

South Humber Bank Energy Centre Project

Planning Inspectorate Reference: EN010107

South Marsh Road, Stallingborough, DN41 8BZ

The South Humber Bank Energy Centre Order

Document Reference: 5.12 Indicative Lighting Strategy

The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009 Regulation 5(2)(q)



Applicant: EP Waste Management Ltd
Date: April 2020

DOCUMENT HISTORY

Document Ref	5.12 Indicative Lighting Strategy		
Revision	1.0		
Author	R Marr		
Signed		Date	April 2020
Approved By	K Cobb		
Signed		Date	April 2020
Document Owner	AECOM		

GLOSSARY OF ABBREVIATIONS AND DEFINITIONS

Abbreviation	Description
AGI	Above Ground Installation
ANO	Air Navigation Order
BS	British Standard
CAA	Civil Aviation Authority
CEMP	Construction Environmental Management Plan – a plan to outline how a construction project will avoid, minimise or mitigate effects on the environment and surrounding area.
CIBSE	The Chartered Institute of Building Services Engineers
CIE	Commission Internationale de L’Eclairage
curfew	The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by a government controlling authority, usually the local government
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
E	Illuminance – The quantity of light, or luminous flux falling on a unit area of a surface in Lux (lx). One Lux is equivalent to one lumen per square metre
Eh	Horizontal Illuminance in Lux (lx)
EIA	Environmental Impact Assessment. The assessment of the likely significant environmental effects of a development undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulation 2009.
EN	European
EPA	Environmental Protection Act
EPC	Engineering, procurement and construction
EPH	Energetický A Průmyslový Holding – the holding company of EP UK. EPH owns and operates assets in the Czech Republic, Slovak Republic, Germany, Italy, Hungary, Poland and the United Kingdom.
EPWM	EP Waste Management Limited (The Applicant)
ES	Environmental Statement – A report in which the process and results of an Environment Impact Assessment are documented.
Ev	Ev = Average Vertical Illuminance in Lux (lx)

Glare	A sensation that is produced by bright areas within the field of vision and may be experienced either as discomfort glare or disability glare. Glare caused by reflections in specular surfaces is usually known as veiling reflections or reflected glare
HGV	Heavy goods vehicle
I	Light Intensity in Candelas (cd)
ILP	The Institute of Lighting Professionals
L	Luminance in Candelas per square metre (cdm-2)
LX	the SI unit of illuminance, equal to one lumen per square meter.
LG	Lighting Guide
Lv	Veiling Luminance – A measure of the loss of visibility caused by the disability glare from the obtrusive light installation
NELC	North East Lincolnshire Council
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project – defined by the Planning Act 2008 and cover projects relating to energy (including generating stations, electric lines and pipelines); transport (including trunk roads and motorways, airports, harbour facilities, railways and rail freight interchanges); water (dams and reservoirs, and the transfer of water resources); waste water treatment plants and hazardous waste facilities. These projects are only defined as nationally significant if they satisfy a statutory threshold in terms of their scale or effect.
Photocell	A light sensing device used for switching/controlling luminaires
PINS	Planning Inspectorate
PA	Planning Act
Ra	Colour rendering measures the light source's ability to render colours correctly and is graded from 0-100. 8 colours act as controls against a pre-defined light source
RGL	Glare Rating Limit – A metric used for the assessment of glare
SHBEC	South Humber Bank Energy Centre (The Proposed Development)
SLL	Society of Light and Lighting
TI	Threshold Increment
ULR	Upward Lighting Ratio of the installation – the maximum permitted percentage of luminaire flux that goes directly into the sky. This metric is often used as a measure of 'sky-glow'
U ^o	Uniformity In order to perform visual tasks in illuminated areas, there should not be any great differences in brightness so that uniformity should not fall below $U^o = E_{min}/\bar{E}$
Veiling Luminance	(Lv) A measure of disability glare, superimposed over the eye's retinal image that is produced by stray light within the eye

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1.0 EXECUTIVE SUMMARY

- 1.1.1 This Indicative Lighting Strategy document discusses the type and level of lighting requirements of the proposed energy from waste plant referred to as South Humber Bank Energy Centre (the Proposed Development). An overview of the Proposed Development and site location is included in Section 2.
- 1.1.2 Section 3 provides a review of the relevant lighting standards and guidance. It discusses the legislative background on light pollution, the planning policy context in national policy statements and the National Planning Policy Framework, before discussing international and national guidance available on limiting light pollution, with reference to the Institute of Lighting Professionals' lighting limits.
- 1.1.3 Section 4 discusses the lighting standards and guidance on limiting light levels, with reference to the lighting requirements outlined in British Standards Institute BS EN 12464-2:2014. A summary of other guidance and reference documents is also discussed.
- 1.1.4 Section 5 outlines the sensitive receptors to light at the site and surrounding area, including residential, road, rail and ecological – these are mapped on Figure 1 for ease of reference.
- 1.1.5 Section 6 provides an overview of the obtrusive light level limits that will be followed to minimise light spill to each of the receptor categories outlined in Section 5. Sections 7 and 8 then discuss the Site lighting requirements for the construction and operational phases of the Proposed Development, respectively. A number of indicative impact avoidance measures are outlined in Section 9, which are to be adopted as good lighting design practice. Details will be confirmed at the detailed design stage.
- 1.1.6 In summary it is concluded that the Indicative Lighting Strategy provides an appropriate outline of the lighting requirements for the Proposed Development as part of the Application, and identifies potential measures to adequately control obtrusive light through detailed design of the lighting scheme. The controls are secured through a requirement in the Draft DCO (Document Ref. 2.1).

2.0 INTRODUCTION

2.1 Overview

- 2.1.1 This Indicative Lighting Strategy (Document Ref. 5.12) has been prepared on behalf of EP Waste Management Limited ('EPWM' or the 'Applicant'). It forms part of the application (the 'Application') for a Development Consent Order (a 'DCO'), that has been submitted to the Secretary of State (the 'SoS') for Business, Energy and Industrial Strategy, under section 37 of 'The Planning Act 2008' (the 'PA 2008').
- 2.1.2 maintenance of an energy from waste ('EfW') power station with a gross electrical output of up to 95 megawatts (MW) including an electrical connection, a new site access, and other associated development (together 'the Proposed Development') on land at South Humber Bank Power Station ('SHBPS'), South Marsh Road, near Stallingborough in North East Lincolnshire ('the Site').
- 2.1.3 A DCO is required for the Proposed Development as it falls within the definition and thresholds for a 'Nationally Significant Infrastructure Project' (a 'NSIP') under sections 14 and 15(2) of the PA 2008.
- 2.1.4 The DCO, if made by the SoS, would be known as the 'South Humber Bank Energy Centre Order' ('the Order').
- 2.1.5 Full planning permission ('the Planning Permission') was granted by North East Lincolnshire Council ('NELC') for an EfW power station with a gross electrical output of up to 49.9 MW and associated development ('the Consented Development') on land at SHBPS ('the Consented Development Site') under the Town and Country Planning Act 1990 on 12 April 2019. Since the Planning Permission was granted, the Applicant has assessed potential opportunities to improve the efficiency of the EfW power station, notably in relation to its electrical output. As a consequence, the Proposed Development would have a higher electrical output (up to 95 MW) than the Consented Development, although it would have the same maximum building dimensions and fuel throughput (up to 753,500 tonnes per annum (tpa)).

