

East Anglia ONE
Offshore Windfarm

East Anglia ONE Offshore Windfarm

Operational Artificial Lighting Emissions
Plan

Requirements 21 (3) & (4) Work No. 39
Final for Discharge

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REVISION CONTROL

Revision and Approvals					
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1	08-01-2016	Interim for Consultation	BS	AS	GG
2	22-07-2016	Final for Approval	IEC	RM	PS
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Abbreviations

AC – Alternating Current
BS – British Standard
CfD – Contracts for Difference
DC – Direct Current
DCO – Development Consent Order
DECC – Department for Energy and Climate Change
EA – Environment Agency
EAOL – East Anglia ONE Limited
EIA – Environmental Impact Assessment
ELO – Environmental Liaison Officer
EMS – Environmental Management System
ES – Environmental Statement
GIS – Gas-Insulated Switchgear
GW – Gigawatts
LED – Light Emitting Diode
MW - Megawatts
NE – Natural England
PIR – Passive Infra Red
TV – Television
W – Watt
VP- Visual Point

1 Introduction

1.1 Project Overview

1. East Anglia ONE Limited (EAOL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Energy and Climate Change (DECC) on June 17th 2014 for East Anglia ONE Offshore Wind Farm (EA ONE). The DCO granted consent for the development of a 1200MW offshore windfarm and associated infrastructure.
2. In February 2015 EAOL secured a Contract for Difference (CfD) award to build a 714MW project and ScottishPower Renewables announced its role in leading East Anglia ONE towards construction. In April 2015 EAOL submitted a non-material change application to DECC to amend the consent from direct current (DC) technology to alternating current (AC). In March 2016 DECC authorised the proposed change application and issued a Corrections and Amendments Order.
3. The onshore construction works associated with EA ONE comprise of the following, which is based on the assumption that the AC technology with a capacity of 714MW and transmission connection of 680MW;
 - A landfall site at Bawdsey, Suffolk
 - Up to six underground cables, approx. 37km in length
 - Up to four cable ducts for the future East Anglia THREE project
 - An onshore substation located at Bramford next to existing National Grid infrastructure
4. This document relates to the onshore substation located near Bramford, Suffolk, to the north of the existing National Grid substation.

1.2 Scope and Purpose

5. The scope of this plan is the management and mitigation of artificial light emissions during the operational phase of the EA ONE onshore substation, herein referred to as 'the substation', defined as Work No. 39 in the DCO.
6. This Artificial Lighting Emissions Plan sets out mitigation measures to be applied to the operational substation (Work No. 39) to reduce the potential for significant impacts from light emissions during its operation. This plan has been produced to fulfil DCO Requirements 21 (3) and (4):

21. - (3) Work No. 39 shall not be commenced until a written scheme for the management and mitigation of artificial light emissions during the operation of Work No. 39, including measures to minimise lighting pollution and the hours of lighting, has been submitted to and approved in writing by the relevant planning authority.

- (4) The approved scheme for the management and mitigation of artificial light emissions must be implemented before and maintained during the operation of Work No. 39.
7. The purpose of this Artificial Lighting Emissions Plan for Work No 39 is to ensure compliance with relevant European and UK legislation, environmental commitments and environmental best practice. It sets out the lighting management measures to be implemented before and maintained during the operation of the substation.

2 Guidelines and Standards

8. The operational lighting strategy for the substation has been developed in accordance with the following guidance and standards:
- The Institution of Lighting Engineers (2000) *Guidance notes for the reduction of light pollution*¹. The Institution of Lighting Engineers, UK;
 - The Institution of Lighting Professionals (2011) *Guidance Notes for the Reduction of Obtrusive Light GN01:2011*². The Institution of Lighting Professionals, UK;
 - British Standard BS EN 12464-2:2014 Light and lighting. Lighting of work places. Outdoor work places;
 - British Standard BS 5489-1:2013 Code of practice for the design of road lighting. Lighting of roads and public amenity areas;
 - Bat Conservation Trust (2014). Artificial lighting and wildlife: Interim Guidance – Recommendations to help minimise the impact of artificial lighting. BCT. London.

¹ <https://www.gov.uk/sitecollectiondocuments/planning%20and%20building/SPG%20Lightpollution%202002.pdf>

² <https://www.theilp.org.uk/documents/obtrusive-light/guidance-notes-light-pollution-2011.pdf>

3 Identification of Potentially Sensitive Receptors

3.1 Introduction

9. During the operational phase of the substation external lighting is required for the following purposes:
- Flood lighting required for the illumination of areas for safe access and egress, repair and maintenance activities; car park areas and security purposes; and
 - Lighting for plant and equipment.
10. Lighting from these sources has the following potential impacts:
- Intrusive lighting impacting nearby residents causing disturbance and annoyance, particularly with regard to sleep patterns;
 - Impact on ecological sensitive receptors from lighting spillage;
 - Impact on visual amenity due to the illumination of the night sky; and
 - Lighting on surrounding roads distracting passing motorists.

3.2 Potentially sensitive receptors to artificial light emissions

11. Potentially sensitive receptors that could be affected by operational external artificial lighting of the substation include visual and ecological receptors.

3.2.1 Visual receptors

12. The potentially sensitive visual receptors are the visual receptors in close proximity to the onshore substation. These include occupiers of residential properties, users of the outdoors and agricultural workers. A review to identify potentially sensitive receptors that could be affected by operational artificial lighting has been undertaken.
13. The following viewpoints, presented in Table 3-1, were identified as potential visual receptor view points as part of the Landscape and Visual Amenity Impact assessment (Environmental Statement, Volume 4, 7.5.2 Chapter 29 Seascape, Landscape and Visual Amenity and 7.5.2a Figure 29.2) within 1km distance from the substation and as such have been considered as visual receptors. The locations of these viewpoints are presented on Figure 1.

Table 3-1: Viewpoints within 1 km buffer from Landscape and Visual Amenity Impact assessment (ES)

No.	Location	Description	Distance (km) and Direction of View	Easting	Northing
VP5	Orchard Lands, Near Canes Farm	Residential and outdoor recreation	1.02km, NE	609260	245168
VP6	Near Hill Farm	Residential and outdoor recreation	0.67km, NE	609025	245913
VP11	Near Bullenhall Farm	Residential and outdoor recreation	0.88km, W	610525	246413
VP12	Near Tye House	Residential and outdoor recreation	0.98km, SW	609920	247058

14. In addition to these viewpoints further visual receptors have been identified in the form of the nearest residential properties to the substation, which are Woodlands Farm, Bullenhall Farm and Hill Farm, all located at more than 500m from the onshore substation. The locations of these properties are presented on Figure 1.

