proposed development including light from the Public Realm, Access roads and security areas, light spill from glazing and metal perforated panels, façade up-lighting and bowl lighting on surrounding ecological receptors.	Adverse
Operational R1 - R3	Potential effects of light pollution from the proposed development including light from the Public Realm, Access roads and security areas, light spill from glazing and metal perforated panels, façade up-lighting and bowl lighting on surrounding existing and committed residential receptors.	Adverse

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16.5 DESIGN INTERVENTIONS

DESIGN INTERVENTION	DESCRIPTION	REASON FOR INTERVENTION	FURTHER INFORMATION
Design of public realm lighting	Lighting is required for general open spaces, pedestrian circulation and amenity areas, access roads and car parks at the proposed development and has been designed in order to provide sufficient light for each of these areas.	Environmental protection and to comply with relevant ILP environmental zone limits.	Section 5.0, Appendix 16.1
Lighting to minimise upward light spill	The design of the floodlighting has been undertaken using specific products (Musco TLC-LED-1400 Luminaires) designed to minimise upward light spill with bright, uniform light directed onto the field and not spilling above it.	Environmental protection and to comply with relevant ILP environmental zone limits.	Section 5.0, Appendix 16.1
Signage Lighting	The external illuminated advertisements/signage recommendations as part of the ILP guidance note for the reduction of lighting pollution will be applied.	To comply with relevant ILP environmental zone limits	Section 6.0, Appendix 16.1
Lighting of the Hydraulic Tower	The best practice principles proposed for the tower have been designed in such a way to comply with the 'Bats and Artificial Lighting in the UK' guidance document.	To protect light sensitive bats roosting within the tower	Section 5.0 and Figure 7 in Appendix 16.1

16.6 ASSESSMENT PRE-MITIGATION (INCLUDING DESIGN INTERVENTIONS)

16.6.1 Proposed Development Scenario – Operational Phase (Event-day Lighting) Residential Existing and Committed

RECEPTOR(S) AFFECTED	PRE-CURFEW CRITERIA (LX)	POST -CURFEW CRITERIA (LX)	PREDICTED MODEL ILLUMINANCE (LX)	RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
R1	10.0	2	0.34	Low	Negligible	Negligible	No
R2	10.0	2	7.25	Low	Moderate	Minor	
R3	10.0	2	1.82	Low	Negligible	Negligible	
PR1	10.0	2	0.96	Low	Negligible	Negligible	
PR2	10.0	2	1.30	Low	Negligible	Negligible	
PR3	10.0	2	0.92	Low	Negligible	Negligible	
PR4	10.0	2	0.48	Low	Negligible	Negligible	
PR5	10.0	2	0.36	Low	Negligible	Negligible	
PR6	10.0	2	0.70	Low	Negligible	Negligible	
PR7	10.0	2	0.91	Low	Negligible	Negligible	
PR8	10.0	2	3.63	Low	Moderate	Minor	
PR9	10.0	2	8.76	Low	Moderate	Minor	
PR10	10.0	2	7.68	Low	Moderate	Minor	
PR11	10.0	2	6.30	Low	Moderate	Minor	

16.6.2 Proposed Development Scenario – Operational Phase (Event-day Lighting) Ecology

RECEPTOR(S) AFFECTED	ECOLOGICAL CRITERIA LUX	PREDICTED MODEL ILLUMINANCE (LX)			RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
		0.75	1.5	5.0				
Eco 1	2.0	0.18	0.13	0.13	High	Negligible	Minor	No
Eco 2	2.0	0.22	0.15	0.16	High	Negligible	Minor	
Eco 3	2.0	0.22	0.16	0.16	High	Negligible	Minor	
Eco 4	2.0	0.20	0.14	0.14	High	Negligible	Minor	
Eco 5	2.0	0.16	0.12	0.12	High	Negligible	Minor	
Eco 6	2.0	0.21	0.16	0.17	High	Negligible	Minor	