2.2 The Applicant

- 2.2.1 The Applicant is a subsidiary of EP UK Investments Limited ('EPUKI'). EPUKI owns and operates a number of other power stations in the UK. These include SHBPS and Langage (Devon) Combined Cycle Gas Turbine ('CCGT') power stations, Lynemouth (Northumberland) biomass-fired power station, and power generation assets in Northern Ireland. EPUKI also owns sites with consent for new power stations in Norfolk (King's Lynn 'B' CCGT) and North Yorkshire (Eggborough CCGT).
- 2.2.2 EPUKI is a subsidiary of Energetický A Průmyslový Holding ('EPH'). EPH owns and operates energy generation assets in the Czech Republic, Slovak Republic, Germany, Italy, Hungary, Poland, Ireland, and the United Kingdom.

2.3 The Proposed Development Site

- 2.3.1 The Proposed Development Site (the 'Site' or the 'Order limits') is located within the boundary of the SHBPS site, east of the existing SHBPS, along with

part of the carriageway within South Marsh Road. The principal access to the site is off South Marsh Road.

- 2.3.2 The Site is located on the South Humber Bank between the towns of Immingham and Grimsby; both over 3 km from the Site. The surrounding area is characterised by industrial uses dispersed between areas of agricultural land with the nearest main settlements being the villages of Stallingborough, Healing and Great Coates. The Site lies within the parish of Stallingborough although Stallingborough village lies over 2 km away.
- 2.3.3 The Site lies within the administrative area of NELC, a unitary authority. The Site is owned by EP SHB Limited, a subsidiary of EPUKI, and is therefore under the control of the Applicant, with the exception of the highway land on South Marsh Road required for the new Site access.
- 2.3.4 The existing SHBPS was constructed in two phases between 1997 and 1999 and consists of two CCGT units fired by natural gas, with a combined gross electrical capacity of approximately 1,400 MW. It is operated by EP SHB Limited.
- 2.3.5 The Site is around 23 hectares ('ha') in area and is generally flat, and typically stands at around 2.0 m Above Ordnance Datum (mAOD).
- 2.3.6 The land surrounding the Site immediately to the south, west and north-west is in agricultural use with a large polymer manufacturing site, Synthomer, and a waste management facility, NEWLINCS, both located to the north of the Site and also accessed from South Marsh Road. The estuary of the River Humber lies around 175 m to the east of the Site.
- 2.3.7 Access to the South Humber Bank is via the A180 trunk road and the A1173. The Barton railway line runs north-west to south-east between Barton-on-Humber and Cleethorpes circa 2.5 km to the south-west of the Site and a freight railway line runs north-west to south-east circa 300 m (at the closest point) to the Site.
- 2.3.8 A more detailed description of the Site is provided at Chapter 3: Description of the Proposed Development Site in the Environmental Statement ('ES') Volume I (Document Ref. 6.2).

2.4 The Proposed Development

- 2.4.1 The main components of the Proposed Development are summarised below:
- Work No. 1— an electricity generating station located on land at SHBPS, fuelled by refuse derived fuel ('RDF') with a gross electrical output of up to 95 MW at ISO conditions;
 - Work No. 1A— two emissions stacks and associated emissions monitoring systems;
 - Work No. 1B— administration block, including control room, workshops, stores and welfare facilities;
 - Work No. 2— comprising electrical, gas, water, telecommunication, steam and other utility connections for the generating station (Work No. 1);
 - Work No. 3— landscaping and biodiversity works;

- Work No. 4— a new site access on to South Marsh Road and works to an existing access on to South Marsh Road; and
- Work No. 5— temporary construction and laydown areas.

2.4.2 Various types of ancillary development further required in connection with and subsidiary to the above works are detailed in Schedule 1 of the DCO. A more detailed description of the Proposed Development is provided at Schedule 1 'Authorised Development' of the Draft DCO and Chapter 4: The Proposed Development in the ES Volume I (Document Ref. 6.2) and the areas within which each of the main components of the Proposed Development are to be built is shown by the coloured and hatched areas on the Works Plans (Document Ref. 4.3).

2.5 Relationship with the Consented Development

2.5.1 The Proposed Development comprises the works contained in the Consented Development, along with additional works not forming part of the Consented Development ('the Additional Works'). The Additional Works are set out below along with an explanation of their purpose.

2.5.2 a larger air-cooled condenser (ACC), with an additional row of fans and heat exchangers – this will allow a higher mass flow of steam to be sent to the steam turbine whilst maintaining the exhaust pressure and thereby increasing the amount of power generated;

- a greater installed cooling capacity for the generator – additional heat exchangers will be installed to the closed-circuit cooling water system to allow the generator to operate at an increased load and generate more power;
- an increased transformer capacity – depending on the adopted grid connection arrangement the capacity will be increased through an additional generator transformer operating in parallel with the Consented Development's proposed generator transformer or a single larger generator transformer. Both arrangements would allow generation up to 95 MW; and
- ancillary works – the above works will require additional ancillary works and operations, such as new cabling or pipes, and commissioning to ensure that the apparatus has been correctly installed and will operate safely and as intended.

2.5.3 The likely construction scenario is for work on the Consented Development (pursuant to the Planning Permission) to commence in Quarter 2 ('Q2') of 2020 and to continue for around three years. Following grant of a DCO for the Proposed Development (approximately halfway through the three-year construction programme), the Applicant would initiate powers to continue development under the Order instead of the Planning Permission. The Order includes appropriate powers and notification requirements for the 'switchover' between consents, to provide clarity for the relevant planning authority regarding the development authorised and the applicable conditions, requirements, and other obligations. Once the Order has been implemented the additional works would be constructed and the Proposed Development would be built out in full. The Proposed Development would commence operation in 2023.

2.5.4 Alternative construction scenarios, involving construction entirely pursuant to the Order, are also possible. Accordingly, three representative scenarios are described within Chapter 5: Construction Programme and Management in the ES Volume I (Document Ref. 6.2) and assessed in the Environmental Impact Assessment ('EIA').

