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PROSPERITY PARC

LIGHTING IMPACT ASSESSMENT

DFL-UK
17 City Business Centre, Hyde Street, Winchester, SO23 7TA
+44(0)1962 855080 | info@dfl-uk.com | www.dfl-uk.com

ILP INSTITUTION OF LIGHTING PROFESSIONALS

nqa ISO 9001 QUALITY MANAGEMENT UKAS MANAGEMENT SYSTEMS

HEA Highway Electrical Association

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Designs for Lighting (DFL) is a business built on successfully collaborating with our clients. We have over 20 years proven experience in our industry, listening to the challenges our clients face, developing the best solutions and being innovators in our specialism. Our role is to find the most effective and sustainable outcome to enhance and support your projects. We proudly work with recognised industry bodies to promote and shape the future of the industry and ensure our staff are trained to exceed the required competency levels of our industries. Above all, we ensure each project delivers against our values.

Quality

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Table of Contents

Table of Figures

Table of Tables

1. INTRODUCTION

1.1. Executive Summary

1.1.1. This Lighting Impact Assessment has been written by DFL (Designs for Lighting Ltd[1]), a lighting design consultancy specialising in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.

1.1.2. The Lighting Impact Assessment assessed the proposed lighting at the former Anglesey Aluminium Works, at Holyhead (Application Site).

1.1.3. The Proposed Development is for 2.3m sq.ft. in a range of employment uses as shown in the Proposed Development Parameters Plan (**Figure 6**).

1.1.4. Lighting associated with the Proposed Development will comply with relevant British Standards and Institution of Lighting Professionals (ILP) guidance to ensure obtrusive light is minimised in accordance with best practice.

1.1.5. A Lighting Strategy (**Appendix 1**) has been development for the Proposed Development. This Lighting Impact Assessment assesses the potential effects of the lighting proposed within this strategy document on receptors that have been identified surrounding the Application Site.

1.1.6. This report outlines the following:

- Relevant obtrusive light policies in direct relation to the Proposed Development,
- Relevant National and Local Policies,
- Relevant Guidance Documents,
- Why the Proposed Development requires artificial lighting,
- Details as to how lighting will be implemented for the Proposed Development,
- The existing lighting conditions within and surrounding the Application Site,
- Those locations that are sensitive to lighting, and;
- The potential effects the proposed lighting.

1.1.7. It has been identified that the Application Site is set within a well inhabited rural Settlement (E3). This is due to the existing character of the Application Site and adjacent areas. However, due the semi-rural character of the areas located East and South of the Application Site, the criteria used for the assessment of lighting effects is that of an E1 Environmental Zone. This provides a stricter framework for the assessment, ensuring that obtrusive light is affectively managed.

[1] https://www.dfl-uk.com/about/

1.1.8. A desktop (**Section 7**) and on-site (**Section 8**) lighting baseline survey has been carried out for the Application Site. This found that the Application Site is currently predominantly dark.

1.1.9. This darkness was due to the demolition and remediation works currently taking place on the Application Site, and the majority of the lighting having been removed or deactivated for these works. Previously, the Application Site would have been more brightly lit due to its use as Anglesey Aluminium.

1.1.10. Lighting associated with the Proposed Development shall be designed in accordance with the Lighting Strategy for the Application Site outlined in **Appendix 1**.

1.1.11. The Lighting Strategy has been written in accordance with the relevant British Standards, industry guidance and local policies to ensure it is unlikely to give rise to obtrusive light with the potential to affect human, environmental and ecological receptors.

1.1.12. Through the application of the Lighting Strategy human and heritage receptors will not be significantly affected by obtrusive light, as shown in **Section 10**, **Appendix 5** and **Appendix 6**.

1.1.13. The indicative horizontal light spill diagram (**Appendix 5**) and the indicative vertical illuminance calculations (**Appendix 6**) have been produced using the Illustrative Masterplan. This provides a reasonable scenario for how the site could be developed but the Parameters Plan sets the parameters for how the scheme will be brought forward through reserved matters applications in due course. Lighting calculations are based on the Lighting Strategy which is detailed within **Appendix 1** and all obtrusive light calculation have been conducted using a maintenance factor of 1 (as described within GN01:2021 and GN08:2023).

1.1.14. The lighting assessment is based on the Parameters Plan, while using the Master Plan to prove an example of how lighting may be implemented within the set of parameters shown on the Parameters Plan.

1.1.15. There will be a **Slight** residual effect on the ecology receptors. This effect will be restricted to those areas that are closest to the lit area of the Proposed Development, with the majority of these areas being retained as dark space. This includes the retained green space area, which will not experience light levels above the recommended levels detailed within GN08:2023 (**Section 10**, **Appendix 5** and **Appendix 6**).

1.1.16. There will be a change in the lighting baseline levels due to the Proposed Development. However, this is likely to bring the baseline lighting levels on the Application Site back to similar levels when it was used as Anglesey Aluminium.

1.1.17. Due to the Lighting Strategy (**Appendix 1**) and the mitigation detailed within **Table 32** levels of obtrusive light will be kept within the guidance levels of an E1 Environmental

Zone. This is due to improvement is lighting technology and the selection of appropriate and modern standards for the areas that will be lit.

2. METHOD OF ASSESSMENT AND SIGNIFICANCE CRITERIA

2.1. Methodology

2.1.1. The assessment has been carried out in accordance with the published guidance documents from the ILP and Highways standards. These quantify impacts to surroundings, the levels of direct upward light, light intrusion, viewed source intensity and glare regarded as acceptable for varying environmental zones.

2.1.2. The Lighting Impact Assessment was based on a desktop study and baseline survey. The methodology employed for this assessment is appropriate to the location of the site. It comprises of, a desk-top study of the legislative policy and guidance context; consultation with the design team; a desktop study and site survey in which the baseline conditions were established based on industry guidance; confirmation of the general expected light levels for the relevant Environmental Zone in which the site is located; evaluation of the likely effects of the approved lighting using appropriate assessment criteria; indicative layout and associated light spill modelling.

2.1.3. The methodology takes guidance from the Institution of Lighting Professionals PLG 04 document "Guidance on Undertaking Environmental Lighting Impact Assessments" and the Highways standard DMRB V11(LA104) model of assessing impact .

2.1.4. The Matrix in Table 3.8.1 of the DMRB V11 has been compared to the residual effects descriptions in PLG04 and given a comparative description, this has been done to line up the relevant outcomes in the DMRB V11 matrix (**Table 4**) to the Residual effects table from PLG04 (**Table 5**). This sets out industry best practice for conducting the assessment.

2.1.5. Significance of an effect should only be reported after an assessment of the design and mitigation measures (the residual effect).

2.2. Study Area

2.2.1. The desktop study area was determined by assessing the Application Site boundaries and the potential receptors that could be affected by a change in the base line lighting levels. The impacts and effects of artificial lighting installed within the Application Site were then evaluated in line with the criteria shown in **Table 1- Table 3**.

2.2.2. The desktop study involved research into relevant legislation, policy and guidance relating to obtrusive light. It also involved studying of ordnance survey maps, plans and aerial photography views to identify likely receptor locations.

2.2.3. The study area is detailed in **Section 7** and **Section 8**.

2.3. Classification of Environmental Zone

2.3.1. To understand the restrictions needed to keep the implementation of lighting to a minimum we use what is classified as an environmental zone, this is rated from E0 to E4, an environmental zone is given its designation based on the context of the surrounding environment as defined by the ILP in GN01/2021 (see **Section 7**).

2.4. Potential Effects from Artificial Light

2.4.1. The potential effects on human receptors and the surrounding environment are evaluated based on their adherence to the limitations outlined in the relevant ILP guidance. This guidance, GN01/2021, outlines restrictions on such things as light intrusion, luminous source intensity, upward light spill (or sky glow). The tables outlining the restricts are in **Section 5** (Guidance).

2.4.2. As the needs of ecology differ from those of a human amenity or human safety receptor a separate set of guidance, GN08/2023, is used to evaluate the effects of lighting on the most light sensitive ecology receptors (Bats). An explanation of the implementation and restrictions to protect light sensitive ecology such as bats is outlined in **Section 5**.

2.5. Significance Criteria

2.5.1. The significance of an effect from artificial lighting has been based upon the sensitivity of the receptor and the magnitude of impact at that receptor due to the revised conditions.

- The sensitivity of the receptor has been classified as High, Medium, or Low according to the descriptions provided in **Table 1**.
- The magnitude of change is determined as being High, Medium, Low , Negligible, Adverse or Beneficial, descriptions for each are provided in **Table 2.**
- The significance of effect is derived through a matrix (**Table 4**), matching the sensitivity of the receptor, with the magnitude of the impact to calculate the significant criteria and residual effects value.

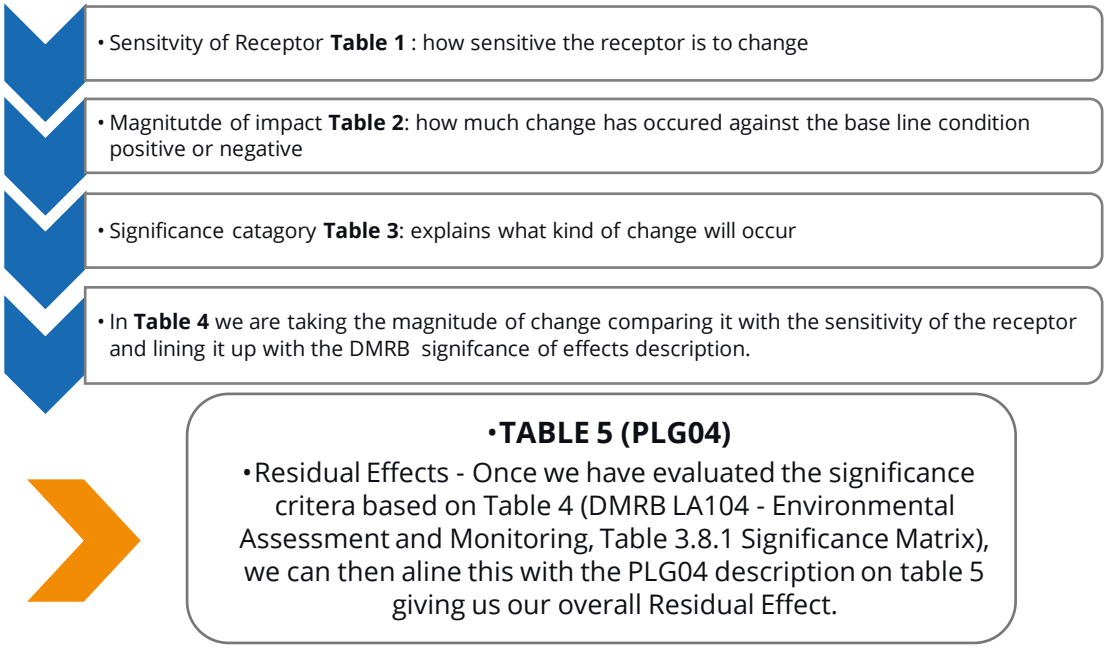


Figure 1: Effects outcome explanation

Sensitivity	Description of Criteria	
High	The environment is fragile, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.	
	Human Amenity (PHAR)	receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance)
	Human Safety (PSR)	receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers or workers).
	Ecological (PSER)	where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.
Medium	The environment has a degree of adaptability and resilience and is likely to accommodate the changes caused by an impact, although there may still be some residual modification as a result.	
	Human Amenity (PHAR)	receptors which are sensitive to a change in lighting however not such that the quality of life would be affected
	Human Safety (PSR)	receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers or workers).
	Ecological (PSER)	where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt

Low	The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.	
	Human Amenity (PHAR)	receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance) .
	Human Safety (PSR)	receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers or workers).
	Ecological (PSER)	The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.
Negligible	Receptor has little or no night-time activity	

Table 1: Criteria for receptor Sensitivity

Magnitude of change		Definition of Change
Major	**Adverse**	A large change compared to the natural variations in background levels. A clear breach of limits and standards. For example, levels of obtrusive light in the form of sky glow, light trespass or glare towards a receptor which exceeds the limits set within the ILP guidance for a higher Environmental Zone might classify as a high magnitude of change.
	Beneficial	A large change compared to the natural variations in background levels. A clear and obvious decrease in light applied to the Application when compared to the existing baseline. For example, the removal of a large obtrusive light source for one that results in a surrounding compliant with the relevant standards and guidance.
Moderate	**Adverse**	Change which is noticeable and may be a breach of limits and standards. In terms of the limits set in the ILP guidance this might equate to exceeding the limit but within the limits set for the next Environmental Zone.
	Beneficial	Change that results in a slight improvement on the existing baseline. This may bring a site that is in minor breach of guidance but the new application results in a surrounding that is compliant or closer to compliant.
Minor	**Adverse**	Change which, when compared to background levels, is only just noticeable but does increase the surrounding light levels
	Beneficial	Change which, when compared to background levels, is only just noticeable but does decrease the light impacting the surrounding environment.
Negligible		No noticeable change
No Change		No Change from baseline condition, this will be deemed "negligible" when assessed as a magnitude of change.

Table 2: Criteria for Magnitude of change (+/- = Baseline – Proposed Design)

Significance category	Typical description
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Table 3: Definitions of significance categories (Magnitude of change x receptor sensitivity, table4)

Significance of Effect Matrix		Magnitude of Change				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity of Receptor	**Very High**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or very large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 4: Significance of Effect Matrix (Score +/- based on Magnitude of Impact)

Residual Effects		
DMRB Descriptions	**PLG04 Description**	**Description**
Very large **Large or very large**	Major (beneficial)	Substantial reduction in obtrusive light at sensitive receptors and/or users of the site such that large scale improvements to visual amenity, human safety or health is delivered. Significantly improves ecological habitats
Moderate or Large **Moderate** **Slight or Moderate**	Moderate (beneficial)	Moderate reduction in obtrusive light at sensitive receptors and/or users of the site such that noticeable improvements to visual amenity, human safety or health are delivered. Improves ecological habitats
Slight	Minor (beneficial)	Minor reduction in obtrusive light at sensitive receptors and/or users of the site such that perceptible improvements to visual amenity, human safety or health is delivered; perceptible improvement to ecological habitats.
Neutral or Slight **Neutral**	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
Slight	Minor (adverse)	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Effects are reversible or temporary.
Moderate or Large **Moderate**	Moderate (adverse)	Moderate increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to

Slight or Moderate		properties, increase in Sky Glow or effects on flora and fauna. Requires monitoring and local remedial work. For example, lighting which is visible and causes nuisance to a sensitive receptor outside the site.
Very large **Large or very large**	Major (adverse)	Major increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Requires extensive remedial works. For example, a floodlighting installation which directs light into the eyes of oncoming motorists causing disability glare and potential reduction in visual performance leading to an increased risk of collision.

Table 5: Residual Effect Description

3. LEGISLATIVE FRAMEWORKS AND NATIONAL POLICIES

3.1. Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

3.1.1. Since 2005, artificial light has been incorporated as a potential statutory nuisance. An amendment to section 79 of the Environmental Protection Act 1990, contained within the Clean Neighbourhoods and Environment Act 2005 states:

"The following matters constitute "statutory nuisances" for the purposes of this Part, that is to say— [....]

[....] artificial light emitted from premises so as to be prejudicial to health or a nuisance;

[....]and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint".

3.2. Planning Policy Wales (PPW) Edition 12 (February 2024)

3.2.1. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties such as the Socio-economic Duty. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places.

"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 and features of the natural environment such as tranquillity;

• retain dark skies where appropriate;

• prevent glare and respect the amenity of neighbouring land uses; and

• reduce the carbon emissions associated with lighting.

6.8.2 Dark sky reserves exist in various parts of Wales, including Snowdonia, Brecon Beacons and the Elan Valley. Dark sky reserves can contribute positively to an area in economic and environmental terms and their characteristics should be taken into account when preparing development plan strategies and policies and when considering individual development proposals.

6.8.3 Lighting to provide security can be particularly important in rural areas or for specific purposes such as defence or to create calming environments. Where this is the case, planning authorities should adopt policies for lighting, including the control of light pollution, in their development plans.

6.8.4 Planning authorities can attach conditions to planning permissions for new developments that include the design and operation of lighting systems, for example, requiring energy-efficient design and to prevent light pollution.

3.3. Future Wales - The National Plan 2021 - 2040

"Future Wales – the National Plan 2040 is our national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of our communities."

3.4. Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026

3.4.1. The relevant Local Planning Authority (LPA) for the Proposed Development is the Isle of Anglesey County Council. Policies detailed within the Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 apply to the lighting associated with the Proposed Development.

The applicable policies are:

POLICY PCYFF 2: DEVELOPMENT CRITERIA

"A proposal should demonstrate its compliance with:

1. *Relevant policies in the Plan;*
2. *National planning policy and guidance.*

Proposals should:

3. *Make the most efficient use of land, including achieving densities of a minimum of 30 housing units per hectare for residential development (unless there are local circumstances or site constraints that dictate a lower density);*
4. *Provide appropriate amenity space to serve existing and future occupants;*
5. *Include provision for storing, recycling and waste management during the construction period and occupancy period;*
6. *Include, where applicable, provision for the appropriate management and eradication of invasive species;*

Additionally, planning permission will be refused where the proposed development would have an unacceptable adverse impact on:

7. *The health, safety or amenity of occupiers of local residences, other land and property uses or characteristics of the locality due to increased activity, disturbance, vibration, noise, dust, fumes, litter, drainage, light pollution, or other forms of pollution or nuisance;*

8. *Land allocated for other development/ uses."*

POLICY AMG 5: LOCAL BIODIVERSITY CONSERVATION

"Proposals must protect and, where appropriate, enhance biodiversity that has been identified as being important to the local area by:

a) *Avoiding significant harmful impacts through the sensitive location of development.*

b) *Considering opportunities to create, improve and manage wildlife habitats and natural landscape including wildlife corridors, stepping stones, trees, hedges, woodlands and watercourses.*

A proposal affecting sites of local biodiversity importance will be refused unless they can conform with all of the following criteria:-

1. *That there are no other satisfactory alternative sites available for the development.*

2. *The need for the development outweighs the importance of the site for local nature conservation;*

3. *That appropriate mitigation or compensation measures are included as part of the proposal.*

Where necessary, an Ecological Assessment which highlights the relevant local biodiversity issues should be included with the planning application."