3.2.2 Ecological receptors

15. Spill and intrusive lighting from operational external lighting could potentially disturb ecologically sensitive receptors which includes nocturnal species. At the substation, the key ecologically sensitive receptors from the operational artificial lighting emissions were identified in the Environmental Statement as badgers, bats and birds (breeding and non-breeding birds). In addition, pre-construction surveys carried out in 2015 showed presence of Great Crested Newts (GCN) in the waterbody approximately 100m to the north of the onshore substation and an area of GCN compensation habitat have been proposed 50m to the northeast of the onshore substation (see Figure 1).
16. All species of British bat are protected by The Wildlife and Countryside Act 1981 (as amended) extended by the Countryside and Rights of Way Act 2000. Bats are also European Protected Species listed on The Conservation of Habitats and Species Regulations 2010. Different bat species vary in their sensitivity to lighting. *Myotis/Plecotus* species are the most light-sensitive species which have been recorded in the survey area. The impact of the lighting has the potential to reduce the available foraging and roosting habitat for bats as the lighting may deter bat from using a hedgerow or reaching a favour roosting site.
17. Trees with potential bat features were identified in the initial 2012 Surveys with the results updated during surveys undertaken in 2015. Trees identified as potential bat features are presented on Figure 1 and Figure 2. One tree with potential bat features was recorded within the 100m distance from the onshore substation, identified as TN244 on Figure 2. Tree TN244 was assessed as having 'low' bat roost potential during the preliminary bat roost surveys in 2012 and was reassessed in May 2015 which confirmed that its status of 'low' potential was still valid. As such no further surveys or mitigation specific to this tree were required due to the low potential for impacting on roosting bats. It is however recognised there is potential for wider foraging and commuting activities of bats in the area surrounding the substation.
18. Pre-construction badger surveys have been carried out in 2016 and some outlier badger setts were identified within 100m distance from the onshore substation. As badger setts locations are sensitive information, there are not shown on Figure 1.
19. This information provided in this document does not take into account any potential mitigation measure that could be implemented in the construction of the substation (i.e. closure of a badger set or relocation potential sensitive receptors).

4 Scheme Description

4.1 Introduction

20. The operational artificial lighting scheme of the substation has been designed taking into account the objectives to achieve the required performance outcomes as described in Table 4-1:

Table 4-1: Objectives and performance outcomes

OBJECTIVES	PERFORMANCE OUTCOMES
<ul style="list-style-type: none"> • Lighting installations are positioned so as to avoid spillage of light directly towards roads, residences, other potential viewing locations or ecological receptors. • Vegetation screens will be utilised, where required, to minimise the impact of any light spillage in the direction of roads, residences, other viewing locations or ecological receptors. • Total night time glow from operational external lighting is minimised. 	<ul style="list-style-type: none"> • Sufficient lighting is provided on site to ensure that safety is not compromised. • External lighting complies with relevant European and UK legislation, DCO Requirement, environmental commitments as set out in the ES and environmental and construction best practice. • The safety of external traffic on nearby roads is not affected by light sources on site. • Light emissions impacts from site on nearby sensitive visual receptors is avoided or minimised where avoidance is not possible. • Light emissions impacts from site on ecological receptors is avoided or minimised where avoidance is not possible.

4.2 Scheme description

21. External lighting of the substation during the operational phase will be only required for the following purposes:
- access and egress;
 - security lighting;
 - car park lighting; and
 - repair/maintenance.
22. At night substation lighting will be switched off as the substation will be unmanned. For emergency works, or work requiring perception of the detail, portable luminaires to suit the work will be used. Lights will only be used during periods where and when work is to be carried out (i.e. maintenance) and lights will be positioned to suit the work.
23. No additional lighting is to be located along Bullen Road or along the additional access roads leading to or within the substation.
24. Exterior lighting will allow safe access and emergency egress for personnel (including from buildings) and safe operation of equipment, subject to the following minimum requirements:
- Maintained average illuminance 6 lux.
 - Minimum maintained point illuminance 2.5 lux.
25. The substation lighting system will be controlled manually via switches within the buildings. Exterior lighting to buildings will be controlled by PIR-based motion detectors (passive infrared).

26. Luminaires selected will ensure reduction in spill light and glare and sky glow. Luminaires shall be Light Emitting Diode (LED) type with directable light output to minimise light pollution.
27. Exterior lighting to buildings will incorporate LED luminaires at the perimeters, and those located at the access doors will be connected to PIR detectors. An internal wall override switch shall be fitted adjacent to the entrance door to enable constant operation.
28. A summary of the number, height and type of luminaries that will be installed at the onshore substation is described below:
 - 38 LED 90W Floodlights with floodlighting peak 45° from vertical (Type OLSYS2 40L70 740 CL1 A/S).
 - 34 Floodlights located in 15 columns of 6m height; and
 - 4 wall mounted floodlights: 2 in the GIS room (6/7m high) and 2 in the control room (4.5m high).
 - 99 wall mounted lights (COOPER 2 x 13W LED GLR-2L-CWPC) and emergency lights (EBGLR-2L-CWPC).
29. The location and specification details of the luminaries are presented in Appendix 1 Technical Drawings and Luminaries' Specifications.

4.3 Hours of lighting

30. At night substation lighting will be switched off as the substation will be unmanned. Lights will only be used during periods where work is to be carried out (i.e. maintenance/repair).

5 Mitigation

5.1 Embedded mitigation measures

31. The substation has been carefully designed to reduce the potential for significant impacts and to minimise impacts on the environment and includes a series of embedded mitigation measures. The mitigation measures that have been adopted as part of the project design to avoid or minimise potential impacts from operational artificial lighting on the sensitive receptors are presented in Table 5-1:

Table 5-1: Embedded mitigation measures related to potential operational external lighting impacts.

Mitigation Measures	Rationale
Careful siting of the onshore substation to the north of existing Bramford substation to gain maximum benefit from screening effect provided by existing woodland.	Minimise Impact.
Onshore substation to be constructed on lowered ground levels.	Minimise Impact.
Pre-construction surveys for protected species and Schedule 1 birds.	To ensure mitigation is based on up to date survey data.
Proposed lighting to be limited to internal access roads and walkways with task lighting operated only when and where it is required for specific inspection or maintenance work. Lights would be installed on columns or attached to buildings and lamps would have directional or horizontal cut-off reflectors.	Minimise Impact.
Directional lighting and cowls will be used.	Minimise light spill on adjacent habitats and minimise impacts to birds and bats.
Operational lighting shall be positioned and directed to minimise nuisance to footpath users, residents, to minimise distractions to passing drivers on adjoining public highways and to minimise skyglow, so far as reasonably practicable.	Minimise Impact on visual receptors.
Proposed lighting scheme will comply with best practice guidance and standards (See Section 2).	Minimise Impact.

5.2 Operational mitigation measures

34. Where, after taking into account embedded mitigation, significant impacts would be unavoidable then additional mitigation is proposed, these are presented in the following table:

Table 5-2: Mitigation measures related to potential operational external lighting impacts.

