

# APPENDIX 15C: BASELINE LIGHTING REPORT

**NOT PROTECTIVELY MARKED**

**NOT PROTECTIVELY MARKED**

**Hinkley Point C**  
Associated Development - Bridgwater A

EDF ENERGY

6th April 2011  
Final Report  
9W2434





HASKONING UK LTD.  
DEVELOPMENT & TRANSPORT

5th Floor, Radcliffe House  
Blenheim Court  
Solihull B91 2AA  
United Kingdom  
+44 (0)121 709 6520 Telephone  
Fax  
info@solihull.royalhaskoning.com E-mail  
www.royalhaskoning.com Internet

Document title Hinkley Point C  
Associated Development - Bridgwater A  
Document short title Bridgwater A Baseline Lighting Report  
Status Final Report  
Date 6<sup>th</sup> April 2011  
Project name Hinkley Point C Associated Developments  
Project number 9W2434  
Client EDF ENERGY  
Reference R9W2434/303487/Bridgwater A/Soli

Drafted by Malcolm Mackness  
Checked by Christopher Crockford  
Date/initials check .....  
Approved by Matthew Loffman  
Date/initials approval .....  
.....

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## 1 INTRODUCTION

This report was commissioned by EDF Energy to provide technical advice with regards to any proposed lighting in connection with the proposed accommodation campus (the proposed development) at the Bridgwater A site (the site).

This report is structured as follows:

- Project Methodology
  - An introduction into how the proposed development and associated landscape and visual assessment would, in part, be carried out.
- Summary of Terms
  - A description of terms used in the report.
- Baseline Assessment
  - A review of the existing lighting baseline from a day and night-time perspective from representative viewpoints.
- Proposed Lighting
  - Describes the strategy for the proposed lighting scheme, which details the performance criteria which would be achieved from both an ecological and operational perspective. This would cover both the permanent lighting scheme (i.e. operational phase) and any temporary lighting required throughout the construction phase.
  - Provides an explanation of any mitigation techniques used to inform the lighting strategy.
- Assessment of Effects
  - Provide an understanding of the proposed effects on the agreed representative viewpoints.

The baseline assessment and an assessment of the effects on the seven representative viewpoints set out in the landscape and visual impact assessment (LVIA) (see the **Environmental Statement (Chapter 15)** of this volume) of the proposed development.

The proposed lighting scheme is based on a requirement to light the following elements of the proposed development:

- the access junctions from the A39 (Bath Road) into the site, which would be adopted by Somerset County Council;

- lighting within the proposed development, which would including the lighting of: internal roads, pedestrian walkways, car parks and bus parking areas and the sports pitches.

The findings of this report have been used to inform the landscape and visual assessment in the **Environmental Statement (Chapter 15)** of this volume).

## 2 METHODOLOGY

The general approach to completing the assessment is as follows:

- Site visits to ascertain the context of the study area by day and night. This includes describing existing sources of illumination; and an assessment of relative heights between the site and viewpoints; and
- a description of the lighting environment during the construction and operational phases.

As part of the proposed lighting strategy has been developed in conjunction with:

- EDF Energy (applicant and operator);
- Project Landscape Architects;
- Project Architects; and
- Project Ecologist.

The lighting strategy makes reference to the following standards and other documents:

- The Environmental Protection Act 1990 (as amended by the Clean Neighbourhoods and Environment Act 2005), specifically sections 79 and 80;
- BS-EN 12464-2:2007: Lighting of work places. Outdoor work places;
- BS 5489:2003 Part 1: Code of Practice for the Design of Road Lighting;
- BS-EN 13201:2003 Parts 1-4: Road Lighting;
- Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:1992 – Outdoor Environment.
- Institution of Lighting Professionals (ILP formerly ILE) guidance notes for the reduction of light pollution.
- Bat Conservation Trust (Version 3, May 2009)/ILE Bats and Lighting in the UK;
- BS EN 12193:2007 Light and Lighting – Sports Lighting.



