

# Onshore Converter Station

## Construction Artificial Lighting Emissions Plan

DCO Requirement 23 (1) & 22(2)(f)

(Applicable to Work Numbers 62 to 69)

Prepared by:	Checked by:	Approved by:
Kay Griffin, SLR		

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## 1. INTRODUCTION AND SCOPE

### 1.1. Project Overview

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy & Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1,200MW offshore windfarm and associated infrastructure and is live until 28 August 2022.
2. The DCO has now been subject to three non-material variations:
  - In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
  - In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations (reducing the number of these to one) and wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
  - In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.
3. The onshore construction works associated with EA THREE will have a capacity of 1,400MW and transmission connection of 1,320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:
  - The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
  - Two onshore electrical cables (single core);
  - Up to 62 jointing bay locations each with up to two jointing bays;
  - One onshore converter station, adjacent to the EA ONE Substation;
  - Three cables to link the converter station to the National Grid Bramford Substation;
  - Up to three onshore fibre optic cables; and
  - Landscaping and tree planting around the onshore converter station location.
4. Since the granting of the DCO, the decision has been made that the electrical connection for EA THREE will comprise a high voltage direct current (HVDC) cable rather than a high voltage alternating current cable and, therefore, the type of substation that will be required is a HVDC converter station. The substation will be referred to here as a 'converter station' and this amended terminology has been agreed with the relevant authorities on 15 October 2020. It has also been determined that only one converter station will be constructed rather than two and that the converter station will be installed in a single construction phase.

### 1.2. Purpose and Scope

5. This Construction Artificial Lighting Emissions Plan (CALEP) sets out mitigation measures to be applied to the construction activities being undertaken as part of EA THREE onshore converter station to reduce the potential for significant impacts from light emissions. This document has been produced to fulfil DCO Requirements 23 (1) and 22 (2) (f) which state:

**23. (1)** *No stage of the connection works may commence until written details of any external lighting to be installed in connection with that stage (which includes any relevant measures identified in the artificial light emissions plan contained in the outline code of construction practice), including measures to prevent light spillage, have, after consultation with the highway authority, been submitted to and approved by the relevant planning authority; and any approved means of lighting must be installed in accordance with the approved details and retained for the duration of the construction period for that stage.*

**22. (2)** *The code of construction practice must include-*  
*(f) artificial light emissions plan;*

6. The scope of this document relates to the CALEP associated with the construction of the onshore converter station. This stage comprises Work No.s 62 to 69 and is located to the north of the existing NG substation and adjacent to the EA ONE Substation (Figure 1 Site Context Plan). CALEPs have been produced for each stage of the onshore works and are provided under separate cover. In addition, an Operational Phase Artificial Lighting Emissions Plan (OPALEP)( EA3-GRD-CON-PLN-IBR-000112) has been prepared to set out mitigation measures to be applied to the operational EA THREE onshore converter station (Work No. 67).
7. Construction works at the Converter Station will be some of the first onshore connection works to commence. The access track and temporary laydown will be constructed in Summer 2022 with the remaining works being undertaken from Q3 2023.
8. The purpose of this CALEP is to ensure that the construction activities for the EA THREE onshore converter station comply with relevant European and UK legislation, DCO conditions, environmental commitments as set out in the Environmental Statement (ES), and environmental and construction best practice.
9. The measures contained herein shall be adhered to by the Principal Contractor (and their subcontractors) and the implementation and compliance will be monitored by the Construction Management Team. These measures will only be revised with the agreement of Mid Suffolk District Council (MSDC).

## 2. ABBREVIATIONS

<b>BCT</b>	Bat Conservation Trust
<b>CALEP</b>	Construction Artificial Lighting Emissions Plan
<b>CLO</b>	Community Liaison Officer
<b>DBEIS</b>	Department of Business, Energy and Industrial Strategy
<b>DC</b>	Direct Current
<b>DCO</b>	Development Consent Order
<b>EA ONE</b>	East Anglia ONE Offshore Windfarm
<b>EA THREE</b>	East Anglia THREE Offshore Windfarm
<b>EATL</b>	East Anglia THREE Limited
<b>EnvCoW</b>	Environmental Clerk of Works
<b>ES</b>	Environmental Statement
<b>GCN</b>	Great crested newts
<b>HSE</b>	Health and Safety Executive
<b>HVDC</b>	High Voltage Direct Current
<b>ILP</b>	Institution of Lighting Professionals
<b>LED</b>	Light emitting diode
<b>MSDC</b>	Mid Suffolk District Council
<b>MW</b>	Megawatt
<b>NG</b>	National Grid
<b>OPALEP</b>	Operational Phase Artificial Lighting Emissions Plan
<b>PRoW</b>	Public Rights of Way
<b>SCC</b>	Suffolk County Council