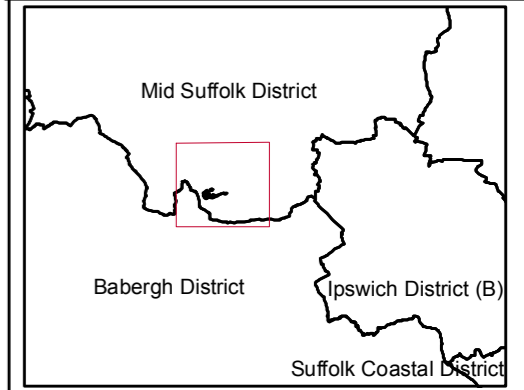
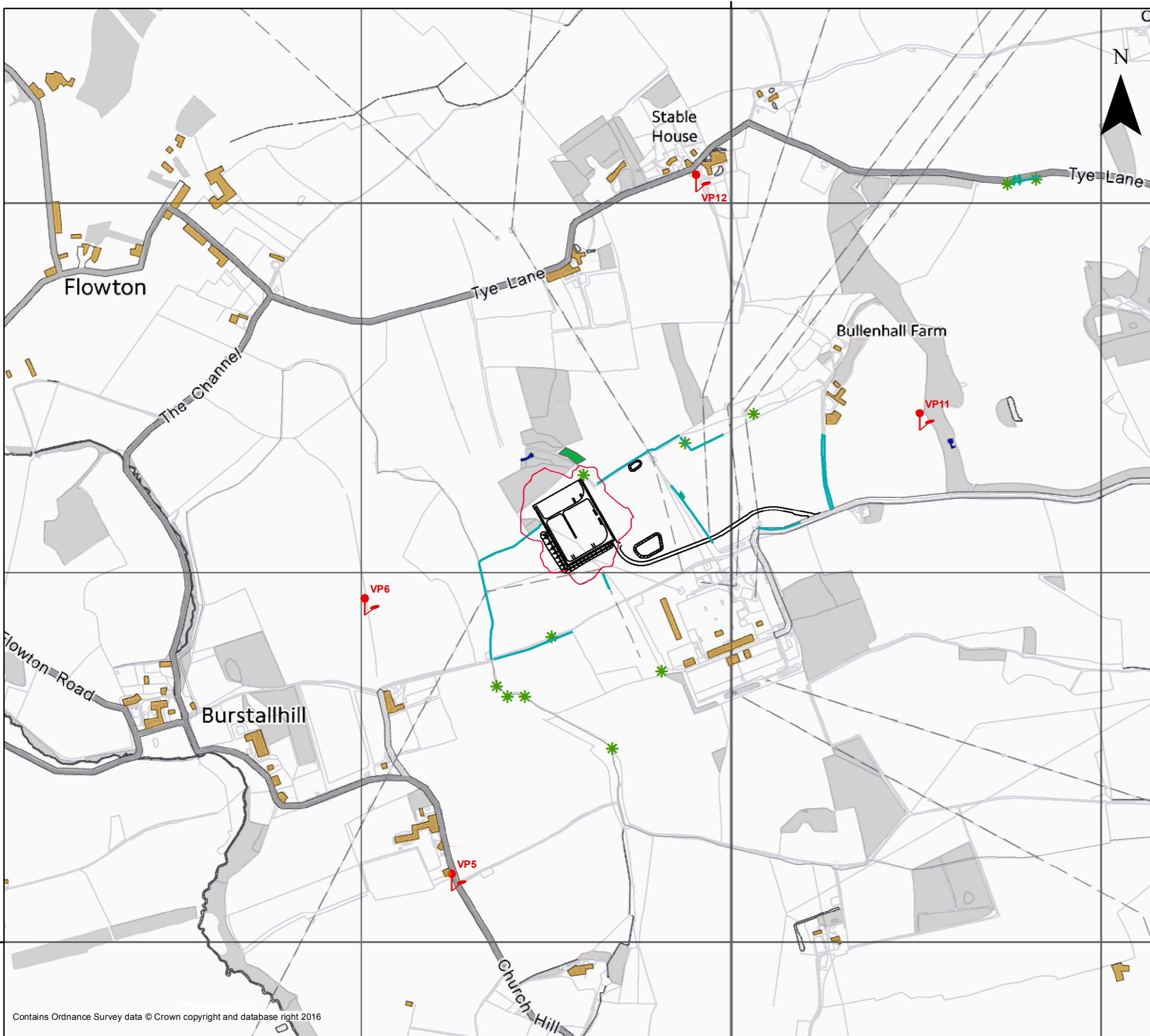
Mitigation Measures	Rationale
External lighting at the onshore substation to be limited to internal access roads and walkways with task lighting operated only when and where it is required for specific inspection or maintenance work.	Minimise Impact on visual receptors.
If any additional temporary external lights are required during periods where work is to be carried out, lights will be positioned to suit the work and luminaires selected will ensure reduction in spill light and glare and sky glow.	Minimise Impact.

6 Operation

37. As described in Section 4, the substation will be unmanaged and lights will be switched off. Lights will only be used during periods where maintenance or emergency works is to be carried out.
38. The predicted spill lighting levels for the proposed lighting scheme described in Section 4 have been estimated³. A predicted spill light level of zero lux at a 1.5m high reference point on a horizontal plane is reached at approximately 73m from the substation. The zero lux contour calculated at 1.5m high reference point is shown in Figure 1 and Appendix 1. A further lux plan showing additional isolux contours at spill levels gradient: 0, 0.5, 1.1, 2.1 isolux, is presented in Figure 2.
39. The closest properties are located at approximately 500m from the substation and therefore they will not be affected by spill lighting from the substation.
40. There are some potential ecological receptors close to the onshore substation area as described in Section 3.2.2. The closest tree to the substation is considered to have 'low' potential for bats however it is recognised that there is potential for wider foraging and commuting activities of bats in the surrounding area, and impacts to these, have been considered. The proposed scheme has therefore taken into account the '*Recommendations to help minimise the impact artificial lighting (Bat Conservation Trust)*' with the use of directional LED lighting and cowls to remove/minimise any potential impacts to bats within the locality. Furthermore the substation will be only lit during periods where maintenance or emergency works are carried out.
41. Provided all mitigation measures described in this document are in place, the residual impact of the operational artificial lighting emissions on the near sensitive receptors will be not significant.

³ DIALux Software has been used.