Strategic Policy PS19: Conserving and Where Appropriate Enhancing The Natural Environment

"The Councils will manage development so as to conserve and where appropriate enhance the Plan area's distinctive natural environment, countryside and coastline, and proposals that have a significant adverse effect on them will be refused unless the need for and benefits of the development in that location clearly outweighs the value of the site or area and national policy protection for that site and area in question. When determining a planning application, consideration will need to be given to the following:

1. Safeguard the Plan area's habitats and species, geology, history, the coastline and landscapes;

2. Protect or where appropriate enhance sites of international, national, regional and local importance and, where appropriate, their settings in line with National Policy;

3. Have appropriate regard to the relative significance of international, national or local designations in considering the weight to be attached to acknowledged interests, ensuring that any international or national responsibilities and obligations are fully met in accordance with National Policy;

4. Protect or enhance biodiversity within the Plan area and enhance and/or restore networks of natural habitats in accordance with the Local Biodiversity Action Plans and Policy AMG 5;

5. Protect or enhance biodiversity through networks of green/ blue infrastructure;

6. Safeguard internationally, nationally and locally protected species;

7. Protect, retain or enhance the local character and distinctiveness of the individual Landscape Character Areas (in line with Policy AMG 2) and Seascape Character Areas (in line with Policy AMG 4);

8. Protect, retain or enhance trees, hedgerows or woodland of visual, ecological, historic cultural or amenity value."

Policy AMG 1: Area of Outstanding Natural Beauty Management Plans

"Proposals within or affecting the setting and/ or significant views into and out of the Areas of Outstanding Natural Beauty must, where appropriate, have regard to the relevant Area of Outstanding Natural Beauty Management Plan."

3.4.2. The effects of lighting are discussed throughout this policy document, and therefore the effects of lighting on safety, amenity and ecology have been considered in the development of the Lighting Strategy.

3.5. Anglesey County Council and Gwynedd Council Joint Local Development Plan – Habitats Regulations Assessment July 2017

3.5.1. In addition to the main Joint Local Development Plan document, a Habitats Regulations Assessment (July 2017) has been published.

3.5.2. Light pollution is discussed throughout this document, specifically in regard to key local natural places.

3.6. Street Lighting Adoption

3.6.1. Where applicable the street lighting within the Proposed Development will follow the street lighting specification of Anglesey County Council.

3.7. S38 & S278 COMPLIANT ROADS

3.7.1. Whilst the roads and paths within the Proposed Development will be privately maintained, they will be designed to an adoptable standard (where relevant) and will be compliant with the relevant British Standards.

4. BRITISH STANDARDS

4.1. BS 5489-1:2020 - Lighting of Roads and Public Amenity Areas - Code of practice.

4.1.1. This standard gives recommendations on the general principles of road lighting, its aesthetics and technical aspects and provides guidance on operational maintenance. It also provides guidance on means of minimizing energy consumption and limiting the impacts on the environment and adjacent properties.

4.2. BS EN 13201-2:2015 - Road lighting. Performance requirements.

4.2.1. This British and European standard defines the performance requirements specified as lighting classes for road lighting aiming at the visual needs of the road users, as well as the consideration of the environmental aspects of the road lighting to be applied.

4.3. BS EN 12464-2:2014 - Light and Lighting – Lighting of workplaces

4.3.1. This British and European standard specifies lighting requirements for outdoor workplaces which meet the needs for visual and performance. All visual tasks are considered with the exclusion of lighting specified for the use of lighting required in an emergency.

5. GUIDANCE

5.1. Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals GN01/2021)

5.1.1. The Lighting Strategy and this Lighting Impact Assessment is informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, which is typically caused by poorly designed and installed exterior artificial lighting. The Lighting Strategy and this Lighting Impact Assessment is informed by the most relevant sections of GN01/2021 that has recently been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks.
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, etc.
E2	Rural	Low district brightness (SQM ~ 15 to 20)	Sparsely inhabited rural areas, Village or relatively dark outer suburban locations.
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres or suburban locations.
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity.

Table 6: Environmental Zone Descriptions

Environmental Zones	Sky Glow ULR[2] (Max %)	Light Trespass (Into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew[3]	Average L (cd/m^2)
E0	0	0	0	0
E1	0	2	0 (1*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 7: Obtrusive Light Criteria

[2] ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky.

[3] Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off; this typically refers to 23h00 – 07h00

5.2. GN08/2023 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

5.2.1. This document is aimed at lighting professionals, lighting designers, planning officers, developers, bat workers/ecologists and anyone specifying lighting. It is intended to raise awareness of the impacts of artificial lighting on bats, and mitigation is suggested for various scenarios. However, it is not meant to replace site-specific ecological and lighting assessments, which states the following.

"It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light adverse behaviour (Stone, 2012)."

"A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component."

*"A buffer zone subdivided to into smaller zones of increasing illuminance limit further away from the Supporting Habitat would ensure light levels (illuminance - measured in lux) do not exceed certain defined limits. This has the effect of a gradual decrease in lighting from the developed zone, rather than a distinct cut-off, which may provide useable area for the project which also limits lighting impacts on less sensitive species, or less well-used habitat." (see **Figure 2**).*

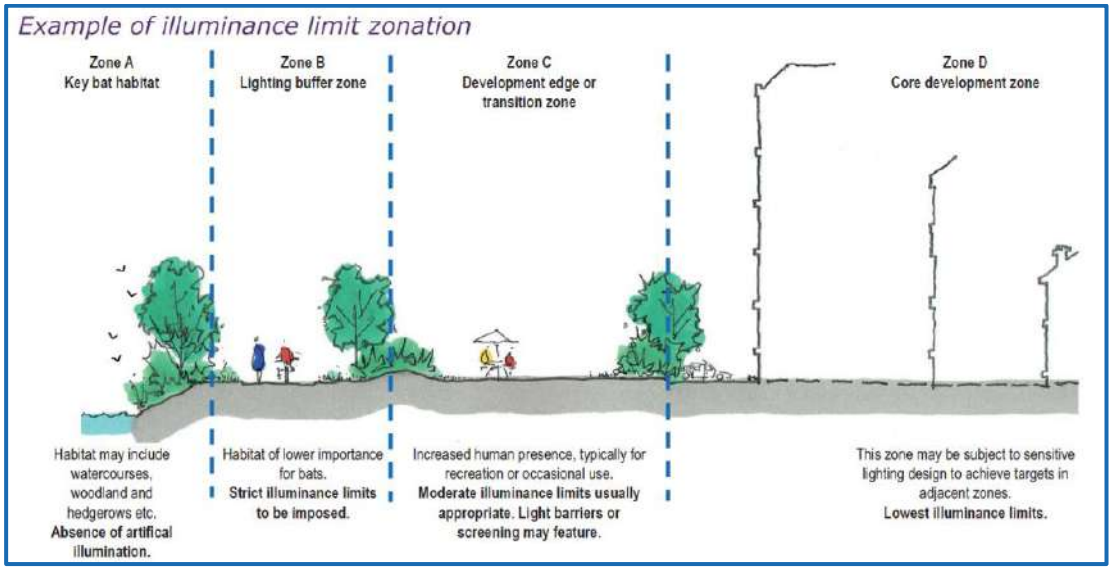


Figure 2: Example of lighting zonation near sensitive boundaries and known ecological habitat

5.3. PLG23:2020 Lighting for Cycle Infrastructure – Institution of Lighting Professionals

5.3.1. Lighting for cycle infrastructure will be informed by guidance detailed in ILP PLG23:2020.

5.3.2. The lighting class for the cycle route will be selected based on its type: Unsegregated, Segregated, Strategic, Major, Local, Rural. This is then used to confirm the lighting class as detailed within BS 5489-1:2020.

5.3.3. The placement of lighting columns within cycle infrastructure is important for achieving a safe and useful cycle route. **Figure 3** contains an extract from PLG23:2020 discussing this.

Obstacle Avoidance

For simplicity, the dynamic width (actual width plus deviation) of a cyclist on the road may be taken as 1m.

Lighting columns, should not be installed within 1m of a cycle track.

Where signs are erected above footways and cycle tracks, adequate clearance is required for pedestrians and cyclists. A minimum height of 2300mm for pedestrians and 2400mm for cyclists is recommended.

Sign posts should be placed at least 0.5m from the carriageway and cycle track edge, but no more than 1m from the route to ensure that they are visible to users.

Where any equipment is installed less than 1m from any cycle infrastructure, it is recommended that a retro-reflective band of contrasting colour is installed around each of them, at a suitable height to increase conspicuity.

Figure 3: Obstacle Avoidance Guidance from PLG23:2020 Page 15

5.4. PLG02:2013 The Application of Conflict Areas on the Highway – Institution of Lighting Professionals

5.4.1. Due to the residential nature of the Proposed Development, the use of conflict areas with the Application Site will be minimal.

5.4.2. The main location where conflict area lighting will be used in the main entrance to the Proposed Development. This area is not included within the scope of this report, but will form part of the section 278 works.

5.5. TR12:2007 Lighting of Pedestrian Crossings – Institution of Lighting Professionals

5.5.1. Where pedestrian crossing area included of main access roads and they tack the form of Zebra, Toucan, Pelican, etc, and are not signal control, they may required lighting as outlined within TR12:2007 (**Figure 4** and **Figure 5**).

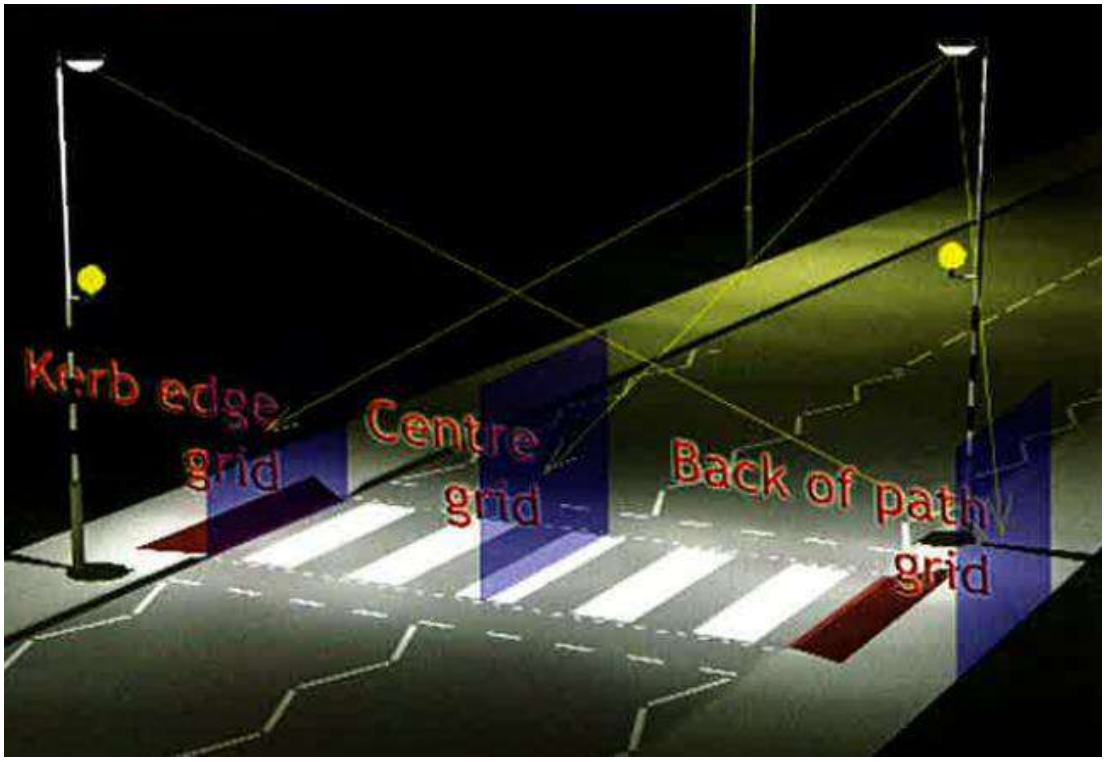


Figure 4: TR12:2007 Crossing Example

Design values

Minimum average horizontal illuminance ($\bar{E}$) on the carpet:

Carpet $\bar{E}$ = 3.5 x average horizontal road illuminance with U_o > 0.6

Minimum vertical illuminance at a point E_v:

Grid 1 (centre of crossing)	= 2 x nominal average horizontal road illuminance
Grid 2 (kerb edge)	= 2 x nominal average horizontal road illuminance
Grid 3 (rear of waiting area)	= 1.5 x nominal average horizontal road illuminance.

Note: the value of the average road horizontal illuminance to be used is that designed within the standard installation in the vicinity of the crossing – and this average should be the actual design value in the particular installation and not the nominal value for the lighting class selected.

Figure 5: TR12:2007 Lighting Levels

5.5.2. Where these crossing are adjacent to conflict areas (roundabout), and a risk assessment has been conducted, they may be included within the conflict area lighting to avoiding the need for specific lighting.

5.6. GN010:2019 Night-time Photography

5.6.1. This document provides guidance on the recording of night-time photography for the purposes of capturing the lit environment at night.

5.6.2. This guidance document has been followed in the recording of the night-time photography for the Lighting Baseline Survey.

5.7. PLG04:2013 Guidance on Undertaking Environmental Lighting Impact Assessments

5.7.1. This document provides the methodology and framework used for the undertaking of the Lighting Impact Assessment.

5.7.2. PLG:04:2013 is used throughout the UK by lighting professional when conducting Lighting Impact Assessment, and the method detailed within this document is accepted and required by councils across the UK.

5.8. DMRB LA104 Environmental Assessment and Monitoring

5.8.1. DMRB LA104 is used as supplementary guidance to PLG:04:2013.

5.8.2. This document provides details of the sensitivity, magnitude of change, significance of effect and residual effect criteria used within this Lighting Impact Assessment.

6. ASSUMPTIONS AND LIMITATIONS

6.1.1. Due to the Proposed Development being at an outline planning stage, this assessment is based on the Parameters Plan and several assumptions have been made in the completion of the Lighting Strategy and this Lighting Impact Assessment. These will be confirmed or amended during the detailed designs once full details of the design constrains have been confirmed, and it has been possible to liaise with the Highway Authority where relevant during the reserved matters applications in due course.

6.1.2. It is assumed that the speed limit of all roads within the Proposed Development will be ≤30mph, and that carparking will not be allowed on the any roadways.

6.1.3. It is assumed that the area surrounding the Application Site experiences a low crime rate, and that the traffic flow through the Proposed Development will be quiet-normal[4] but of mixed use. Data obtained from the Police.uk shows a crime rate for this area of 58.05 total reported crimes per 1,000 people in 2023, this is lower than the force average of approximately 73 total reported crimes per 1,000 people in 2023[5].

6.1.4. No utilities searches have been conducted at this stage. It is assumed that the column locations shown in **Appendix 5** do not conflict with any underground services. However, if future utilities searches uncover any underground services, or through clash detection any conflicts are found, the lighting columns positions may need to be moved to account for this.

6.1.5. The cleaning frequency of the luminaires have been assumed to be 72 months. This is the worst-case scenario for the maintenance factor calculations, and provides the worst-case scenario for the obtrusive light calculations once a maintenance factor of 1 is used.

6.1.6. All indicative external lighting calculations have been conducted using Lighting Reality Pro Version 2.3.0. This is a 2-dimensional lighting calculation software that does not account for reflected light within the calculations.

6.1.7. Several third-party sources have been used in the creation of the Lighting Strategy and Lighting Impact Assessment. DFL-UK have used this information to conduct an initial assessment of the baseline lighting conditions and the Environmental Zone of the Application Site, as well as to identify several of the receptors relevant to the Proposed Development. DFL-UK cannot guarantee the accuracy of this data, and relies on this for indicative assessment only. Where available, primary data has been used and will be used to inform the detailed lighting designs. Examples of the third-party sources are:

- CPRE Skyward Radiance Mapping Data,
- Department for Transport Data,
- Police UK Data.

[4] Road Traffic UK
[5] Police.UK - Compare Your Area

7. DESKTOP ASSESSMENT

7.1. Site Description and Context

7.1.1. The Application Site is the former Anglesey Aluminium Works, at Holyhead (now called Prosperity Parc). An indicative boundary of the site and Parameters Plan can be seen in **Figure 6**.

7.1.2. A desktop assessment and baseline lighting survey have been undertaken to evaluate the existing lighting conditions within and surrounding the Application Site.

Figure 6: The Parameters Plan and Redline Boundary

7.2. Designations

7.2.1. The Application Site is not within a designated Special Protection Areas (SPA), Special Area of Conservation (SAC), Sites of Special Scientific Interest Site (SSSI) or a National Park (NP)[6].

[6] Natural Resources Wales

7.2.2. The Application Site is, however, close to several protected locations and an AONB:

- Anglesey AONB,
- Beddmanarch-Cymyran: SSSI
- Anglesey Terns / Morwenoliaid Ynys Môn: SPA
- North Anglesey Marine / Gogledd Môn Forol: SAC

7.2.3. All these locations are on the coast or in the sea, and are too far from the Application Site to be directly affected by light spill.

7.3. CPRE Night Blight Mapping[7]

7.3.1. To inform our understanding of the night-time environment, we look to use the CPRE Nightblight map to better understand the current baseline light levels surrounding the Application Site. The CPRE Night Blight Mapping indicates the levels skyward radiance within the vicinity of the Application Site is between 4 - 8 Nano Watts/cm²/sr. As shown in **Figure 7**, the likely levels of skyglow within the vicinity of the Application Site are similar to those expected within an E3 zone.