### 3. CONSTRUCTION DETAILS

#### 3.1. Enabling Works

10. The onshore construction works will commence with the enabling works, which comprises the establishment of the temporary laydown area (Work No 65) and the access to this from the existing EA ONE access road. The temporary laydown area will be directly northeast of the converter station and will include temporary offices, welfare, car parking, materials and equipment storage. At the start of the works the onshore converter station compound and temporary laydown area will be temporarily fenced in accordance with the Fencing and Enclosures Plan (EA3-GRD-CON-PLN-IBR-000106) and a security cabin will be installed at the main access gate.
11. Following any necessary ecological mitigation, topsoil will be stripped from the access road and temporary laydown area and stored at specific storage locations as to avoid cross contamination with other materials. Topsoil storage and management will be compliant with the recommendations and requirements set out in the Onshore Converter Station Landscape Management Plan (EA3- EA3-GRD-CON-PLN-IBR-000103). Topsoil will be stored to one side of the working area, in such a way that it is not mixed with any subsoil. Typically this would be stored as an earth bund of a maximum height of two metres, to avoid compaction from the weight of the soil. Storage time will be kept to a minimum, to prevent the soil deteriorating in quality and the topsoil bunds seeded to prevent windblow. Topsoil stripped from different fields will be stored separately, as would soil from specific hedgerow banks or woodland strips.
12. The construction of an access road typically involves the placement of suitable graded imported stone material onto a suitable subgrade, potentially with a reinforcing geogrid and/or a geotextile, however other methods such as soil stabilisation may be used if considered appropriate. Following the initial topsoil stripping, the on-site access road will be installed for a width of 6m.
13. The enabling works will also include installation of surface water drainage for the access road and temporary laydown area, in accordance with the Surface Water and Drainage Management Plan (EA3-GRD-CON-PLN-IBR-000107). Foul water drainage during this initial period will be via portable welfare facilities, with a tank that will be emptied on a weekly or bi-weekly basis.

#### 3.2. Construction

14. The EA THREE onshore converter station will be located within a fenced compound (maximum 157m by 186m) (Work No. 67), immediately to the east of the East Anglia ONE Substation and to the north of the existing NG Bramford Substation. The converter station will contain electrical equipment including power transformers, switchgear, reactive compensation equipment, harmonic filters, cables, lightning protection masts, control buildings, communications masts, backup generators, access, fencing and other associated equipment, structures or buildings. The converter station will have a compact layout, with the majority of the equipment contained in buildings not incongruous to their setting.
15. The construction of the converter station will comprise a number of key stages, including: platform upfill to finished level (approx. 54m AOD) foundations and building construction and equipment installation and commissioning.
16. The main site access has already been constructed as part of the EA ONE works, however, an internal service road from this will require installation.
17. The enabling works will include grading and earthworks to remove any unsuitable materials from the converter station area and to build up with suitable fill material to establish a formation level for the converter station construction. The materials excavated will be reused on site as engineering fill or landscaping depending on material properties.
18. Following the completion of the site grading, works will commence with the excavations for ducting and the foundations for the buildings and external plant. The building will largely comprise steel, concrete or masonry and cladding materials. The structural steelwork will be fabricated and prepared off site and delivered to site for erection activities using cranes. The composite or cassette cladding panels (e.g. Kingspan) will be delivered to site ready to erect and be fixed to the steelwork.
19. The civil works will be followed by the installation and commissioning of the electrical equipment. The large transformers will be filled on site. The smaller electrical components will be constructed on site using small mobile plant and lifting apparatus.

#### 3.3. Cable Installation

20. Works No.s 63 and 66 will comprise the installation in open trenches of cables to connect the Converter Station to the nearby National Grid Bramford Substation. Construction activities for the installation of the cable in open trenches will be undertaken within a temporarily fenced strip of land, referred to as the working width.

21. The cable route into the Converter Station from Work No. 64 through Work No 63 was not known at the time of the preparation of the Environmental Statement and it was considered at that time that this may also be installed using open trenches. The ducts have now, however, been installed during the construction works for EA ONE to end within Work No. 67 (the converter station site). There will, therefore, be no requirement, as originally anticipated, to open trench these through Work no. 63 to the Converter Station.
22. Works in Work No. 62 will also include the installation of haul road to reach a jointing bay in the adjacent Work No. 58 (not part of this stage) to the east. This will follow the route of the EA ONE haul road as shown in Figure 2.
23. In addition, all ducts to be used for EA THREE, which were installed during the EA ONE construction works, will require to be 'proved' to ensure that they are intact and free of debris. This will generally be undertaken by the use of foam pigs driven under pressure from jointing bay to jointing bay. Each stretch of duct that was installed using HDD will, however, require duct-proving excavations at each end to allow the use of different diameter foam pigs, due to a difference in the diameter of these compared to the ducting installed using open trench techniques.

### 3.4. Lighting During Construction

#### 3.4.1. Overview

24. The majority of the construction activities will be conducted during daylight hours and will not require artificial lighting, unless daylight conditions are not sufficient for specific works to ensure safe working. It is anticipated that there would be some limited activities requiring work on a 24 hour basis, these works will require the use of artificial temporary lighting to ensure safe working. Artificial lighting will also be needed particularly during the winter months when daylight hours are shorter than the specified working hours. For the highest structures within the converter station, lighting at higher elevations will be required.
25. The activities which may require temporary external artificial lighting at night are:
- Continuous works, such as concrete pouring;
  - Security purposes;
  - Delivery of abnormal loads;
  - Potential emergency works; and
  - Equipment such as stockpiles and emplacement areas, which will be carefully sited to ensure no light spillage.
26. Lighting from these sources has the potential to have the following impacts:
- Intrusive lighting impacting nearby residents causing disturbance and annoyance, particularly with regard to sleep patterns;
  - Impact on ecological sensitive receptors from light spill;
  - Impact on visual amenity due to the illumination of the night sky; and
  - Lighting on surrounding roads distracting passing motorists.