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RECEPTOR(S) AFFECTED	ECOLOGICAL CRITERIA	PREDICTED MODEL ILLUMINANCE (LX)			RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
	LUX	0.75	1.5	5.0				
Eco 7	2.0	0.18	0.12	0.12	High	Negligible	Minor	
Eco 8	2.0	0.22	0.18	0.19	High	Negligible	Minor	
Eco 9	2.0	0.23	0.16	0.17	High	Negligible	Minor	
Eco 10	2.0	0.28	0.23	0.25	Medium	Negligible	Negligible	
Eco 11	2.0	0.30	0.25	0.27	Medium	Negligible	Negligible	
Eco 12	2.0	0.29	0.28	0.28	Medium	Negligible	Negligible	
Eco 13	2.0	1.11	1.09	0.90	High	Negligible	Minor	
Eco 14	2.0	1.43	1.28	1.35	High	Negligible	Minor	
Eco 15	2.0	0.47	0.34	0.34	High	Negligible	Minor	
Eco 16	2.0	0.62	0.47	0.49	High	Negligible	Minor	
Eco 17	2.0	0.60	0.46	0.45	High	Negligible	Minor	
Eco 18	2.0	0.42	0.32	0.33	High	Negligible	Minor	
Eco 19	2.0	0.39	0.31	0.32	High	Negligible	Minor	
Eco 20	2.0	0.40	0.32	0.33	High	Negligible	Minor	
Eco 21	2.0	0.46	0.37	0.36	High	Negligible	Minor	
Eco 22	2.0	0.33	0.23	0.26	High	Negligible	Minor	
Eco 23	2.0	0.38	0.26	0.30	High	Negligible	Minor	
Eco 24	2.0	0.62	0.50	0.51	Medium	Negligible	Negligible	
Eco 25	2.0	0.64	0.54	0.59	Medium	Negligible	Negligible	
Eco 26	2.0	0.55	0.52	0.53	Medium	Negligible	Negligible	
Eco 27	2.0	1.03	0.97	0.98	High	Negligible	Minor	
Eco 28	2.0	1.67	1.40	1.33	High	Negligible	Minor	
Eco 29	2.0	1.41	1.18	1.13	High	Negligible	Minor	
Eco 30	2.0	1.26	0.90	0.74	High	Negligible	Minor	
Eco 31	2.0	0.90	0.76	0.75	High	Negligible	Minor	
Eco 32	2.0	1.02	0.95	0.86	High	Negligible	Minor	
Eco 33	2.0	0.95	0.79	0.81	High	Negligible	Minor	
Eco 34	2.0	0.56	0.17	0.97	High	Negligible	Minor	
Eco 35	2.0	10.90	9.18	2.43	Medium	Minor	Minor	
Eco 36	2.0	5.38	4.79	2.27	Medium	Minor	Minor	
Eco 37	2.0	2.60	2.53	2.53	High	Negligible	Minor	
Eco 38	2.0	3.97	4.26	3.40	Medium	Minor	Minor	
Eco 39	2.0	3.09	3.33	3.60	Medium	Minor	Minor	
Eco 40	2.0	3.41	3.54	3.96	Medium	Minor	Minor	
Eco 41	1.0	-	-	0.18	High	Negligible	Minor	



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RECEPTOR(S) AFFECTED	ECOLOGICAL CRITERIA LUX	PREDICTED MODEL ILLUMINANCE (LX)			RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
		0.75	1.5	5.0				
Eco 42	1.0	-	-	0.20	High	Negligible	Minor	

16.6.3 Proposed Development Scenario – Operational Phase (Non-Event day Lighting) Residential Existing and Committed

RECEPTOR(S) AFFECTED	PRE-CURFEW CRITERIA (LX)	POST -CURFEW CRITERIA (LX)	PREDICTED MODEL ILLUMINANCE (LX)	RECEPTOR SENSITIVITY	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
R1	10.0	2	0.14	Low	Negligible	Negligible	Yes – The closest lighting columns facing PR9, PR10 will be switched off during Post-curfew criteria. See figure 17 in Appendix 16.1
R2	10.0	2	1.8	Low	Negligible	Negligible	
R3	10.0	2	0.59	Low	Negligible	Negligible	
PR1	10.0	2	0.39	Low	Negligible	Negligible	
PR2	10.0	2	0.55	Low	Negligible	Negligible	
PR3	10.0	2	0.43	Low	Negligible	Negligible	
PR4	10.0	2	0.25	Low	Negligible	Negligible	
PR5	10.0	2	0.18	Low	Negligible	Negligible	
PR6	10.0	2	0.35	Low	Negligible	Negligible	
PR7	10.0	2	0.46	Low	Negligible	Negligible	
PR8	10.0	2	1.81	Low	Negligible	Negligible	
PR9	10.0	2	4.39	Low	Major	Moderate	
PR10	10.0	2	3.82	Low	Major	Moderate	
PR11	10.0	2	1.58	Low	Negligible	Negligible	