2.6 The Purpose and Structure of this Document

2.6.1 The Proposed Development will require the installation of a number of luminaires to provide visual comfort, safety and operational performance, which in turn will have the potential to result in obtrusive light at receptor locations.

2.6.2 At the time of submission of the Application, the engineering, procurement and construction (EPC) contractor has not been appointed and detailed design work for the Proposed Development has not been carried out. Therefore, detailed information on the lighting to be used at the Proposed Development is not yet available. Nevertheless, it is recognised that to prevent potential nuisance from lighting, the Application should set out general proposals as to the purposes, types and levels of lighting required, to allow an appropriate level of control to be secured within the DCO. In addition, the environmental impact assessment (in particular the landscape and visual, and ecology assessments) assume that the measures to reduce obtrusive light at receptor locations as set out within this document are in place.

2.6.3 The Indicative Lighting Strategy is structured as follows:

- Sections 3 and 4 provide information on pertinent standards and guidance relating to obtrusive lighting and lighting design;
- Section 5 describes the type and location of the light sensitive receptors in relation to the Proposed Development;
- obtrusive light limits for the operational phase of the Proposed Development are defined in Section 6;
- lighting requirements for the construction and operational phases of the Proposed Development are discussed in Sections 7 and 8;
- measures to avoid obtrusive light impacts are summarised in Section 9; and
- Section 10 provides a summary and conclusions.

2.6.4 At the detailed design stage, a computational light modelling exercise will be undertaken. This will ensure that the Site is adequately lit and also that obtrusive light is suitably controlled, in accordance with this Strategy.

3.0 OBTRUSIVE LIGHT STANDARDS AND GUIDANCE

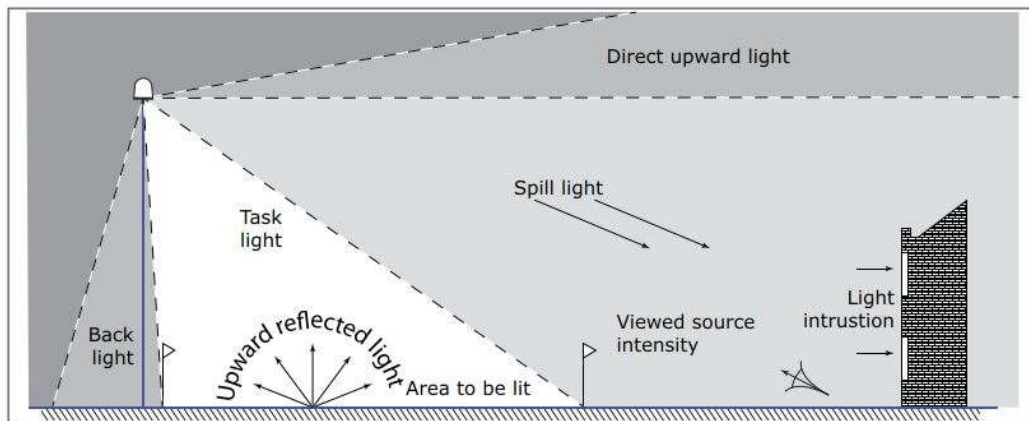
3.1 Definition of Obtrusive Light

3.1.1 Obtrusive Light, whether it keeps someone awake through a bedroom window or impedes their view of the night sky, is a form of pollution, which may also be a nuisance in law and which can be substantially mitigated without detriment to the lighting requirements of the task.

3.1.2 Obtrusive light (sometimes referred to as light pollution) may be thought of as having three components; and are all forms of obtrusive light which may cause nuisance to others, adversely affect fauna and flora and waste money and energy. The three components of obtrusive light are (see Plate 3.1):

- sky glow - light that contributes to the brightening of the night sky;
- glare – the uncomfortable brightness of a light source when viewed against a darker background; and
- light intrusion – the spilling of light beyond the boundary of the property or area being lit.

Plate 3.1 Types of Intrusive Light (adapted from Table 1a in ILP, 2020 guidance notes)



3.2 Legislative Background

3.2.1 Light pollution was introduced within the Clean Neighbourhoods and Environment Act 2005 as a form of statutory nuisance under the Environmental Protection Act 1990 ('the EPA') which was amended in 2006 to include the following nuisance definition:

“(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance”

3.2.2 Although light was described as having the potential to cause statutory nuisance (see also the Statutory Nuisance Statement (Document Ref. 5.9)), no prescriptive limits or rules were set for impact assessment purposes. Guidance notes for the Reduction of Obtrusive Light produced by the Institute of Lighting Professionals (ILP, 2020) have, therefore, been referred to for the purposes of this assessment.

- 3.2.3 Guidance produced on Section 101 to Section 103 of the Clean Neighbourhoods and Environment Act 2005 has also been referred to, which places a duty on local authorities to ensure that their areas are checked periodically for existing and potential sources of statutory nuisances – including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or reoccur, local authorities must issue an abatement notice (in accordance with Section 80(2) of the EPA 1990), requiring that the nuisance cease or be abated within a set timescale.
- 3.2.4 It is a requirement of the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations') that plans and projects are subject to an Appropriate Assessment if it is likely that they will lead to significant adverse effects on a Natura 2000 site (the collective name for European designated sites). Impacts from lighting are relevant to the Habitats Regulations Assessment (HRA) and lighting is considered in the HRA Signposting Document (Document Ref. 5.8), and also reported in within Chapter 10: Ecology in ES Volume I (Document Ref. 6.2).

3.3 Planning Policy Context

National Policy Statements

- 3.3.1 The Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change, 2011) reference states in section 5.6.4:

“The applicant should assess the potential for artificial light to have a detrimental impact on amenity, as part of the Environmental Statement.

In particular, the assessment provided by the applicant should describe:

- *the type, quantity and timing of emissions;*
- *aspects of the development which may give rise to emissions;*
- *premises or locations that may be affected by the emissions;*
- *effects of the emission on identified premises or locations; and*
- *measures to be employed in preventing or mitigating the emissions.”*

and

“The IPC [now Secretary of State] should satisfy itself that:

- *an assessment of the potential for artificial light...to have a detrimental impact on amenity has been carried out; and*
- *that all reasonable steps have been taken, and will be taken, to minimise any such detrimental impacts.”*

- 3.3.2 This Indicative Lighting Strategy for the Proposed Development considers the lighting requirements with reference to relevant standards and guidance, and measures to avoid adverse effects on sensitive receptors, as required by NPS EN-1.