Figure 1 Predicted Spill Lighting Levels



Legend

- Predicted 0 Lux Countour at 1.5m Height
- East Anglia One Substation
- * Trees with potential Bat Features
- Visual Points (Environmental Statement)
- Buildings (OS Maps)
- ◆ Tree Replanting
- Tree Replanting RPA
- Existing Hedgerow
- Great Crested Newts Ponds (Pre Construction survey 2015)
- Proposed Great Crested Newts Compensation habitat (2016)

1:10,000
SCALE @ A3
0 75 150 300
Metres

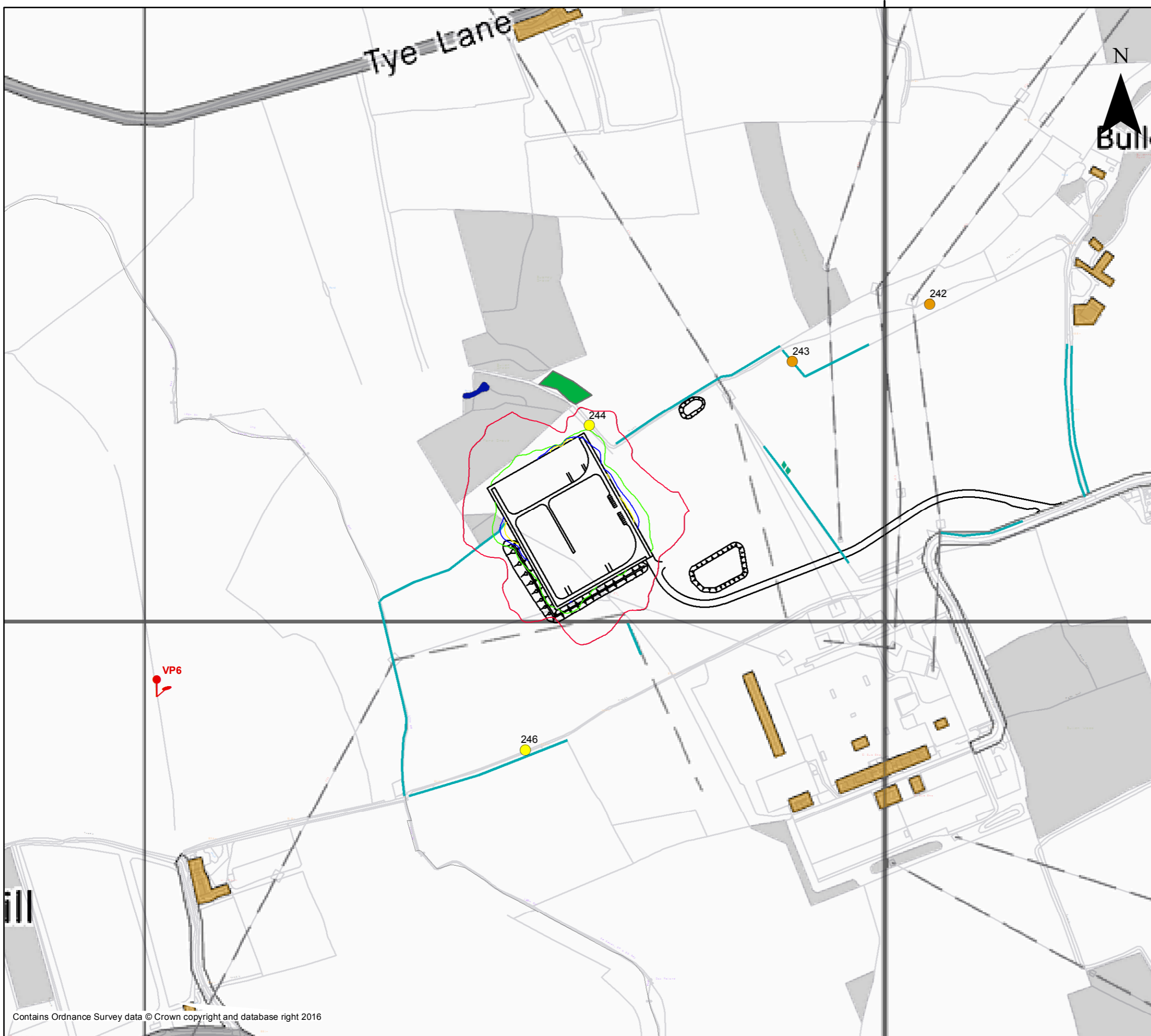
DATE: 03/10/2016 EA1-CON-F-GBE-008556

FIGURE 1: Predicted Spill Lighting Levels
Artificial Lighting Emission Plan
Substation

East Anglia ONE Offshore Windfarm

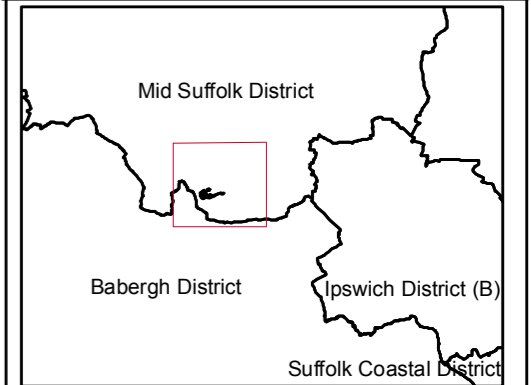


Figure 2 Predicted Spill Lighting Levels Additional Information



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610000



Legend

Spill Levels

- 0 Lux
- 0.5 Lux
- 1.1 Lux
- 2.1 Lux

Trees with potential Bat Features

- Low Potential
- Moderate Potential
- East Anglia One Substation
- Visual Points (Environmental Statement)
- Buildings (OS Maps)
- ◆ Tree Replanting
- Tree Replanting RPA
- Existing Hedgerow
- Great Crested Newts Ponds (Pre Construction survey 2015)
- Proposed Great Crested Newts Compensation habitat (2016)