16.6.4 Proposed Development Scenario – Operational Phase (Non-Event Lighting) Ecology

RECEPTOR(S) AFFECTED	ECOLOGICAL CRITERIA LUX	PREDICTED MODEL ILLUMINANCE (LX)			RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
		0.75	1.5	5.0				
Eco 1	2.0	0.09	0.09	0.09	High	Negligible	Minor	No
Eco 2	2.0	0.1	0.1	0.1	High	Negligible	Minor	
Eco 3	2.0	0.1	0.1	0.1	High	Negligible	Minor	
Eco 4	2.0	0.09	0.09	0.09	High	Negligible	Minor	
Eco 5	2.0	0.08	0.08	0.08	High	Negligible	Minor	
Eco 6	2.0	0.1	0.1	0.1	High	Negligible	Minor	
Eco 7	2.0	0.08	0.08	0.08	High	Negligible	Minor	
Eco 8	2.0	0.1	0.1	0.11	High	Negligible	Minor	
Eco 9	2.0	0.11	0.11	0.11	High	Negligible	Minor	
Eco 10	2.0	0.14	0.13	0.14	Medium	Negligible	Negligible	
Eco 11	2.0	0.14	0.14	0.15	Medium	Negligible	Negligible	
Eco 12	2.0	0.14	0.14	0.15	Medium	Negligible	Negligible	
Eco 13	2.0	0.55	0.55	0.45	Medium	Negligible	Negligible	

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RECEPTOR(S) AFFECTED	ECOLOGICAL CRITERIA	PREDICTED MODEL ILLUMINANCE (LX)			RECEPTOR SENSITIVITY	IMPACT	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
	LUX	0.75	1.5	5.0				
Eco 14	2.0	0.71	0.64	0.67	Medium	Negligible	Negligible	
Eco 15	2.0	0.2	0.19	0.2	High	Negligible	Minor	
Eco 16	2.0	0.26	0.26	0.27	High	Negligible	Minor	
Eco 17	2.0	0.25	0.25	0.25	High	Negligible	Minor	
Eco 18	2.0	0.18	0.18	0.19	High	Negligible	Minor	
Eco 19	2.0	0.17	0.17	0.18	High	Negligible	Minor	
Eco 20	2.0	0.18	0.18	0.19	High	Negligible	Minor	
Eco 21	2.0	0.19	0.19	0.19	High	Negligible	Minor	
Eco 22	2.0	0.15	0.15	0.16	High	Negligible	Minor	
Eco 23	2.0	0.17	0.17	0.18	High	Negligible	Minor	
Eco 24	2.0	0.3	0.25	0.27	Medium	Negligible	Negligible	
Eco 25	2.0	0.31	0.25	0.28	Medium	Negligible	Negligible	
Eco 26	2.0	0.28	0.27	0.28	Medium	Negligible	Negligible	
Eco 27	2.0	0.32	0.38	0.4	High	Negligible	Minor	
Eco 28	2.0	0.56	0.55	0.54	High	Negligible	Minor	
Eco 29	2.0	0.48	0.47	0.46	High	Negligible	Minor	
Eco 30	2.0	0.41	0.35	0.32	High	Negligible	Minor	
Eco 31	2.0	0.32	0.32	0.32	High	Negligible	Minor	
Eco 32	2.0	0.37	0.36	0.35	High	Negligible	Minor	
Eco 33	2.0	0.31	0.32	0.33	High	Negligible	Minor	
Eco 34	2.0	0.22	0.06	0.45	Medium	Negligible	Negligible	
Eco 35	2.0	5.4	2.53	0.85	Medium	Negligible	Negligible	
Eco 36	2.0	1.91	1.03	0.55	Medium	Negligible	Negligible	
Eco 37	2.0	0.56	0.54	0.55	Medium	Negligible	Negligible	
Eco 38	2.0	1.34	1.51	1.06	Medium	Negligible	Negligible	
Eco 39	2.0	0.6	0.6	0.66	Medium	Negligible	Negligible	
Eco 40	2.0	0.69	0.79	0.84	Medium	Negligible	Negligible	
Eco 41	1.0	0.1	0.1	0.1	High	Negligible	Minor	
Eco 42	1.0	0.09	0.09	0.09	High	Negligible	Minor	

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16.7 MITIGATION & ENHANCEMENT MEASURES