#### 3.4.2. Types and Positioning Requirements

27. Lighting should be sufficient to enable people to work, use facilities and move from place to place safely and without experiencing eye-strain. Table 3-1, which has been adapted from Health and Safety and Executive (HSE) document Health and Safety Guidance 38 (HSG38) 'Lighting at Work' (1997), details the recommended minimum lighting levels for different types of work activity and location applicable to the outside working areas. It makes recommendations for average illuminance for the work area as a whole and for minimum measured illuminance at any position within it.

**Table 3-1 Recommendations for Minimum Lighting Levels (adapted from HSE document HSG38 (Lighting at Work)).**

Activity	Typical locations/ types of work	Average illuminance measured (lux) 1x	Minimum illuminance measured (lux) 1x
<b>Movement of people, machines and vehicles</b>	Access roads and vehicle compound/parking areas.	20	5

Activity	Typical locations/ types of work	Average illuminance measured (lux) 1x	Minimum illuminance measured (lux) 1x
<b>Background work including movement of people, machines and vehicles in hazardous areas; rough work not requiring perception of detail</b>	Construction site clearance, excavation and soil work.	50	20
<b>Task based lighting and work requiring limited perception of detail</b>	Where specific work tasks are required to focus on a particular point or feature.	100	50

28. The artificial lighting required at the onshore converter station construction works will comply with the minimum requirements for safe work operations, the guidance and standards (Section 6) and mitigation measures avoiding or minimising the impacts on sensitive visual and ecological receptors.

### 3.4.3. Hours of Lighting

29. The need for artificial lighting will be dependent on seasonality and will be switched on 30 minutes before sunset<sup>1</sup> (which will change through the winter) to the end of the shift. It will also be switched on at the start of the shift to up to 30 minutes after sunrise. Again, this is dependent on seasonality and will change through the winter months and with daylight savings adjustments.
30. Working hours will comply with DCO Requirement 25, which states:

#### Construction hours

**25.—(1)** Construction work for the connection works must only take place between 0700 hours and 1900 hours Monday to Saturday, with no activity on Sundays or bank holidays, except as specified in paragraph (2).

**(2)** Outside the hours specified in paragraph (1), construction work may be undertaken for essential and non-intrusive activities including but not limited to:

**(a)** continuous periods of operation that are required as assessed in the environmental statement, such as concrete pouring;

**(b)** fitting out works associated with the onshore substation(s) comprised within Work No. 67;

**(c)** delivery to the connection works of abnormal loads that may cause congestion on the local road network;

**(d)** connection works carried out on the foreshore;

**(e)** daily start up or shut down;

**(f)** electrical installation; and

**(g)** non-destructive testing.

**(3)** All construction work undertaken in accordance with paragraph (2)(a) to (d) must be agreed with the relevant planning authority in writing in advance, and must be carried out within the agreed time.

31. Further information is provided in Section 5.5 of the Code of Construction Practice (EA3-OND-CNS-REP-IBR-000005).

<sup>1</sup> As determined by the Met Office with respect to Ipswich  
<https://www.metoffice.gov.uk/weather/forecast/u12b4ht3f#?date=2021-05-24>



32. There may be a requirement for artificial lighting on emergency works, which in any case will need to comply with the minimum requirements for safe work operations, the guidance and standards (Section 2) and mitigation measures avoiding or minimising the impacts on sensitive visual and ecological receptors.

33. At the converter station, security will be 24 hours, however this will not require continuous lighting.

#### **4. CONSTRUCTION ARTIFICIAL LIGHTING EMISSIONS PLAN GOVERNANCE**

34. Prior to the commencement of construction, an Environmental Clerk of Works (EnCoW) will be appointed by the Principal Contractor to manage *inter alia* the implementation of the CALEP. Contact details for the EnCoW will be submitted to stakeholders for their records prior to commencement of construction.

#### **5. LOCAL COMMUNITY LIAISON**

35. EATL is committed to providing clear communication to local residents and will manage public relations with local residents and businesses. Proactive community liaison will be maintained, keeping local residents informed of the type and timing of the works involved. As outlined in the Code of Construction Practice (EA3-GRD-CON-PLN-IBR-000110), a combination of communication mechanisms such as posters, notices, exhibitions, letters, newsletters, website updates and parish council meetings will be employed to keep local residents and businesses informed.

36. A designated EA THREE Community Liaison Officer (CLO) will manage and respond to any public concerns, queries or complaints in a professional and diligent manner as set out in the Community Liaison and Public Relations Procedure contained within the Code of Construction Practice (EA3-GRD-CON-PLN-IBR-000110). The Complaints Procedure will be publicised and complaints will be directed to the EATL Community Liaison Officer. All enquiries will be logged, investigated and rectifying actions taken when deemed appropriate. Enquiries will be dealt with in an expedient and courteous manner. Details of complaints will be reported to Mid Suffolk District Council (MSDC) and SCC within 48 hours.

37. Parish Councils, District Councillors, (including ward members and portfolio holders), and County Councillors in the area and the local liaison group will be contacted (in writing) in advance of the proposed works and ahead of key milestones in order to advise them of the ongoing works. The information provided will include a timetable of works, a schedule of working hours, the extent of the works, and a contact name, address and telephone number in case of complaint or query.

