
West Burton C (Gas Fired Generating Station)

The West Burton C (Generating Station) Order

Land to the north of the West Burton B Power Station,
Nottinghamshire

Lighting Strategy



Applicant: EDF Energy (Thermal Generation) Limited
Date: April 2019

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GLOSSARY OF ABBREVIATIONS AND DEFINITIONS

ABBREVIATION	DESCRIPTION
BS	British Standard – business standards based upon the principles of standardisation recognised inter alia in European Policy.
CAA	Civil Aviation Authority – The lighting of cranes will follow the guidelines of the CAA.
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.
ILP	Institute of Lighting Professionals – Professional lighting association for the UK and Ireland, providing guidance and notes on key lighting principles.
IP	Internal Protection Marking – Details the level of protection of a light against intrusion from dust, water, body parts and accidental contact.
LED	Light-emitting diode.
WBC	West Burton C Power Station.

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Executive Summary

EDF Energy (Thermal Generation) Limited is proposing to develop a gas fired peaking plant to be known as 'West Burton C' (WBC). The Proposed Development Site is located within the existing West Burton Power Station site, near Gainsborough, Nottinghamshire.

The aim of this document is to outline the principles that would be adopted for the lighting of WBC. The principles that would be used are based on guidelines and standards from the Institute of Lighting Professionals (ILP), British Standards (BS) and Bat Conservation Trust.

As the site would only be intermittently in operation, the overarching philosophy for the development is to be a reduced light site. This means that permanent light fixtures are present for pedestrians and safety and security reasons, whilst light needed for maintenance would be in the form of temporary lighting fixtures.

As part of the project development, two options have been looked at:

- Option 1 – Single large gas turbine; and
- Option 2 – Up to five smaller gas turbines.

Both options have similar maximum equipment heights but Option 2 has the slightly larger plant footprint and so is considered the 'worst case' in terms of lighting at the Proposed Development's sensitive receptors. The strategy therefore considers the Option 2 indicative plant layout when looking at the principles that shall be adopted in the different plant operating areas.

For Option 2, the external lighting has been divided into three main areas: site roads, central zone comprising gas turbine area and water/diesel storage tanks and generator and southern zone comprising gas receiving facility. The site roads would be lit by column mounted Light-emitting diode (LED) road luminaires up to 12m in height. The central zone would be lit through a combination of LED luminaires mounted on columns up to 12m in height and buildings/enclosures. The southern zone would be lit by column mounted equipment no greater than 10m in height. The central and southern zone would normally only be lit when the site is in operation, unless required for safety or security reasons, and would not have the lighting levels to accommodate maintenance.

The luminaires would be designed to emit minimum light upwards with specific measures taken for fixed head lanterns, movable luminaires and lanterns at height. A site wide lighting control system would be implemented to control all luminaires.

For construction, artificial light would be used to maintain safe practice and security whilst adhering to the mitigation against excessive light.

In conclusion, the strategy provides key principles that should be implemented in the development of a detailed design which includes ensuring health and safety, reducing light pollution and maintaining security of the site.

1. Introduction

- 1.1.1 This strategy outlines the lighting concept for the operation of the proposed West Burton C Power Station development. The intention of this strategy is not to design the lighting required, but to outline the principles that shall be adopted.
- 1.1.2 As part of the project development, two options have been looked at:
- Option 1 – Single large gas turbine; and
 - Option 2 – Up to five smaller gas turbines.
- 1.1.3 Both options have similar maximum equipment heights, but Option 2 has the slightly larger plant footprint and so is considered the ‘worst case’ in terms of lighting at the Proposed Development’s sensitive receptors. The strategy, therefore, considers the Option 2 indicative plant layout when looking at the principles that shall be adopted in the different plant operating areas.
- 1.1.4 The strategy also provides a brief summary of the lighting that is required during the plant construction phase, However, a more detailed description of these requirements is covered as part of the Framework Construction Environmental Management Plan (CEMP) (**Application Document Ref. 7.3**).
- 1.1.5 To enable formation of the lighting principles, recommendation has been taken from the following standards and guidelines:
- BSEN 12464-2:2014 - Light and lighting - Lighting of work places. Part 2 - Outdoor work place (Reference 1);
 - ILP Guidance Notes (Reference 2);
 - Bat Conservation Trust document – Bats and Lighting in the UK (Reference 3); and
 - ILP Guidance Notes for the Reduction of Obtrusive Lights (Reference 4).