### 3 SUMMARY OF TERMS

Atmospheric Conditions (for Aura / Sky Glow)	The amount of particle pollution and presence of moisture and other gases in the atmosphere. Light is scattered by the particles and that coming back to an observer below causes the veiling effect of sky glow.
Aura	Localised halo of light above a lit area, caused by direct upward light or reflections from the ground and other surfaces. More obvious where light units are grouped relatively close together and/or of high power.
Colour Rendering Index (CRI)	Ability of a light source to match colours in comparison with a full spectrum light source such as daylight or a tungsten lamp. On a scale of 0–no colour matching, 100– full colour matching.
Metal Halide	Mercury discharge lamp with metal halide additives. White light with good to very good colour rendering properties, depending on exact type, CRI typically between 65–90.
Sky Glow	Wide area of night sky scattering direct and indirect upward light back to an observer. Depends on atmospheric conditions and the amount of upward light. Very typical above urban areas.
SON	High-pressure sodium discharge lamp. Golden orange light. Very poor CRI of 20.
SOX	Low pressure sodium discharge lamp. Orange light, essentially monochromatic, identifying only yellow colour with all others rendered as shades of grey. CRI 0.
Environmental Zone E1 – E4	A classification method developed by the ILE to match appropriate lighting controls to the local environment e.g. an E1 Zone is an ANOB and an E4 Zone a City Centre area.

## **4 BASELINE ASSESSMENT**

### **4.1 Landscape by Day**

Bridgwater is an urban area, with extensive residential areas, shops and supermarkets. In addition it is a local transport hub, with two motorway junctions and a main railway line.

### **4.2 Landscape by Night**

The urban nature of the immediate vicinity is distinguished at night by the extensive street lighting and the presence of commercial and industrial lighting. Domestic lighting, in the form of external porch and security fittings, together with light from windows adds to the lighting presence.

From a distance and relatively close to the town, significant sky glow indicates the presence of extensive SOX and SON-T public lighting. In addition, metal halide installations associated with Bridgwater College, sports facilities and commercial premises add local auras of white light within the scene.

Bridgwater and its environment can be classified within an 'E3 Zone'.

### **4.3 Visual Assessment During Hours of Darkness**

The site is bound by the Bridgwater to Highbridge (part of the Bristol to Penzance) railway and the A39 (Bath Road), which has SOX lighting primarily. The site is the southern part of an extensive factory complex, which is now in process of being demolished.

Just south of the site, across the A39 (Bath Road), is the Bridgwater and Albion Rugby Football Club, Bridgwater Town Football Club and the main Bridgwater College site. All of these facilities have metal halide lighting systems installed.

Both of the sports facilities have high mast systems, which provide high levels of illumination. They create a very bright white light environment, with spill light outside the immediate pitch areas, which is very noticeable locally and from a distance, when in use.

Bridgwater College has extensive metal halide security and car park area lighting using more conventional street lighting type fittings, mounted between circa. 6 to 10m.

None of the sports lighting was seen in operation during site visits, although some of the white light sources visible at Cannington and Comwich may be attributable to one or more of the three sets of pitch lights in this immediate vicinity.

It is not known if some of the lights are still used, but some functioning lighting was observed in this area.

## 4.4 Viewpoints

The following viewpoints have been assessed as part of this report.

BA Viewpoint 1	Bristol Road Playing Fields and adjoining residential properties
BA Viewpoint 2	St John's Cemetery
BA Viewpoint 3	Bristol Road, allotment gardens
BA Viewpoint 4	Footpath along Bath Road
BA Viewpoint 5	Properties on Bath Road opposite Bridgwater Sports and Social Club
BA Viewpoint 6	Residential properties on Bath Road
BA Viewpoint 7	Footbridge, Westonzoyland Road

The images correspond to the main views indicated at the viewpoint locations. They are not 'stitched' panoramic scenes and are not to the same scale. They are used to give context to the lighting assessments.

Relative heights from viewpoint locations to the proposed junction have been assessed from Google Earth. They include the 1.7m 'eye level' height and have been indicated to the nearest metre. They are not intended as absolutes, but are designed to provide some context relevant to the day and night views illustrated.

Night-time photographs cannot be compared between different viewpoints due to differing ambient lighting conditions, exposure times and imager sensitivity (ISO) settings, as well as differing weather and atmospheric conditions. The following should be noted:

- General camera settings were left as normal, with auto white balance.
- No post-processing of night images has been done, other than:
  - de-skewing, if needed;
  - cropping to letterbox format;
  - reduction of JPEG sizes for printing purposes within the Word document;
  - in particular, no changes to Gamma parameters have been made.