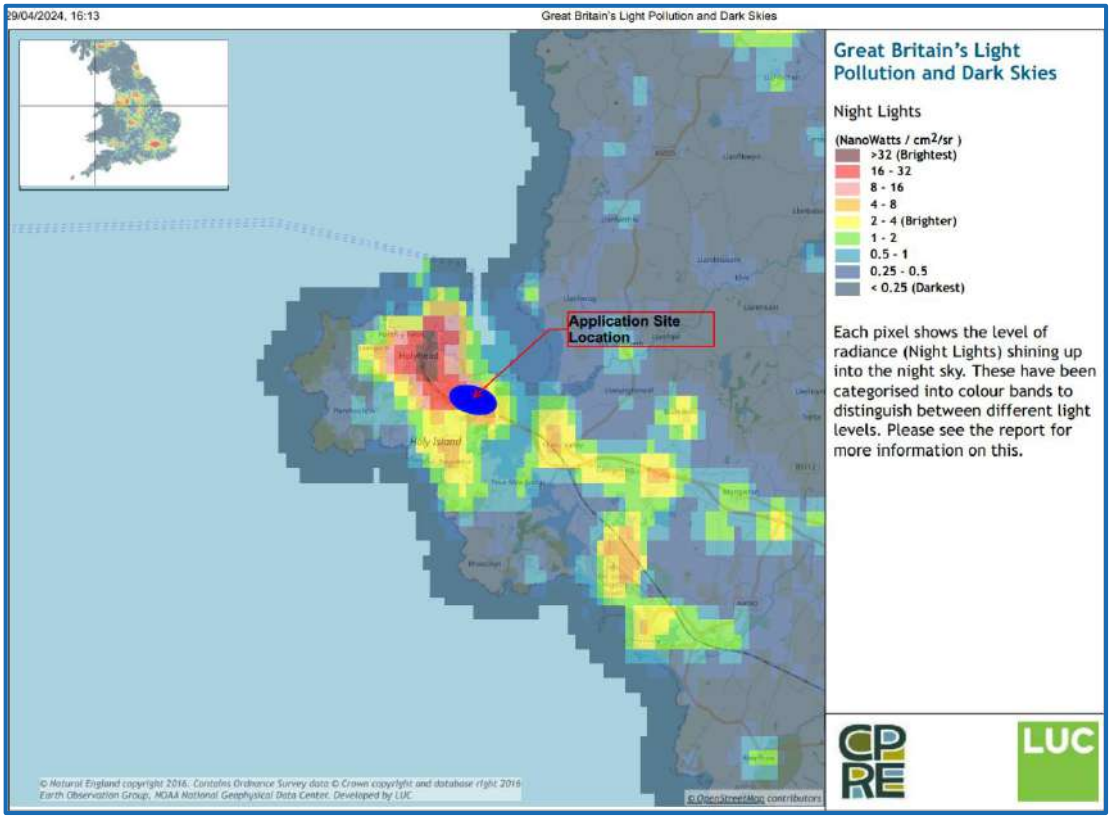


Figure 7: CPRE Skyward Radiance Map

[7] NightBlight Map is a visual representation of light pollution as a view from above the earth's atmosphere and indicates upward light spill based on sky glow.

7.4. Local Character

7.4.1. **Figure 8** shows the Application Site and the surrounding landscape.

Figure 8: The Application Site in its Context

7.4.2. As shown in **Figure 8** the Application Site is south of the suburban areas of Kingsland and Holyhead. There are also several other suburban areas within the surrounding area, such as Trearddur Bay. However, as can been seen in **Figure 8** the surrounding landscape is predominantly green space and agriculture land.

7.4.3. This shows that there are areas surrounding the Application Site that fit the definition of a E3 Environmental Zone and an E2/E1 environmental zone.

7.5. Environmental Zone Classification

7.5.1. The Environmental Zone criteria detailed within **Table 6** and **Table 7** informs the basis of the Lighting Impact Assessment.

7.5.2. The Application Site is considered to be located within an E3 Environmental Zone, because of its former use as the Anglesey Aluminium Works and its proximity to Kingsland and Holyhead.

7.5.3. However, this has only informed the process of deciding upon lighting class as detailed within the Lighting Strategy (**Appendix 1**).

7.5.4. Due to the semi-rural nature of the surrounding area and the Application Site's location within and near the Anglesey AONB, the potential effects of lighting will be assessed against the criteria of an E1 Environmental Zone.

Zone	Surrounding	Examples	Limitations		Sky Glow ULR (Max)
			Pre-curfew	Post-curfew	
E1	Natural	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, etc.	2	0 (1*)	0%

Table 8: Limitations of the environmental zone.

8. BASELINE LIGHTING SURVEY

8.1. Introduction

8.1.1. A Lighting Baseline Survey has been conducted for the Application Site to provide details of the existing lit conditions on and surrounding the Application Site.

8.1.2. The dates and conditions during the Lighting Baseline Survey are detailed in **Table 9**.

Date	Astronomical Twilight	Moon Phase	Weather Conditions (night)	Daytime Phase Start	Night-time Phase Start
15/05/2024	23:01	First Quarter (50%)	Weather conditions were clear with no rain or overcast to the sky. The temperature was 18°	16:00	23:00
16/05/2024	23:03	First Quarter (59%)	Weather conditions were cloudy with a heavy overcast. There was an intermittent light rain, and the temperature was 13°. Cloud cover over Caer y Twr was heavy and obstructing views.	10:30	23:00

Table 9: Lighting Baseline Survey Date and Weather Conditions

8.2. Baseline Lighting Survey Methodology

8.2.1. The Baseline Lighting Survey consisted of illuminance recordings within the Application Site, as well as contextual photography that was taken both within and surrounding the Application Site.

8.2.2. This was done to build an understanding of the existing lit conditions of the Application Site, and what lighting is present in the surrounding area.

8.2.3. Illuminance measurements were taken in the horizontal plane with the illuminance meter being placed on the ground above the measurement point, and in the vertical

plane at approximately 1.5m in height facing north, east, south, and west. This totalled 5 illuminance readings per measurement location.

8.2.4. Measurements were taken using a Konica Minolta T-10A illuminance meter (serial number: 20015648) which has a current calibration certificate (certificate no: STD_137059). A copy of the calibration certificate can be found in **Appendix 3.** This is a handheld illuminance meter.

8.2.5. The results of the illuminance measurements can be seen in **Appendix 3**.

8.2.6. Supplementary photography was taken across the Application Site during the day. This was done during the site induction and provides details of the general condition of the Application Site at the time of the survey.

8.2.7. Several areas containing lighting, and the types of lighting equipment found on the Application Site was photographed.

8.2.8. Day and night-time photography was recorded using the guidance document ILP GN010:2019. This was done at predetermined locations across the Application Site and in key locations outside the Application Site. The locations where photography was recorded following this guidance can be seen in **Appendix 4**.

8.2.9. A DSLR camera was used, and this was mounted on a tripod.

8.2.10. All photography recorded during the Lighting Baseline Survey can be seen in **Appendix 4**.

8.3. Condition of the Application Site

8.3.1. During the Lighting Baseline Survey, the Application Site was currently undergoing demolition and remediation work of the old Anglesey Aluminium Site.

8.3.2. This meant that several of the existing buildings had been demolished and the majority of the existing lighting was inactive.

8.3.3. All streetlights within the Application Site other than those on the entrance road before the main gate, and one streetlight along the old railway line were inactive. This meant the Application Site was predominantly dark.

8.3.4. Existing and active lighting was located on the demolition compound which was located in the southern section of the Application Site.

8.3.5. Areas of the Application Site that contained existing lighting is shown in **Figure 9**.

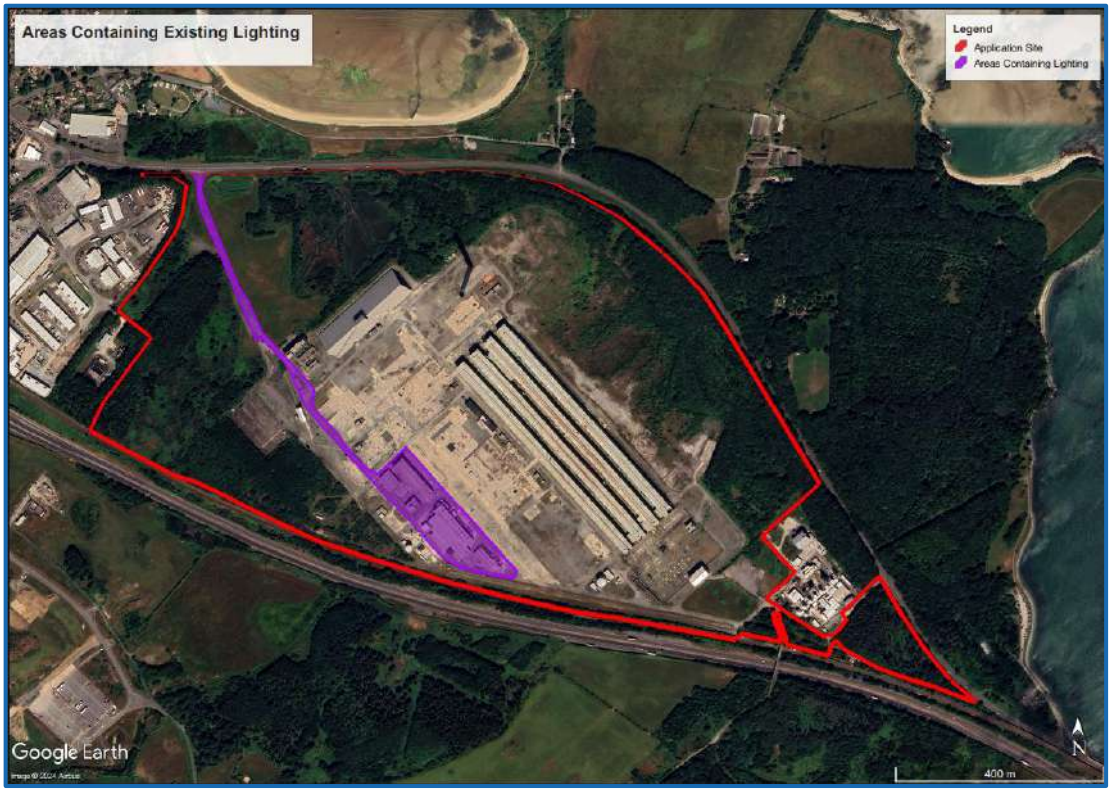


Figure 9: Areas of the Application Site that Contained Existing and Functional Lighting During the Lighting Baseline Survey

Notes to **Figure 9**:

1. Areas that contained existing and functional lighting are highlighted in purple.

8.3.6. Images showing the existing lighting within the Application Site is shown in **Appendix 4**.

8.3.7. Due to the Application Site being in a current state of demolition it was predominantly dark, with areas of bright lighting for the demolition compound.

8.3.8. This would not have been the case previously, as evidenced by the number of existing lighting columns identified across the Application Site (**Appendix 4**) and due to its former used as the Anglesey Aluminium Site.

8.4. Illuminance Results

8.4.1. The full illuminance result recorded during the Lighting Baseline Survey can be found in **Appendix 3**.

8.4.2. The illuminance results show that the boundaries of the Application Site are predominant dark, with areas near the access road and the demolition compound contain some light spill.

8.4.3. The maximum illuminance recorded during the survey was 10.52 Lux. This was recorded in the horizontal plane under the only active streetlight along the old rail line (measurement location 12). The majority of the remaining results were below 0.2Lux.

8.5. Photography Result

8.5.1. The locations photography was recorded, and the images, can be seen in **Appendix 4**.

8.5.2. Direct views of the Application Site from the surrounding area were limited. Direct views of the Application Site were only available from photography locations 008 and 014. This was due to the topography of the area, the woodland surrounding the Application Site and the existing buildings surrounding the Application Site preventing viewing from other locations.

8.5.3. Further views are available from Caer y Twr, however this location was not visited during the Lighting Baseline Survey due to low cloud cover, which prevented views of the Application Site from the top of this mountain.

8.5.4. Views from photography location 007 (**Table 41**), 008 (**Table 42**), 009 (**Table 43**), 010 (**Table 44**), 011 (**Table 45**) and 012 (**Table 46**) were predominantly dark in all directions. However, limited lighting was visible in the distance or for small residential roads nearby.

8.5.5. Location 008 (**Table 42**) had a clear view of the access road on the Application Site and the existing lighting in this location. This was only visible across the A5, which is lit in this area.

8.5.6. Location 006 (**Table 40**) has no direct views of the Application Site and no lighting on the Application Site was visible from this location. However, this area contains a large amount of existing lighting associated with the surrounding roadways, hotels, commercial and sporting facilities (Holyhead Hotspur FC). During the survey, the lighting for Holyhead Hotspur FC was not active, but if this was active it would have been the brightest source of lighting in the area.

8.5.7. Location 013 (**Table 47**) was the burial mound call Trefignath. This location had the only clear views of the Application Site due to its raised topographical position compared to the Application Site, which give it views over the existing tree line (**Figure 10**).

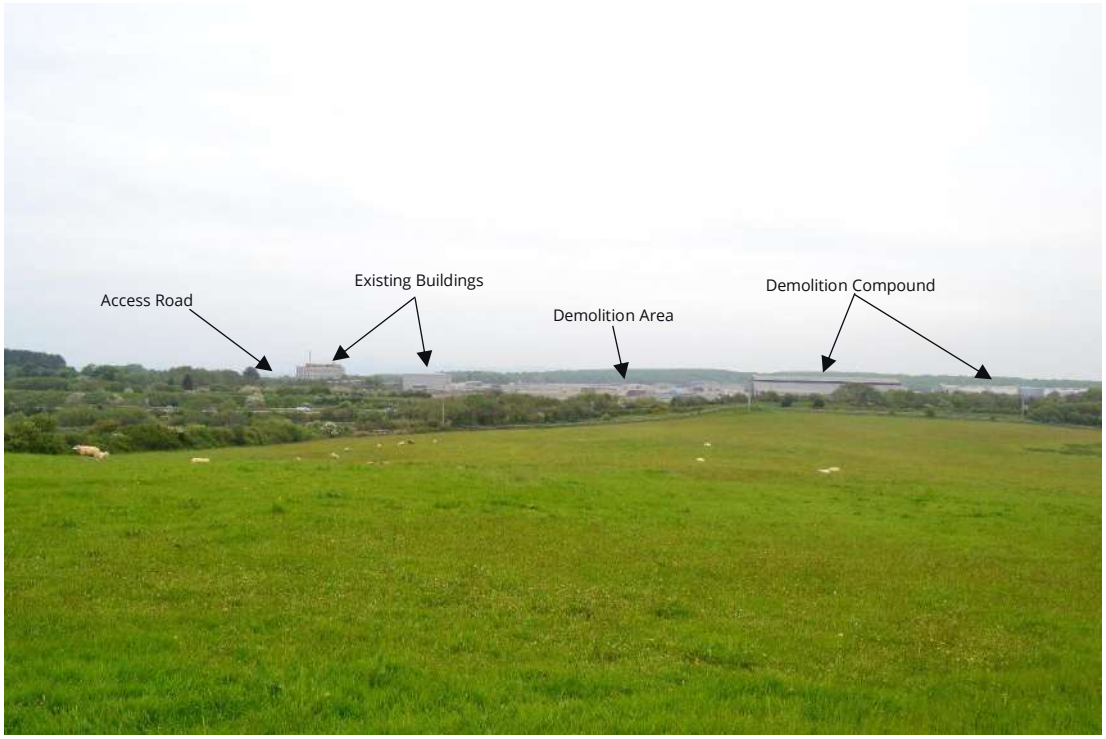


Figure 10: View of the Application Site from Photography Location 014

8.5.8. This location has the clearest views of the surrounding area and the lighting located on Holyhead (**Figure 11**, **Figure 12** and **Figure 13**).

Figure 11: View of the North Wales Expressway (A55) from Photography Location 014

Figure 12: View of the Holyhead Interim Inland Border Facility Service from Photography Location 014

Figure 13: View of the Demolition Compound from Photography Location 014

8.5.10. Of the locations visited, location 014 provided the most comprehensive views of the existing lighting within surrounding the Application Site. This showed that the majority of

the existing lighting on Holyhead is located along the A55 and in the suburban and commercial areas in the north of the island.

8.6. Summary

8.6.1. The existing lit conditions on the Application Site are assessed as "dark" with the majority of the lighting being inactive or having been removed as part of the current demolition works. However, this was not always the case. When the Application Site was used as the Anglesey Aluminium Site it would have contained a significant amount of active lighting, as demonstrated by the images in **Appendix 4**. These show a large number of streetlighting columns installed across the Application Site.

8.6.2. The majority of locations surrounding the Application Site do not have direct views of the Application Site. Views of the Application Site are screened by the topography of Holyhead Island and the existing woodland planting surrounding the Application Site. This woodland planting is located both within and outside the Application Site.

8.6.3. Location 008 and 013 do have direct views of the Application Site.

8.6.4. Location 008 (**Table 42**) has a clear view of the access road only, with the rest of the Application Site being obscured by trees and topography.

8.6.5. Location 013 (**Table 47**) has clear views across the Application Site. As shown in **Figure 10**.

8.6.6. It was also found that there is a significant presence of existing lighting on the island of Holyhead, with this being concentrated on the A55 and the suburban and commercial areas on the island. This is supported by Night Blight Mapping Data produced by the CPRE (**Figure 7**).

9. IDENTIFIED RECEPTORS

9.1. Ecological

9.1.1. Trueline Midlands Ltd (the project ecologist) have been liaised with regarding the identification of sensitive areas within and surrounding the Application Site.