1:5,000
SCALE @ A3

0 25 50 100

Metres

DATE: 03/10/2016 EA1-CON-F-GBE-008556

FIGURE 2: Predicted Spill Lighting Levels

Artificial Lighting Emission Plan
Substation

East Anglia ONE Offshore Windfarm





Appendix 1 Technical Drawings and Luminaries Specifications

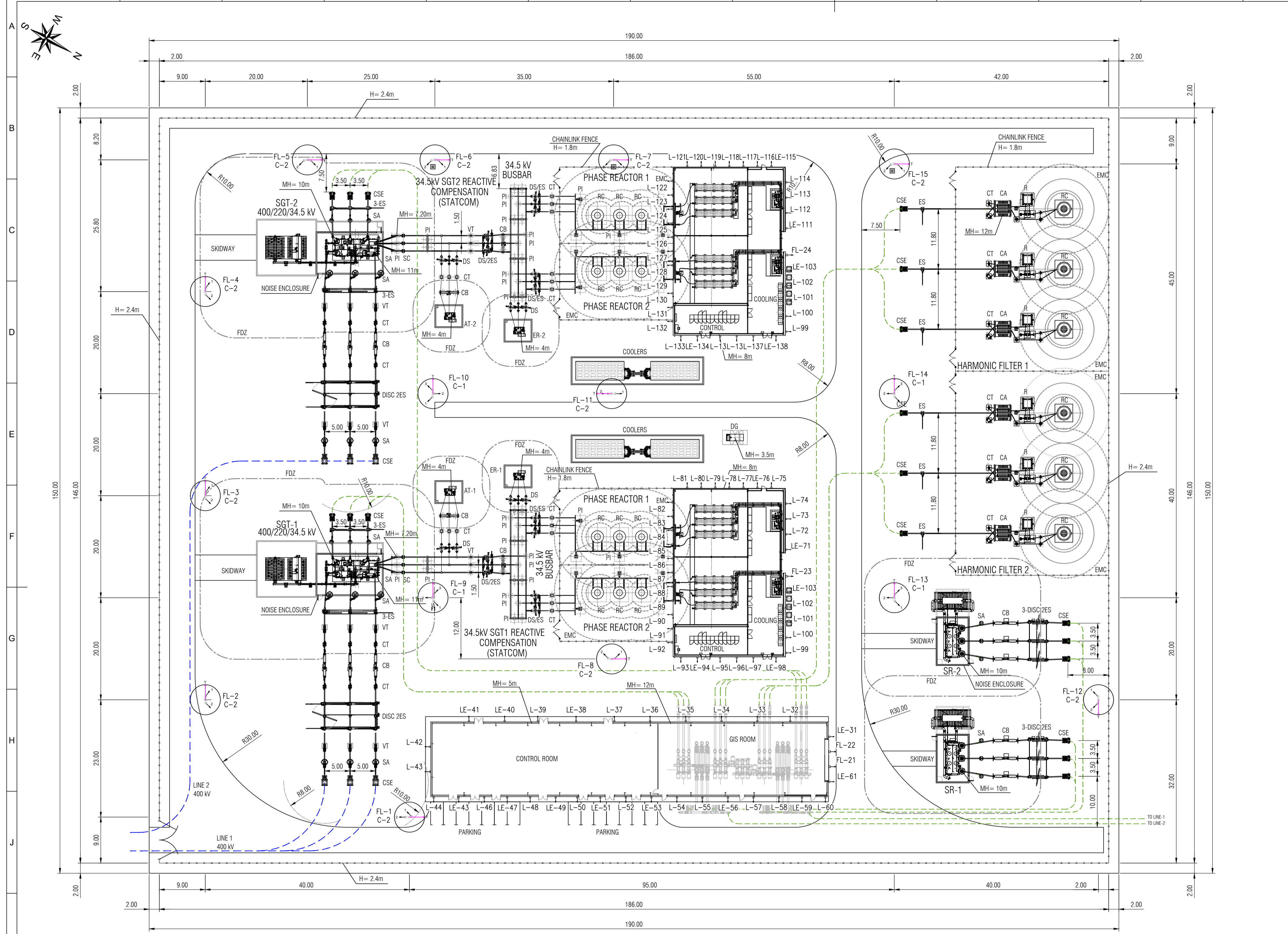
ONSHORE SUBSTATION 400/220/34.5kV

LIGHTING SYSTEM

SHEET ID.		DESCRIPTION	DATE
N°	REV.		
00	0	INDEX SHEET	28/06/16
01	0	COMPOUND LIGHTING LAYOUT	28/06/16
02	0	LIGHTING LEVEL LAYOUT - 0 LUX CURVE	28/06/16
03	0	FLOODLIGHTING COLUMN GENERAL ARRANGEMENT	28/06/16

0a	28/06/2016	SFC	MCB	EECA	MVFL	FIRST ISSUE FOR TENDER
REV.	DATE	Drawn	Prep.	Checked	Approv.	REASON. STATUS OF REVISION
Client :						Client drawing nº :
						Other ref. of client :
General Contractor / Engineering :						QUALITY LIST: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
						DESIGN VERIFICATIONS: LEVEL 1 <input type="checkbox"/> LEVEL 2 <input checked="" type="checkbox"/> NOT APPL. <input type="checkbox"/>
						Approval / Release for Construction : According stamps on drawing
Author :		Project :			Classification :	
Adícora		OSS EAST ANGLIA ONE				
		Titles :			Type of Document :	
		GRID TRANSMISSION SYSTEM ONSHORE SUBSTATION 400/220/34.5kV INDEX SHEET				
First issue :		INITIAL ISSUE			Sheet: 00 Next Sh: 01	
Sign:	Drawn	Prep.	Check.	App.	Draw. nº : EA1-GRD-DO-ADI-010849	
Acron:					Replaces : SCALE : NTS SIZE: A3	

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SCHEDULE OF SYMBOLS		
QUANTITY	SYMBOL:	DESCRIPTION:
4	C-1	COLLAPSIBLE 6m HEAVY DUTY MID-HINGED FLOODLIGHT COLUMN WITH FLANGE PLATE AND DOUBLE FIXED MOUNTING BRACKET AS ABACUS (3 LUMINAIRE)
11	C-2	COLLAPSIBLE 6m HEAVY DUTY MID-HINGED FLOODLIGHT COLUMN WITH FLANGE PLATE AND DOUBLE FIXED MOUNTING BRACKET AS ABACUS (2 LUMINAIRE)
	T	PROPOSED FLOODLIGHT DIRECTION OF TILT
	Topple Zone	TOPPLE ZONE (1.25 X HEIGHT OF THE COLUMN ABOVE HINGE)
38	FL	THORN "OLSYS AREA 96262350 OLSYS2 40L70 740 CL1 A/S" 90 W LED_8711 EXTERNAL FLOODLIGHT. IP66 CORROSION RESISTANT. IK08 MECHANICAL RESISTANT. CLASS II ELECTRICAL OR SIMILAR APPROVED FLOODLIGHT PEAK AT 45° FROM VERTICAL
99	L	L - COOPER "LS GLR-2L-CWPC" 2x13 W LED LE- EMERGENCY EBGLR-2L-CWPC LIGHTING WALL MOUNTED
-	Wall Mounted Board	WALL MOUNTED 4 WAY EXTERNAL LIGHTING DISTRIBUTION BOARD TO BE CORRECTLY LABELED TO SUIT DESIGN REQUIREMENT
15	Fused Titan	LUCY FUSED TITAN 2 NT06-TT-NG12 CUT OUT OR SIMILAR APPROVED (ONE PER FLOODLIGHT COLUMN)

COMPOUND LIGHTING EQUIPMENT (90 WATT)				
REF.	HEIGHT (m)	LUMINAIRE ANGLES		
		1	2	3
FL-1	6	135	180	-
FL-2	6	45	315	-
FL-3	6	45	315	-
FL-4	6	45	315	-
FL-5	6	315	225	-
FL-6	6	315	225	-
FL-7	6	315	225	-
FL-8	6	45	135	-
FL-9	6	315	180	45
FL-10	6	225	0	135
FL-11	6	0	180	-
FL-12	6	135	225	-
FL-13	6	315	180	45
FL-14	6	315	180	45
FL-15	6	315	225	-