#### **6. GUIDELINES AND STANDARDS**

38. This CALEP has been developed in accordance with the following guidance and standards:

- Institution of Lighting Professionals (ILP), 2020, Guidance Note for the Reduction of Obtrusive Light, (ILP, 2020).
- British Standard BS EN 12464-2:2014 Light and lighting. Lighting of work places. Outdoor work places;
- British Standard BS 5489-1:2020 Code of practice for the design of road lighting. lighting of roads and public amenity areas;
- Health and Safety and Executive (HSE), Health and Safety Guidance 38 (HSG38) 'Lighting at Work' (HSE, 1997)
- Bat Conservation Trust (BCT), ILP (2018), Guidance Note 08/18 Bats and artificial lighting in the UK, Bats and the Built Environment series, (BCT, ILP, 2018); and
- BCT Interim Guidance: artificial lighting and wildlife (BCT, 2014).

#### **7. POTENTIALLY SENSITIVE RECEPTORS**

##### **7.1. Introduction**

39. Potentially sensitive receptors that could be affected by temporary external artificial lighting during construction works include visual and ecological receptors.

##### **7.2. Visual receptors**

40. The potentially sensitive visual receptors are those in close proximity to the onshore converter station construction works. 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 external artificial lighting has been undertaken.

41. The following viewpoints, presented in Table 7-1, were identified as potential visual receptor viewpoints as part of the Landscape and Visual Amenity Impact assessment (Environmental Statement, Volume 1, Document 6.1.29 Chapter 29 Seascape, Landscape and Visual Amenity and Volume 2, Document 6.2.29 a to h) within 1km distance and with visibility of the converter station. As such, these have been considered as visual receptors. The locations of these viewpoints are presented on Figure 2.:

**Table 7-1: Viewpoints within 1 km buffer from Landscape and Visual Amenity Impact assessment (ES)**

No.	Location	Description	Distance and Direction from Converter station construction works with lighting (Works no. 67 and 65)	Easting	Northing
<b>VP5</b>	Orchard Lands, Near Canes Farm	Residential and outdoor recreation	1.01km, NE	609260	245168
<b>VP6</b>	Near Hill Farm	Residential and outdoor recreation	0.66km, NE	609025	245913
<b>VP10</b>	Near Fidgeon's Farm	Residential and outdoor recreation	1.06km, W	610885	246013
<b>VP11</b>	Near Bullenhall Farm	Residential and outdoor recreation	0.63km, SW	610525	246413
<b>VP12</b>	Near Tye House	Residential and outdoor recreation	0.49km, SW	609920	247058

42. In addition to these viewpoints further visual receptors have been identified in the form of the nearest residential properties to the converter station, which are Woodlands Farm, Bullenhall Farm and Hill Farm, all located at more than 300m from the onshore converter station. The locations of these properties are presented on Figure 2 Potentially Sensitive Receptors to Construction Lighting.
43. At the identified distances, light intrusion/nuisance and, spill light are not considered to be significant. Light control measures with respect to visual receptors will therefore relate to limitation of light of bright luminaries in the field of view and also sky glow.
44. In addition to the above residential and recreation receptors there are Public Rights of Way over 520m to the west, 120m to the south and 240m to the east of the converter station site and temporary laydown (Work No.s 67 and 65), as shown on Figure 1 Potentially Sensitive Receptors to Construction Lighting.

### 7.3. Ecological Receptors

45. Light spill and intrusive lighting from night-time works could potentially disturb ecologically sensitive receptors which includes nocturnal species. At the converter station, the key ecologically sensitive receptors from the construction artificial lighting emissions are considered to comprise badgers, bats and birds (breeding and non- breeding birds). In addition, surveys for EA THREE carried out in 2021 confirmed presence of Great Crested Newts (GCN) in the waterbody approximately 130m to the northwest of the proposed EA THREE onshore converter station site.

46. All species of British bat, and their roosts, 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 2017 (as amended) making it an offence to injure, damage or disturb any individual bat or a roost.. Different bat species vary in their sensitivity to lighting. Particularly sensitive species of bats to artificial light disturbance have been recorded within the survey area around the converter station including *Myotis* and *Plecotus* species, and the rarer Barbastelle bat. The impact of the lighting has the potential to disturb bats whilst within a roost, deter use of a bat roost, reduce available foraging time by delaying roost exit and disrupt the available foraging and commuting flight paths.
47. Trees with potential bat features were identified in the initial 2012 surveys with the results updated during surveys undertaken in 2020 and 2021. Trees identified as potential bat features are presented Figure 2 Potentially Sensitive Receptors to Construction Lighting, including three mature field boundary trees considered to provide low, moderate and high potential to support roosting bats. However, no roosts have been recorded in these features to date. 16 new bat boxes have been installed as part of EA ONE landscaping on the existing hedges, as shown on Figure 2 Potentially Sensitive Receptors to Construction Lighting.
48. Badgers and their setts are protected from damage and disturbance under the Badger Protection Act (1992). Pre-construction badger surveys have been carried out in 2016, with the results updated during surveys undertaken in 2021. Active and inactive outlier setts are present around the field boundaries and within adjacent woodland. Some outlier badger setts were identified within 100m distance from the onshore converter station. As badger setts locations are sensitive information, there are not shown on Figure 2 Potentially Sensitive Receptors to Construction Lighting.
49. Great crested newts are not considered to be a potential receptors to construction lighting impacts due to the distance of the ponds used by this species from the construction works where lighting may be used.
50. Birds may be sensitive to lighting due to illumination of nests and hunting habitats. All wild birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). Bird species listed on Schedule 1 of the Act are afforded further protection making it an offence to intentionally or recklessly disturb any such bird when it is building its nest or while it is in or near a nest containing dependant young, and / or disturb the dependant young of any such bird. Schedule 1 birds have been recorded in some areas surrounding the onshore development area and as such may be disturbed from light spillage if nesting. As Schedule 1 locations are sensitive information, they are not shown on Figure 2 Potentially Sensitive Receptors to Construction Lighting, however no nesting Schedule 1 species have been recorded near to the converter station stage. It is noted that a new barn owl box has also been installed as part of the EA ONE landscaping scheme, as shown on Figure 2.
51. This information provided in this document does not take into account any potential ecological mitigation measures that could be implemented in the construction of the converter station (i.e. closure of a badger sett or relocation of potential sensitive receptors).