9.1.2. The Retained & Enhanced Green Infrastructure within the Application Site has been identified as areas where potentially sensitive ecological receptors maybe present. These locations are shown in **Appendix 2**. Therefore, the Lighting Strategy and this Lighting Impact Assessment has been informed by GN08/2023. The ecology receptors to lighting are detailed in **Table 10**.

Receptor Type	Receptor No. (Appendix 3)	Description	Sensitivity
Ecology	PSER 001	Retained & Enhanced Green Infrastructure (North Application Site)	High
Ecology	PSER 002	Retained & Enhanced Green Infrastructure (South Application Site)	High
Ecology	PSER 003	Retained & Enhanced Green Infrastructure (East Application Site)	High
Ecology	PSER 004	Retained & Enhanced Green Infrastructure (West Application Site)	High

Table 10: Potentially Sensitive Ecological Receptors (PSER)

9.1.3. These are not the only areas where potentially sensitive species may be located, they are however the closest to areas within the Proposed Development that will have lighting proposed on them. Therefore, by assessing the effects of lighting on these areas the potential effects on areas further away are also assessed.

9.1.4. This is due to the fact that illuminance, and the effect of lighting, reduces over the distance from the source of light.

9.2. Human Amenity

9.2.1. Potential Human Amenity Receptors (PHAR) have been identified surrounding the Application Site as shown in **Appendix 2**. Therefore, the Lighting Strategy and this Lighting Impact Assessment has been informed by guidance detailed within GN01/2021 (**Table 7**). The human amenity receptors to lighting are detailed in **Table 11**.

Receptor Type	Receptor No. (Appendix 3)	Description	Sensitivity
Human Amenity	PHAR 001	Dwellings on Kingsland Road and Mill Road	Medium
Human Amenity	PHAR 002	Dwellings on Maes-Y-Delyn	Medium
Human Amenity	PHAR 003	Dwellings on Maes Cyttir	Medium
Human Amenity	PHAR 004	Dwellings on Penrhos Beach Road 001	Medium
Human Amenity	PHAR 005	Dwellings on Penrhos Beach Road 002	Medium
Human Amenity	PHAR 006	Dwellings on Penrhos Beach Road 003	Medium
Human Amenity	PHAR 007	Dwellings on Lon Trefignath Road 001	Medium
Human Amenity	PHAR 008	Dwellings on Lon Trefignath Road 002	Medium
Human Amenity	PHAR 009	Dwellings on Private Road South of the Application Site	Medium
Human Amenity	PHAR 010	Dwelling and Coffee Cups Cafe	Medium

Table 11: Potential Human Amenity Receptors (PHAR)

9.3. Heritage Receptors

9.3.1. RPS Group (the project heritage consultant) have been liaised with regarding the identification of sensitive areas within and surrounding the Application Site.

9.3.2. Potential Sensitive Heritage Receptors (PSHR) have been identified surrounding the Application Site as shown in **Appendix 2**. Therefore, the Lighting Strategy and this Lighting Impact Assessment has been informed by guidance detailed within GN01/2021 (**Table 7**). The heritage receptors to lighting are detailed in **Table 12**.

Receptor Type	Receptor No. (Appendix 3)	Description	Sensitivity
Heritage	PSHR 001	Trefignath Historical landmark	Medium

Table 12: Potentially Sensitive Heritage Receptors (PSHR)

9.3.3. This is not the only heritage location surrounding the Application Site. There is a Scheduled Monument (former neolithic long barrow) to the west and a standing stone (also scheduled) to the Northwest. However, both are well screened by foliage and topography, and therefore are not included.

10. ASSESSMENT OF EFFECTS

10.1. Overview

10.1.1. The light spill diagrams and vertical calculations shown in **Appendix 5** and **Appendix 6** provide details of the spread of light across the Application Site and the illuminance levels likely to reach the identified sensitive receptors.

10.1.2. This assessment is based on the Parameters Plan which sets the parameters for how the scheme will be brought forward through reserved matters applications in due course.

10.1.3. The lighting calculations that have been conducted are indicative and are based on the Proposed Development Master plan. This shows one way in which the Proposed Development can be lit, and provides an example of the potential light spill that can be produced by the Proposed Development.

10.1.4. To ensure the worst-case scenario has been modelled, the highest potential light levels have been modelled. This means the maintenance factors of all luminaires has been set at MF = 1.0[8] with the cleaning frequency assumed to be 72 months. This demonstrates the light levels at their highest (initial light levels at the start of luminaire life).

10.1.5. The embedded mitigation detailed within the Lighting Strategy (**Appendix 1 Table 32**) has been applied to the lighting calculations where it was required.

10.2. Illuminance Calculations

10.2.1. Vertical light spill calculations have been conducted for PSER 001, with other locations being assessed based on the light spill diagrams (**Appendix 5**). The results are shown in **Table 13**.

Receptor No	GN08/2023 requirements	Maximum vertical Illuminance (Lux)	Pass/fail
PSER 001	0.40	0.21	Pass
	0.40	0.21	Pass
	0.40	0.22	Pass
	0.40	0.19	Pass
	0.40	0.13	Pass
	0.40	0.20	Pass
	0.40	0.21	Pass

Table 13: PSER results table, maximum illuminance.

10.2.2. The vertical light levels reaching the retained green space within PSER 001 do not exceed 0.22 Lux, keeping the light levels within the guidance given within GN08/2023 in this area.

[8] https://www.dfl-uk.com/knowledge-hub/faqs/

10.2.3. Extracts from the light spill diagrams found in **Appendix 5** are shown in **Figure 14** - **Figure 16** which depict the possible levels of lighting spill surrounding PSER 002 – PSER 004.

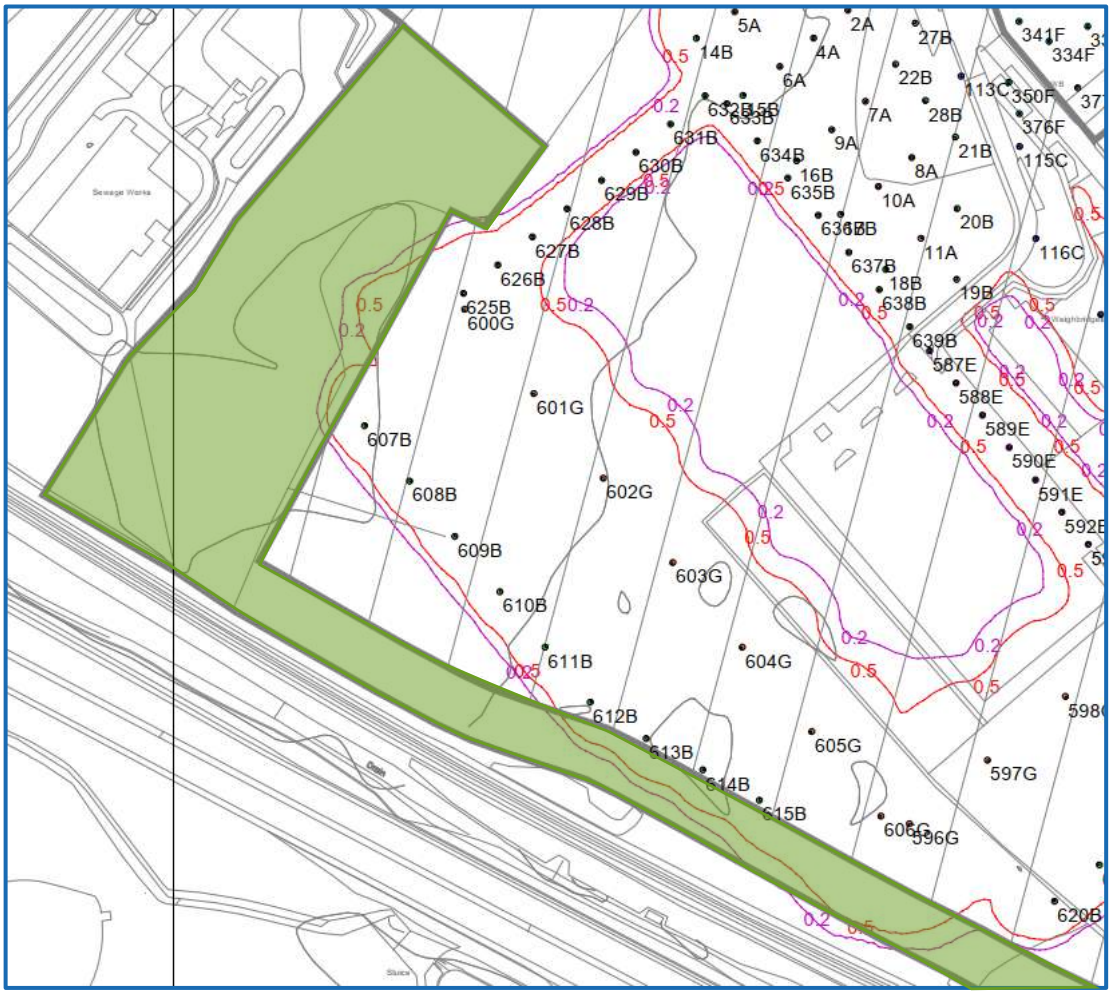


Figure 14: Light Spill surrounding PSER 002 (PSER 002 is highlighted in green)

Source: See supporting document **3444-DFL-ELG-XX-LD-EO-13001**

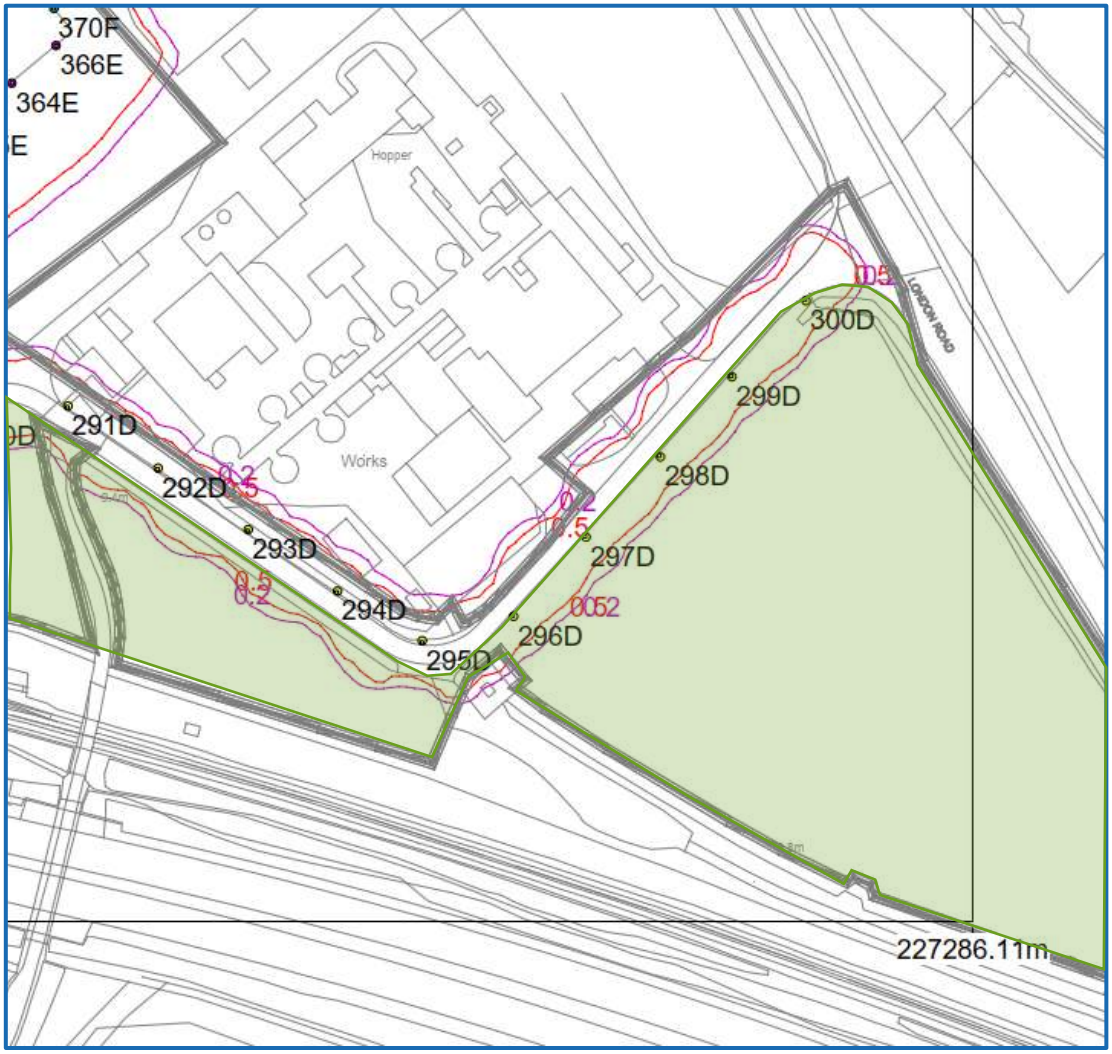


Figure 15: Light Spill surrounding PSER 003 (PSER 003 is highlighted in green)

Source: See supporting document **3444-DFL-ELG-XX-LD-EO-13003**

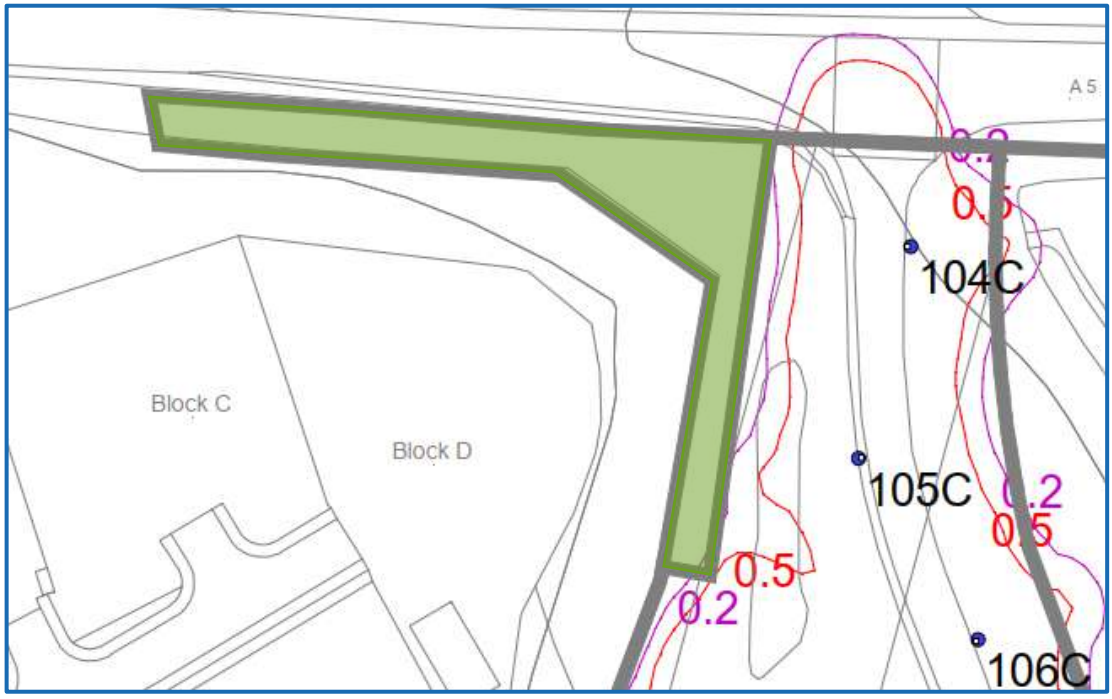


Figure 16: Light Spill surrounding PSER 004 (PSER 004 is highlighted in green)

Source: See supporting document **3444-DFL-ELG-XX-LD-EO-13001**

10.2.4. As can be seen from **Figure 14** - **Figure 16** light spill does not encroach far into PSER 002, PSER 003 and PSER 004.

10.2.5. PSER 004 (**Figure 15**) has the largest encroachment from light spill for it's size of the three locations shown in **Figure 14** - **Figure 16.** However, this location is adjacent to the existing lit access road, and this level of light spill will not result in a significant change compared to the baseline.

10.2.6. Where human receptors are potentially sensitive to vertical light spill, a vertical illumination grid has been modelled, as shown in **Appendix 5** and **Appendix 6**.

10.2.7. The light levels based on the modelling do not exceed 1 Lux, keeping the light levels within the guidance given within GN01/2021 for an area identified as an E1 environment.

Receptor No	GN01/2021 requirements		Maximum vertical Illuminance (Lux)	Pass/fail
	Pre-curfew	Post Curfew		
PHAR 001	2 Lux	<0.1 Lux	0.00	Pass
PHAR 002	2 Lux	<0.1 Lux	0.00	Pass
PHAR 003	2 Lux	<0.1 Lux	0.00	Pass
PHAR 004	2 Lux	<0.1 Lux	0.03	Pass
PHAR 005	2 Lux	<0.1 Lux	0.03	Pass
PHAR 006	2 Lux	<0.1 Lux	0.09	Pass
PHAR 007	2 Lux	<0.1 Lux	0.00	Pass
PHAR 008	2 Lux	<0.1 Lux	0.00	Pass
PHAR 009	2 Lux	<0.1 Lux	0.00	Pass
PHAR 010	2 Lux	<0.1 Lux	0.00	Pass

Table 14: PHAR results table, maximum illuminance

10.2.8. Of the human amenity receptors, only PHAR 008 has clear views of the Application Site, and this is restricted to the access road and entrance to the main site. This view is partly obscured by deciduous trees and the light spill reaching this location has been modelled as 0 Lux.

10.2.9. Vertical lighting calculation has also been conducted for heritage receptors (**Appendix 5** and **Appendix 6)**

10.2.10. The light levels based on the modelling do not exceed 1 Lux, keeping the light levels within the guidance given within GN01/2021 for an area identified as an E1 environment.