National Planning Policy Framework

- 3.3.3 The National Planning Policy Framework (NPPF) Ministry of Housing, Communities and Local Government 2019 (MHCLG) states that the purpose of the planning system is to contribute to the achievement of sustainable development and constitute the Government's view on what sustainable development in England means in practice for the planning system. A principal concept contained within the NPPF is the presumption in favour of sustainable development and with regard to artificial lighting, the NPPF states:

“c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

International Guidance

- 3.3.4 The purpose of Commission Internationale De L'Eclairage (CIE) 150:Guide on the limitation of the effects of obtrusive light from outdoor lighting installations (CIE 150:2017) is to aid in formulating guidelines for assessing the environmental effects of exterior lighting and to provide limits for relevant lighting parameters to control the obtrusive effects of exterior lighting to tolerable levels. CIE 150:2017 refers to the potentially adverse effects of exterior lighting on both natural and man-made environments.
- 3.3.5 CIE 126: Guidelines for Minimising Sky Glow (CIE, 1997) gives general guidance for lighting designers and policy makers on the reduction of sky glow. The report gives recommendations about maximum permissible values for exterior lighting installations. These values are regarded as limiting values. Lighting designers should strive to meet the lowest criteria for the design. Practical implementation of the general guidance is left to national regulations.

National Guidance

- 3.3.6 The Institute of Lighting Professionals (ILP) Guidance notes for the reduction of obtrusive light (2020) (GN01/20) propose lighting guidance and criteria for local authorities with a recommendation that these are incorporated at the local plan level.
- 3.3.7 GN01/20 reflect the changes in international guidance regarding obtrusive light as detailed in CIE 150:2017:- Guide on the limitation of the effects of obtrusive light from outdoor lighting installations. It also considers industry comment regarding the assessment and definition of obtrusive lighting.
- 3.3.8 This strategy has been based upon GN01/20 criteria. GN01/20 should be used in conjunction with CIE 150:2017 and CIE 126:1997 (described in the International Guidance sub-section above) and not as a replacement for the procedures contained therein.

ILP Criteria (General Observer)

- 3.3.9 The ILP has developed an Environmental Zone classification system for the categorisation of receptor locations. This is summarised in Table 3.1 below.
- 3.3.10 It is recommended that local planning authorities specify the environmental zones given in Table 3.1 for exterior lighting control within their development plans

Table 3.1: ILP Environmental Zone Classifications

ZONE	SURROUNDING	LIGHTING ENVIRONMENT	EXAMPLES
E0	Protected	Dark (SQM 20.5+)	UNESCO Starlight Reserves, IDA Dark Sky Parks 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 areas	Town/ city centres with high levels of night-time activity

3.3.11 For each Environmental Zone, obtrusive light limits for exterior lighting installations are specified (refer to Table 3.2 and Table 3.3).

3.3.12 These limits are intended to support decision makers in establishing whether obtrusive lighting is detrimental to local amenity or a potential statutory nuisance.

Table 3.2: (Table 3 of ILP GN01:20) Maximum values of vertical illuminance on properties.

LIGHTING TECHNICAL PARAMETER	APPLICATION CONDITIONS	ENVIRONMENTAL ZONES				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (Ev)	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 3.3: (Table 3 of ILP GN01:20 and Table 2 of CIE:150) Maximum values of Upward Light Ratio (ULR).

LIGHTING TECHNICAL PARAMETER	ENVIRONMENTAL ZONES				
	E0	E1	E2	E3	E4
Upward light Ratio (ULR)/%	0	0	2.5	5	15

Recommended Maximum Values of Light Parameters for the Control of Obtrusive Light

- 3.3.13 To avoid intrusion or nuisance lighting to surrounding properties, limits apply to nearby dwellings/ premises or potential dwellings/ premises and specifically windows; the values are the summation of all lighting installations.
- 3.3.14 Table 3.2 can also be considered for the management of spill light; however, designers must consider the task performance requirements of any adjacent lit areas and ensure that any spill light does not adversely affect these performance parameters as this could affect their safe use. This may result in a need to minimise spill and intrusive lighting values to less than might be expected for the environmental zone within which the installation lies.
- 3.3.15 The limits for the luminous intensity of bright luminaires are dependent on the viewing distance d (between the observer and the bright luminaire(s)) and the projected area A_p , of the bright part of the luminaire in the direction of the observer. Table 4 on page 10 of ILP GN01/20 gives values for luminous intensity of bright luminaires.
- 3.3.16 Table 3.2 above refers pre and post curfew conditions. The Proposed Development will operate 24 hours a day, so lighting is required for safety and security throughout the entire period of darkness or reduced daylight. For this reason it is considered that imposing a lighting curfew for obtrusive lighting would be unreasonable and would have the potential to conflict with Site health and safety. This is in line with ILP GN01/20, which states on page 13:

“These notes are intended as guidance only and the application of the values given in the various tables should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are

therefore no substitute for professionally assessed and designed lighting, where the various and maybe conflicting visual requirements need to be balanced’.

- 3.3.17 BS EN 12464-2: 2014 Light and Lighting at work places (BSI, 2014) states the following with regard to obtrusive light , pre and post curfew regulations, *“In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits”.*

4.0 LIGHTING DESIGN STANDARDS AND GUIDANCE

- 4.1.1 There are published standards and guidance for most lighting tasks, adherence to which will help mitigate obtrusive lighting aspects.
- 4.1.2 Described below are certain extracts of standards and guidance expected to be used when developing the exterior lighting design for the proposed development.

4.2 British Standards

BS EN 12464-2: 2014 'Light and lighting – Lighting of workplaces. Part 2: Outdoor work places' (British Standards Institute, 2014)

- 4.2.1 BS EN 12464-2:2014 specifies lighting requirements for outdoor work places, which meet the needs for visual comfort and performance. All usual visual tasks are considered. Criteria that are potentially relevant to the Site are given in Tables 4.1 to 4.5 below, where U^o refers to the uniformity of illumination, RGL refers to the Glare Rating Limit (a metric for the assessment of glare), and Ra relates to colour rendering.