#### 4.4.1 Bridgwater A 1

Bristol Road Playing Fields And Adjoining Residential Properties



**Figure BA1**

Open Views Across Playing Field And Railway Line to Site, With the A39 (Bath Road) Beyond



**Figure BA1N**

Conditions: Fine, dry, some light cloud at high level; and stars visible with no moon.

The foreground and site are dark, with no local lighting seen to be operative from this view.

SOX lighting along the A39 (Bath Road) visible in the background, possibly creating the illumination of the top of the factory buildings.

Sky glow relatively obvious, attributable to extensive residential area to the east, beyond the A39 (Bath Road).

#### 4.4.2 Bridgwater A 2

St John's Cemetery



**Figure BA2**

Close viewpoint, hedges and trees bounding railway line, with factory site beyond.

No night-time access.

Informed assessment based on the two other viewpoint locations close by; and the site would be dark.

The remains of the buildings would be silhouetted against the sky glow from east Bridgwater to varying extents, subject to atmospheric conditions.

#### 4.4.3 Bridgwater A 3

Bristol Road Allotment Gardens



**Figure BA 3**

## Views Across Railway Line To Site East And South-East



**Figure BA 3N**

Conditions: Fine, dry, some light cloud at high level. Stars visible, no moon.

Site dark, with tree / hedge cover restricting direct sight of A39 (Bath Road) lighting.

Light aura from this and estate lighting beyond clearly visible, silhouetting trees and remains of buildings. Spill light from street lighting illuminating top of far structure.

### 4.4.4 Bridgwater A 4

#### Footpath Along the A39 (Bath Road)



**Figure BA 4**

Limited views into southern section of site, due to hedge



**Figure BA 4N:**

Conditions: Fine, dry, some light cloud at high level. Stars visible, no moon.

SOX street lighting along A39 (Bath Road) very dominant, with back spill falling into site and illuminating hedges and properties.

Light sources difficult to identify, but seem to be at sports pavilion area. Other more distant sources may be visible, beyond site.

Some sky glow in background from northern areas of Bridgwater.

#### **4.4.5 Bridgwater A 5**

Properties on the A39 (Bath Road) opposite Bridgwater Sports and Social Club



**Figure BA 5**



**Figure BA 5N**

Conditions: Fine, dry, some light cloud at high level. Stars visible, no moon.

Site area dark, with hedge and trees obscuring direct views.

Light from window in property visible, but nothing identifiable as exterior lighting in site.

Road lighting creating local haze along the A39 (Bath Road) and limiting any impression of sky glow from more distant lighting along the A38 (Bath Road) and northwards.

#### **4.4.6 Bridgwater A 6**

Residential properties on the A39 (Bath Road)



**Figure BA 6 1**





**Figure BA 6 1N**



**Figure BA 6 2**



**Figure BA 6 2N**

Conditions: Fine, dry, some light cloud at high level. Stars visible, no moon.

Site area dark, with hedge and trees obscuring direct views at lower levels.

Sodium light illuminating upper south west face of old factory building. Source unclear.

North-west views (BA 6 2N) very dark. All views across to site affected by illumination levels and direct glare from the A39 (Bath Road) and service road street lighting.

Background sky glow not very obvious, again due to contrast with A39 lighting.

#### 4.4.7 Bridgwater A 7

Footbridge, Westonzoyland Road



**Figure BA 7**

View only to general area of site, centre of image. Remaining structures obscured by topography and buildings.



**Figure BA 7N**

Conditions: Fine, dry, some light cloud at high level. Stars visible, no moon.

No clear view of any illumination of remaining structures, or lighting associated with the site. Local station and street lighting dominating the scene.

Possible direct sight of some remote lighting units, but very low intensity from this viewpoint and not very clear on image.

Some sky glow apparent but not clear on image.

## 5 PROPOSED LIGHTING

### 5.1 General

This section of the study outlines the lighting elements of the proposed development in respect of:

- statutory and operational requirements for the construction and operational phases;
- design of an appropriate lighting scheme including a review of environmental considerations associated with the provision of artificial lighting.

### 5.2 Lighting for the Construction process

The fundamental considerations of this scheme of lighting during construction are to:

- satisfy health and safety requirements;
- minimise the potential impact of lighting upon the surrounding area by minimising sky glow, glare, and light spillage.