Receptor No	GN01/2021 requirements		Maximum vertical Illuminance (Lux)	Pass/fail
	Pre-curfew	Post Curfew		
PSHR 001	2 Lux	<0.1 Lux	0.01	Pass

Table 15: PSR results table, maximum illuminance.

10.2.11. PHSR 001 has clear views of the Application Site, and as such will have clear views of the Proposed Development and the proposed lighting (**Figure 10** - **Figure 13**). Due to the light spill reaching this location been modelled as a maximum of 0.01 Lux the light levels

in this location will not increase, however there will be an increase in visible lighting from this location.

10.3. Magnitude of Change

10.3.1. By comparing the modelled illuminance levels at the sensitive receptors with the recommendations made in GN01:2021 and GN08:2023, the magnitude of change is assessed.

Receptor	Guidance Limits		Maximum Modelled Results	Magnitude of Change
	Pre-Curfew	Post-Curfew		
PSER 001	0.4 Lux	0.4 Lux	0.22 Lux	Minor
PSER 002	0.4 Lux	0.4 Lux	See **Figure 14**	Minor
PSER 003	0.4 Lux	0.4 Lux	See **Figure 15**	Minor
PSER 004	0.4 Lux	0.4 Lux	See **Figure 16**	Minor
PHAR 001	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 002	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 003	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 004	5 Lux	1 Lux	0.03 Lux	No Change
PHAR 005	5 Lux	1 Lux	0.03 Lux	No Change
PHAR 006	5 Lux	1 Lux	0.09 Lux	No Change
PHAR 007	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 008	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 009	5 Lux	1 Lux	0.00 Lux	No Change
PHAR 010	5 Lux	1 Lux	0.00 Lux	No Change
PSHR 001	5 Lux	1 Lux	0.01 Lux	No Change

Table 16: Magnitude of Change Assessment

10.4. Significance of Effect

10.4.1. Using the matrix in **Table 4** the sensitivity of the receptor (**Table 10** - **Table 12**) and the magnitude of change (**Table 16**) is use to ascertain the significance of the effect of lighting.

Receptor	Sensitivity	Magnitude of Change	Significance of Effect
PSER 001	High	Minor	Slight or Moderate
PSER 002	High	Minor	Slight or Moderate
PSER 003	High	Minor	Slight or Moderate
PSER 004	High	Minor	Slight or Moderate
PHAR 001	Medium	No Change	Neutral
PHAR 002	Medium	No Change	Neutral
PHAR 003	Medium	No Change	Neutral
PHAR 004	Medium	No Change	Neutral
PHAR 005	Medium	No Change	Neutral
PHAR 006	Medium	No Change	Neutral
PHAR 007	Medium	No Change	Neutral
PHAR 008	Medium	No Change	Neutral
PHAR 009	Medium	No Change	Neutral
PHAR 010	Medium	No Change	Neutral
PSHR 001	Medium	No Change	Neutral

Table 17: Assessment of Significance of Effect

10.4.2. Due to the low levels of illuminance reaching PSER 001 – PSER 004 and they fact that the majority of these areas of retained woodland/green space will be maintained as dark areas, the final significance of effect at these locations is considered to be **Slight**.

10.5. Residual Effects

10.5.1. Using the significance of effect (**Table 17**) the residual effects are assessed.

Receptor	Residual Effects	Description
	DMRB Descriptions	
PSER 001	Slight	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna. Effects are reversible or temporary.
PSER 002	Slight	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna.
PSER 003	Slight	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna.
PSER 004	Slight	Minor increase in obtrusive light at sensitive receptors and / or users of the site such as an increase in Glare, Light Trespass to properties, increase in Sky Glow or effects on flora and fauna.
PHAR 001	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 002	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 003	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 004	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 005	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 006	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 007	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 008	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.

PHAR 009	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PHAR 010	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.
PSHR 001	Neutral/ Not significant	No appreciable effect on sensitive receptors. Effects are reversible.

Table 18: Residual Effects Assessment

10.5.2. The residual effect on all human amenity receptors and heritage receptors is assessed as being **Neutral/Not significant**.

10.5.3. The residual effect of the ecology receptors is considered to be **Slight**. This is primarily due to the close proximity of the retained woodland/green space areas to lit areas of the site. This effect is restricted primarily to the boundaries of these areas, with the majority of the retained woodland/green space being maintained as dark. This is demonstrated in light spill diagrams found in **Appendix 5**.

10.6. New Baseline Assessment

10.6.1. The proposed lighting for the Proposed Development will cause an increase in the baseline lighting levels within the Application Site.

10.6.2. As discussed within this report, this will not result in significant effects on the identified human and heritage receptors, with all light intrusion modelling being ≤0.1 Lux. A **Slight** effect will take place on the ecology receptors. However, the majority of these areas will be maintained as dark spaces, with the retained greenspace not experiencing light levels above the recommendations made in GN08:2023 (≤0.4 Lux vertical).

10.6.3. Due to the demolition and remediation works taking place on the Application Site, the current baseline is predominantly dark. However, this would not have also been the case. When the Application Site was previous used as Anglesey Aluminium the baseline lighting levels would have been higher than it currently is.

10.6.4. The Proposed Development will bring the baseline lighting levels back up to be more similar with the previous conditions when Anglesey Aluminium was active. However, due to improvements in lighting technology, both in control systems and luminaire technology, there will be a reduction in obtrusive light (light pollution) compared to the Anglesey Aluminium Site.

11. CONCLUSION

11.1. General

11.1.1. Lighting associated with the Proposed Development shall be designed in accordance with the Lighting Strategy for the Application Site outlined in **Appendix 1**.

11.1.2. The Lighting Strategy has been written in accordance with the relevant British Standards, industry guidance and local policies to ensure it is unlikely to give rise to obtrusive light with the potential to affect human, environmental and ecological receptors.

11.1.3. Through the application of the Lighting Strategy human and heritage receptors will not be significantly affected by obtrusive light, as shown in **Section 10**, **Appendix 5** and **Appendix 6**.

11.1.4. There will be a **Slight** residual effect on the ecology receptors. This effect will be restricted to those areas that are closest to the lit area of the Proposed Development, with the majority of these areas being retained as dark space. This includes the retained green space areas, which will not experience light levels above the recommended levels detailed within GN08:2023 (**Section 10**, **Appendix 5** and **Appendix 6**).

11.1.5. There will be a change in the lighting baseline levels due to the Proposed Development. However, this is likely to bring the baseline lighting levels on the Application Site back to similar levels when it was used as Anglesey Aluminium.

11.1.6. Due to the Lighting Strategy (**Appendix 1**) and the mitigation detailed within **Table 32** levels of obtrusive light will be kept within guidance levels for an E1 Environmental Zone. This is due to improvement is lighting technology, the selection of appropriate and modern standards for the areas that will be lit, and the mitigation that is proposed within the Lighting Strategy.

APPENDIX 1

Lighting Strategy

12. LIGHTING STRATEGY

12.1. Summary

12.1.1. The Proposed Development will require lighting for safety and amenity at limited times during the hours of darkness. Lighting will be fit for purpose and sensitive to nearby human and ecological receptors.

12.1.2. Lighting will be of an appropriate specification and designed in accordance with British Standards.

12.1.3. The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the Application Site is located, is sensitive to the area, and provides a recognised standard level of lighting for all areas requiring illumination.

12.1.4. Amenity lighting for the Proposed Development will be applied sensitively and the effects of obtrusive light will be assessed for the receptors identified both within and surrounding the Application Site.

12.1.5. Luminaires will be used with integral LEDs and only where the luminaire photometry is available from the manufacturer. This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are minimised or mitigated.

12.1.6. Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.

12.1.7. All lighting unless otherwise stated is to emit a warm white colour temperature light (3000 Kelvin or less) to reduce the potential for adverse effects onto potentially sensitive receptors.

12.1.8. Where lighting is to be adoptable by the Local Authority, the colour temperature may be required to be 4000 Kelvin. This will only be used on adoptable roads where there are no ecology constrains.

12.2. Areas and Tasks that Require Lighting

12.2.1. Due to the application being submitted in outline, the Lighting Strategy describes the lighting requirements for the task areas that may be included in the final design of the Proposed Development.

12.2.2. The follow tasks and areas may be lit using the adoptable specification of the LPA:

- Main access road leading from London Road (A5) to the Site Gate, and;

- Secondary Access Road.

12.2.3. The follow tasks and areas will be lit using a private specification:

- Roads that are internal to the Site,
- Communal Amenity Areas (Pedestrian Only)
- Parking Areas (Cars only),
- Parking Areas (HGV only),
- Loading Bays,
- External pedestrian routes for the individual units,
- Relighting existing substation (if required after assessment of existing lighting equipment),
- Proposed substations,
- Bus Shelters,
- Road crossing (Zebra, Toucan and Pelican),
- Rail loading and unloading areas, and;
- Rail yard and support areas.

12.3. Main access road leading from London Road (A5) to the Site Gate

12.3.1. The main access road leading from London Road (A5) to the site gate will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-2:2015

12.3.2. Performance requirements for this area are outlined in **Figure 17.**

12.3.3. Following a risk assessment, the lighting class will remain as recommended in BS 5489-1:2020 and BS EN 13201-2:2015. There will be no car parking on the road, the crime rate in this area is low[9], it is assumed this road will have a moderate traffic flow.

Traffic flow	Lighting class		
	Dual carriageway		Single carriageway
	Junction density: high	Junction density: low	
High to very high[A)]	M3	M4	M3
Low to moderate[B)]	M4	M5	M4
Very low[C)]	M5	M6	M5

Figure 17: Performance requirements – Main access road adoptable

[9] Police UK North Wales

12.4. Secondary Access Road

12.4.1. The secondary access road will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-2:2015.

12.4.2. Performance requirements for this area are outlined in **Figure 18**.

12.4.3. Due to this area being an E3 environmental zone, this road only being used for secondary access, and the expected traffic flow when in use being high, the lighting class selected for this road is P3.

12.4.4. However, due to this road being used for emergency use, and the speed at which vehicles travel down this road potentially being high, and there most likely being mixed use on this road, it is recommended that the lighting class is increased to P2.

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Figure 18: Performance requirements – Secondary Access Road

12.5. Internal Site Roads

12.5.1. Internal Site Roads will be illuminated in accordance with BS EN 12464-2:2014.

12.5.2. Performance requirements for these areas are outlined in **Figure 19**.

12.5.3. Following a risk assessment, the lighting class will remain as recommended in BS EN 12464-2:2014. There will be no car parking on the roads and crime is this area is low[10]

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.1.1	Walkways exclusively for pedestrians	5	0,25	50	20	
5.1.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0,40	50	20	
5.1.3	Regular vehicle traffic (max. 40 km/h)	20	0,40	45	20	At shipyards and in docks, R_{GL} may be 50
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0,40	50	20	
5.1.5	Cleaning and servicing	50	0,25	50	20	All relevant surfaces

Figure 19: Performance requirements – Internal Site Roads

12.6. Communal Amenity Areas (Pedestrian Only)

12.6.1. Communal Amenity Areas that will be exclusive use by pedestrians will be illuminated as detailed within BS 5489-1:2020 & BS EN 13201-2:2015.

12.6.2. The exact performance requirements for this area are subject to a full risk access at the detailed design once the full design constrains will be known. However, the expected performance requirements for these is likely to comply with a P2 or P3 lighting class or a comparative class (**Figure 20**).

[10] Police UK North Wales

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Figure 20: Performance requirements – Communal Amenity Areas (Pedestrian Only)

12.7. Parking Areas (Cars Only)

12.7.1. Parking areas for cars will be illuminated in accordance with BS 5489-1:2020 & BS EN 12464-2:2014.

12.7.2. Performance requirements for these areas are outlined in **Figure 21**.

12.7.3. Parking areas for cars within the Proposed Development will be a mix of sizes, however none will be heavy traffic. Therefore, only medium and light traffic lighting classes will be used.

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.9.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25	55	20	
5.9.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0,25	50	20	
5.9.3	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	0,25	50	20	

Figure 21: Performance requirements – Parking Areas (Cars Only)

12.8. Parking Areas (HGVs Only)

12.8.1. Parking Areas for HGVs will be illuminated in accordance with BS 5489-1:2020 & BS EN 12464-2:2014.

12.8.2. Performance requirements for these areas are outlined in **Figure 22**.

12.8.3. Parking areas for HGVs within the Proposed Development will be a mix of sizes, however none will be light traffic. Therefore, only medium and heavy traffic lighting classes will be used.

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.9.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25	55	20	
5.9.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0,25	50	20	
5.9.3	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	0,25	50	20	

Figure 22: Performance requirements – Parking Areas (HGVs Only)

12.8.4. The use of the heavy traffic lighting class must be only for the largest and most heavily used HGV parking areas, and must be justified with a full risk assessment.

12.9. Loading Bays

12.9.1. Loading Bays where HGV reverse into the bay and are unloading into the units will be illuminated in accordance with BS EN 12464-2:2014.

12.9.2. Performance requirements for these areas are outlined in **Figure 23**.

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.7.1	Short-term handling of large units and raw materials, loading and unloading of solid bulk goods	20	0,25	55	20	
5.7.2	Continuous handling of large units and raw materials, loading and unloading of freight, lifting and descending location for cranes, open loading platforms	50	0,40	50	20	
5.7.3	Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	100	0,50	45	20	
5.7.4	Demanding electrical, machine and piping installations, inspection	200	0,50	45	60	Use local lighting

Figure 23: Performance requirements – Loading Bays

12.10. External Pedestrian Routes for the Individual Units

12.10.1. Pedestrian routes for the individual units will be illuminated in accordance with BS 5489-1:2020 & BS EN 12464-2:2014.

12.10.2. Performance requirements for these areas are outlined in **Figure 24**.

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.1.1	Walkways exclusively for pedestrians	5	0,25	50	20	
5.1.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0,40	50	20	
5.1.3	Regular vehicle traffic (max. 40 km/h)	20	0,40	45	20	At shipyards and in docks, R_{GL} may be 50
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0,40	50	20	
5.1.5	Cleaning and servicing	50	0,25	50	20	All relevant surfaces

Figure 24: Performance requirements – External Pedestrian Routes for the Individual Units

12.11. Existing and Proposed Substation

12.11.1. Existing and Proposed Substations will be illuminated in accordance with BS EN 12464-2:2014.

12.11.2. Performance requirements for these areas are outlined in **Figure 25**.

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

Figure 25: Performance requirements – Relighting Existing Substation

12.11.3. Depending on an assessment of the condition of the existing substation lighting, some or all of the lighting class detailed within **Figure 25** will be required.

12.12. Bus Shelters

12.12.1. Bus Shelters will be illuminated in accordance with BS 5489-1:2020 & BS 8300-1:2018.

12.12.2. Lighting within any bus shelters will be provided by the manufacturers as part of the proprietary product, and the lighting will conform with the relevant standards and guidance.

12.13. Road Crossings (Zebra, Toucan and Pelican)

12.13.1. Where road crossings are included in the Proposed Development, a risk assessment must be undertaken to determine if supplementary lighting is required.

12.13.2. Based on the risk assessment, it may be necessary to illuminated road crossing as detailed in ILP TR12: 2007 using the lighting class for the surrounding road surface as the basis for the lighting levels.

12.14. Rail Loading and Unloading Areas

12.14.1. Rail loading and unloading areas will be illuminated in accordance with BS EN 12464-2:2014.

12.14.2. Performance requirements for these areas are outlined in **Figure 26**.

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.7.1	Short-term handling of large units and raw materials, loading and unloading of solid bulk goods	20	0,25	55	20	
5.7.2	Continuous handling of large units and raw materials, loading and unloading of freight, lifting and descending location for cranes, open loading platforms	50	0,40	50	20	
5.7.3	Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	100	0,50	45	20	
5.7.4	Demanding electrical, machine and piping installations, inspection	200	0,50	45	60	Use local lighting

Figure 26: Performance requirements – Rail Loading and Unloading Areas

12.15. Rail Yard and Support Areas

12.15.1. The rail yard and support areas will be illuminated in accordance with BS EN 12464-2:2014.

12.15.2. Performance requirements for these areas are outlined in **Figure 27.**

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
General	Railway areas including light railways, tramways, monorails, miniature rails, metro, etc.					Avoid glare for vehicle drivers.
5.12.1	Open platforms, very small number of passengers, e.g. train stops	5	0,20	55	20	1. Special attention to the edge of the platform 2. $U_d \geq 1/10$
5.12.2	Tracks in passenger station areas, including stabling	10	0,25	50	20	$U_d \geq 1/8$
5.12.3	Railway yards: flat marshalling, retarder and classification yards	10	0,40	50	20	$U_d \geq 1/5$
5.12.4	Hump areas	10	0,40	45	20	$U_d \geq 1/5$
5.12.5	Freight track, short duration operations	10	0,25	50	20	$U_d \geq 1/8$
5.12.6	Open platforms, small number of passengers, e.g. rural and local trains,	10	0,25	50	20	1. Special attention to the edge of the platform 2. $U_d \geq 1/8$
5.12.7	Walkways in railway areas, open footbridges	10	0,25	50	20	
5.12.8	Level crossings	20	0,40	45	20	
5.12.9	Open platforms, medium number of passengers, e.g. suburban or regional trains or inter-city services	20	0,30	45	20	1. Special attention to the edge of the platform 2. $U_d \geq 1/6$
5.12.10	Freight track, continuous operation	20	0,40	50	20	$U_d \geq 1/5$
5.12.11	Open platforms in freight areas	20	0,40	50	20	$U_d \geq 1/5$
5.12.12	Servicing trains and locomotives	20	0,40	50	40	$U_d \geq 1/5$
5.12.13	Railway yards handling areas	30	0,40	50	20	$U_d \geq 1/5$
5.12.14	Coupling area	30	0,40	45	20	$U_d \geq 1/5$
5.12.15	Stairs, small number of passengers	50	0,40	45	40	
5.12.16	Open platforms, large number of passengers, e.g. inter-city services	50	0,40	45	20	1. Special attention to the edge of the platform 2. $U_d \geq 1/5$
5.12.17	Covered platforms, small number of passengers, e.g. suburban or regional trains or inter-city services	50	0,40	45	40	1. Special attention to the edge of the platform 2. $U_d \geq 1/5$
5.12.18	Covered platforms in freight areas, short duration operations	50	0,40	45	20	$U_d \geq 1/5$
5.12.19	Covered platforms, large number of passengers, e.g. inter-city services	100	0,50	45	40	1. Special attention to the edge of the platform 2. $U_d \geq 1/3$
5.12.20	Stairs, large number of passengers	100	0,50	45	40	
5.12.21	Covered platforms in freight areas, continuous operation	100	0,50	45	40	$U_d \geq 1/5$
5.12.22	Inspection pit	100	0,50	40	40	Use low-glare local lighting

Figure 27: Performance requirements – Rail Yard

12.16. Operational Equipment

12.16.1. Performance requirements for roadways that will be adopted are outlined in **Table 19**.

Equipment Specification	
Application Area	Adoptable roadways
Correlated Colour Temperature (Kelvin / K)	≤4000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	V-Max II (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[11]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 19: Luminaire performance requirements - Adoptable roadways

[11] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.2. Performance requirements for privately owned and maintained roadways, amenity areas and parking areas are outline in **Table 20**.