2. Lighting Standards

- 2.1.1 To enable people to perform outdoor visual tasks efficiently and accurately, especially during the night, adequate and appropriate lighting should be provided. The degree of visibility and comfort required in a wide range of outdoor workplaces is governed by the type and duration of activity.
- 2.1.2 BS EN 12464-2:2014 Light and lighting – Lighting of work places (Part 2: Outdoor work places) (Reference 1) specifies requirements for lighting tasks in most outdoor work places and their associated areas in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice.
- 2.1.3 BS EN 12464-2:2014, Table 5.11.1 (Reference 1) has been determined as the most appropriate guidance to apply to the Proposed Development (see extract below).

Table 5.11 — Power, electricity, gas and heat plants

Ref. no.	Type of area, task or activity	\bar{E}_m lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.11.1	Pedestrian movements within electrically safe areas	5	0,25	50	20	
5.11.2	Handling of servicing tools, coal	20	0,25	55	20	
5.11.3	Overall inspection	50	0,40	50	20	
5.11.4	General servicing work and reading of instruments	100	0,40	45	40	
5.11.5	Repair of electric devices	200	0,50	45	60	Use local lighting

3. Design Principles

3.1.1 The main lighting design principle for the Proposed Development are:

- to ensure the health and safety of employees and visitors performing normal working duties;
- to ensure the safe movement of vehicular and pedestrian traffic around the site during the hours of darkness;
- to minimise light pollution in terms of light trespass, sky glow and glare to the identified sensitive receptors; and
- to ensure the security of the site and its occupants including lighting suitable for the correct functioning of the preferred CCTV system.

3.1.2 As the Proposed Power Plant Site would only be intermittently in operation and remotely operated, the overarching philosophy underpinning the design of the lighting for the development is to have a reduced light site. Permanent lighting would be for general pedestrian movement, safety and security purposes only. Any lighting that may be required for maintenance purposes would be produced by temporary lighting sets specific to the required task. Lighting shall be further reduced to only critical lighting from 23:00 to 05:00 hours to reduce the impact of obtrusive lighting on the local environment (i.e. 23.00 hrs as per recommendation from the ILP Guidance Notes for the Reduction of Obtrusive Lights (Reference 4) and 05.00 hrs as per the usual recommendation from local authorities).

3.1.3 The Environmental Statement (**Application Document Ref 5.2**) has identified the potential for disturbance to adjacent habitats during the construction and operation of the Proposed Development. Specific to this Lighting Strategy, the potential for excessive glare of light towards adjacent habitats used by foraging bats has been identified as a concern. This Lighting Strategy outlines recommendations from BS EN 12464-2:2014 (Reference 1) and the ILP Guidance Notes (Reference 2) to minimise the impact of lighting to these adjacent habitats. Such recommendations include:

- the types of lighting to minimise upwards spread of light;
- the mounting heights and angles to minimise obtrusive glare; and
- guidance on light limitations for different environments.

3.1.4 In addition, the construction engineers and the lighting design engineers for the Proposed Development shall follow the guidance and mitigations outlined in the Bat Conservation Trust document – Bats and Lighting in the UK (Reference 3).

3.1.5 All luminaires would have the necessary optical control and be appropriately aimed to minimise direct upward light emission. The lighting proposals seek to utilise LED lanterns which provide safety (reduced maintenance) and

environmental advantages (more control than conventional light sources).
Advantages of LED luminaires are:

- low power consumption and long and predictable lifetime;
- high colour rendering;
- quick turn on and off;
- reduced energy consumption (cost saving); and
- reduced carbon footprint.

3.1.6 The luminaires chosen would, where ever practicable, have no light emitted above the horizontal to ensure the lighting is well controlled and would not directly contribute to any sky glow or cause light pollution/obtrusive light.

3.1.7 Luminaires shall also be positioned and aimed so that peak light intensities from any fitting do not unintentionally illuminate any building or structural façade.

3.1.8 It is assumed at present that there would be no overhead lines in the vicinity of the proposed lighting; this will require confirmation at detailed design stage. If overhead lines are present then where equipment is mounted on columns, the columns should be hinged to be lowered for maintenance purposes.

4. External Lighting by Area

4.1.1 As part of the project development, two options have been looked at:

- Option 1 – single large gas turbine.
- Option 2 – up to five smaller gas turbines.