The construction phase lighting would be provided to the lighting design standards and guidance documents, as per a permanent lighting installation. Lighting would comply with the relevant regulations, standards and guidance documents, including:

- Lighting at Work, HSG 38, Health and Safety Executive Books Publication;
- Lighting Guides, LG1 and LG6 published by The Chartered Institution of Building Services Engineers; and
- International Commission on Illumination (CIE) Guides.

Artificial lighting during the construction phase would only be used during the hours of darkness, low levels of natural light or specific construction methods or phases to ensure the health, safety and welfare of the construction staff, visitors to the site, leisure traffic and members of the public as appropriate to the construction work being undertaken.

Lighting during the construction phase would generally be required to provide illumination for the following:

- access/road lighting;
- lighting for the safe movement of staff/operatives/visitors and pedestrians;
- site and on structures and plant/vessels;
- specific construction tasks;
- site security;

- area lighting for site office, compound and materials storage facilities;
- plant and equipment.

All fixed lighting installations (columns) at ground level would be restricted to a maximum height of 10m during the construction phase. Where practicable, the mounting height of luminaires would be reduced below the 10m, unless specific operations, construction methods, plant or equipment necessitate the mounting height to be increased which would then be limited to the specific operation or duration of that construction phase.

The luminaires to be mounted on lighting columns would comprise of a flat glass construction, appropriate to the construction and location of installation. The aiming angle of the peak intensity of the luminaire would be limited, to maintain the light from the luminaire generally within 75 degrees from the downward vertical, controlling the lighting of the area and minimise any potential glare, sky glow and obtrusive lighting to the surrounding areas.

The luminaires to be mounted on the lighting columns would incorporate the appropriate photometry reflectors to control the distribution of light from the luminaires and maintain the illumination within the construction site areas, boundary or task.

Mobile lighting would be mounted on telescopic poles not exceeding 10m in height. Where lighting is required for work on elevated structures during construction of the building, lighting would be provided to meet health and safety requirements; this would include crane-mounted lighting mounted to illuminate the working areas.

The proposed horizontal lighting illuminance levels (minimum and average levels) would generally comply with the lighting standard and guidance documents relevant to the method and construction work being undertaken. Lighting levels would be the minimum necessary as far as is practicably possible, in line with safe working practices.

Where a high level of illumination is required it would be suitably controlled to minimise the impact upon local residents, the environment, wildlife, ecology, road and construction traffic and maritime vessels. Where a high level of lighting (greater than 150 lux) is required it would be limited to the specific construction task area and for the length of the task only.

The construction lighting would be designed, installed and controlled to limit any potential impact upon the surrounding area by minimising sky glow, glare and light spillage.

The contractor would be required to ensure that all plant, equipment and machinery used in the construction of the facility has the appropriate lighting for the safety of operation, be controlled and operated to minimise any 'obtrusive' light into the surrounding area by directing light onto and into the area of construction work.

The construction lighting would be designed, installed and controlled by the contractor such that they meets fully with their statutory obligations for the health, safety and

welfare of the construction staff during the construction phase, visitors to the site and to ensure the minimum impact of lighting installation during the construction phase.

The lighting installation would be designed and installed to diminish the effect on navigational aids or signs, public roads and residential areas.

During low levels of activities, holidays or lulls in operation the contractor would be required to maintain only appropriate minimum levels of illumination around the site that is commensurate for site security and safety reasons during hours of darkness or low levels of natural light, however this would be reviewed on an area by area basis to provide the minimum levels required.

As part of the construction process and the nature of this project, the contractor would monitor the lighting levels and spillage during the construction of the facility and records would be retained on site. Appropriate action would be taken where lighting levels are inadequate or excessive.

## **5.3 Operational Lighting**

### **5.3.1 Introduction**

As part of the lighting design, a number of factors have been considered to ascertain the correct illuminance levels and minimise the effect on the local environment.