Equipment Specification	
Application Area	Privately owned and maintained roadways, amenity areas and parking areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	V-Max II (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[12]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 20: Luminaire performance requirements - Privately owned and maintained roadways, amenity areas and car parks

[12] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.3. Performance requirements for privately owned car parks where luminaires are installed in central positions are outline in **Table 21**.

Equipment Specification	
Application Area	Privately owned car parks
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	DW Windsor (Or Similar Approved)
Luminaire Model	Sephora (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[13]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 21: Luminaire performance requirements - Privately owned car parks

[13] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.4. Performance requirements for privately owned HGV parks where luminaires are installed in central positions are outline in **Table 22**.

Equipment Specification	
Application Area	HGV parks
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Clear Flood (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[14]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 22: Luminaire performance requirements - Privately owned HGV parks

[14] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.5. Performance requirements for the loading bays are outline in **Table 23**.

Equipment Specification	
Application Area	Loading bays
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Clear Flood (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Wall mounted
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[15]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 23: Luminaire performance requirements – Loading Bays

[15] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.6. Performance requirements for the external pedestrian routes for the individual units are outline in **Table 24**.

Equipment Specification	
Application Area	External pedestrian routes for the individual units
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	Denver ID: Wall (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels at detailed design
Height	≤3m
Mounting Arrangement	Wall mounted
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[16]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 24: Luminaire performance requirements – External pedestrian routes for the individual units

[16] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.7. Performance requirements for the substations (existing and proposed) are outline in **Table 25** and **Table 26**.

Equipment Specification	
Application Area	Substations (existing and proposed)
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	Denver ID: Wall (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤3m
Mounting Arrangement	Wall mounted
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[17]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 25: Luminaire performance requirements – Substations (Existing and Proposed) – Wall Mounted

[17] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

Equipment Specification	
Application Area	Substations (existing and proposed)
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	V-Max II (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[18]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 26: Luminaire performance requirements – Substations (Existing and Proposed) – Post Top

[18] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.8. Performance requirements for the road crossing (Zebra, Toucan and Pelican) are outline in **Table 27**.

Equipment Specification	
Application Area	Road crossing (Zebra, Toucan and Pelican)
Correlated Colour Temperature (Kelvin)	One step up or down from road lighting Correlated Colour Temperature, as per ILP TR12:2007
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Digistreet (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels Must use specific Zebra lighting optics as per ILP TR12:2007
Reference	Type - dependant on design lighting levels detailed design
Height	6m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[19]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 27: Luminaire performance requirements – Road Crossing

[19] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.9. Performance requirements for the Rail loading and unloading areas are outline in **Table 28**.

Equipment Specification	
Application Area	Rail loading and unloading areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Clear Flood (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤10m
Mounting Arrangement	Wall Mounted Pot Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[20]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 28: Luminaire performance requirements - Rail loading and unloading areas

[20] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.16.10. Performance requirements for the rail yard and support areas are outline in **Table 29** - **Table 31**.

Equipment Specification	
Application Area	Rail yard and support areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	Denver ID: Wall (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤3m
Mounting Arrangement	Wall mounted
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[21]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 29: Luminaire performance requirements - Rail Yard and Support Areas

[21] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

Equipment Specification	
Application Area	Rail yard and support areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Holophane Europe (Or Similar Approved)
Luminaire Model	V-Max II (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G4
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[22]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 30: Luminaire performance requirements - Rail Yard and Support Areas

[22] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

Equipment Specification	
Application Area	Rail yard and support areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Clear Flood (Or Similar Approved)
Light Source	LED - Lumen output dependant on design lighting levels
Reference	Type - dependant on design lighting levels detailed design
Height	≤8m
Mounting Arrangement	Wall Mounted or Post Top
Luminaire Tilt	0°
Glare Glass (G Class)	≥G3
Upward Light Output Ratio **E1 < 0%**	0%
Example Luminaire Image	
Controls[23]	Central Management System (CMS) Photocell: Dusk-Till-Dawn

Table 31: Luminaire performance requirements - Rail Yard and Support Areas

[23] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

12.17. Embedded Mitigation

12.17.1. Careful design will ensure the effects of lighting are minimised onto sensitive receptors as far as is possible.

12.17.2. **Table 32** details the mitigation that will be embedded into the lighting designs for the Proposed Development.

Mitigation Name	Description of Mitigation	Installation Location
Restricting the Upward Light Output Ratio	All luminaires will have an Upward Light Output Ratio of 0%.	Whole Proposed Development
Restricting Luminaire Tilt	All luminaires will be installed with a 0° as standard. An allowance to tilt luminaires to 5° may be made, where it is demonstrated that: 1. This is required to achieve a standard lighting level on the task or area, and 2. This will not result in any significant effects on the surrounding receptors.	Whole Proposed Development
Glare Class Restriction	All luminaires will have a minimum Glare Class of G3. Where it is available, a minimum Glare Class of G4 will be used as shown in **Table 19** - **Table 31**.	Whole Proposed Development
Installation of Back Light Shielding	Manufactures often provide "back light optics" where back light mitigation is integrated on the lenses of the luminaires. This is the preferred option as it provides the greatest degree of controlled (**Figure 28**). Where this is not available, traditional back light shields can be used (**Figure 29**).	Whole Proposed Development: Where luminaires are installed on the boundary of an area facing into the site.
Using the lowest possible Correlated Colour Temperature	Throughout the Proposed Development the standard Correlated Colour Temperature used will be ≤3000K. Where there are areas of specific ecological sensitivity the lighting near this area will be dropped to ≤2700K. In locations where there are specific safety concerns, for example in the substations, the Correlated Colour Temperature may be increase to ≤4000K. However, a risk assessment needs to be undertaken to justify this increase if this does not form part of a local authority adoptable specification.	Whole Proposed Development

Mitigation Name	Description of Mitigation	Installation Location
Using the lowest applicable lighting levels for tasks and areas	All areas and task will be lit using the lowest applicable lighting levels are defined in the relevant British Standard (**Section 4** and **Figure 17 Figure 27**). This will ensure a standard and recognised levels of light is provided for all areas of the Proposed Development, while ensure no area is over lit. During the detailed lighting design, a risk assessment must be undertaken to help defined the specific lighting class for any area.	Whole Proposed Development
Centralised Lighting Controls	Throughout the Proposed Development a centralised lighting control system/s will be used. This will ensure lighting is only active as require during the hours of darkness, will allow dimming based on traffic flow, and switching to take place based on the hours of use. For example: 1. When a car park is experiencing low use over night the lighting can be dimmed, 2. If a unit is closed overnight, then all associated lighting can be switched off. This will not only reduce the effects of lighting, but will save money and energy for the owner of the lighting system.	Whole Proposed Development
Using the minimum practical mounting height	All luminaires will be mounted at the minimum practical mounting height for the area or task. This will reduce the visibility of the luminaires in the landscape, by allowing surrounding trees and buildings to act as blocking features to direct views of luminaires. This will also help ensure there is minimum need to tilt luminaires, by providing enough height for the light to travel forward into the task area.	Whole Proposed Development
Using appropriate optic for the areas being illuminated	The luminaire optic used will be specific to the area being lit (**Figure 30**). This will ensure the task and area is lit to a standard level of light, while also allow the lux contours to be shaped to the specific areas. This will help reduce light spill out of area and either over lighting or under lighting area.	Whole Proposed Development

Mitigation Name	Description of Mitigation	Installation Location
Only using Luminaires where Photometry is Available from the Manufacturer	Luminaires will be used with integral LEDs and only where the luminaire photometry is available from the manufacturer (**Figure 30**). This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are minimised or mitigated.	Whole Proposed Development

Table 32: Embedded Mitigation Table

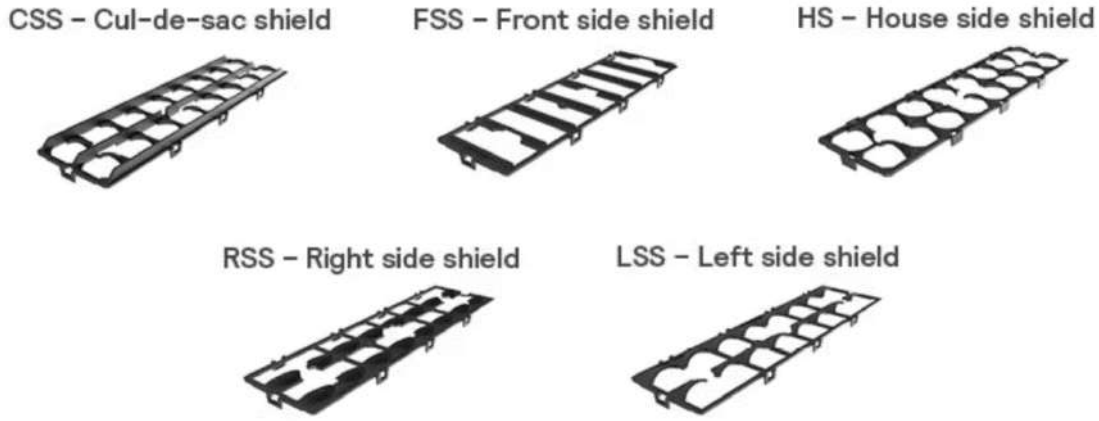


Figure 28: Example of Integrated Light Spill Control Options – Signify (Philips)

Figure 29: Example of a Traditional Back Light Shield

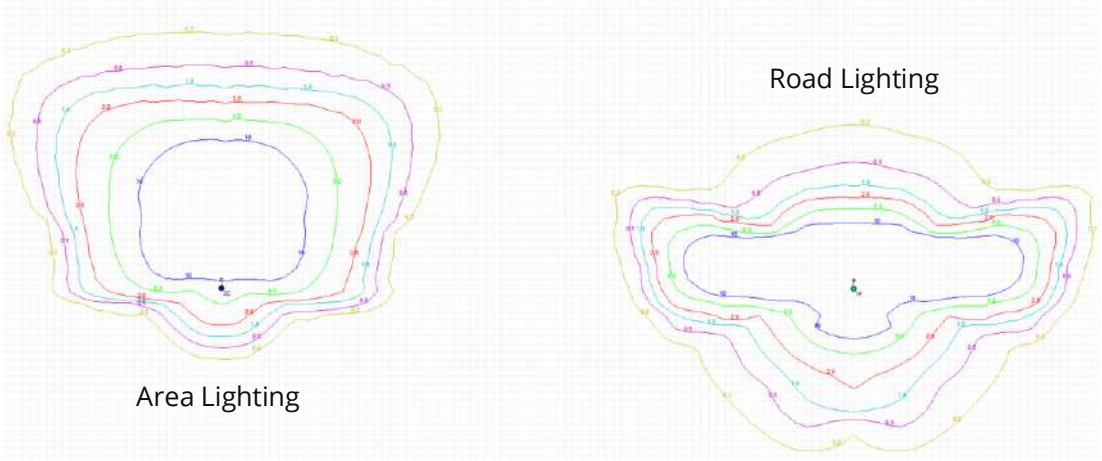


Figure 30: Example of Two Different Luminaire Optics

APPENDIX 2

Sensitive Receptors

Human Receptors

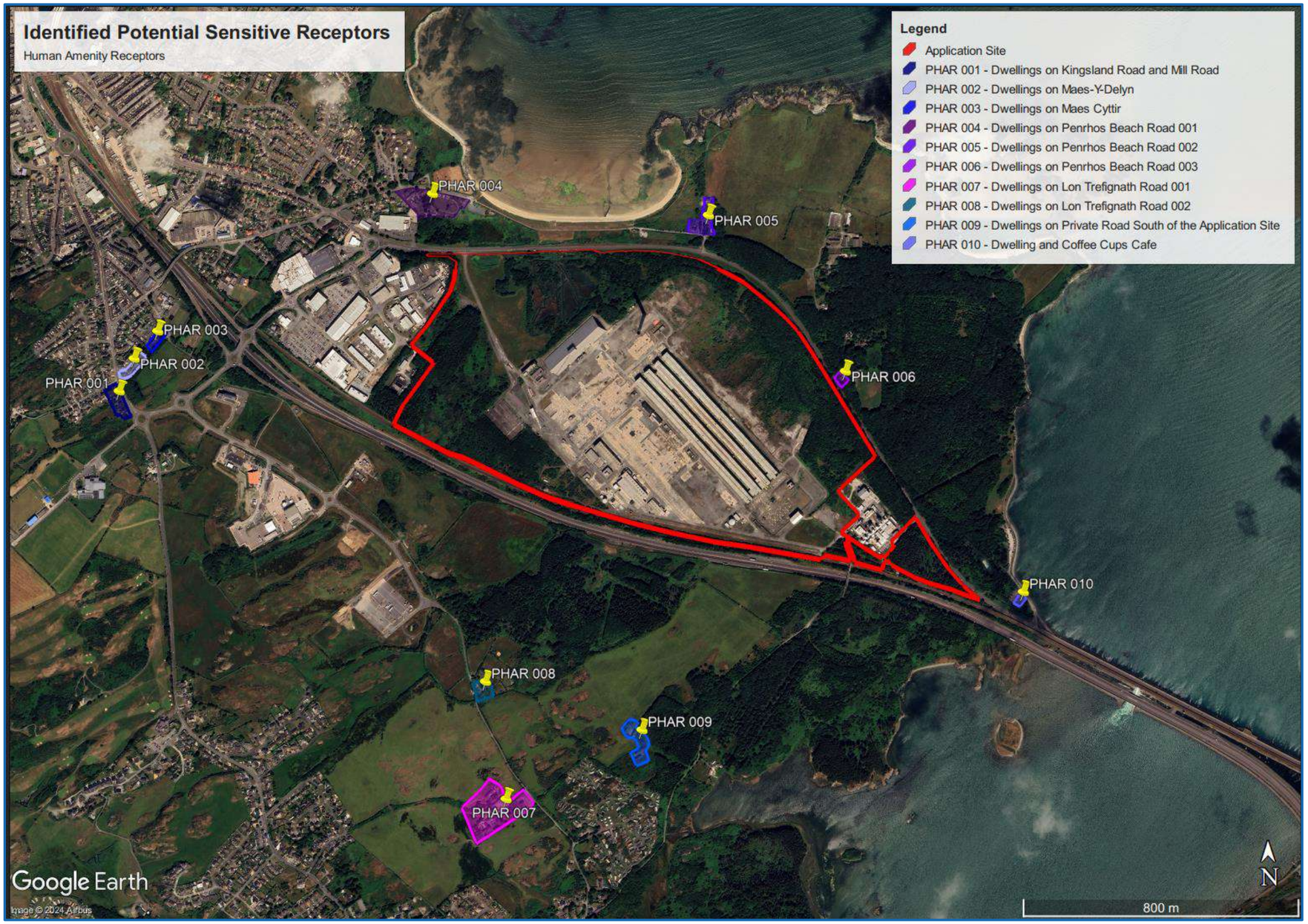


Figure 31: Human Receptors (PHAR)