- NOTES:-**
- THIS DRAWING SHALL BE READ FOR THE EXTERIOR LIGHTING ONLY. THIS DRAWING SHALL NOT BE READ FOR THE LAYOUT OF PLANT/EQUIPMENT, CABLE ROUTES, CIVIL ENGINEERING WORKS AND BUILDING CONSTRUCTION.
 - THE PROPOSED LIGHTING COLUMNS SHALL BE COMPLETE WITH A CROSSARM, BOLT DOWN BASE AND LOCKABLE BASE COMPARTMENT. THE FLOODLIGHT COLUMNS AND THE CROSSARMS SHALL BE GALVANISED TO BS EN 1461 AND SHALL COMPLY WITH BS 5649. HIGH COLUMNS SHALL BE MID-POINT HINGED AND FLOODLIGHTS MOUNTED ON THEM TO BE MAINTAINED AT GROUND LEVEL.
 - THE LIGHTING COLUMNS SHALL BE INSTALLED 2m CLEAR OF FENCES TO AVOID BECOMING A "CLIMBING AID" AND TO MAINTAIN SEPARATION FROM THE FENCE EARTHING SYSTEM. ALL EXPOSED METALWORK OF THE FLOODLIGHTING COLUMNS AND THE ASSOCIATED CROSSARMS SHALL BE BONDED TO THE SUBSTATION EARTH.
 - THE LIGHTING COLUMNS SHALL BE COMPLETE WITH BOLT DOWN BASE SUITABLE FOR MOUNTING ON CONCRETE BASE. THE CONCRETE BASES SHALL BE WITH "EASY BEND" DUCTS SUITABLE FOR LOOPING THE UNDERGROUND CABLES AND SUBSTATION EARTH SHALL BE ROUTED EXTERNALLY OR A SEPARATE DUCT SHALL BE USED FOR THE EARTH CONDUCTOR. NOTE THAT THE COLUMN BASE FIXING TEMPLATE AND THE ASSOCIATED ANCHOR BOLTS WILL BE REQUIRED AS A SEPARATE EARLY DELIVERY TO ENABLE THE CIVIL WORKS TO PROCEED.
 - THE LIGHTING COLUMNS SHALL BE ERECTED IN SUCH A WAY THAT THEY DO NOT INFRINGE SAFETY DISTANCE OF THE LIVE APPARATUS. TOPPLE ZONES ARE SHOWN FOR THE COLUMNS
 - MOUNTING HEIGHT OF LIGHTING EQUIPMENT IN BUILDINGS:
 GIS ROOM - 6/7m
 CONTROL ROOM - 4.5m
 STATCOM - 6m

ASSOCIATED DRAWING:-

- EA1-GRD-DO-ADI-010849 S02 LIGHTING LEVEL LAYOUT - 0 LUX CURVE
- EA1-GRD-DO-ADI-010849 S03 FLOODLIGHTING COLUMN GENERAL ARRANGEMENT

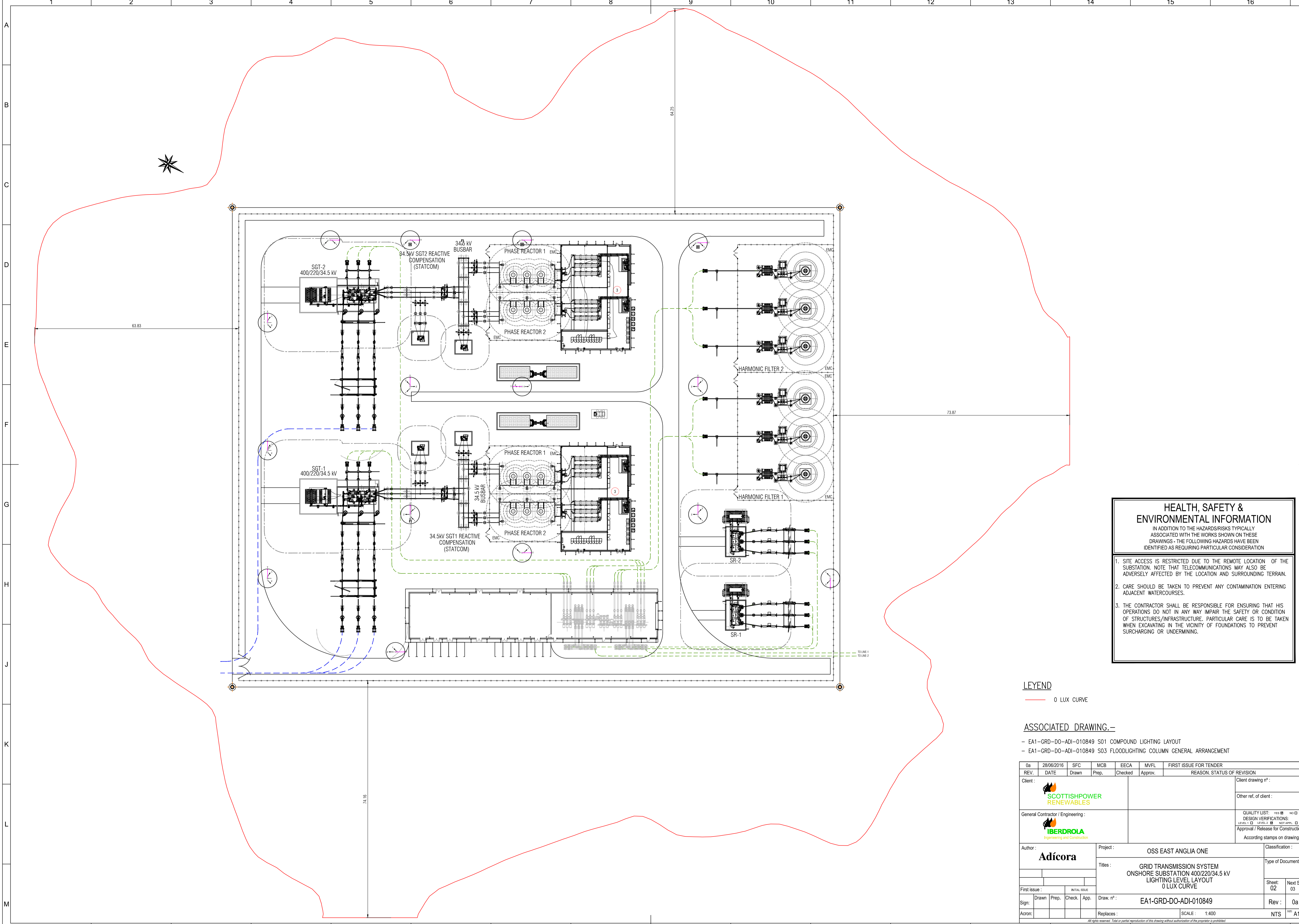
HEALTH, SAFETY & ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS TYPICALLY ASSOCIATED WITH THE WORKS SHOWN ON THESE DRAWINGS - THE FOLLOWING HAZARDS HAVE BEEN IDENTIFIED AS REQUIRING PARTICULAR CONSIDERATION

- SITE ACCESS IS RESTRICTED DUE TO THE REMOTE LOCATION OF THE SUBSTATION. NOTE THAT TELECOMMUNICATIONS MAY ALSO BE ADVERSELY AFFECTED BY THE LOCATION AND SURROUNDING TERRAIN.
- CARE SHOULD BE TAKEN TO PREVENT ANY CONTAMINATION ENTERING ADJACENT WATERCOURSES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF STRUCTURES/INFRASTRUCTURE. PARTICULAR CARE IS TO BE TAKEN WHEN EXCAVATING IN THE VICINITY OF FOUNDATIONS TO PREVENT SURCHARGING OR UNDERMINING.