## 8. LIGHTING SCHEME

### 8.1. Objectives

52. The objectives and performance outcomes for this CALEP are detailed below in Table 8-1.

**Table 8-1: Objectives and performance outcomes**

Objectives	Performance Outcomes
<ul style="list-style-type: none"> <li>To ensure temporary lighting installations are positioned so as to avoid light spill directly towards roads, residences and other potential viewing locations or ecological receptors.</li> <li>To utilise existing vegetation screens to minimise the impact of any light spill in the direction of roads, residences and other viewing locations or ecological receptors.</li> <li>To use directional lighting to reduce light spill and minimise light emissions from night-time construction works to retain dark night skies.</li> <li>To ensure procedures are in place to record and effectively respond to any complaint in respect to lighting.</li> </ul>	<ul style="list-style-type: none"> <li>Minimum levels of lighting are used which provide sufficient lighting to ensure that safety is not compromised.</li> <li>External lighting complies with relevant UK legislation, environmental commitments as set out in the ES and environmental and construction best practice.</li> <li>The safety of external traffic on nearby roads is not affected by light sources on site.</li> <li>Impacts from light emissions from the works on nearby sensitive visual receptors is avoided or minimised where avoidance is not possible.</li> <li>Impacts from light emissions from the works on ecological receptors are avoided or minimised,</li> </ul>

Objectives	Performance Outcomes
<ul style="list-style-type: none"> <li>To record and report the effectiveness of lighting emission controls.</li> <li>To utilise appropriate mitigation measures to reduce glare</li> </ul>	<p>where avoidance is not possible.</p> <ul style="list-style-type: none"> <li>Complaints are responded to quickly and effectively.</li> <li>The effectiveness of lighting emission controls is reported.</li> </ul>

## 8.2. Mitigation

53. The onshore construction works have been carefully designed to minimise impacts on the environment. The onshore converter station site has been sited to the north of the existing Bramford Substation to gain maximum benefit from the screening effect provided by the NG substation and also existing woodland. It is also located to the east of the EA ONE Substation to further gain from screening effects of the buildings and also the screening of the EA ONE landscaping scheme (i.e. the bunds and taller woodland plants).
54. A number of mitigation measures will be adopted as part of the project design to avoid or minimise potential impacts from artificial lighting, relating to construction, on the sensitive receptors. Non-reflective surfaces and barriers and screens will be used as required to minimise light nuisance.
55. Site lighting will be positioned and directed to minimise nuisance to public rights of way users and residents, to minimise distractions to drivers on Bullen Lane and to minimise sky glow, so far as reasonably practicable. External lighting will be limited to internal access roads and walkways, security lighting and task related flood lighting. Lighting will be selected and positioned in accordance with guidance and standards provided in Section 6.
56. Light spill will be reduced by directing the light to where it is needed and away from the identified potentially sensitive receptors, where possible. The design of the luminaire and accessories such as hoods, cowls, louvres will be used achieve this. Where possible asymmetric optics will be used such that the front glazing is kept at or near parallel to the surface being lit. In addition, where possible glare will be minimised by ensuring that the main beam angle directed towards any potential observer is no greater than 70°, in accordance with ILP guidance (ILP, 2021). Higher mounting heights allow lower main beam angles, which can assist in reducing glare.
57. So far as is practicable, all power to temporary lighting will be taken from mains supplies rather than from portable generators. Where portable generators are used, industry best practice will be followed to minimise noise and pollution from such generators.
58. All lighting relating to the onshore construction works are temporary and will be removed as soon as possible on completion of the relevant element of works.

### 8.2.1. Mitigation Specific to Ecology

59. Additional mitigation specific to ecology, in accordance with the Bat Conservation Trust (2018) guidelines will be included as follows:
- LED luminaires will be used where possible;
  - Metal halide, fluorescent sources will not be used;
  - Column heights will be carefully considered to minimise light spill;
  - Narrow spectrum light sources will be used to lower the range of species affected by lighting;
  - Light sources that emit minimal ultra-violet light will be selected;
  - Lights will peak in wavelength higher than 550nm;
  - White and blue wavelengths of the light spectrum will be avoided to reduce insect attraction and where white light sources are required in order to manage the blue short-wave length content, they will be of a warm / neutral colour temperature, ideally <2700Kelvin;
  - Only luminaires with an upward light ratio of 0% and with good optical control will be used; and
  - External security lighting will be set on motion-sensors with short (1 minute) timers
60. Directional beams and non-reflective surfaces will be used to ensure light spill and nuisance does not encroach onto adjacent areas including:

- Woodland, so as not to disturb emerging or foraging bats, badgers or other nocturnal species (birds, hedgehogs). Flood lighting will be directed away from any potential roost identified and 30m disturbance zone around badger setts.
- Other high value foraging habitats and potential flight paths, such as connecting hedgerows and trees.