Table 4.1: BS EN 12464-2: 2014 General requirements for areas and for cleaning at outdoor work places

TYPE OF AREA, TASK OR ACTIVITY	AVERAGE EM LX	U ^o	RGL	RA
Walkways exclusively for pedestrians	5	0.25	50	20
Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0.40	50	20
Regular vehicle traffic (max. 40 km/h)	20	0.40	45	20
Pedestrian passages, vehicle turning, loading and unloading points	50	0.40	50	20
Cleaning and servicing	50	0.25	50	20

Table 4.2: BS EN 12464-2: 2014 General requirements for building sites

TYPE OF AREA, TASK OR ACTIVITY	AVERAGE EM LX	U°	RGL	RA
Clearance, excavation and loading	20	0.25	55	20
Construction areas, drain pipes mounting, transport, auxiliary and storage tasks	50	0.40	50	20
Framework element mounting, light reinforcement work, wooden mould and framework mounting, electric piping and cabling	100	0.40	45	40
Element jointing, demanding electrical, machine and pipe mountings	200	0.50	45	40

Table 4.3: BS EN 12464-2: 2014 General requirements for industrial sites and storage areas

TYPE OF AREA, TASK OR ACTIVITY	AVERAGE EM LX	U°	RGL	RA
Short-term handling of large units and raw materials, loading and unloading of solid bulk goods	20	0.25	55	20
Continuous handling of large units and raw materials, loading and unloading of freight, lifting and descending location for cranes, open loading platforms	50	0.40	50	20
Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	100	0.50	45	20
Demanding electrical, machine and piping installations, inspection	200	0.50	45	60

Table 4.4: BS EN 12464-2: 2014 General requirements for parking areas

TYPE OF AREA, TASK OR ACTIVITY	AVERAGE EM LX	U ^o	RGL	RA
Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25	55	20
Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0.25	50	20
Heavy traffic, e.g. parking areas of major shopping centres	20	0.25	50	20

Table 4.5: BS EN 12464-2: 2014 General requirements for power, electricity, gas and heat plants

TYPE OF AREA, TASK OR ACTIVITY	AVERAGE EM LX	U ^o	RGL	RA
Pedestrian movements within electrically safe areas	5	0.25	50	20
Handling of servicing tools, coal	20	0.25	55	20
Overall inspection	50	0.40	50	20
General servicing work and reading of instruments	100	0.40	45	40
Repair of electric devices	200	0.50	45	60

4.3 Guidance and Reference Documents

The Society of Light & Lighting (SLL) Handbook (2018)

- 4.3.1 Aimed at lighting practitioners, specifiers and students of lighting, this handbook summarises the fundamentals of light and vision, the technology of lighting and guidance on a wide range of applications, both interior and exterior. It is intended to act as a link between the Society of Light and Lighting (SLL)'s 'Code for Lighting' and the Lighting Guides (LG). The handbook also includes a chapter dedicated to exterior workplace lighting (Chapter 24) which has been referred to in the preparation of this Strategy. Criteria that are potentially relevant to the Site are given in Tables 4.6 and 4.7 below.

Table 4.6: SLL Handbook illuminance recommendations for exterior workplaces

ACTIVITY	MINIMUM MAINTAINED ILLUMINANCE (LX)	ILLUMINANCE UNIFORMITY
Safe pedestrian movement in low risk areas	5	0.25
Safe movement of slow vehicles	10	0.4
Safe movement in medium risk areas	20	0.4
Normal traffic	20	0.4
Very rough work	20	0.25
Rough work	50	0.25
Safe movement in high risk areas	50	0.4
Normal work	100	0.5
Fine work	200	0.5

Table 4.7: SLL Handbook recommendations for loading

APPLICATION	HORIZONTAL ILLUMINANCE (LX)	HORIZONTAL ILLUMINANCE UNIFORMITY	MAXIMUM GLARE RATING	MINIMUM COLOUR RENDERING INDEX
Loading bay	150	0.4	25	40
Outdoor loading area	100	0.5	45	20

The SLL Code for Lighting: 2018 (SLL, 2018)

4.3.2 The SLL Code for Lighting provides information on three areas of lighting practice: 1) a summary of the effects of lighting on task performance, behaviour, safety, perception, health, and its financial and environmental costs; 2) a compendium of lighting recommendations relevant to the UK, and 3) detailed descriptions of the calculations required for quantitative lighting design.

- 4.3.3 The lighting requirements for workplaces as set out in the SLL Code are very much aligned with those as set out in BS EN 12464-2: 2014 and so are not expanded on in this section.

4.4 Civil Aviation Authority Requirements

Civil Aviation Authority (CAA) Policy Statement 'Lighting of En-Route Obstacles and Onshore Wind Turbines' (CAA, 2010)

- 4.4.1 The Civil Aviation Authority (CAA) Policy Statement provides an overview of the more generic need for aviation warning lighting on 'tall structures' and onshore wind turbines as set out at Article 219 of the UK Air Navigation Order (ANO) 2009. The CAA Policy Statement clarifies, "*Notwithstanding the Article 219 requirements, some structures of a height of less than 150 metres might need aviation warning lights*". Whilst structures of such heights are not routinely lit for civil aviation purposes, it is possible that aviation stakeholders, including the CAA, may make a case for aviation warning lighting where a structure is considered, by virtue of its location and nature, a significant navigational hazard.
- 4.4.2 Consented Development planning condition 23 confirms the requirements for notification and lighting of tall structures in consultation with the CAA, and this will also be secured by DCO requirement.

Air Navigation: The Order and the Regulations CAP 393 (CAA, 2014a)

- 4.4.3 Article 219 of the Air Navigation Order sets out the requirements for the lighting of en-route obstacles and is reproduced below:

"(1) The person in charge of an en-route obstacle must ensure that it is fitted with medium intensity steady red lights positioned as close as possible to the top of the obstacle and at intermediate levels spaced so far as practicable equally between the top lights and ground level with an interval of not more than 52 metres.

(2) The person in charge of an en-route obstacle must, subject to paragraph (3), ensure that by night the lights required to be fitted by this article are displayed.

(3) In the event of the failure of any light which is required by this article to be displayed by night the person in charge must repair or replace the light as soon as reasonably practicable.

(4) At each level on the obstacle where lights are required to be fitted, sufficient lights must be fitted and arranged so as to show when displayed in all directions.

(5) In any particular case the CAA may direct that an en-route obstacle must be fitted with and must display such additional lights in such positions and at such times as it may specify.

(6) A permission may be granted for the purposes of this article for a particular case or class of cases or generally.

(7) This article does not apply to any en-route obstacle for which the CAA has granted a permission to the person in charge permitting that person not to fit and display lights in accordance with this article.

(8) In this article, an ‘en-route obstacle’ means any building, structure or erection, the height of which is 150 metres or more above ground level, but it does not include a building, structure or erection:

(a) Which is in the vicinity of a licensed aerodrome; and

(b) to which section 47 of the Civil Aviation Act 1982(a) (warning of presence of obstructions near licensed aerodromes) applies.”

4.4.4 Article 221 of the Air Navigation Order sets out the restrictions on lights liable to endanger and is reproduced below:

“(1) A person must not exhibit in the United Kingdom and light which:

(a) by reason of its glare is liable to endanger aircraft taking off from or landing at an aerodrome; or landing at an aerodrome; or

(b) by reason of its liability to be mistaken for an aeronautical ground light is liable to endanger aircraft.

(2) If any light which appears to the CAA to be a light described in paragraph (1) is exhibited, the CAA may direct the person who is the occupier of the place where the light is exhibited or who has charge of the light, to take such steps within reasonable time as are specified in the direction:

(a) to extinguish or screen the light; and

(b) to prevent in the future, the exhibition of any other light which may similarly endanger aircraft.