REV.	DATE	Drawn	Prep.	Checked	Approved	FIRST ISSUE FOR TENDER	REASON/STATUS OF REVISION
0a	28/06/2016	SFC	MCB	EECA	MVFL	FIRST ISSUE FOR TENDER	

Client:		Client drawing n°:	
Other ref. of client:			
General Contractor / Engineering:		QUALITY LIST:	YES <input type="checkbox"/> NO <input type="checkbox"/> DESIGN VERIFICATIONS: LEVEL 1 <input type="checkbox"/> LEVEL 2 <input type="checkbox"/> NOT APP. <input type="checkbox"/> Approval / Release for Construction: According stamps on drawing
Author:	Adicora	Project:	OSS EAST ANGLIA ONE
		Classification:	
		Titles:	GRID TRANSMISSION SYSTEM ONSHORE SUBSTATION 400/220/34.5 kV COMPOUND LIGHTING LAYOUT
		Type of Document:	
First issue:	INITIAL ISSUE	Sheet:	01
Sign:	Drawn Prep. Check. App.	Next Sh:	02
Draw. n°:	EA1-GRD-DO-ADI-010849	Rev.:	0a
Replaces:		Scale:	1:400
		NTS	A1



HEALTH, SAFETY & ENVIRONMENTAL INFORMATION

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1. SITE ACCESS IS RESTRICTED DUE TO THE REMOTE LOCATION OF THE SUBSTATION. NOTE THAT TELECOMMUNICATIONS MAY ALSO BE ADVERSELY AFFECTED BY THE LOCATION AND SURROUNDING TERRAIN.
2. CARE SHOULD BE TAKEN TO PREVENT ANY CONTAMINATION ENTERING ADJACENT WATERCOURSES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT HIS OPERATIONS DO NOT IN ANY WAY IMPAIR THE SAFETY OR CONDITION OF STRUCTURES/INFRASTRUCTURE. PARTICULAR CARE IS TO BE TAKEN WHEN EXCAVATING IN THE VICINITY OF FOUNDATIONS TO PREVENT SURCHARGING OR UNDERMINING.

LEYEND
 — 0 LUX CURVE

ASSOCIATED DRAWING.-

- EA1-GRD-DO-ADI-010849 S01 COMPOUND LIGHTING LAYOUT
- EA1-GRD-DO-ADI-010849 S03 FLOODLIGHTING COLUMN GENERAL ARRANGEMENT

0a	28/06/2016	SFC	MCB	EECA	MVFL	FIRST ISSUE FOR TENDER		
REV.	DATE	Drawn	Prep.	Checked	Approved	REASON, STATUS OF REVISION		
Client:						Client drawing n°:		
General Contractor / Engineering:						Other ref. of client:		
Author:		Adicora				QUALITY LIST: YES # NO #		
Project:		OSS EAST ANGLIA ONE				DESIGN VERIFICATIONS:		
Titles:		GRID TRANSMISSION SYSTEM ONSHORE SUBSTATION 400/220/34.5 kV LIGHTING LEVEL LAYOUT 0 LUX CURVE				LEVEL 1 <input type="checkbox"/> LEVEL 2 <input type="checkbox"/> NOT APP. <input type="checkbox"/>		
Classification:						Approval / Release for Construction:		
Type of Document:						According stamps on drawing		
First issue:		INITIAL ISSUE				Sheet: 02 Next Sh: 03		
Sign:		Drawn: [] Prep: [] Check: [] App: []				Draw. n°: EA1-GRD-DO-ADI-010849		
Replaces:						Rev.: 0a		
Scale:		SCALE: 1:400				NTS ¹⁰⁰ A1		

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The Gladiator LED luminaire offers an energy saving alternative to traditional light sources for amenity area and perimeter lighting applications. The twin multi-die LED arrays deliver a long 50,000 hour life and eliminate the need for lamp changes, minimising through life operating and maintenance costs, saving 39% in energy over an equivalent 42W CFL variant. The provision for automatic dusk to dawn operation via an optional photocell variant allows automatic security lighting whilst avoiding wasted energy during daylight hours.

The robust cast aluminium base and polycarbonate lens offer good impact resistance ideally suited to commercial applications. Installation is made easy with integrated features such as the side mount cable gland or rear BESA cable entry options.

- Low energy LED solution, 39% less energy consumed than typical 42W CFL equivalent product
- Long, 50,000 hour LED life to L70, typically 10-12 years commercial operation with no lamp changes can dramatically reduce maintenance costs
- Robust, die cast aluminium base with conduit entries provides rigid base ideal on uneven walls
- Attractive, curved profile, polycarbonate diffuser has high impact resistance, ideal for public spaces and commercial applications
- IP65 rated, dust tight and jet proof housing construction, ideal for exterior use and ease of cleaning
- Photocell option for dusk 'til dawn operation enables automatic safety/security illumination whilst preventing wasted energy during daylight hours
- The LED solution offers the benefit of instant white light, no run up delay and good visual acuity over HID lamp options

Lamp Options

- 2 x Multi-die LED arrays
- 5000K cool white
- 65CRI
- 700mA drive current, fixed output, >0.9pf LED driver

Materials

- Base - Pressure die cast aluminium black finish
- Lens / Cover - Polycarbonate, self coloured black cover and clear prismatic optic section

Options

- Integral photocell option provides further energy saving through automatic dusk to dawn operation
- Add 'PC' suffix to the catalogue number for the photocell option
- Integral emergency conversion, 3 hour duration (Operates both LEDs in emergency mode)

Installation Notes

- Suitable for wall mounting
- BESA entry features on back plate
- 20mm conduit entry on both sides for through wiring
- Fused terminal block with 2 x 2.5mm² cable capacity per termination
- Hinged diffuser secured by captive screws

Specification

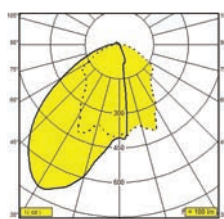
To specify state: Robust wall mounted LED area lighting luminaire, dust tight and water jet proof to IP65, with die cast aluminium base and polycarbonate lens / cover assembly including clear prismatic refractor and optional photocell as Eaton's Gladiator LED range, part no. _____