61. Pre-construction surveys for protected species and Schedule 1 birds will be undertaken in the vicinity of the converter station site. Survey works have an expiry of approximately 18-24 months and, therefore, if works are to take place 18-24 months after the most recent surveys, a re-survey will be undertaken in order to confirm that the status of the habitats has not changed and to ensure that mitigation is based on up to date survey data.

62. External lighting at night will be avoided as far as feasible, particularly during the months of higher bat activity (August – October). When lighting at night is required, it will comply with the Bat Conservation Trust (2018) recommendations on external lighting (as set out above) as agreed with Natural England, as required. This will be designed to avoid light spill to both:

- Woodland, so as not to disturb emerging or foraging bats, badgers or other nocturnal species. . Flood lighting will be directed away from any potential roost identified and 30m disturbance zone around badger setts.

63. Other high value foraging habitats and potential flight paths, such as connecting hedgerows and standalone trees.

64. Should any Schedule 1 or other species of bird be found to be nesting within the vicinity of the proposed construction works, an exclusion zone will be implemented specific to that species in accordance with the Ecological Mitigation Plan (EA3-OND-CNS-REP-BOW-000001).

65. Periods of 24-hour lighting at the converter station(s) will be minimised where possible during construction.

## 9. MONITORING AND REPORTING

### 9.1. Monitoring

66. Regular inspections of lighting mitigation measures will be undertaken by the Principal Contractor's construction management team, the EnvCoW and ecological specialists where required, to ensure effective implementation and report any non-compliances. If non-conformity with any control and mitigation measures is identified, it will be recorded and appropriate remedial action will be implemented.

67. The frequency and the location inspections will be determined by the EnvCoW and will be included in the Project Environmental Management Plan (included within the Code of Construction Practice (EA3-GRD-CON-PLN-IBR-000110) and the Construction Environmental Management Plan (prepared by contractors).

68. Any complaint regarding lighting on the site will be directed to the EnvCoW who will in turn notify MSDC. The EnvCoW will investigate the complaint and provide a response to the complainant and MSDC within 48 hours. Investigation will include checking that luminaires remain directional and suitable for the application. If the complaint is justified a solution will be found to prevent reoccurrence, such as use of hoardings or other barriers to contain light spill. This may include investigation of alternatives, such as the use of lower wattage lighting, or re-direction of lighting or re-positioning shielding.

### 9.2. Reporting

69. The effectiveness of lighting controls will be reported in the Site Inspection and Audit Reports. Inspections will be undertaken by the ecological specialists, where required and will be reported to the EnvCoW.

## 10. REFERENCES

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<https://cdn.bats.org.uk/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?mtime=20181113114229>;

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ILP, 2021, *Guidance Note 01/21, Guidance Note for the Reduction of Obtrusive Light*, London,  
<https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021>.

FOR DISCHARGE

## **APPENDIX 1 TECHNICAL DRAWINGS AND LUMINARIES SPECIFICATIONS**

FOR DISCHARGE

CUBE Next 4x300W	Technical Data
Minimum dimensions (L x W x H)	1230 x 1160 x 2405 mm
Maximum dimensions (L x W x H)	1790 x 1735 x 8400 mm
Dry weight	1285 kg
Lifting system	Hydraulic
Mast rotation	340°
Max. lamps power	4 x 300 W
Lamps type	LED
Max. total lumen	153000 Lm
Max. illuminated area	4200 m <sup>2</sup>
Battery running time	56 h @ 33% dimming
	22 h @ 80% dimming
	17 h @ 100% dimming
Battery recharging time	12 h
Inlet plug (A/V/Hz)	32/220/50 – 32/240/60
Avg. sound pressure	0
Wind speed resistance	110 km/h



Picture shown may not reflect actual configuration.



### V20 light tower

The **V20 light tower** is a brand-new mobile light tower equipped with 4x320W high efficiency LED lamp floodlights. More than 140 hours of running time and one of the lowest sound pressure level in the industry: only 58 dB(A) at 7 meters.

### GTL01 digital controller

The V20 is equipped with a **GTL01 digital controller** specifically studied to manage every function of the light tower for the best ease of use.

### Generac LED lamps

4 x 320W high efficiency LED floodlights designed by Generac Mobile®.

### Low voltage LED

The floodlights are powered with **low voltage** 48 Volts. No more high voltages on external cables. Safety as a must!

### Top accessibility

3 doors for a wider access. 2 compass-top doors with «wing» shape provide a complete access to the engine for a safe and convenient maintenance. 1 back door allows the access to the digital control panel.

### RLS – Rapid Locking Stabilizers

The special shape of the **adjustable stabilizers** allows the operator to level the V20 light tower in few seconds.

### The lowest noise level!

Innovation means also **decreasing the noise level!** The V20 light tower emits only 58 dB(A) @ 7 meters.

### Long running time

Thanks to the V20's fuel saving features such as the small engine and the LED lamps, this model can **run up to 143 hours** without refueling.

### Double power

You can connect a V20 to another V20 and run two lighting towers with only one engine.