Ecology Receptors

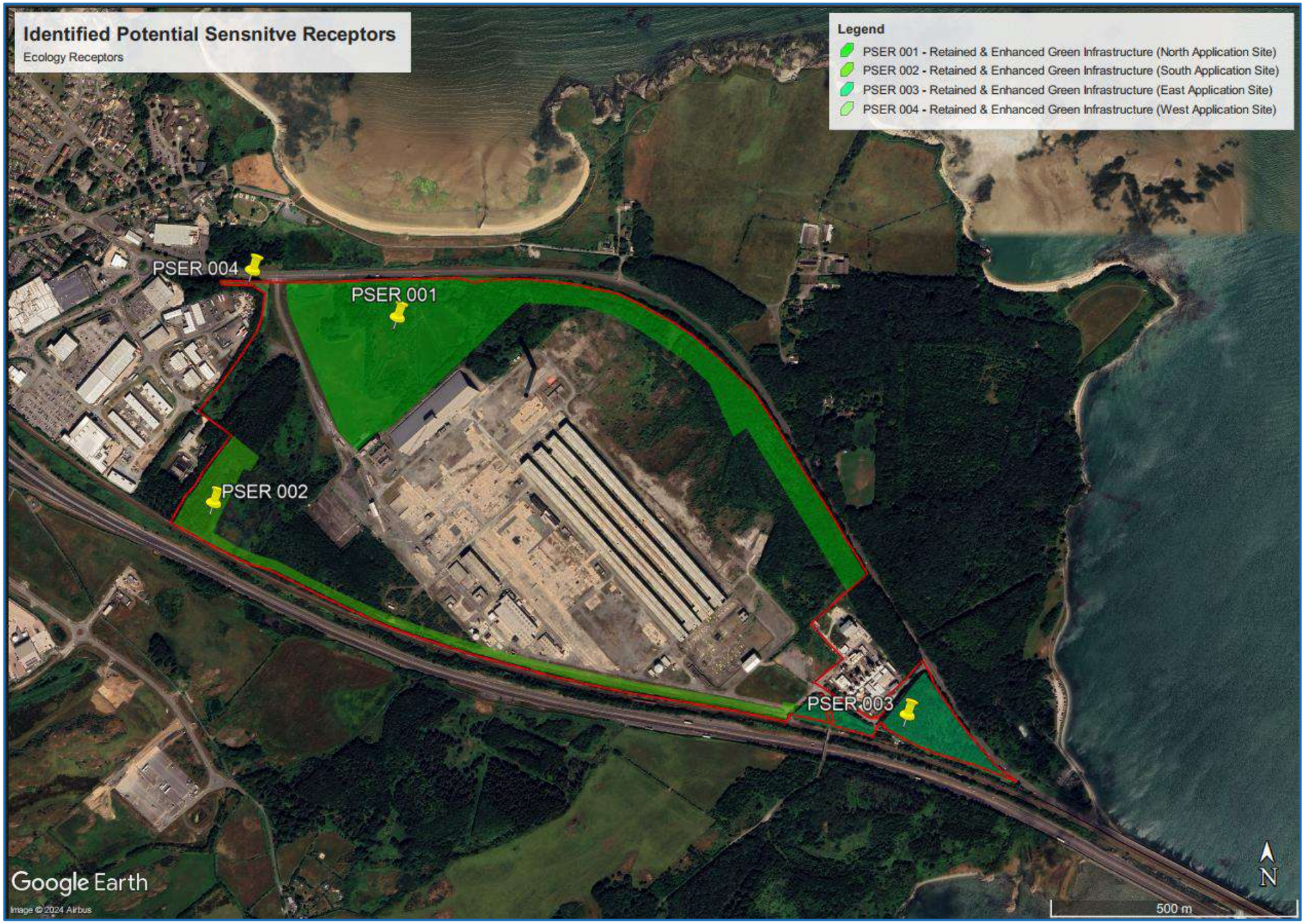


Figure 32: Ecology Receptor (PSER)

Heritage Receptors

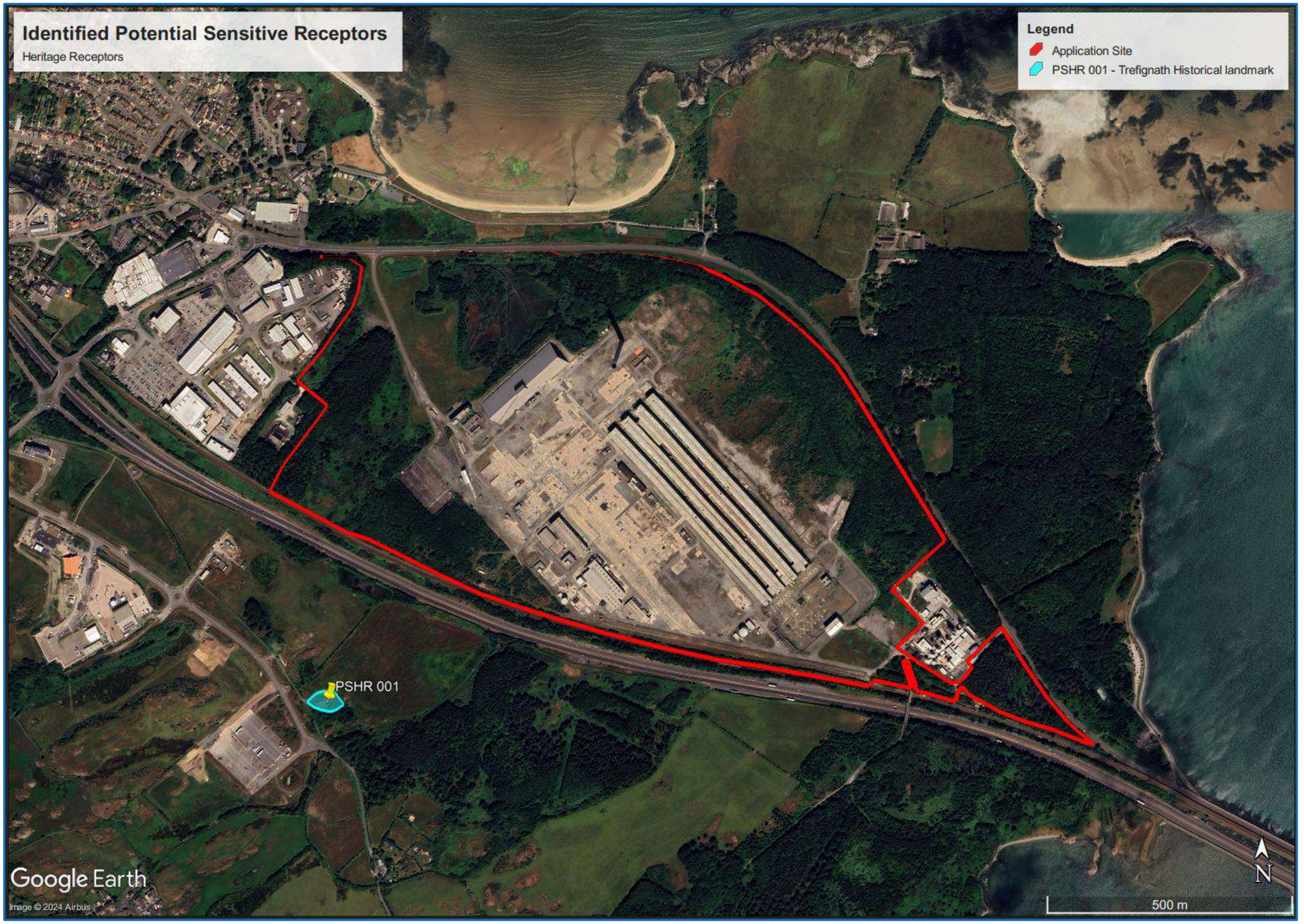


Figure 33: Heritage Receptor (PSHR)

APPENDIX 3

Baseline Lighting Survey Results

Reading number	Eh	Ev North	Ev East	Ev South	Ev West
1	0	0.02	0.01	0.02	0.04
2	0.01	0	0	0.03	0.03
3	0.02	0.01	0.01	0.02	0.03
4	0	0	0	0.05	0.04
5	0.06	0	0.01	0.05	0.04
6	0.03	0	0.04	0.16	0.07
7	0.03	0	0.1	0.09	0.04
8	0.02	0.02	0.03	0.07	0.06
9	0.03	0.05	0.06	0.03	0.19
10	0.02	0.11	0.06	0.12	0.1
11	0.06	0.1	0.16	0.1	0.12
12	10.52	2.1	1.52	2.57	0.63
13	0.04	0.06	0.07	0.04	0.03
14	0	0.04	0.17	0.07	0.02
15	0.02	0.02	0.05	0.02	0.03
16	1.85	1.42	0.73	2.14	1.98
17	3.03	0.64	0.56	0.97	2.89
18	0.54	0.13	0.17	0.89	0.96
19	0.1	0.04	0.07	0.13	0.2
20	0.02	0	0.04	0.05	0.05
21	0.02	0.03	0.03	0.06	0.12
22	0	0	0	0.06	0.1
23	0	0	0	0.05	0.04
24	0	0	0	0.08	0.02
25	0.03	0	0.02	0.15	0.07
26	0.03	0.01	0.13	0.16	0.13
27	0.02	0	0	0.09	0.12
28	0.02	0	0	0.12	0.15
29	0.07	0.01	0.02	0.36	0.16
30	0.36	0.06	0.21	1.22	0.83
31	3.13	1.28	2.16	3.89	3.33

Table 33: Lighting Baseline Survey Illuminance Results

Certificate of Calibration

Issued by: BSRIA Instrument Solutions - A division of BSRIA Limited
Date of issue: 18 August 2023

Certificate number
STD_145652

Page 1 of 2 pages

BSRIA

Laboratory address:
Old Bracknell Lane West, Bracknell,
Berkshire RG12 7AH
T: +44 (0) 1344 459 314 | 0800 254 5566
E: instruments@bsria.co.uk
W: www.bsria.com/uk/instrument/

MATT NEWLAND
Approved signatory

Customer: Designs for Lighting UK Ltd
Fao Fran Goodyear 17 City Business Centre Hyde Street
Winchester Hampshire SO23 7TA

Date received: 02 August 2023

Instrument:

BSRIA I.D.:	129521
Description:	Light meter
Manufacturer:	Konica Minolta
Model:	T-10A
Serial number:	36621008
Procedure version:	BLT264V1

Laboratory conditions:

Temperature: 20 °C ± 4 °C Relative humidity: < 75 %rh
Mains voltage: 240 V ± 10 V Mains frequency: 50 Hz ± 1 Hz

Comments:

Instrument calibration conducted as found - no adjustments undertaken.
This certificate only relates to the range shown within.
At time of calibration the instrument was fitted with the measurement head serial number 55611050.

Calibration information:

The instrument was calibrated by comparison against laboratory reference equipment whose values are traceable to recognised National Standards. This is an electronic document that has been signed digitally.

The uncertainties quoted refer to the calibration only and are not intended to indicate any long-term instrument specification/performance. This certificate only relates to the items calibrated and was performed at the above laboratory address.

Calibrated by: D. M. Tovey **Date of calibration:** 18 August 2023

Figure 34: Illuminance Meter Calibration Certificate Page 1

Certificate of Calibration

As Found Results

Certificate number
STD_145652

Page 2 of 2 pages

Reference equipment used in the calibration:

Instrument description	Serial number	Certificate number	Last cal. date	Cal. period
Light Bench (ZZMLB02)	18425/2 & 18426/1	ZZMLB02 - 2023	02/03/2023	12 Months
Light Bench (ZZMLB03)	18425/1 & 18427/1	ZZMLB03 - 2023	02/03/2023	12 Months
Distance Measuring System (ZZMLB04)	4816	ZZMLB04 - FEB 2023	08/02/2023	12 Months

Calibration uncertainties:

Illuminance : 0 to 2000 lux ±5 % of applied value or 0.1 lux whichever is greatest.
Measurement uncertainty equals the above plus the devices resolution as reported in the results section, added in quadrature.

Calibration procedure, Illuminance:

The instrument was calibrated against laboratory standards which are themselves traceable back to National Standards.

The illuminance measurements were conducted in accordance with the methodology contained in BS 667 using a tungsten filament lamp with a colour temperature of 2856 k. Illuminance levels were calculated using an inverse square law with respect to distance away from a tungsten filament lamp source.

The light meters reference plane was taken to be the front face of the diffuser.

The illuminance meter was zeroed prior to calibration.

Calibration results, Illuminance:

Range	Applied	Indicated	Correction	Specification	% of Spec.	Comment
Auto	0.00 lux	0.00 lux	0.00 lux	±0.01 lux	0.0 %	
	50.0 lux	50.6 lux	-0.6 lux	±1.1 lux	54.5 %	
	100.0 lux	100.6 lux	-0.6 lux	±2.1 lux	28.6 %	
	250.0 lux	248.8 lux	1.2 lux	±5.1 lux	23.5 %	
	500.0 lux	494 lux	6.0 lux	±11.0 lux	54.5 %	
	1000.0 lux	987 lux	13.0 lux	±21.0 lux	61.9 %	
	2000.0 lux	1966 lux	34.0 lux	±41.0 lux	82.9 %	

Any test points marked with a * do not comply with instrument specification.

End.

Figure 35: Illuminance Meter Calibration Certificate Page 2

Figure 36: Illuminance Measurement Locations – Northern Section of the Application Site

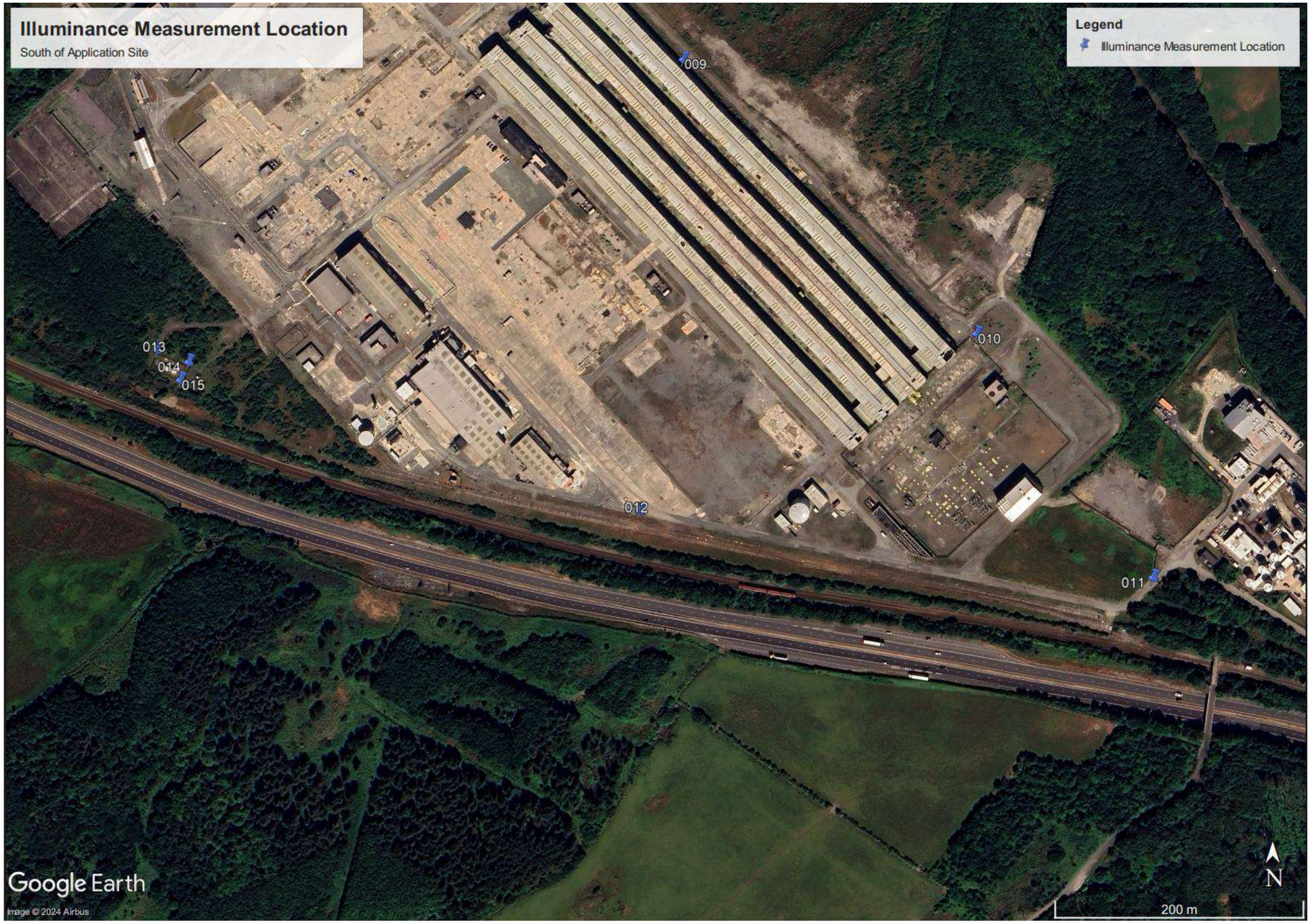


Figure 37: Illuminance Measurement Locations – Southern Section of the Application Site

APPENDIX 4

Baseline Lighting Survey Photography

Sample Photography Taken During Site Induction

Notes	Image
Typical lighting column found across the Application Site. Only one lighting column was working during the lighting baseline survey. The majority had been deactivated during the demolishing works.	

View across the Application Site.

View for the demolition compound.

View across the Application Site facing the Northeast boundary.	

View of the Northwest boundary from within the Application Site.

This location previously had the building called the A-Frame in it along with external lighting associated with this building.