4.1.2 Both options have similar maximum equipment heights but Option 2 has the slightly larger plant footprint and so is considered the ‘worst case’ in terms of extrusive lighting at the Proposed Development’s sensitive receptors. The indicative layout for Option 2 has been assumed when looking at the required external lighting.

4.1.3 For the purposes of this indicative design, the layout has been split into areas. The final layout of the West Burton C site has not yet been determined, so the Lighting Strategy is indicative at this stage. The options and the lighting requirements for each zone have been outlined in the sub sections below.

4.2 Option 2 Indicative Plant Layout

- site roads
- central zone comprising gas turbine area and water/diesel storage tanks and generator
- southern zone comprising gas receiving facility

4.3 Site Roads

4.3.1 The site roads would be lit by column mounted LED road luminaires. The overall lantern mounting height would be up to 12m. During night time hours a partial lighting strategy would be applied to reduce the total output from the lighting scheme.

4.3.2 The road lighting also contributes to the illumination in the central zone.

4.4 Central Zone

4.4.1 The central zone comprising of the gas turbine generators, water/diesel storage and generator would be predominately lit by the columns located on the site access road at the perimeter of the area. This lighting would be supplemented with additional lighting within the compound area. A combination of LED luminaires mounted on the buildings and/or enclosures, if part of the design and on columns up to 12m is required to achieve the appropriate lighting levels.

4.4.2 The level of lighting within open compounds would be sufficient to allow the safe movement of pedestrians and vehicles (using their headlights) about the compound in areas that they might reasonably be expected to negotiate at night. It

is not intended to facilitate planned or unplanned maintenance activities for which additional localised portable equipment would be required.

- 4.4.3 The lighting in this area would be group switched, so the lighting is operated only when required.

4.5 Southern Zone

- 4.5.1 Lighting of open compounds such as the gas receiving facility would use column mounted equipment at no more than 10m above the ground level.

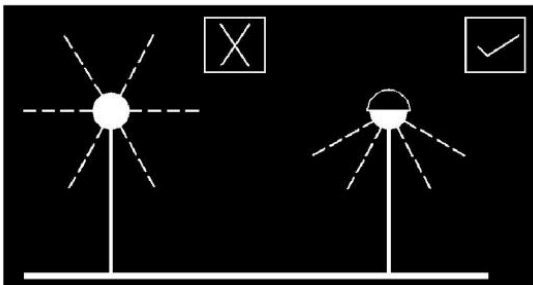
- 4.5.2 The level of lighting within open compounds would be sufficient to allow the safe movement of pedestrians and vehicles (using their headlights) about the compound in areas that they might reasonably be expected to negotiate at night. It is not intended to facilitate planned or unplanned maintenance activities for which additional localised portable equipment would be required.

5. Lighting Equipment

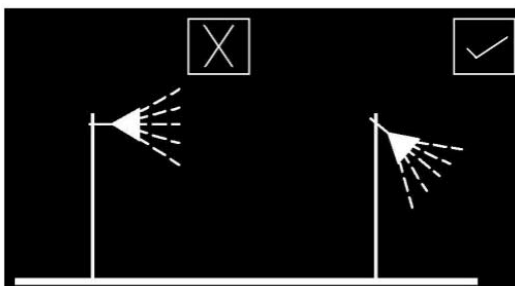
- 5.1.1 All luminaires would be designed to minimise upward light spill and have no light above the horizontal.
- 5.1.2 Luminaires would, where appropriate, be controlled by a site wide lighting control system to minimise waste light output.
- 5.1.3 All external luminaires would be ingress protected to a minimum standard of IP65 and would be chosen to suit any hazardous areas as identified during detailed design.
- 5.1.4 Lighting equipment in the gas receiving area would be of a design to conform with the hazardous area rating.

5.2 Generic Equipment and Installation

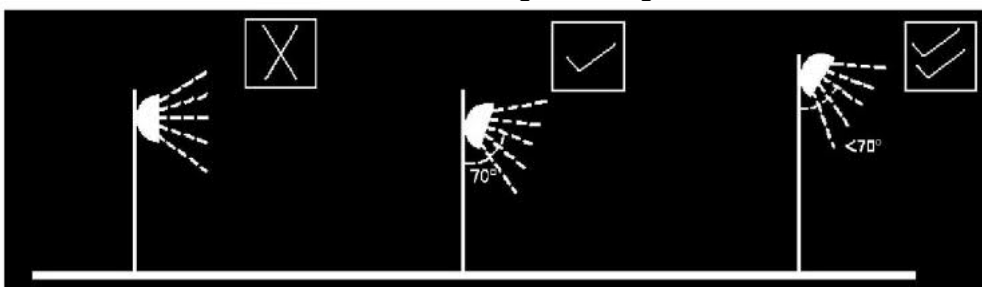
- 5.2.1 Lighting reflected off buildings could have a significant impact on the level of light spill produced. Equally important is the choice of lighting equipment and lighting techniques. This general guidance would be followed when selecting equipment and lighting techniques.