### **5.3.2 Performance Objectives**

The primary aims of the lighting design are summarised as follows:

- to deliver a high quality and efficient lighting design, with regards to lamp efficacies and maintenance regime over the relatively short life of the installation;
- to provide safe, attractive and clear routes during the night-time for road users and pedestrians;
- to provide a suitable lighting installation which is in accordance with the requirements of the site with regards to CCTV and general security;
- to create an environment where users feel safe and secure;
- to be considerate to the sensitive areas of the site with regards to the ecological constraints and identify areas of darkness to attempt to preserve the landscapes and minimise the environmental impact of the lighting installation.

### **5.3.3 Design Parameters**

The following design standards have been applied within this strategy to ascertain the most appropriate way forward for illuminating the site:

- BS-EN 13201:2003 Parts 1 – 4;

- the Environmental Protection Act 1990 (as amended by the Clean Neighbourhoods and Environment Act 2005), specifically sections 79 and 80;
- CIBSE Lighting Guide 6;
- BS-EN 12464-2:2007;
- ILE Guidance Notes for the reduction of Light Pollution;
- Bat Conservation Trust (version 3, May 2009) / ILE Bats and Lighting in the UK;
- BS EN 5489-1:2003 – Code of Practice for the Design of Road Lighting – Part 1 Lighting of Roads and Public Amenity Areas, BSI, 2003;
- BS EN 12193:2007 Light and Lighting – Sports Lighting.

In order to specify the most appropriate level of illumination to the site lighting, the scheme is segregated into the following areas:

- new access junction at the A39 (Bath Road) into the site, which would be adopted public highway lighting;
- lighting within the proposed development, which includes: internal roads, pedestrian walkways, car parks and bus parking areas and the sports pitches.

In conjunction with the standards and guidelines listed above, the following illuminance levels have been specified to provide adequate illumination.

Publication Site Task / Recommendation	Horizontal Illuminance	
	Average (lux)	Minimum (lux)
<b>BS EN13201:2003</b>		
Site Access Roads - Class S1 (Lamps to be greater than Ra 60)	15	5
Conflict Areas (Junctions, Roundabouts and Turning circles) – Class CE 3 (Lamps to be greater than Ra 60)	15	6
Site Access Roads - Class S2 (Lamps to be greater than Ra 60)	10	3
Conflict Areas (Junctions, Roundabouts and Turning circles) – Class CE 5 (Lamps to be greater than Ra 60)	10	4
Roads to be adopted by Somerset County Council - Class ME3:		
Conflict Areas (Junctions, Roundabouts and Turning circles) – Class CE 2	20	8
Roads to be adopted by Somerset County Council - Class ME3:		
Conflict Areas (Junctions, Roundabouts and Turning circles) – Class CE 2	20	12
<b>BS EN 12464-2:2007 Lighting of work places – Part 2: Outdoor work places</b>		
Walkways exclusively for pedestrians	5	N/A
<b>BS 5489-1:2003</b>		
Staff Car parks – Large	20	5
Staff Car parks – Medium	10	2.5

The ILE assessment method for lighting obtrusion is based on classifying landscapes into four environmental zones - E1 – E4.

Obtrusive Light Limitations - ILE UK Recommendations						
Environmental Zone	Sky Glow ULR (Max) %	Light Trespass (into windows) Ev Lux		Source Intensity I kCd		Building Luminance L (cd/m2)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Pre-curfew
<b>E1</b> Intrinsically dark landscapes Nat. Parks, AONBs etc	0	2	1*	2.5	0	0
<b>E2</b> Low district brightness Rural, small village, relatively dark urban location	2.5	5	1	7.5	0.5	5
<b>E3</b> Medium district brightness Small town centres or urban location	5	10	2	10	1.0	10
<b>E4</b> High district brightness areas Town / city centers with high night-time activity levels	15	25	5	25	2.5	25

**ULR** - Upward Light Ratio of Installation (maximum permitted % of luminaire flux for total installation going directly skywards).  
**Ev** - Vertical illuminance in Lux (Lumens per square metre) - measured on glazing at centre of window  
**I** - Light source intensity in Candelas (cd)  
**L** - Luminance in Candelas per square metre ( cd/m2)  
**See Institution of Lighting Engineers 'Guidance Notes for the Reduction of Obtrusive Light' - [www.ile.org.uk](http://www.ile.org.uk)**

The design strategy described within this report has been based upon the classification of the project falling within environmental zone E3.

### 5.3.4 Ecological Considerations

The **Environmental Statement (Chapter 15)** of this volume identifies a number of biodiversity receptors within the site and surrounding area and which have the potential to be significantly affected by the proposed development. One of the mechanisms by which biodiversity receptors could be affected is by changes in lighting levels, which could cause disturbance to commuting or foraging. Further information provided in **Chapter 15** of this volume of the Environmental Statement.

As a starting point to minimise potential lighting impacts, the following guidance was considered:

- sodium lamps (SON) would be used in preference to mercury or metal halide lamps to ensure fewer insects are attracted to the lights and away from hedgerows;
- light intensity would be as low as is permissible to comply with health and safety requirements;
- light spill towards adjacent habitats would be reduced to a minimum (using cowls as necessary);
- the height of the lighting columns would be modelled and optimised in order that the extent of light spill can be clearly understood; and



- lighting would be motion- or switch-activated, as this would allow substantial periods of darkness during which bats can traverse the site normally.

Whilst the above guidance needs to be considered in order to limit the effects on the local ecology, other factors such as light quality and functionality must not be sacrificed.

Based on this guidance, the intention is to reduce lighting levels within the proposed development to a minimum, whilst remaining within the relevant standards and achieving a safe environment for road users and pedestrians.

Whilst it is recommended that SON type lamps are used throughout the proposed development, the light quality from these are significantly poorer than the light emitted from metal halide/white light lamps. Also lamp technology has progressed over recent years to reduce the UV characteristics of such white light sources. It is therefore proposed that white light lamps are used, where possible, to create a functional lighting installation which remains sympathetic to the local ecology. As such these lamps are considered to be “bat friendly” light source. Also to further limit the effects of UV from the light source, all luminaires would be fitted with flat glass reflectors which would also reduce the UV emitting characteristics of the luminaire.

Light spill at the edges of the site would be minimised by using cowls to direct the light where it is needed and reduce back spill. This would be carefully designed; having consideration for lighting column height, to ensure the primary aim of the lighting in each location can be achieved.

The assessment of lighting impacts on biodiversity receptors is presented in the **Environmental Statement (Chapter 15 of this volume)**.

### 5.3.5 Security Considerations

The lighting provided at the site would ensure a safe and secure environment for road users and pedestrians.

At the proposed junction an emphasis would be on ensuring the safe movement of transport and welfare of the pedestrians.

The lighting would be considerate to the security requirements of the proposed development; in particular the requirements with regards to the CCTV installation and illuminance levels at the perimeter.

It has been advised that the following lighting levels of 1 lux minimum are required at the perimeter fence in both:

- Horizontal plane – 2.5m either side of the fence;
- Vertical plane – 1.5m high at the perimeter fence only.

Light source colour rendering index (Ra) would be >60 to aid with visual clarity and facial recognition via the CCTV cameras.

### 5.3.6 Design Strategy

The design of the proposed development lighting undertakes to address the ecological constraints as previously identified, whilst achieving a functional solution that performs in accordance with current standards and legislation. Whilst the design addresses the strict light control, no compromise would be made which would in any way jeopardise the safety of the end user.

It is very important that every effort possible be undertaken to reduce light pollution.

Light pollution can take differing forms and is a very subjective matter. However, the main light limitation issues to be addressed when design the lighting for the proposed site are sky glow, overspill, and line of sight intensity. These factors will be closely considered when selecting lighting equipment for the installation.

Sky glow can be addressed by a good choice of luminaires that would neither project light upwards nor throw too much light directly on to objects (thereby reflecting back upwards). Good aiming and selection of luminaires with good reflectors would arrest overspill and line of sight intensity.

### 5.3.7 Design Proposals

This section details specifically the design concepts considered and incorporated as part of the proposed development.

Modifications to the existing lighting would be required as part of the junction upgrade and road widening of the A39 (Bath Road) to provide access into the site.

It is proposed that existing columns would be removed and the scheme upgraded to a CE2 classification.

Lighting would be provided utilising a luminaire complete with appropriately controlled light distribution and a high quality optical control system. This would include the use of flat glass luminaires to provide an accurately controlled, low obtrusive light installation and a total light cut-off above the horizontal in line with obtrusion values stated above.

It is proposed that these areas would be illuminated using 10m columns installed on either side of the roads, and central reservations in order to provide adequate illumination.

The control and switching of the lighting circuits is to be via a photocell which switches the lights on at dusk and off at dawn. This would be as per Somerset County Council's operational requirements for street lighting.

The external lighting specification for the proposed development allows for adjustments in lighting levels dependant on the tasks, activities and associated risks linked with the area to be illuminated.

Lighting columns for roads, parking areas, pedestrian areas and the coach parking area for this site would be approximately 8m in height. The lighting columns for the sports pitches would be approximately 12m in height.

Perimeter security lighting would be provided by lighting columns at a minimal height, in this case approximately 5m mounting height. The luminaires selected offer a high level of light pollution control to ensure compliance with the dark sky principals of the project. Minimum lighting levels would be maintained during the hours of darkness in this area to ensure the quality of CCTV surveillance for the perimeter fence.

Where required to minimise spill light onto environmentally sensitive areas, the luminaires would be provided with shields, baffles or louvers. The use of the various shielding elements would provide a reduction in the spill light levels subject to type, orientation, inclination and the mounting height of the luminaires.

### **5.3.8 Luminaire Proposals**

Where possible luminaire types/manufacturers have been selected in accordance with existing column types currently installed within the area.

Also further to conversations held with Somerset County Council, it appears that Urbis are a preferred supplier with regards to the external lighting within the district.

Discussions have also been held with the lighting consultants in order to adopt a common approach, who have informed us that Urbis have been selected as the primary supplier of external lighting units on their sites

Therefore, considering the above and EDF Energy's wishes to maintain uniformity with regards to luminaire manufacturers across the other proposed off-site associated developments, it follows that the proposed design for this site would be based upon the Urbis products where possible.

Limiting the product suppliers and types would aid future maintenance/repairs by limiting the number of stock components and types, such as lamps.

## 6 LIGHTING APPRAISAL

This section sets out an appraisal of the effects of incorporating the proposed lighting strategy as described within the preceding sections.

### 6.1 Bridgwater A 1

Bristol Road Playing Fields and Adjoining Residential Properties

The lighting provided at the modified junction on the A39 (Bath Road) may be partially visible beyond the existing row of trees. However this is unlikely to differ greatly from the existing A39 (Bath Road) lighting installation which is currently visible.

Differences between the existing installation and the new lighting proposal for the road widening scheme with regard to aura and sky glow would be negligible.

It is probable that the main site lighting would be visible from this viewpoint. Street lighting/columns are likely to be visible along with building security lights and internal lighting through windows. This would also contribute to sky glow in the medium distance views across the playing fields.

When in use the lighting of the sports pitches would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

### 6.2 Bridgwater A 2

St John's Cemetery

Night-time access was not possible at this viewpoint. The following is an informed appraisal of the likely effects.

The lighting provided at the modified junction on the A39 (Bath Road) may be partially visible beyond the trees depending upon building heights within the proposed development.

Differences between the existing installation and the new lighting proposal for the road widening scheme with regard to aura and sky glow would be negligible.

It is probable that the site lighting would be visible from this viewpoint. Street lighting/columns are likely to be visible along with building security lights and internal lighting through windows. This would also contribute to sky glow in the medium distance beyond the cemetery.

When in use the lighting of the sports pitches would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

### 6.3 **Bridgwater A 3**

Bristol Road, allotment gardens

The lighting provided at the modified junction on the A39 (Bath Road) would not be visible beyond the existing trees/hedge rows at the far end of the allotment gardens.

Differences between the existing installation and the new lighting proposal for the road widening scheme with regard to aura and sky glow would be negligible.

It is unlikely that the main site lighting would be visible from this viewpoint, due to the existing trees/hedgerows at the far end of the allotment gardens. Depending on height, building security lights and internal lighting through windows may be visible.

Main site lighting would contribute to sky glow in the medium distance views beyond the allotment gardens.

When in use the lighting for the sports pitches would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

### 6.4 **Bridgwater A 4**

Footpath along the A39 (Bath Road)

Lighting along the A39 (Bath Road), at the point where the existing highway is to be widened, and new access junction to site constructed would be out of shot to the left of this viewpoint (see Figure BA 4). Therefore the proposed junction lighting would have no effect from this location.

Main site lighting would be visible from this viewpoint Street lighting/columns are likely to be visible along with building security lights and internal lighting through windows. This would also contribute to aura and sky glow above the site.

When in use, the MUGA lighting would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

### 6.5 **Bridgwater A 5**

Properties on the A39 (Bath Road) opposite Bridgwater Sports and Social Club

A39 (Bath Road) lighting, at the point where the existing highway is to be widened, and new access junction to site constructed would be out of shot to the left of this viewpoint (see Figure BA 5). Therefore the proposed junction lighting would have no effect from this location.

Main site lighting would be visible from this viewpoint street lighting/columns are likely to be visible along with building security lights and internal lighting through windows. This would also contribute to aura and sky glow above the site.

When in use, the lighting for the sports pitches would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

## 6.6 Bridgwater A 6

Residential properties on the A39 (Bath Road)

This viewpoint looks across the A39 (Bath Road) at the point where it is to be widened, with the main access junction to the site in clear view.

Lighting columns would be clearly visible at this point designed to specifically illuminate the foreground, which is the main conflict area of the proposed highway. Due to the increased lighting class higher illumination levels would be present in comparison to the existing A39 lighting installations.

The proposed lighting would be visible from this viewpoint street lighting/columns are likely to be visible along with building security lights and internal lighting through windows. This would also contribute to aura and sky glow above the site.

When in use, the lighting of the sports facilities would be prominent in the longer distance views with possible direct views and considerable aura/sky glow against the contrasting dark skies and landscape.

## 6.7 Bridgwater A 7

Footbridge, Westonzoyland Road

Lighting provided at the A39 (Bath Road) site access junction would not be visible from here, due to the distance of the viewpoint from the site along with existing building topology within the near views.

Some aura/sky glow may be visible from the junction lighting in the long distance views on the horizon.

Similarly main site lighting would not be visible from this location due to the distance of the viewpoint from the proposed development along with existing building topology within the near views.

Sky glow may be visible above the site in the long distance views on the horizon.

When in use, the lighting of the sports pitches may be more noticeable in the longer distance views. Whilst it is unlikely that columns/floodlights would be seen directly, they may create a small section of aura/sky glow against the contrasting dark skies and landscape.

## 7 SUMMARY OF MITIGATION THROUGH DESIGN

An assessment of effects on the viewpoint locations is given in the preceding section. Apart from fixed lighting, vehicle headlights would be noticeable, although this would be transitory.

The potential effects of the proposed development would be:

- visibility of light sources;
- spill light around the immediate areas of lighting;
- indirect upward light as a result of reflection off the ground and other surfaces.

To limit potential effects, the following strategies would be employed:

- All lighting equipment on the site would utilise flat glass luminaires, set horizontally, to eliminate any direct upward light and maximise control of spill light.
- The target lighting levels for the site would have been set according to the relevant standards, health and safety and security requirements, but would be kept to a minimum to limit the effects of reflected upward light creating an aura above the site.
- If areas of the site are not used operationally throughout the night, the opportunity to dim fittings or switch some off would be taken, again subject to safety and security needs.
- Any adoptable road lighting would have to operate in accordance with the Highway Authority requirements.
- Impacts on biodiversity resulting from the lighting design of the proposed development have been considered. Where possible, whilst considering the security requirements, the lighting of the site has been designed to minimise these potential effects. An assessment of the impact of lighting on biodiversity receptors is provided in this **Environmental Statement (Chapter 15)**.

## 8 REFERENCE DOCUMENTATION

The following documents have been referred to throughout this report:

- The Environmental Protection Act 1990 (as amended by the Clean Neighbourhoods and Environment Act 2005), specifically sections 79 and 80;
- BS-EN 12464-2:2007 – Lighting of work places - Outdoor work places;
- BS 5489:2003 Part 1: Code of Practice for the Design of Road Lighting;
- BS-EN 13201;2003 Parts 1-4 : Road Lighting;
- Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:1992 – Outdoor Environment. This standard is an industry document which gives good advice with regards to specific lighting techniques for areas such as lorry parks;
- Institution of Lighting Professionals (ILP formerly ILE) Guidance Notes for the reduction of Light Pollution. Particularly relevant to the design of rural areas;
- Bat Conservation Trust (Version 3, May 2009/ ILE Bats and Lighting in the UK;
- BS EN 12193:2007 Light and Lighting – Sports Lighting.