*Picture shown may not reflect actual configuration.*

V20 Y2	Technical Data
Minimum dimensions (L x W x H)	2250 x 1400 x 2436 mm
Maximum dimensions (L x W x H)	2640 x 1900 x 8500 mm
Dry weight	1030 kg
Lifting system	Hydraulic
Mast rotation	340°
Lamps power	4 x 320 W
Lamps type	LED
Total lumen	188160 Lm
Illuminated area	4500 m <sup>2</sup>
Engine	Yanmar 2TNV-70
Engine cooling	Liquid
Cylinders (q.ty)	2
Engine speed (50/60 Hz)	1500 / 1800 rpm
Liquid containment (110%)	√
Alternator (kVA/V/Hz)	5/220/50 – 5/240/60
Outlet socket (kVA/V/Hz)	2/220/50 – 2/240/60
Inlet plug (A/V/Hz)	16/220/50 – 16/240/60
Avg. sound pressure	58 dB(A) @ 7m
Wind speed resistance	110 km/h
Tank capacity	100 l
Running time	143 h



Picture shown may not reflect actual configuration.

# HOFTRONIC™

## DATASHEET



### LED FLOODLIGHT 200 WATT 160LM/W IP65 4000K 5 YEARS WARRANTY

#### Specifications

448476

SKU

Input power	220-240V AC	Dimensions	458.5 x 371 x 57 mm
Watts	200 Watt	Operating temperature	-20°C ~ 40°C
Equivalent watts	3600 Watt	Switching cycles	20.000 cycles
Luminous flux	32000 Lumen	Life span	30.000 hours
Light color	Neutral white	Certification	CE, RoHS
Color temperature	4000K	Warranty	5 years
Color rendering index (CRI)	70Ra	Suitable for	Indoor and outdoor
Beam angle	120°	Color	Black
Powerfactor	> 0.95	Frequency	50/60Hz
Energy label	A++	EAN	7439628448476
IP-rate	IP65		
Material	Aluminium		
Dimmable	No		



# SMC TL-90 LED Mobile Lighting Tower



Compact and easy to transport, the **SMC TL-90 LED** lighting tower has powerful 240W LED lamps, giving a strong and even light stream with instant on/of light and a lamp life of 50,000 hours and saves up to **50% fuel savings**. The machine is fully retractable for transport and storage. The lighting towers can be equipped with autostart/stop which allows the user to minimise fuel consumption by a further **30%**, yet maximise efficiency. It also features a mains changeover switch to effectively run a unit from a mains power or alternatively link 3 machines together using only one engine. They are suitable for a wide range of applications.

The lighting tower functions in all climatic conditions and with a comprehensive and protected monitoring system. Safety features include mast deployment alarm and a safety system which ensures the mast descends automatically when the handbrake is released, preventing collisions with overhead obstacles.



**Fuel saving up  
to £2,000 per  
year\*\***

## Features:

- **Fuel saving of £160 per month\***
- **Instant light**, no restricted time
- **Super silent operation** – reduced noise pollution at just 60dB(A) at 7m
- **Hydraulically operated mast** can be fully extended to 9m height in only 12 seconds
- **Compact and robust design** with the ability to load ten units together for ease of transportation
- **Fork lit pockets and single lit eye** for easy transportation
- **360° rotating head lamp** with telescopic mast for quick and easy operation
- **5 x 240W LED lamps** fitted with high output optics for high intensity light
- **Bio-degradable oil** in hydraulic system
- **Engine fluids fully bunded** to protect the environment from spills
- **Fuel efficient** giving 133 hours of uninterrupted operation
- **Mains changeover switch** to run unit from mains power
- **Link up to 3 machines** together using only one engine
- **EC whole vehicle type approved trailer**
- **50,000 hours LED lamp life**
- Galvanised canopy

## Safety Features:

- Mast deployment alarm & safety system

## Optional Extras:

- 110 Volt power outlet
- 4 wind down prop stands
- Auto-run timer module
- Eco Sensor dusk to dawn timer

\* Compared to standard tower lights

\*\*As of September 2014

Specifications are subject to change without prior notice

**SAVAGE**  
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**0121 328 1100**  
[www.savageplanthire.co.uk](http://www.savageplanthire.co.uk)

## SPECIFICATION

ENGINE TYPE	Kubota D905-BG 3cyl Water Cooled 7.4kW @ 1500rpm diesel
HYDRAULIC SYSTEM	Bio-degradable Oil
FUEL TANK CAPACITY	130 Litres
FUEL CONSUMPTION	0.97 l/hr (Lamps only)
RUNNING TIME	133 Hours
LAMP SPECIFICATION	5 x 240W LED
AVERAGE SOUND PRESSURE LEVEL @ 7 METRES	60dB(A)
ALTERNATOR	Mecc Alte LT3 110 4 Pole, 230V, 50Hz
CONTINUOUS POWER / STANDBY POWER	5.0kW / 5.5kW**
POWER OUTLET SOCKETS	1 x 16 AMP outlet 1 x 16 AMP inlet
MAST MAXIMUM HEIGHT	8740mm
MAST RAISE / LOWER TIME	12 / 18 secs
WIND SPEED	Suitable for operation in wind speeds up to 100km/h
STABILISERS	4 with rear wind down legs
BUNDING	Fully banded to 120% for all fluids
ROAD LIGHTS AND REFLECTORS	Standard
DIMENSIONS FOR TRANSPORT (LxWxH)	2565mm x 1320mm x 2100mm
DIMENSIONS FULLY DEPLOYED(LxWxH)	2870mm x 2639mm x 8740mm
WEIGHT FULLY FUELLED / UNFUELLED	1050kg / 933kg

\*\* Allows 1 unit to power up to 3 units

### Optional Specifications:

#### Petrochemical Specification:

- Spark arrestor
- Chalwyn valve

#### Offshore specification:

- Spark arrestor
- Chalwyn valve
- Fuel water trap
- Ani-static fan belt
- Braided fuel lines
- Battery isolator switch
- Fuel isolator shut of valve