Catalogue Numbers

Lamp Rating	Cat No	Weight (kg)
2 x 13W LED	GLR-2L-CW	1.7
2 x 13W LED	GLR-2L-CWPC	1.8
Emergency		
2 x 13W LED	EBGLR-2L-CW	2.1
2 x 13W LED	EBGLR-2L-CWPC	2.2

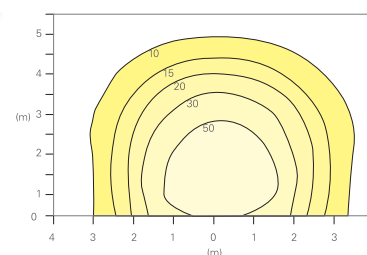
Photometric Data

Cat No: GLR-2L-CW

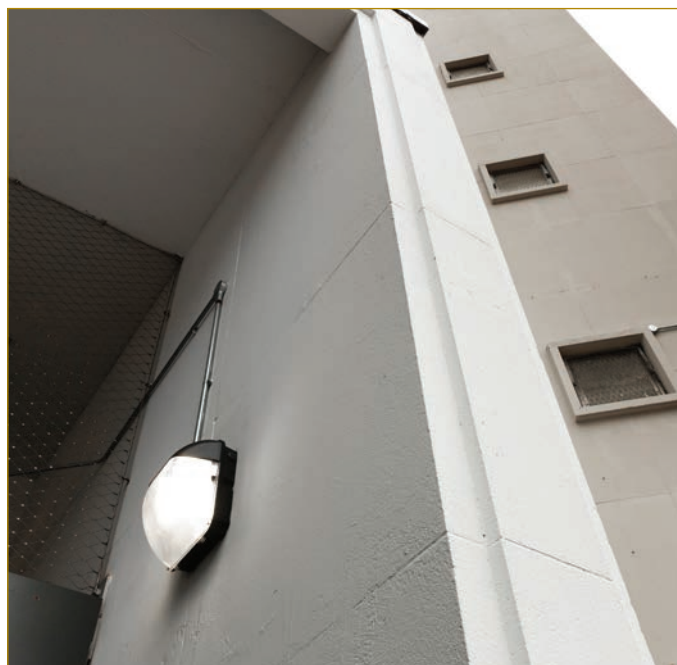
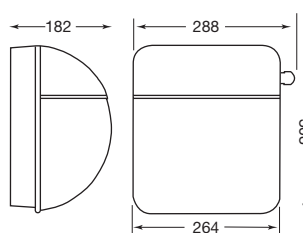


LOR: 1.00
ULOR: 0.04
DLOR: 0.96

Cat No: GLR-2L-CW mounted at 3m



Dimensions



Olsys Area

96262350 OLSYS2 40L70 740 CL1 A/S

THORN

LED 90W LED_8711	T _a 50		IP66	IK08		CE		EAC
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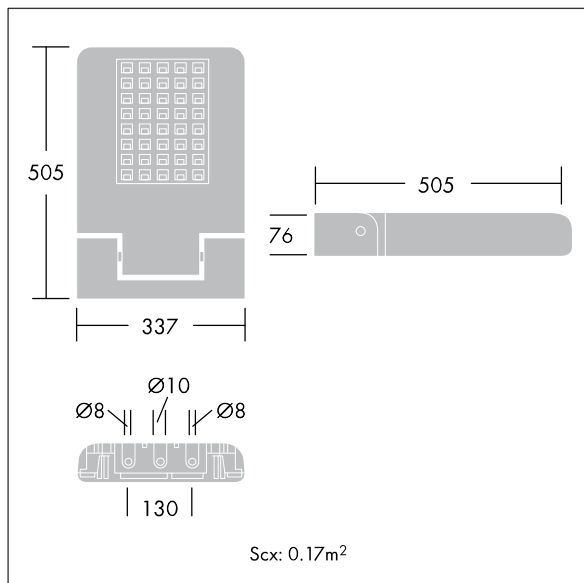
Olsys Area

An LED floodlight with asymmetric distribution for area lighting applications. Electronic, Class I electrical, IP66, IK08. Body: die-cast Aluminium (AS9U), powder coated silver-grey (RAL 9006). Enclosure: tempered glass. Optics: Aluminium. Supplied in one box, ready to install. Mounting attachments to be ordered separately. Complete with 4000K LED

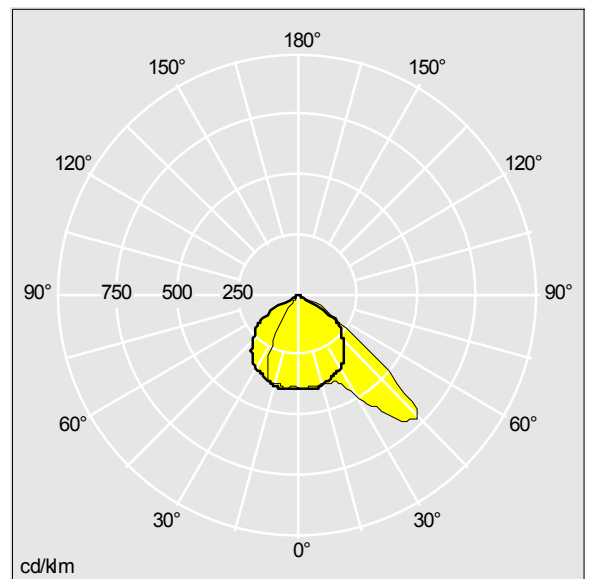
Dimensions: 505 x 337 x 76 mm
Total power: 90 W
Weight: 9.8 kg
Scx: 0.17 m²



TLG_OSYS_F_2ASPDB.jpg



TLG_OSYS_M_AREA2.wmf



TLLA_OSYS2AS4_DC.ltd

Lamp position: STD - standard
Light Source: LED
Luminaire luminous flux*: 8702 lm
Luminaire efficacy*: 97 lm/W
Lamp efficacy: 97 lm/W

Correlated colour temperature*: 4000 Kelvin
Rated median useful life*: 50000h L70 at 25°C
Ballast: 1x EL2
Luminaire input power*: 90 W Lambda = 0.9
LOR: 1,00 ULOR: 0,00 DLOR: 1,00

All values marked with an * are rated values. Thorn uses tried and tested components from leading suppliers, however there may be isolated instances of technology-related failures of individual LEDs during the rated product lifetime. International standards set the tolerance in initial flux and connected load at ±10%. Colour temperature is subject to a tolerance of up to +/-150 Kelvin from the nominal value. Unless stated otherwise, the values apply to an ambient temperature of 25°C.

In most products the failure of one LED point causes no functional impairment to the lighting performance of the luminaire and is therefore no reason for complaint.

Thorn Lighting is constantly developing and improving its products. The right is reserved to change specifications without prior notification or public announcement.

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