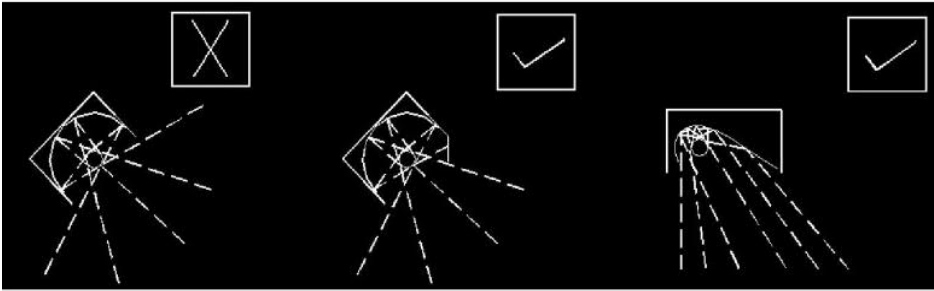
Fixed head lanterns will not emit any direct light above horizontal.



Movable luminaires will be tilted so that no light is being emitted above horizontal.



Lantern heights will be increased where feasible to reduce tilt angles.



Quality luminaire optics will be used which accurately control light distribution and do not spill light into the atmosphere.

6. Lighting Control

- 6.1.1 External lighting control would form part of the overall lighting control system. Operators would have the ability to override any lighting circuit and, where appropriate, individual luminaires from a central location. The general lighting control philosophy is for the lighting to be controlled by a combination of time clock and photocell arrangements with additional local control where appropriate.

7. Construction Site Lighting

- 7.1.1 Construction lighting would be required in areas where natural lighting is unable to reach (sheltered/confined areas) and prior to permanent lighting being installed. Lighting may also be required around the site for night time construction and during normal working hours within winter months.
- 7.1.2 Artificial lighting shall be provided to maintain sufficient security and health and safety for the site whilst adopting the mitigation principles outlined in this report to avoid excessive glare and minimise spill of light to nearby receptors.
- 7.1.3 Construction cranes shall provide aviation warning lights in line with the Civil Aviation Authority (CAA) guidance – CAP1096 (Reference 5).
- 7.1.4 Further details on the required type and control of lighting is covered as part of the Framework CEMP (**Application Document Ref. 7.3**).

8. Conclusions

- 8.1.1 The operation of the Proposed Development would be intermittent, allowing the plant to be mostly operated remotely from the adjacent West Burton B Power Plant. As such, the overarching lighting strategy would be to have a reduced light site.
- 8.1.2 This strategy document does not outline the detailed design but provides the principles, guidance and the recommended type of equipment that is required to illuminate the site. When determining the lighting requirements, an indicative site layout has been used and split into different zones in order to assess the requirements for specific plant equipment. For each area, the level of lighting is proposed and fixture mounting guidance is provided to ensure adequate light whilst minimising light spill and glare.
- 8.1.3 In summary, the key principles that shall be adopted when developing the detailed design include:
- to ensure the health and safety of employees and visitors performing normal working duties;
 - to ensure the safe movement of vehicular and pedestrian traffic around the site during the hours of darkness;
 - to minimise light pollution in terms of light trespass, sky glow and glare to the identified sensitive receptors; and
 - to ensure the security of the site and its occupants including lighting suitable for the correct functioning of the preferred CCTV system.

9. References

- 1 BS EN 12464-2:2014. 2014. Light and lighting - Lighting of work places. Part 2 - Outdoor work places
- 2 Institute of Lighting Professionals. 2015-19. ILP Guidance Notes
- 3 Bat Conservation Trust. 2018. Bats and artificial lighting in the UK – Guidance Note
- 4 Institute of Lighting Professional. 2011. Guidance notes for the reduction of obtrusive light
- 5 Civil Aviation Authority. 2014. Guidance to Crane Operators on Aviation Lighting and Notification (CAP1096)