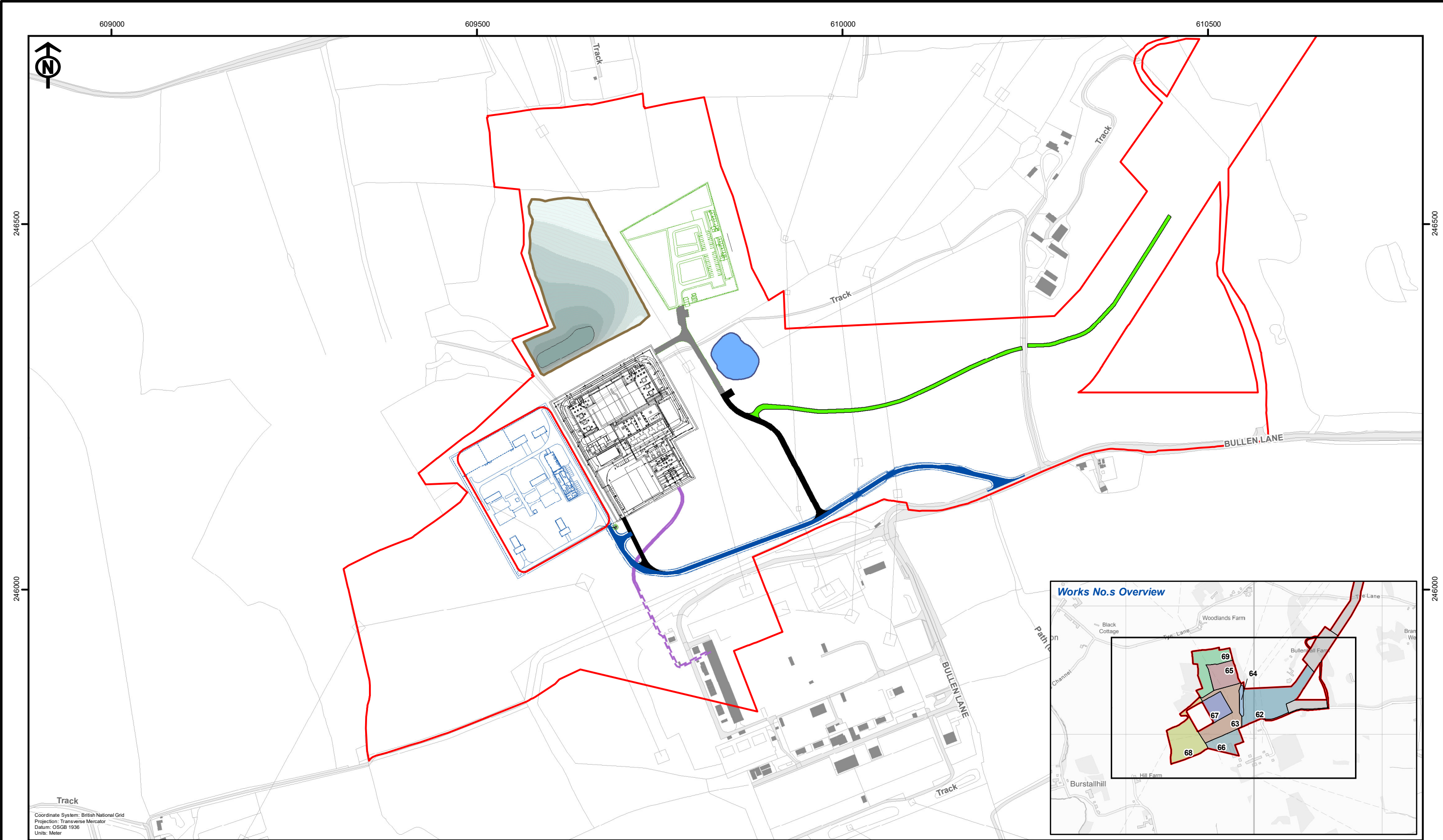


### SAVAGE PLANT HIRE

Office: 222 St Margarets Road, Ward End, Birmingham, B8 2BG  
T: +44 (0) 121 328 1100 F: 0121 327 3548  
E: enquiries@savageplanthire.co.uk W: www.savageplanthire.co.uk







EA THREE DCO Corridor

EA THREE Onshore Converter Station Layout Detail

EA THREE Onshore Converter Station Temporary Site Facilities Detail

EA THREE Converter Substation to National Grid Substation Cable Route

400kV AC Cable - Open Cut Section

400kV AC Cable - Ducted Section

EA THREE Onshore Converter Station Access Roads

Permanent

Temporary

EA THREE Cable Access Road

Haul Road

EA THREE Onshore Converter Station SUDs Pond

EA THREE Area to be Reprofled

EA ONE Onshore Converter Station Access Road

Works No.s

65

66

67

68

69

62

63

64

B	04/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue
Rev	Date	By	Comment

Original A3 Plot Scale 1:5,000

0 100 200 Metres

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NOT TO BE USED FOR NAVIGATION.

Onshore Converter Station Stage

Figure 1: Site Context Plan

Drg No	05356.00006.12.0001.1 ONCS Site Context Plan
Rev	2
Date	04/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Drawings\EA3\Onshore Substation\ONCS and Commencement Master\5356.00006.12.0001.1 ONCS Site Context.mxd