(3) The direction may be served either personally or by post, or by affixing it in some conspicuous place near to the light to which it relates.”

CAP 1096: Guidance to Crane Operators on Aviation Lighting and Notification (CAA, 2014b)

4.4.5 CAP 1096 sets out the requirements for aviation warning lighting to cranes and sets out the potential requirement for crane activity to be notified to the aviation community.

4.4.6 As the details of aviation lighting requirements are set out in legislation and CAA guidance, and will be secured by a DCO requirement, aviation lighting is not discussed further in this Indicative Lighting Strategy.

5.0 OBTRUSIVE LIGHT RECEPTORS

5.1 Introduction

5.1.1 There are several categories of potentially light sensitive receptors: these being, residential, ecological, road and rail. As the Proposed Development design progresses it is proposed to undertake a computational light modelling exercise in order to ensure that obtrusive light is suitably controlled. This section sets out indicative light-sensitive receptor locations for consideration when undertaking such an obtrusive light assessment. The indicative light-sensitive receptors are set out in Figure 1 (see Appendix 1) of this report.

5.2 Residential Receptors

5.2.1 Residential light-sensitive receptor locations have been identified at the following locations:

- Mauxhall Farm, approximately 3 km north-west of the Site;
- Poplar Farm, approximately 1 km west of the Site;
- Brickfield House, South Marsh Road, approximately 1.6 km west of the Site;
- Primrose Cottage, approximately 1.3 km west of the Site;
- Cress Cottage, approximately 1.3 km west of the Site; and
- Beechwood Farm Carvery, approximately 1.85 km south of the Site.

5.3 Road Receptors

5.3.1 Road user receptor locations have been identified in the vicinity of the Site, including at the following locations:

- A180 running south-east to north-west of the Site;
- South Marsh Road, running north-east and north-west of the Site; and
- Hobson Way, running north-west to south-west of the Site.

5.4 Ecological Receptors

5.4.1 Ecological receptors have been identified and are summarised below. Further details can be found in Chapter 10: Ecology within ES Volume I (Document Ref. 6.2).

Statutory Designated Sites within 10 km

5.4.2 Humber Estuary is approximately 175 m east of the Site. The Estuary is designated as a European Marine Site (EMS), encompassing designations as a Special Area of Conservation (SAC), SPA and Ramsar site because of its estuarine and intertidal habitats that support internationally important populations of wintering birds

Statutory National and Local Nature Conservation Designations within 2 km

5.4.3 The Humber Estuary is also designated as a Site of Special Scientific Interest (SSSI), the boundary of which largely overlaps with the SPA, SAC and Ramsar designated site boundaries. There are no other statutory national or local nature conservation designations within 2 km of the Site.

Non Statutory Nature Conservation Designations within 2 km

- 5.4.4 There are Four Local Wildlife Sites (LWS) were identified in the desk study area These are:
- Healing Cress Beds Stallingborough LWS – approximately 0.7 km south-west;
 - Sweedale Croft Drain LWS – approximately 0.8 km south-east;
 - Laporte Road Brownfield Site LWS – approximately 1 km north-west; and
 - Fish Ponds to the West of Power Station, Stallingborough LWS – approximately 1 km south-west.
- 5.4.5 In addition, two Sites of Nature Conservation Importance (SNCI) were identified; Field West of Power Station Stallingborough SNCI (approximately 30 m south-west) and North Moss Lane Meadow SNCI (approximately 0.9 km north-west). No citations were available for the SNCIs, because they have not been surveyed against the revised Greater Lincolnshire Nature Partnership (GLNP) LWS selection criteria (the LWS designation supersedes the SNCI designation). These sites are therefore not considered further because there is no information available on them.

Protected/ Notable Species and Habitats (including habitats functionally linked to the SPA)

Field to the South - Wintering Birds

- 5.4.6 The large arable field to the south of the Site, for which the southern boundary is defined by Oldfleet Drain, is referred to in ES Volume I Chapter 10: Ecology as 'Field 37'.
- 5.4.7 This field regularly supports lapwing, curlew and golden plover across the winter months, and is noted to be an important field in the South Humber Bank survey area for high tide roosting, loafing and feeding birds. Although outside the Humber Estuary SPA/ Ramsar designated site boundary, this field is considered to be functionally linked to the SPA/ Ramsar.
- 5.4.8 This field is evaluated as being of Regional importance to nature conservation for its wintering and passage bird assemblage, for which several key SPA/ Ramsar species have been recorded in numbers above the 1% threshold of the Humber Estuary population. The eastern part of this field has been allocated in the NELC Local Plan for the development of strategic mitigation habitat for waterbirds as part of the South Humber Gateway strategic mitigation strategy that forms Policy 9 of the Local Plan.

Field to the North - Wintering Birds

- 5.4.9 Two large arable fields to the north of the Proposed Development (on the north side of South Marsh Road) are referred to Fields 30 and 31.
- 5.4.10 These fields are also considered to be functionally linked to the Humber Estuary, and although in the most recent survey years they have supported very low numbers of birds, peak counts in 2006/07 for golden plover and lapwing were particularly significant.

5.4.11 This field is evaluated as being of Regional importance to nature conservation for its wintering and passage bird assemblage, for which several SPA/ Ramsar species have been recorded in numbers well above the 1% threshold of the Humber Estuary population.

5.5 Rail Receptors

5.5.1 Rail receptors have been identified at the following locations:

- Habrough, Stallingborough, Healing and Great Coates Stations and connecting rail lines run south-west of the Site;
- a rail line running from the south-east to north-west, leading to Immingham Dock, lies approximately 400 m to the west of the Site.

6.0 OPERATIONAL OBTRUSIVE LIGHT LIMITS

6.1 Proposed Obtrusive Light Limits (Residential Receptors)

6.1.1 It is considered appropriate to categorise the Site as being within an Environmental Zone 3 (see Table 3.1).

6.1.2 Therefore, the proposed permitted obtrusive light level limits for residential receptors are as follows:

- an on-site Upward Lighting Ratio of 5% (see Table 3.3);
- a light intrusion limit at residential windows of 10 lx (see Table 3.2); and
- a source intensity limit when viewed from receptor locations of 10 kcd.

6.2 Proposed Obtrusive Light Limits (Road Users)

6.2.1 Roads adjacent to the Site have the potential to be affected by disability glare and veiling luminance associated with the Proposed Development lighting scheme. The constraints criteria to be adopted will be confirmed during the detailed design stage, upon further analysis that considers the lighting classes already in place. It is important that a suitably segmented analysis is undertaken that accounts for variations in lighting class along the various stretches of road.