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE / BENEFICIAL
Construction	Lighting associated with dock infill, demolition and other construction works on sensitive receptors surrounding the proposed development site during the construction phase	<p>The Construction Management Plan for the project produced by Laing O’Rourke states the following with regards to lighting; “All site lighting will be LED energy efficient and kept low level and angled to point into the site. Lighting will be switched off outside of working hours”</p> <p>Lighting effects associated with the construction phase will be mitigated by implementing good practice measures across the Site including implementing a CEMP.</p> <p>Measures to be implemented include but not limited to:</p> <ul style="list-style-type: none"><li>■ specified working hours, uses of lighting, locations of floodlights;</li><li>■ lighting to be switched off unless specifically needed; and</li><li>■ barriers to be erected to shield adjacent receptors where appropriate.</li></ul> <p>All on Site light installations will be positioned sensitively and targeted away from nearby receptors as identified above. Glare from floodlighting will be minimised by positioning lights to less than 70 degrees from the vertical uplift and will be directed into the Site. This will reduce upward light spill and subsequently reduce the impact on the Dark Sky environment. Further Construction mitigation measures can be found within the lighting technical report.</p>	CEMP, secured by planning condition, implemented by the contractor.	Minor	Adverse
Operational -Control of lighting during post-curfew periods (after 23:00)	Car park/ public realm lighting at the closest point to the committed Liverpool Waters would be turned off during post-curfew event conditions	To comply with relevant ILP environmental zone limits at committed receptors at Liverpool Waters.	Implemented into Lighting management once operational	Negligible	Negligible

16.8 ASSESSMENT POST MITIGATION

16.8.1 Proposed Development Scenario – Operational Phase (Event Day and Non-event Day Lighting after 11pm with Lights facing PR9/PR10 switched off) Residential Committed (Post Curfew)

RECEPTOR(S) AFFECTED	POST-CURFEW CRITERIA (LX)	PREDICTED MODEL ILLUMINANCE (LX)	RECEPTOR SENSITIVITY	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?
PR1	2.0	1.08	Low	Negligible	Negligible	No
PR2	2.0	1.42	Low	Negligible	Negligible	
PR3	2.0	1.01	Low	Negligible	Negligible	
PR4	2.0	0.52	Low	Negligible	Negligible	
PR5	2.0	0.26	Low	Negligible	Negligible	
PR6	2.0	0.30	Low	Negligible	Negligible	
PR7	2.0	0.25	Low	Negligible	Negligible	
PR8	2.0	0.25	Low	Negligible	Negligible	
PR9	2.0	1.55	Low	Negligible	Negligible	
PR10	2.0	1.30	Low	Negligible	Negligible	
PR11	2.0	1.58	Low	Negligible	Negligible	

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## 16.9 REFERENCES

[1] Ministry of Housing, Communities and Local Government, "National Planning Policy Framework," February 2019.

[2] Ministry of Housing, Communities and Local Government. (2014 - Last Updated 2019) Planning Practice Guidance -Light Pollution. [Online]. <https://www.gov.uk/guidance/light-pollution>

[3] Liverpool City Council. (2002) A Plan for Liverpool: Liverpool Unitary Development Plan. [Online]. <http://liverpool.gov.uk/council/strategies-plans-and-policies/environment-and-planning/plan-making-in-liverpool/current-local-plan-documents/unitary-development-plan/>

[4] Liverpool City Council, *The Draft Liverpool Local Plan - Submission Version.*, 2018. [Online]. <http://liverpool.gov.uk/council/strategies-plans-and-policies/environment-and-planning/plan-making-in-liverpool/current-local-plan-documents/local-plan/>

[5] Institution of Lighting Professionals. Guidance Notes for the Reduction of Obtrusive Light.

[6] Institution of Lighting Professionals. (2018) Guidance Note 08/18 Bats and Artificial Lighting in the UK.

[7] HM Government. (1990) Environmental Protection Act 1990.

[8] Department for the Environment, Food and Rural Affairs. (2006) Statutory Nuisance from Insects and Artificial Light, Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005. [Online]. <http://www.darkwightskies.com/wp-content/files/DEFRA%20-%20Statutory%20Nuisance.pdf>

[9] British Standards Institute. (2007) BS EN 12464-2: Lighting of Work Places - Outdoor Work Places.

[10] British Standards Institute. (2003) BS EN 13201-4: Road Lighting – Methods of Measuring Lighting Performance.

[11] British Standards Institute. (2013) BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas.

[12] Institution of Lighting Professionals. (2013) PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments.