CHAPTER 18: LIGHTING

Introduction

18.1 This chapter assesses the impact of the external lighting associated with the Proposed Development. In particular this chapter considers the potential for light nuisance from external lighting sources during construction and operation of the Proposed Development

18.2 The chapter describes the methods used to assess the impacts, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect impacts of the development arising from potential light spill, glare and sky glow, during the construction and operational phases, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts. It has been written by WSP.

Planning Policy Context

Legislative Framework

Clean Neighbourhood and Environment Act (CNEA) 2005

18.3 Clean Neighbourhood and Environment Act (CNEA) 2005 gives Local Authorities and the Environment Agency additional powers to deal with a wide range of issues by classifying artificial light emitted from defined premises as a statutory nuisance.

18.4 The CNEA 2005 amends section 79(1) of the Environmental Protection Act 1990 to extend the statutory nuisance regime to include light nuisance stating the following:

- '(fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance'.

18.5 Guidance produced on Sections 101 to 103 of the CNEA 2005 by DEFRA (DEFRA, April 2006) extends the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice (in accordance with section 80(2) of the Environmental Protection Act 1990), requiring that the nuisance cease or be abated within a set timescale.

National Planning Policy

Planning Policy Wales

18.6 Within the PPW chapter 13 Minimising and Managing Environmental Risks and Pollution pays particular attention to light pollution with paragraph 13.13.2 stating:-

- There is a need to balance the provision of lighting to enhance safety and security to help in the prevention of crime and to allow activities like sport and recreation to take place with the need to: protect the natural and historic

environment including wildlife; retain dark skies where appropriate; prevent glare and respect the amenity of neighbouring land uses; and reduce the carbon emissions associated with lighting.

- Paragraph 13.14.2 continues on to say Local planning authorities should adopt policies for lighting, including the control of light pollution, in their development plans.
- Paragraph 13.15.3 allows Local authorities to attach conditions to planning permissions for new developments that include the design and operation of lighting systems (for example, requiring energy-efficient design) and prevent light pollution.

Regional Planning Policy

People, Places, Futures - The Wales Spatial Plan (Update 2008)

18.7 There are no specific policies noted in People, Places, Futures - The Wales Spatial Plan (Update 2008) relating to light nuisance/pollution and the effects from the introduction of artificial light sources as part of new development proposals.

Local Planning Policy

18.8 The development plan for Anglesey consists of the adopted Gwynedd Structure Plan (1993) and the Local Plan (1996). Significant weight is also given to policies within the Stopped Unitary Development Plan (2005) as this plan has been subject to Inquiry and Inspector's recommendations. Policies in relation to lighting include the following as detailed in section 18.10 and 18.11

18.9 In addition to the documents listed above and in the following sections particular reference for lighting is made in the Isle of Anglesey AONB Management Plan and in particular policy CCC4.1 which specifically referrers to the nightscape and again specifically references Guidance Note 10 and referenced in table 18.2 of this report.

Supplementary Planning Guidance

18.10 The Isle of Anglesey County Council has produced a series of Supplementary Planning Guidance (SPG) documents to be used in the decision making process of planning applications.

18.11 The following SPG contained within the Supplementary Planning Guidance Design Guide For The Urban and Rural Environment are relevant to external lighting and are policies with which the Proposed Development should comply:

- Guidance Note 9: Crime and Security
- Guidance Note 10: Lighting
- Guidance Note 30: Development in the AONB

Guidance

International Guidance

Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, Commission Internationale De L'Eclairage (CIE 150 - International Commission on Illumination) (2003)

18.12 The purpose of this guidance is to help formulate guidelines for assessing the environmental effects of outdoor lighting and to give recommended limits for

relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. This Guide refers to the potentially adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers.

Guidelines for Minimising Sky Glow CIE 126 (1997)

18.13 This guide gives general guidance for lighting designers and policy makers on the reduction of sky glow and provides recommendations regarding maximum permissible values for lighting installations. These values must be regarded as limiting values. Lighting designers should do all possible to meet the lowest specifications for the design. Other uses of the open air areas at night will usually result in less stringent sky-glow requirements. Practical implementation of the general guidance is left to national regulations.

National Guidance

The Institution of Lighting Professionals (ILP, 2011) Guidance Notes for the Reduction of Obtrusive Light

18.14 The ILP (formerly the Institution of Lighting Engineers) has proposed lighting guidance and criteria for local authorities with a recommendation that they are incorporated at the Local Plan level. The guidance defines various forms of light pollution and describes a series of environmental zones (similar to the CIE 150 (2003) Environmental zones) set out in Table 18.3 below. The ILP Guidance Notes provide suitable criteria against which the effects of artificial lighting can be assessed and have been used in this assessment. The ILP Guidance Notes are provided in Appendix 18.2, and are the basis for defining best practice in terms of the process of defining the baseline and the best practice mitigation (best possible means – BPM).

DEFRA (2001) Lighting in the Countryside: Towards Good Practice

18.15 The Office of the Deputy Prime Minister (ODPM – now Department for Communities and Local Government) in conjunction with the Countryside Commission published 'Lighting in the Countryside: Towards Good Practice' in July 1997, and a revised version was issued in 2001

18.16 The guidance was developed to 'provide practical advice on the prevention and control of lighting impacts through appropriate action by all those involved with lighting in the countryside'. Its objective is 'to identify good practice in the planning and design of lighting in rural areas; and advise on how it can be achieved, using case study examples' (ODPM, 2001). The guide aims to provide an overview and common understanding of all aspects of good lighting practice stating that close co-operation and participation is required for all those involved in planning, designing and installing lighting schemes. The guidance provides valuable information on lighting best practice and the standard methodology outlined in this guidance document has been followed as part of this assessment.

Chartered Institute of Building Service Engineers (CIBSE) (1992) Lighting Guide 6 (LG6)

18.17 The CIBSE Lighting Guide 6 (LG6) looks at lighting within the outdoor environment and is supported by their lighting the Industrial Environment document, both of these set the criteria for lighting levels associated with non-highway lighting such as the external access areas surrounding the Proposed Development.

Local Note

Anglesey: Turning the Tide of Light Pollution or, How to Avoid Anglesey Being Just Like Anywhere Else in the UK

18.18 Although not recognised as an official guidance note or policy the above document sets out some local thoughts and aspirations on how Anglesey could maintain its dark skies.

Approach

Assessment Methodology

18.19 A lighting assessment / baseline lighting survey was carried out to assess the current levels of lighting in and around the three development sites and to assess the environmental lighting zones in which the sites sit.

Method of Baseline Data Collation

18.20 The approach and methodology used to assess the baseline lighting conditions on and in the immediate vicinity of the Site involved a desk study and a baseline lighting survey on the site and surroundings, as discussed below.

Desk Study

18.21 A desk study has been undertaken to identify relevant legislation, planning policy, good practice guidance, and sensitive receptors in relation to lighting following the standard methodology outlined in Lighting in the Countryside: Towards Good Practice, (DEFRA, 2001).

Baseline Lighting Survey

18.22 Colin Fish, Associate and Mark Moscrop Senior Engineer of WSP's lighting team visited the sites on the days of the 3rd and 4th August 2011 and the evening of the 3rd August 2011 with the purpose of collecting information on the current level of lighting in and around the sites and to record actual night time levels of light at selected points around the sites and surrounding areas.

18.23 For the purpose of the survey two light meters were used. Both light meters are regularly maintained and calibrated in accordance with the manufacturer's instructions

18.24 Illuminance readings were recorded using a Minolta T10 (Serial Number 41021018/ 60031036).

18.25 Luminance readings where required were recorded using a Minolta LS100 (Serial Number 79013024).

18.26 Readings of illuminance were recorded at a total of 9 monitoring locations (A to I) and were selected based on professional judgement and were selected to be representative of the sites and the wider area. At each of the monitoring locations, vertical illuminance was recorded generally from northerly, southerly, easterly and westerly directions or across the vista towards the site at a height of 1.2m. A reading of horizontal illuminance was also made at each location to benchmark the ambient light. The monitoring locations are shown in **Figure 18.1** and are described in Table 18.1 below.

Table 18.1: Monitoring locations descriptions

Location	Description
A	Located across from Proposed Penrhos Leisure Village in Valley. Readings taken from Beach Road across the water.
B	Located next to the A55 bridge over causeway outside house named Glyn Dwr.
C	Located on Lon Trefignath double gate to AA land.
D	Located on Lon Trefignath (New Road) adjacent to new eastern roundabout, dead end road.
E	Located on Lon Trefignath (New Road) 2nd dead end turning after western roundabout.
F	Located on Penrhos Beach Road Western End Car Park Area.
G	Located on Hunters Chase / Snowdon View Road
H	Located on Mill road at sharp bend with junction of private access road to houses
I	Located on the B4545 Kingsland Road in AA gateway

18.27 The baseline lighting levels on and surrounding the Application Site are described with reference to the Environmental Zone Criteria for light nuisance (spill/source intensity) in to windows and towards observers as outlined in CIE 150 (2003). This is provided as Appendix 18.2.

18.28 Consideration has been given to possible curfew requirements for the external lighting associated with the Proposed Development (not street lighting), both pre-curfew and post curfew (where lighting level may be reduced after a certain time or the external lighting switched off).

18.29 In accordance with current CIE guidance and the ILP Guidance Notes for the Reduction of Obtrusive Light (2011) and in relation to the assessment, the following definitions are used in describing lighting effects: provided in

- Sky glow: the upward spill of light into the sky which can cause a glowing effect and is often seen above cities when viewed from a dark area.
- Light spill: the unwanted spillage of light onto adjacent areas and may affect sensitive receptors, particularly residential properties and ecological sites.
- Glare: the uncomfortable brightness of the light source against a dark background which results in dazzling the observer, which may cause nuisance to residents and a hazard to road users.
- Light nuisance (into windows): the spilling of light beyond the boundary of a property which may cause nuisance to others.

Significance Criteria

18.30 The assessment of likely significant environmental effects considers effects as a result of the artificial lighting required at the Proposed Development only and not the highways lighting as this is not subject to the requirements of the Clean Neighbourhoods and Environment Act. Lighting will be designed to comply with best practice principles to reduce light spill and has taken into account both considerations for the demolition, remediation, construction and the design for the operational phases.

18.31 The significance level attributed to each effect has been assessed based on the magnitude of change due to the Proposed Development, and the sensitivity of the affected receptor / receiving environment to change. Magnitude of change is assessed on a scale of negligible, small, medium or large.

18.32 The criteria used to determine the 'significance' of any change in baseline lighting levels have been defined qualitatively using professional judgement and best practice guidance (as identified above).

18.33 The lighting assessment has followed the methodology outlined in CIE 126 (1997) and CIE 150 (2003) guidance, whilst consideration is also given to 'Lighting in the Countryside: Towards Good Practice' DEFRA, 1997. The criteria used to assess the magnitude and significance of the effects of installed lighting has been derived from CIE 150 (2003), with consideration also given to the Institution of Lighting Professionals (ILP) 'Guidance Notes for the Reduction of Obtrusive Light' (ILP, 2011) which is essentially a distillation of CIE 150. Here reference has been made to the Environmental Zone Criteria for light nuisance into windows (measured in lux and cd/m2) as defined in **Table 18.2.**

Table 18.2: Environmental Zones

Zone	Surrounding	Lighting Environment	Sensitivity	Examples
E0	Protected	Dark	Very High	UNESCO starlight reserves, IDA dark sky parks
E1	Natural	Intrinsically dark	High	National parks, Areas of Outstanding natural Beauty etc.
E2	Rural	Low district brightness	Moderate	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Low	Small town centres of suburban locations
E4	Urban	High district brightness	Negligible	Town / City centres with high levels of night-time activity

18.34 The CIE 150 (2003) guidance proposes that where a district classification falls between two zones that the more rigorous environmental zone standards are applied in the design of the lighting e.g. an E2 environmental zone would be selected in preference to an E3 environmental zone. The CIE 150 (2003) and ILP guidelines and threshold values for the environmental zones are outlined in **Table 18.3.**

Table 18.3: Obtrusive Light Limitations for Exterior Lighting Installations (ILP, 2011)

OBTRUSIVE LIGHT LIMITATIONS FOR EXTERIOR LIGHTING INSTALLATIONS						
Environmental Zones	Sky Glow ULR (Max %)	Light Nuisance into Windows Ev (lux)		Source Intensity I (cd)		Building Luminance Average, Pre-curfew
		Pre-Curfew	Post-Curfew	Pre-Curfew	Post-Curfew	Average L (cd/m2)
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	0.5	5
E3	5	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

Notes to **Table 18.3**
ULR – Upward Light of the Installation is the maximum permitted percentage of luminaire flux that goes directly into the sky.
Ev – Vertical Illuminance in Lux – measured flat on the glazing at the centre of the window.
I – Light Intensity in Candelas (cd)
L – Luminance in Candelas per Square Metre (cd/m2)
Curfew – the time after which stricter requirements (for control of obtrusive light) will apply; often a condition of use of lighting applied by the local planning authority.
*****- Permitted only from public road lighting installations.

18.35 It is proposed that the CIE 150 (2003) and ILP guidance, referred to above, will be used in order to provide suitable assessment criteria against which to assess the potential effects of artificial lighting. The guidance levels for light nuisance into windows and luminaire/source intensity have been used as the principle criteria for assessing the potential effects associated with the Proposed Development. However, given the subjective nature of sky glow and glare, it is difficult to quantify the potential effects due to a number of variables including the fact that sky glow is measured as a percentage change and glare from a light source is dependent on the type and distance from the light source.

18.36 Therefore, in addition to the criteria provided in CIE 150 (2003) and in the ILP guidance notes (2011), the magnitude of effect and significance and duration of the effects will be evaluated using the assessment scale outlined below

Impact Magnitude

18.37 The magnitude of effects has been determined using the following seven point scale:

- **Large Positive**: Large decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties, resulting in a noticeable or major improvement in baseline conditions and is well within the recommended CIE guidance levels.

- **Medium Positive**: Medium decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties, resulting in a moderate improvement in baseline conditions and is within recommended CIE guidance levels.

- **Small Positive**: Small decrease in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at

windows of residential properties, resulting in a perceptible improvement in baseline conditions and is within the recommended CIE guidance levels.

- **Negligible**: Negligible or barely perceptible change in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties and would cause a negligible or barely discernible change to current baseline conditions.

- **Small Negative**: Small increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties, would cause a minor perceptible change in baseline conditions which are slightly above recommended CIE guidance levels but where current uses could still be maintained.

- **Medium Negative**: Medium increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties, and would result in a noticeable effect on baseline conditions moderately in excess of recommended CIE guidance levels.

- **Large Negative**: Large increase in the level of sky glow, nuisance (light spill) and source intensity (glare) on to surrounding areas and illuminance levels at windows of residential properties, and would result in a major effect on baseline conditions significantly in excess of recommended CIE guidance levels.

Impact Significance

18.38 The overall significance of an effect has been determined by measuring the magnitude of the effect against the type and sensitivity of the receptor affected. The significance of effects has been measured using the scale outlined in Table 18.4 below.

Table 18.4: Significance Criteria used in the Assessment

		Site Sensitivity				
		Very High (E0)	**High (E1)**	**Moderate (E2)**	**Low (E3)**	**Negligible (E4)**
Impact Magnitude	**Large Positive**	Major Beneficial	Major Beneficial	Moderate to Major Beneficial	Moderate Beneficial	Minor to Moderate Beneficial
	Medium Positive	Major Beneficial	Moderate Beneficial	Moderate Beneficial	Minor to Moderate Beneficial	Minor Beneficial
	Small Positive	Moderate Beneficial	Minor Beneficial	Minor Beneficial	Minor Beneficial to Negligible	Negligible
	Negligible	Minor Beneficial / Adverse	Minor Beneficial / Adverse to Negligible	Negligible	Negligible	Negligible
	Small Negative	Moderate Adverse	Minor Adverse	Minor Adverse	Minor Adverse to Negligible	Negligible
	Medium Negative	Major Adverse	Moderate Adverse	Moderate Adverse	Minor to Moderate Adverse	Minor Adverse

	Large Negative	Major Adverse	Major Adverse	Moderate to Major Adverse	Moderate Adverse	Minor to Moderate Adverse

Assumptions and Limitations

18.39 Baseline conditions above refer to the conditions recorded on and in the immediate vicinity of the Site during the baseline lighting survey undertaken in August 2011.

18.40 These classifications have been applied indicatively based on the baseline lighting conditions recorded at the Site, available information and guidance levels contained in the ILP Guidance Notes for the Reduction of Obtrusive Light (ILP, 2011).

Baseline Conditions

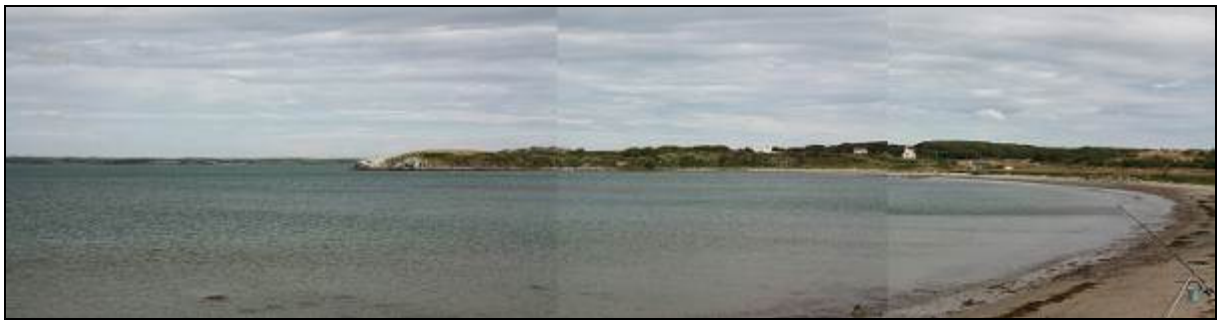
18.41 The Isle of Anglesey is predominately a rural county and still has some of the darkest skies in the whole of the United Kingdom. Anglesey has many environmental and landscape designations such as Area of Outstanding Natural Beauty (AONB), Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC) and Specially Protected Areas (SPA) and the whole island has Special Landscape Area status.

18.42 The proposed development sites all lie within the Anglesey AONB, meaning that the site is sensitive to lighting from new developments. The existing lighting conditions on each of the three development areas are described in the following paragraphs**.**

Penrhos

18.43 The entire site has no external lighting other than that associated directly with the properties on the site. The A5 London Road is not lit until 60m in advance of the main entrance to AAM site and then is lit all the way in to Holyhead.

Photograph 18.1: View across Penrhos Beach to Penrohs Site



Cae Glas

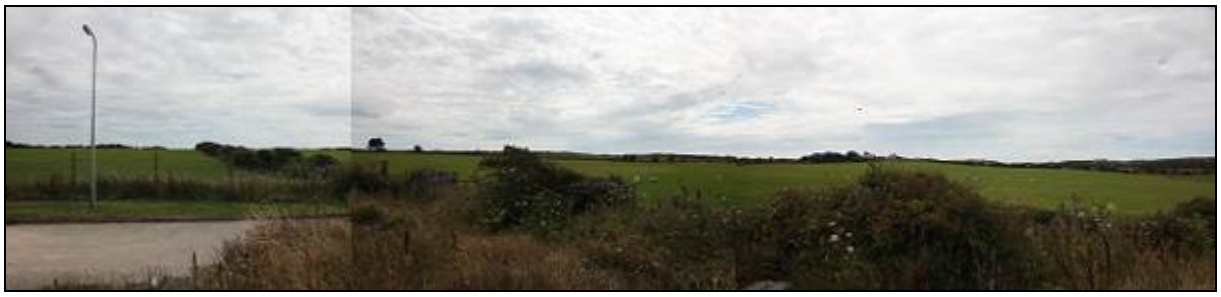
18.44 The entire site has no external lighting other than that associated directly with the properties on the site. The new Parc Cybi road is lit from its eastern most roundabout and then is lit all the way in to Holyhead. The lighting is predominately 8m columns fitted with 0.3m brackets and functional Philips Iridum low profile bowl luminaires fitted with high pressure sodium lamps (SON)

Photograph 18.2: View across the Inland Sea to Cae Glas

Photograph 18.3: View across Lon Trefignarth in to Cae Glas Site

Kingsland

Photograph 18.4: Typical view across the Kingsland site



18.45 Currently the site has no external lighting. There is however lighting directly adjacent to the site associated with the leisure centre access road and parking which has street lighting on it and the football / sports field which has floodlighting installed around it.

18.46 The leisure centre access road and park is lit using 5m hockey stick columns with a functional luminaire fitted with low pressure sodium (SOX) lamps.

18.47 The sports pitch is lit with 8No approximately 12 to 15m columns each with 4No luminaires. The lighting was not operational during the evening of the survey but it is assumed that the floodlight units would be fitted with Metal Halide (MH) lamps in the order of 1kw each.

Survey Results

18.48 The following paragraphs describe the results of the baseline lighting survey undertaken on the 3rd August 2011. This includes information relating to the existing lighting on and surrounding the Sites and provides site specific data from externally lit sources, including buildings, highway lighting and street lighting.

18.49 In order to benchmark the existing levels of lighting on and in the immediate vicinity of the Sites, readings of illuminance were recorded as previously discussed The monitoring locations surrounding the Site and the night time viewpoint locations are shown on **Figure 18.1**

18.50 Pre-curfew and post-curfew details have not been defined. It has been assumed that any residential street lighting as well as highways lighting (lighting key access routes in the area) will remain in operation all night. The flood lit sports pitch may well have a defined curfew after which time the lighting must be switched off, the details of this and any days when it is not permitted to be used are not know at this time and enquires have not provided an answer.

18.51 The figures presented within **Table 18.5** are as measured from public areas but are considered to be representative of conditions on private land. The measured values have been used together with professional judgement to ascertain the existing baseline lighting classification.

Table 18.5: Baseline Lighting Conditions Recorded on the Site and in the Surrounding Area and Details of the ILP Environmental Zone Criteria

Location	Vertical Illuminance (Lux)				Horizontal Illuminance (Lux)	Comments & Observations	Assessed Environmental zone
	N	E	S	W			
A	0.09 Lux towards site				0.16	Weather overcast, Time 22h00 2 Number SON lights on horizon to south of AAM plant source intensity to each from monitoring point was 3.3 & 3.1cd/m2 the ferry port to the north of the view maximum source intensity to monitoring point was 6.8cd/m2. Note Low tide. High sky glow over AAM plant and towards port.	The view from this location to where the development will be situated has been classed as an E1 zone (Intrinsically Dark Landscape) therefore a rural location
B	0.05	0.05	0.04	0.06	0.5	Weather overcast, Time 22h30 High sky glow over AAM plant and towards port and town.	The view from this location to where the development will be situated has been classed as an E1 zone (Intrinsically Dark Landscape) therefore a rural location
C	0.1	0.06	0.05	0.13	0.12	Weather raining, Time 22h45 Sky glow present over AAM plant and light source visible	The view from this location to where the development will be situated has

Location	Vertical Illuminance (Lux)				Horizontal Illuminance (Lux)	Comments & Observations	Assessed Environmental zone
	N	E	S	W			
						on horizon.	been classed as an E1 zone (Intrinsically Dark Landscape) therefore a rural location
D	8.45	0.26	0.11	5.52	3.3	Weather raining, Time 23h10 Start of new street lighting scheme on new road 8m columns SON lanterns with low profile (CTG) Philips Iridium lanterns.	The view to the North / Northwest has been classed as an E3 zone (Medium District Brightness Area) the remaining directions have been assessed as an E1 zone (Intrinsically Dark Landscape). Therefore as this location sits on the boundary of two E zone category's an E2 zone (low district brightness area) should be adopted therefore a rural location
E	0.22	0.48	1.19	0.75	68 Note reading close to street light.	Weather raining, Time 23h25 Middle of new street lighting scheme on new road 8m columns SON lanterns with low profile (CTG) Philips Iridium lanterns.	The views from this location have been classed as an E3 zone (Medium District Brightness Area) therefore a urban location
F	0.06	0.15	0.22	0.19	0.16	Weather raining, Time 23h40 Dark view out to sea. Visible street lighting to the south on the A5.	The view from this location to where the development will be situated has been classed as an E1 zone (Intrinsically Dark Landscape) therefore a rural location
G	0.24	0.31	0.36	0.40	25 Note reading close to street light.	Weather raining, Time 00h00 Dark view out across the site to	The view from this location to where the development will

Location	Vertical Illuminance (Lux)				Horizontal Illuminance (Lux)	Comments & Observations	Assessed Environmental zone
	N	E	S	W			
						the southeast. Some visible lights on northeast horizon from AAM plant. Sky glow present	be situated has been classed as an E1 zone (Intrinsically Dark therefore a rural location Landscape)
H	0.01	0.05	0.01	0.01	0.15	Weather raining, Time 00h25 Dark view out across the site in most directions. Street lighting visible on eastern horizon behind leisure centre. Note at time of site visit the leisure centre was closed and not operating so the impact of the multiuse games area lighting could not be assessed but would have significant impact on the area.	The view to the Notheast / East has been classed as an E3 zone (Medium District Brightness Area) the remaining directions have been assessed as an E1 zone (Intrinsically Dark Landscape) Therefore as this location sits on the boundary of two E zone category's an E2 zone (low district brightness area) should be adopted therefore a rural location
I	0.13	0.04	0.02	0.07	0.09	Weather raining, Time 00h10 The A55 and new road street lighting is very visible on the north to east horizon. On the western side again the leisure centre is visible but at time of site visit the leisure centre was closed and not operating so the impact of the multiuse games area lighting could not be assessed but would have significant impact on the area.	The view to the Notheast / East has been classed as an E3 zone (Medium District Brightness Area) the remaining directions have been assessed as an E1 zone (Intrinsically Dark Landscape) Therefore as this location sits on the boundary of two E zone category's an E2 zone (low district brightness area) should be adopted therefore a rural location

18.52 Whilst the sites are entirely within an ANOB The results of the lighting survey indicate the surrounding lighting within the area is in keeping with that of a rural location close to the town centre but with open views across intrinsically dark vistas. The Site and surrounding area under consideration can be considered as varying but is essentially an area of low district brightness and has been classified as predominantly an environmental zone E2, with some locations being classified as environmental zone E1.

18.53 The Penrhos and Cae Glas sites themselves are dark landscapes, The Kingsland site is essentially a dark landscape with minimal lighting on its boundary

Future Baseline

18.54 Should the Proposed Developments not be constructed it is expected that lighting conditions would remain largely unchanged on the Sites.

18.55 There are several development plans currently in the planning process for the area. These are the Renewable Energy Plant proposed for the area to the north of the AAM plant and Parc Cybi Development located on the southern edge of Holyhead on the west side of A55 Junction 2, and has planning consent for a number of business uses.

18.56 The highway infrastructure has already been built for the Parc Cybi Development and has lighting installed on the main road through the site and as such this lighting has been included in the scope of this report.

18.57 It is assumed that any further lighting on this development will need to meet the same strict planning requirements that is being applied to the developments sites covered in this chapter and that a lighting design will be undertaken by competent designers and therefore the existing Environmental Zoning should remain and a minimal effect on the AONB

18.58 Should the Renewable Energy Plant be built it is again anticipated that the same planning conditions will be applied and again any design for the plant will need to be carried out by a competent designer. Given its close proximity to the AAM plant it should have little effect on the existing Environmental Zoning given the existing lighting in the area of the AAM plant and therefore should have a minimal effect on the AONB.

18.59 However should the Renewable Energy Plant be built there will be a likely significant increase in the amount of light visible from all monitoring points given the proposed height of the structure it would likely change the environmental zoning of the area.

Potential Impacts

18.60 This section of the chapter has been prepared following the base line review and lays down an assessment of the potential impacts of lighting during the demolition, construction and completed development phases and has been assessed against the baseline lighting conditions outlined in **Table 18.5** without implementation of mitigation measures beyond those incorporated directly into the design of the proposed development.

18.61 During the construction phase of the project there will be the need to provide temporary lighting for the construction works, health and safety and security.

18.62 Lighting used during the construction works will comprise standard light fixings. The construction working areas would require localised minimal directional lighting, as required for security purposes and for activities during hours of working during the winter months. Cranes will be lit as required for safety purposes and to allow their safe operation. Safety lighting will be provided within buildings during internal fit out activities.

18.63 Construction works will be limited to agreed working hours, therefore some construction work may be undertaken during the hours of darkness over the winter months. Any temporary / construction lighting needs to be suitably designed and installed to meet the requirements of lighting performance within the assigned environmental zone. This should be checked at the temporary lighting design and commissioning stages by a competent lighting professional (defined as a Member of the ILP).

18.64 Provided the above is followed then the temporary / construction lighting will not be considered as a nuisance and will be suitable for purpose.

18.65 It is assessed that the effects of the construction lighting prior to any mitigation would be considered to be minor negative.

Completed Development

18.66 It is proposed that a system of lighting will be provided to all exterior spaces these will include, but not be limited to the car parks, pedestrian footpaths, roadways, circulation routes, service areas. The purpose of the lighting is to identify and illuminate pedestrian and vehicular routes within the Site and to secure the health and safety of both its users and visitors throughout the hours of darkness. Sufficient lighting should be provided for a safe environment whilst limiting light pollution, ingress to neighbours.

18.67 It is assessed that the effects of the completed development lighting prior to any mitigation would be considered to be minor negative.

Mitigation Measures

Construction Mitigation

18.68 It is assumed that industry standard lighting required for the construction phase will be implemented. As such, the following mitigation measures will be followed as a minimum.

18.69 Any lighting that will need to be installed for the construction phase will need to provide the correct lighting levels for the safety of both the construction workers and general users of the site.

18.70 Lighting installed for the construction site will need to be designed such that where possible all luminaires are mounted within the site hoarding and are directed into the working area and should only be operational during construction works. A level of lighting may be needed for security purposes.

18.71 Any temporary lighting for the users of the site should be provided at a level not lower than is required under the CIBSE guidance documents (CIBSE, 1992) to provide a safe working environment. Where temporary luminaires are required these should be carefully selected for the task required and a photometric design

undertaken to ensure it complies with the relevant sections of this chapter, such as the ILP Guidance Notes for the Reduction of Obtrusive Light (ILP, 2011).

18.72 Good practice guidance documents prepared by the Construction Industry Research and Information Association (CIRIA) note that lighting on construction sites is typically required as part of on-site security and health and safety requirements. However, the online CIRIA Guidance (http://www.ciria.org/complianceplus/) also notes that potential effects towards surrounding receptors need to be minimised through the controlled application of lighting in accordance with current best practice standards.

Completed Development Mitigation

18.73 It is recognised that suitable lighting control needs to be installed and as such it is proposed that all lighting be controlled through the use of photoelectric cells (PEC) or lighting Central Management System (CMS). Lighting will only be provided during the hours of darkness and dependant on operational requirements, e.g. some luminaires may be reduced or dimmed during the night, depending upon area usage.

18.74 Such lighting should be implemented with due consideration for the use of best practicable means to prevent, or to counteract the effects of the artificial light on the surrounding area, this should include effect on any sensitive receptors who have views of the Site. The lighting shall be designed by competent designers (for example members of the ILP) and assessed against the guidance documentation mentioned within this chapter and specific documents relating to lighting for such developments and will be assessed on an area by area basis based on its proposed usage.

18.75 The standards that address the lighting performance / levels for the areas of the development are given in the following documents:

- BS EN 13201; Road lighting
- BS 5489-1:2003; Road lighting
- CIBSE LG6 Lighting guide, The outdoor environment and
- CIE 129, Guide for lighting exterior work areas.

18.76 In the absence of any detailed lighting design or strategy at this stage all lighting will be designed under the principal of Ultra Efficient Lighting (UEL) which means that the right light will be provided at the right time in the right place controlled by the right system.

18.77 This is effectively broken down as follows:

- Right light, look to the correct application of the lighting standards which define the required lighting levels dependent upon the tasks being undertaken and the level of activity. This also looks to the use of the right light source which should be as energy efficient as possible and will include due consideration of LED lighting.

- Right time, the standards permit light levels to be changed dependent upon use, i.e. when activity levels fall then the light class can be redefined. With respect to this development this could be at times when customer site movement is low, for example after 23.00 hrs and thus a security level of lighting can be adopted. This may affect the whole site but is likely to be zoned within the development i.e. areas around key facilities on the sites may

need to be kept at higher levels of lighting but areas that are more isolated from key facilities could have the lighting levels reduced.

- Right place, ensuring that only the tasks required are illuminated thus reducing spill and obtrusive light and is achieved through the careful consideration of luminiares and how they are mounted / installed.

- Right system, the most energy efficient lighting installation requires a suitable control system that permits monitoring and the operation of the lighting dependent of the operating parameters.

18.78 Through careful consideration of the lighting equipment chosen for each area and photometric calculations the lighting designers will take due regard to mitigating potential obtrusive light and nuisance impacts. The designs shall include an obtrusive light study to demonstrate that based on the proposed lighting design that the sensitive receptors will not receive excessive amounts of light as a result of the Proposed Development.

18.79 The choice of luminaire, location, mounting height, lamp wattage and control is the mitigation for the lighting scheme and is in effect in-built into the scheme (i.e. the choice of lighting is part of the design of the scheme and is in accordance with best practice). The design will be checked against all identified receptors to ensure that it is within the limits required for the environmental zones applied to the proposed development.

Table 18.6: Obtrusive Light Limitations for Exterior Lighting Installations (ILP, 2011)

OBTRUSIVE LIGHT LIMITATIONS FOR EXTERIOR LIGHTING INSTALLATIONS						
Environmental Zones	Sky Glow ULR (Max %)	Light Nuisance into Windows Ev (lux)		Source Intensity I (cd)		Building Luminance Average, Pre-curfew
		Pre-Curfew	Post-Curfew	Pre-Curfew	Post-Curfew	Average L (cd/m2)
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	0.5	5
E3	5	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

Source: ILP Guidance Notes for the Reduction of Obtrusive Light (2011)
Notes to Table 16.6:

- ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky
- Ev is Vertical Illuminance in Lux
- I is Light Intensity in Candelas
- L is Luminance in Candelas per square metre
- Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off or the lighting level may be reduced; this is typically refers agreed locally and specific to each installation and environment
- * from public road lighting installations only.

18.80 The site development includes various landscape screening features which includes for example tree planting this will further mitigate any effect of the external lighting on sensitive receptors as it will aid the screening of the lit surfaces.

18.81 Through careful selection of the lighting equipment the concerns of interested parties such as the British Astronomical Association's Campaign for Dark Skies should

Residual Impacts

Construction

18.82 Following implementation of the above measures the residual effects of the construction lighting will be **negligible**.

Completed Development

18.83 The residual effect of external lighting will be **negligible**.

Monitoring and Follow Up

18.84 The design aspect is not sufficient alone and many good lighting designs fail when they are not installed correctly, it is therefore important that the lighting is installed to the design requirements and checked / signed off on site by the designer. All fittings will need to be carefully installed and the views of the lighting from the point of view of all receptors visually checked and any required adjustments made at the time of commissioning.

18.85 The design requirements for sky glow do not require the design to take account of the reflective nature of the surface being lit. As such there will be a percentage of light reflected upwards which is outside the control of the lighting designers, through the correct choice of luminaire and its mounting the designer will ensure that the installation meets the requirements for sky glow reduction as defined in CIE126.

18.86 Illumination within the buildings should also be carefully considered as although light emitted from within buildings tends to fall outside the requirements of lighting nuisance / pollution it can have an impact. The consideration of these aspects must carefully control the internal lighting such that it 'remains within the building' and what light is emitted out is controlled in a suitable manner.

Conclusions

18.87 An assessment of the likely significant environmental effects on sensitive receptors arising as a result of the installation of artificial external lighting associated with the Proposed Development has been undertaken. In particular the assessment considered the potential for obtrusive light and light nuisance from external lighting sources during construction and operation of the Proposed Development.

18.88 A survey of existing lighting levels at the Site and in the surrounding area was undertaken to inform this assessment and whilst the sites are entirely within an ANOB The results of the lighting survey indicate the surrounding lighting within the area is in keeping with that of a rural location close to the town centre but with open views across intrinsically dark vistas. The Site and surrounding area under consideration can be considered as varying but is essentially an area of low district brightness and has been classified as predominantly an environmental zone E2, with some locations being classified as environmental zone E1.

18.89 External Lighting will be provided, when required, during construction for safe working. Temporary lighting will be suitably designed and installed to the required lighting performance. The construction lighting will result in a negligible, temporary effect.

18.90 The permanent operational external lighting will be designed to meet the performance requirements for the tasks being undertaken, this will include due consideration for zoning the lighting such that during hours of reduced use that the lighting levels can be reduced. This will provide an energy efficient lighting installation whilst ensuring that safe operation levels are maintained. Through the choice of luminaire, mounting heights and luminaire orientation the designer can ensure that the requirements for obtrusive light are met and that the installation does not present a nuisance. The operational lighting will present a negligible impact in the long term.

Figures

Figure 18.1: Monitoring locations, Image from Bing maps

Figure 18.2: Site locations, Image from Bing maps

References

- British Standards Institute (BSI) (2003) BS 1301 - Road Lighting – Part 2: Performance Requirements
- BS 5489 (2003). Code of Practice for the Design of Road Lighting – Part 1: Lighting of Roads and Public Amenity Areas
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