6.2.2 The proposed permitted obtrusive light level limits for road users are as follows:

- no road lighting: threshold increment of 15% based on adaptation luminance of 0.1 cd/m² and veiling luminance of 0.04;
- ME6/ ME5: threshold increment of 15% based on adaptation luminance of 1 cd/m² and veiling luminance of 0.25;
- ME4/ ME3: Threshold increment of 15% based on adaptation luminance of 2 cd/m² and veiling luminance of 0.40; and
- ME2/ ME1: Threshold increment of 15% based on adaptation luminance of 5 cd/m² and veiling luminance of 0.84.

6.3 Proposed Obtrusive Light Limits (Railway)

6.3.1 The existing railway has the potential to be affected by glare associated with the Site lighting scheme. The proposed permitted obtrusive light level limits for the railway are as follows:

- glare rating limit of RGL = 50 to general railway areas; and
- glare rating limit of RGL = 45 to coupling areas.

6.4 Proposed Obtrusive Light Limits (Ecological Receptors)

6.4.1 The Site lighting scheme will be designed to generally minimise any impact on ecological receptors by means of minimising illuminance at the receptors, along with the 'viewed' source intensity. The permitted obtrusive light level limits for the ecological receptors will be reviewed at detailed design stage and updated if necessary following pre-construction ecological surveys. As indicative constraints for the Proposed Development's detailed lighting design, the following criteria are suggested as being reasonable at this stage.

- target illuminance levels of less than 1 lx;
- an upper limit illuminance level of 3 lx; and
- source intensity values not to exceed ILP human receptor criteria.

7.0 SITE LIGHTING REQUIREMENTS (CONSTRUCTION PHASE)

7.1 Introduction

- 7.1.1 To enable people to perform temporary outdoor visual tasks safely, efficiently and accurately, adequate and appropriate lighting must be provided during the construction phase.
- 7.1.2 The degree of visibility and comfort required in a wide range of outdoor work places is governed by the type and duration of activity.
- 7.1.3 Exterior lighting can be covered in the following categories:
- amenity lighting, where such lighting is necessary to the enhancement of the business function;
 - accent or task lighting, this may comprise of lighting that is intended to provide additional light over a specific small area in order to carry out or promote the activities of a business; and
 - exterior flood and area lighting, which is intended to provide downward light onto horizontal or near horizontal surfaces, including roadways, car parks, paths, stairs, ramps, gardens and other open spaces for security. This includes illuminated bollards and post-top lanterns.
- 7.1.4 This section sets out the general activities anticipated during the construction phase, although this strategy will be developed further by the EPC contractor.

7.2 Recommended Lighting Values (Construction)

- 7.2.1 Potential obtrusive light effects on the receptors described in Section 5 during construction will be minimised through the controlled application of lighting in accordance with current best practice, and as set out in the Construction Environmental Management Plan (CEMP) for the Proposed Development (see the Framework CEMP at Appendix 5A of the ES, Document Ref. 6.4). The final CEMP will be submitted and approved in accordance with a DCO requirement.
- 7.2.2 The figures quoted in Section 7.3 below are derived from BS EN 12464-2 2014 Light and Lighting of Workplace and SLL Handbook 2018.

7.3 Site Lighting Levels (Construction)

- 7.3.1 An indication of appropriate lighting levels recommended for specific tasks/ areas around the Site is provided as follows:
- temporary designated walkways exclusively for pedestrians: 5 lx maintained average horizontal illuminance, 0.25 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;
 - temporary site roads for regular vehicle traffic (max. 40 km/h): 20 lx maintained average horizontal illuminance, 0.40 minimum uniformity, glare rating limit of RGL 45, minimum colour rendering index of Ra 20;
 - temporary pedestrian routes intersecting and bounding site roads, HGV parking area - pedestrian passages, vehicle turning, loading and unloading points: 50 lx maintained average horizontal illuminance, 0.40 minimum

uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;

- temporary car parks: 10 lx maintained average horizontal illuminance, 0.25 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;
- clearance, excavation and loading areas: 20 lx maintained average horizontal illuminance, 0.25 minimum uniformity, glare rating limit of RGL 55, minimum colour rendering index of Ra 20;
- temporary plant rooms and services areas: 100 lux horizontal on open floors; 200 lux vertical across all control panels, switches, valves, warning signs and on the surfaces of equipment where maintenance is carried out;
- temporary loading bays: 150 lux horizontal on floor and any ramps; uniformity 0.4;
- construction areas, drain pipes mounting, transport, auxiliary and storage tasks: 50 lx maintained average horizontal illuminance, 0.40 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;
- framework element mounting, light reinforcement work, wooden mould and framework mounting, electric piping and cabling: 100 lx maintained average horizontal illuminance, 0.40 minimum uniformity, glare rating limit of RGL 45, minimum colour rendering index of Ra 40;
- element jointing, demanding electrical, machine and pipe mountings: 200 lx maintained average horizontal illuminance, 0.50 minimum uniformity, glare rating limit of RGL 45, minimum colour rendering index of Ra 40;
- gatehouse, weighbridges – normal work: 100 lx maintained average horizontal illuminance, 0.4 minimum uniformity; a dn
- temporary security lighting for large open areas, building façades and fences:- 5 lx maintained average, 0.1 minimum uniformity. Higher illuminance may be required if work is being carried out.

8.0 SITE LIGHTING REQUIREMENTS (OPERATIONAL PHASE)

8.1 Introduction

- 8.1.1 To enable people to perform outdoor visual tasks safely, efficiently and accurately, especially during the night, adequate and appropriate lighting will be provided during the operational phase. Operation will take place 24 hours a day.
- 8.1.2 The degree of visibility and comfort required in a wide range of outdoor work places is governed by the type and duration of activity.
- 8.1.3 Exterior lighting can be covered in the following categories:
- amenity lighting, where such lighting is necessary to the enhancement of the business function;
 - accent or task lighting, this may comprise of lighting that is intended to provide additional light over a specific small area in order to carry out or promote the activities of a business; and
 - exterior flood and area lighting, which is intended to provide downward light onto horizontal or near horizontal surfaces, including roadways, car parks, paths, stairs, ramps, gardens and other open spaces for security. This includes illuminated bollards and post-top lanterns.
- 8.1.4 This section sets out the general activities anticipated for the operational site lighting. Further details will be confirmed at the detailed design stage.

8.2 Recommended Lighting Values (Operational)

- 8.2.1 The indicative operational lighting strategy for the Site is given in the form of a lighting requirements specification below. Details will be confirmed at the detailed design stage, and submitted for approval in accordance with a DCO requirement.
- 8.2.2 The figures quoted in Section 8.3 below are derived from BS EN 12464-2 2014 Light and Lighting of Workplaces and SLL Handbook 2018

8.3 Site Lighting Levels (Operational)

- 8.3.1 An indication of recommended lighting levels for specific anticipated tasks/ areas around the Site is provided as follows:
- designated walkways exclusively for pedestrians: 5 lx maintained average horizontal illuminance, 0.25 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;
 - site roads - regular vehicle traffic (max. 40 km/h): 20 lx maintained average horizontal illuminance, 0.40 minimum uniformity, glare rating limit of RGL 45, minimum colour rendering index of Ra 20;
 - pedestrian routes intersecting and bounding site roads, HGV parking area - pedestrian passages, vehicle turning, loading and unloading points: 50 lx maintained average horizontal illuminance, 0.40 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;

- car parks: 10 lx maintained average horizontal illuminance, 0.25 minimum uniformity, glare rating limit of RGL 50, minimum colour rendering index of Ra 20;
- loading bays: 150 lux horizontal on floor and any ramps; uniformity 0.4;
- plant rooms and services areas: 100 lux horizontal on open floors; 200 lux vertical across all control panels, switches, valves, warning signs and on the surfaces of equipment where maintenance is carried out;
- gatehouse, weighbridges – normal work: 100 lx maintained average horizontal illuminance, 0.4 minimum uniformity; and
- security lighting for large open areas, building façades and fences:- 5 lx maintained average, 0.1 minimum uniformity. Higher illuminance may be required if work is being carried out.

8.3.2 In addition to the recommended lighting levels above, a part-lighting strategy may be suitable for the Site. This would not only result in reduced potential for obtrusive lighting impacts due to a reduced 'on-time' of Site lighting, but will also serve to reduce energy costs. The lighting could be split into three or more circuits: for example, 1) general flood lighting, 2) security lighting, and 3) amenity lighting. Amenity lighting could be split further into amenity for deliveries and amenity for staff. This would allow a part lighting strategy to be adopted across the Site, thus minimising or preventing light impacts on nearby receptors.

8.3.3 During hours of darkness, a 20% - 40% reduction in total lumen output is likely to be achieved (compared to a standard lighting scheme without a part-lighting strategy). The exact luminaires to be switched off or dimmed during these times will be carefully considered, once staff working patterns and areas to be accessed have been finalised, to ensure that suitable lighting levels are maintained.

8.3.4 Photocells and motion detectors are to be used as a primary control on all exterior lighting so that no luminaires will remain switched on during hours of daylight. In addition, several programmable seven day time clocks will be included so that amenity lighting circuits can be programmed to turn on/ off as and when needed to suit the delivery times and staff working patterns.

8.3.5 A manual override switch will be provided to override all control of exterior lighting in the event of an emergency.

9.0 GENERAL OBTRUSIVE LIGHT IMPACT AVOIDANCE MEASURES

9.1.1 Through the adoption of good lighting design practice, incorporating general obtrusive lighting impact avoidance measures such as those described below, obtrusive light will be suitably controlled. It should be noted that the measures listed below are indicative only, and the final measures will be subject to detailed design.

9.1.2 General obtrusive lighting impact avoidance measures may include:

- adopting a part lighting strategy;
- using photocells as a primary means of control;
- where possible, adopting LED luminaires to control obtrusive light due to its high directionality and accordingly the achievable ratio of useful to spill light;
- careful consideration to column locations and luminaire positioning;
- adopting luminaires with minimal upward lighting ratio;
- not tilting luminaires to have uplift above the horizontal;
- optimising column heights;
- minimising building mounted luminaire heights;
- angling building mounted luminaires to limit the level of building luminance;
- adopting lamps with similar correlated colour temperatures;
- using shields and baffles to luminaires; and
- lighting the site boundaries with low power periphery lighting with an asymmetric forward optic having good rear spill cut-off characteristics.

10.0 SUMMARY AND CONCLUSIONS

- 10.1.1 This Indicative Lighting Strategy document has been prepared in order to support the Application for the Proposed Development.
- 10.1.2 At the time of submission of the Application, the EPC contractor has not been appointed and detailed design work for the Proposed Development has not been carried out. Therefore, detailed information on the lighting to be used at the Proposed Development is currently unknown. Nevertheless, it is recognised that potential nuisance from lighting of the Proposed Development may be a concern for local communities and certain statutory consultees. Therefore, the Applicant has commissioned this strategy in order to provide some definition to the type and level of lighting that will be employed at the Proposed Development.
- 10.1.3 This document therefore sets out the indicative lighting strategy in the form of an outline lighting requirements specification for site lighting. It also addresses obtrusive lighting by means of specifying off-site obtrusive lighting constraints.
- 10.1.4 The report also identifies potential measures and guidance that may be taken to control obtrusive light through the detailed design of the Proposed Development lighting scheme.
- 10.1.5 In summary it is concluded that the Indicative Lighting Strategy provides an appropriate outline of the lighting requirements for the Proposed Development as part of the Application, and identifies potential measures to adequately control obtrusive light through detailed design of the lighting scheme. The controls are secured through a requirement in the Draft DCO (Document Ref. 2.1).

11.0 REFERENCES

- British Standards Institute (2014) BS EN 12464-2: 2014 'Light and lighting – Lighting of workplaces. Part 2: Outdoor work places'.
- Civil Aviation Authority (2010) Policy Statement: Lighting of En-Route Obstacles and Onshore Wind Turbines.
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- Commission Internationale De L'Eclairage (2017) CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations.
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- Department for Environment, Food and Rural Affairs (2013) Artificial Light in the Environment
- Institute of Lighting Professionals (2020) Guidance Notes for the Reduction of Obtrusive Light
- Society of Light and Lighting (2018) The Society of Light & Lighting Handbook.

APPENDIX 1: SENSITIVE RECEPTORS

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THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

- LEGEND**
- Order Limits
 - 2km Study Area
 - ★ Residential Receptor
 - ★ Beechwood Carvery
 - Road
 - Railway Track
 - Field Boundary
 - National Designated Sites Within 2km:
 - Priority Habitat
 - Non-Statutory designated Sites Within 2km:
 - Local wildlife site
 - Site of nature conservation interest
 - Statutory Designated Sites:
 - RAMSAR
 - Special area of conservation
 - Special protection area
 - Site of special scientific interest

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Purpose of Issue
SHBEC INDICATIVE LIGHTING STRATEGY

Client
EP WASTE MANAGEMENT LTD

Project Title
SOUTH HUMBER BANK ENERGY CENTRE DCO

Application Document Ref
POTENTIAL LIGHTING SENSITIVE RECEPTORS

Drawn BO	Checked LC	Approved RM	Date 10/03/2020
AECOM Internal Project No. 60580855		Scale @ A3 1:20,000	

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Drawing Ref
FIGURE 1

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