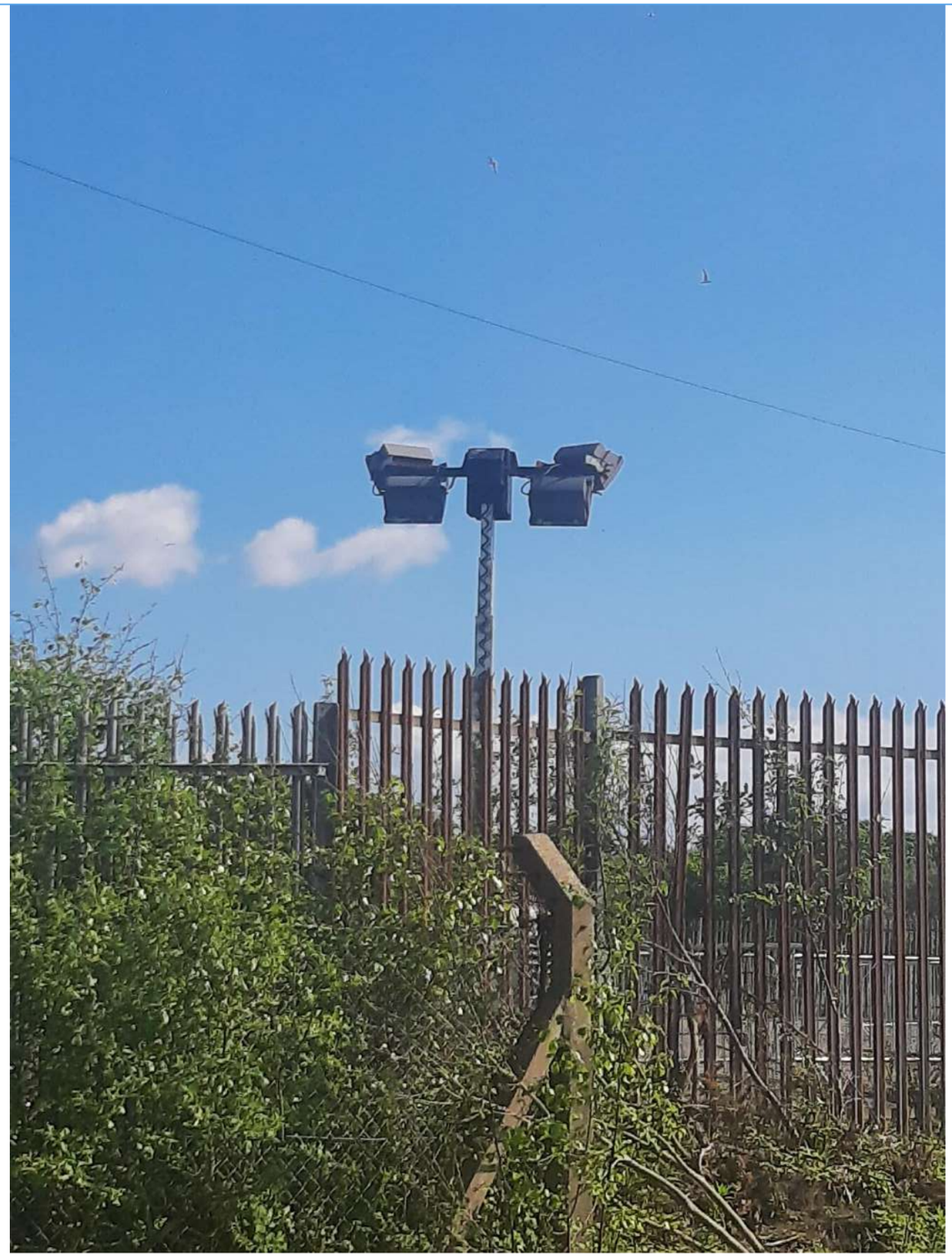
Floodlighting inside the vacant lot adjacent to the A M G Alpoco UK Ltd facility.	

Table 34: Sample Photography Taken During Site Induction

Figure 38: Panoramic View taken from the Northeast corner of the Application Site

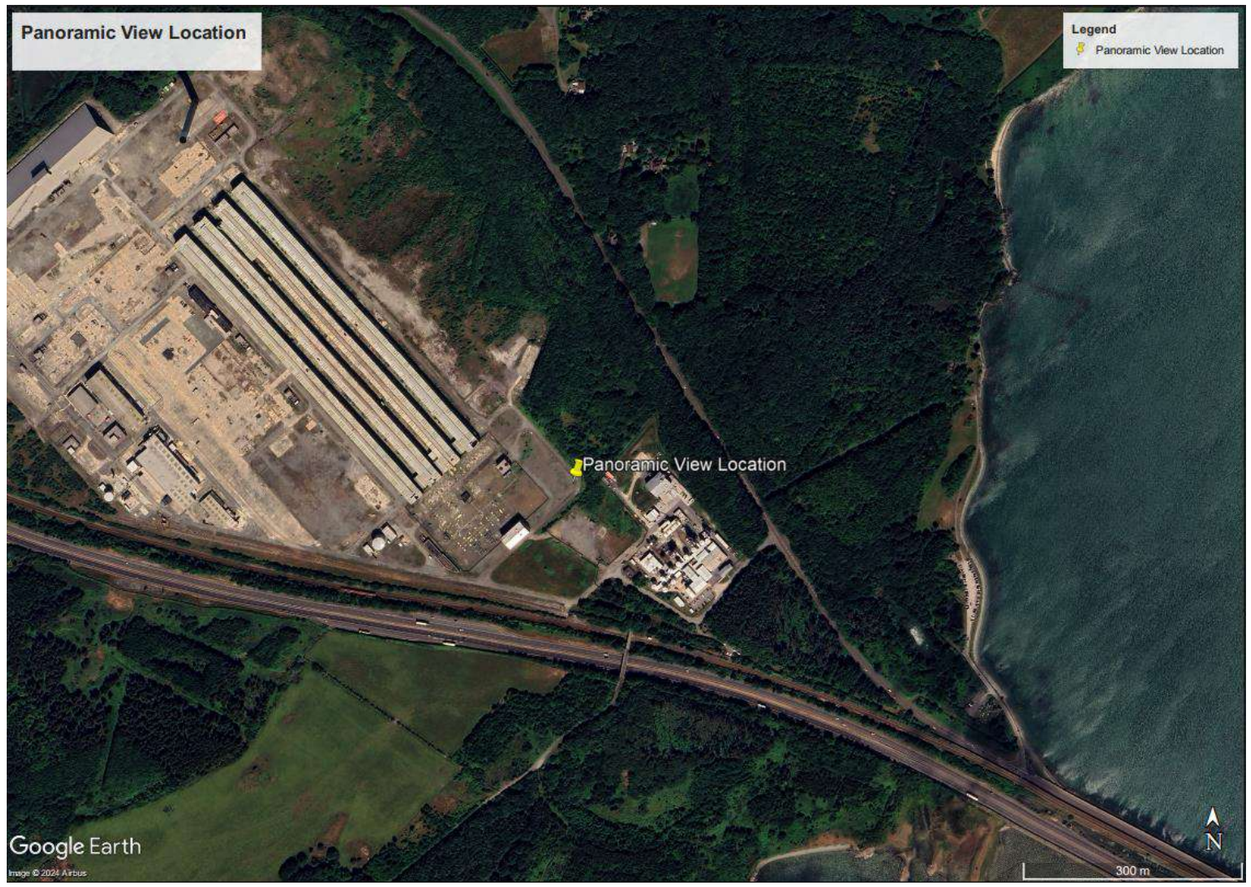


Figure 39: Panoramic View Location

Inside of Application Site

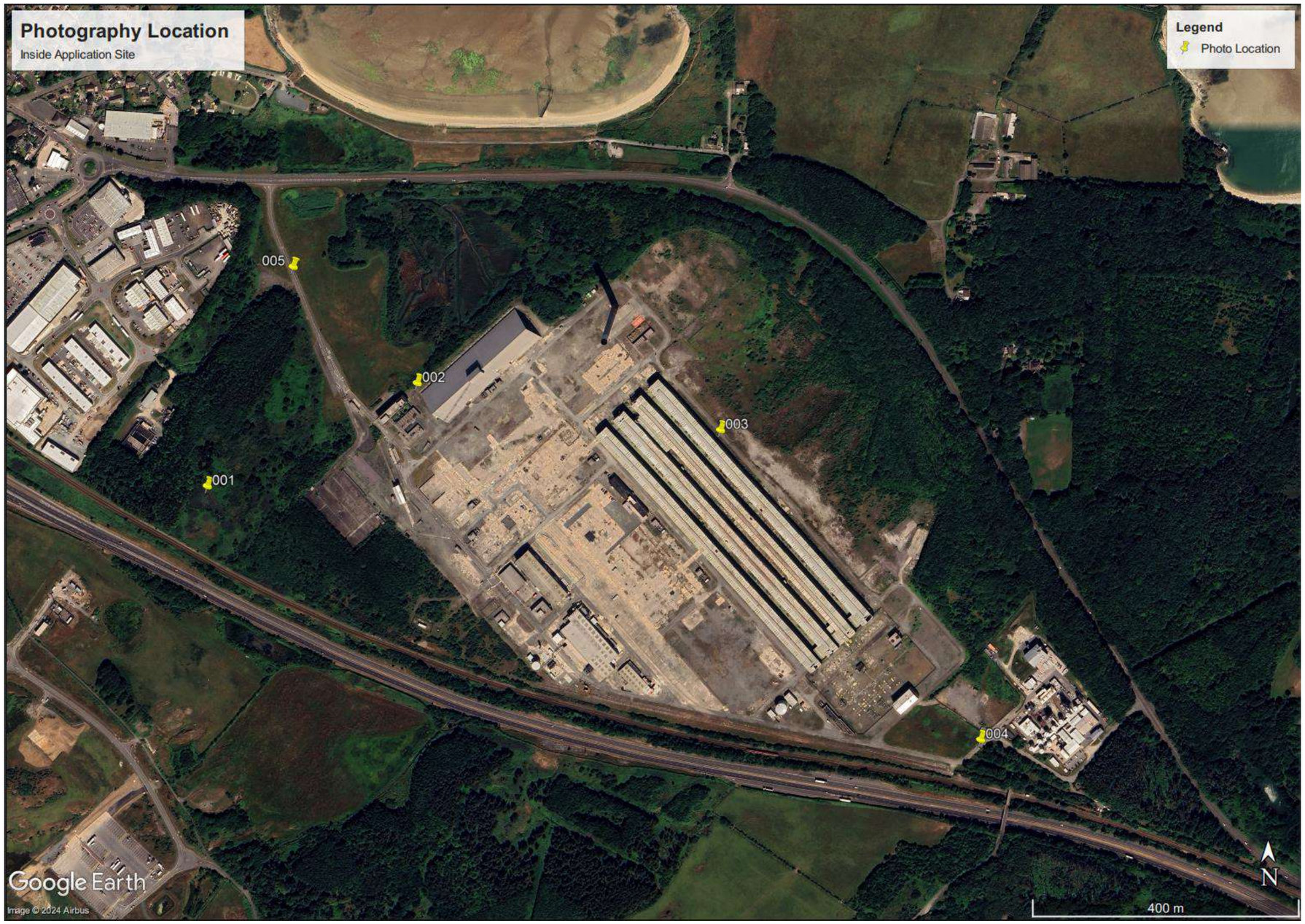


Figure 40: Photography Locations within the Application Site

Photo Location 001	
Photo Parameters	**Image**
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1.3 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Camera Model: NIKON D3100 F-Stop: f/5.6 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 55 mm Max Aperture: 5	

Table 35: Photo Location 001

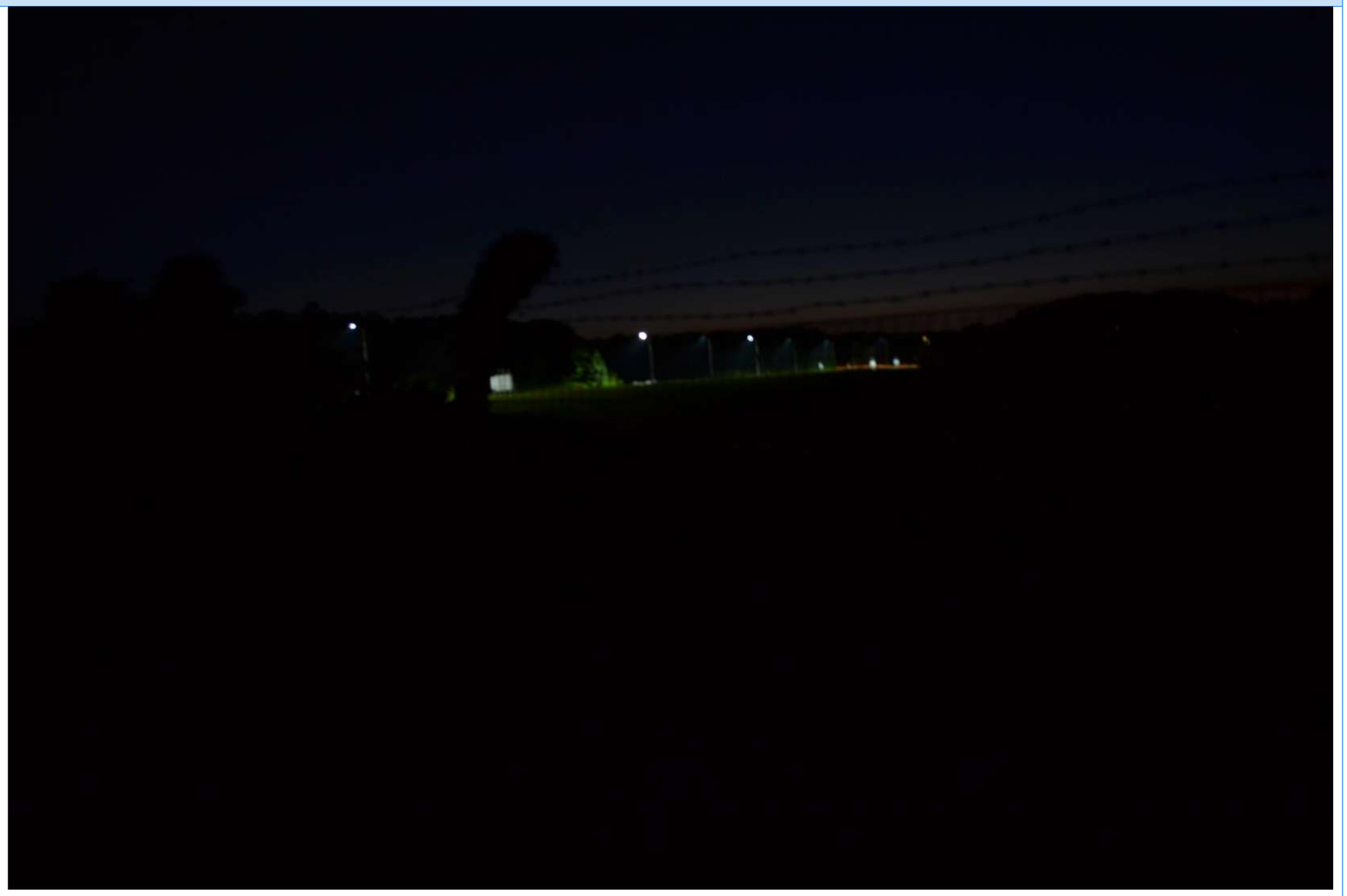
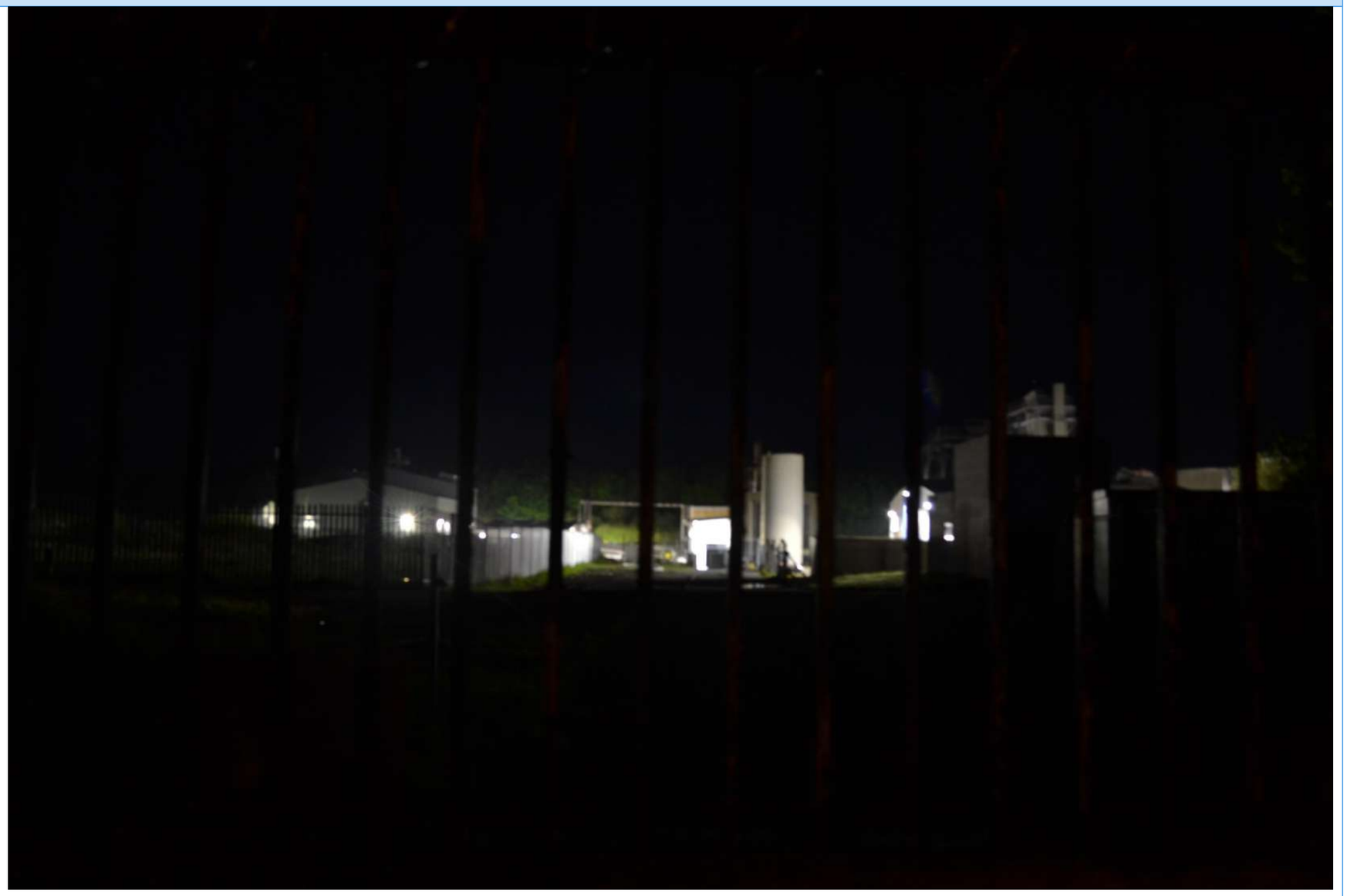
Photo Location 002	
Photo Parameters	**Image**
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Table 36: Photo Location 002

Photo Location 003	
Photo Parameters	**Image**
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Table 37: Photo Location 003

Photo Location 004	
Photo Parameters	**Image**
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 3 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Table 38: Photo Location 004

Photo Location 005	
Photo Parameters	**Image**
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Camera Model: NIKON D3100

F-Stop: f/4.5

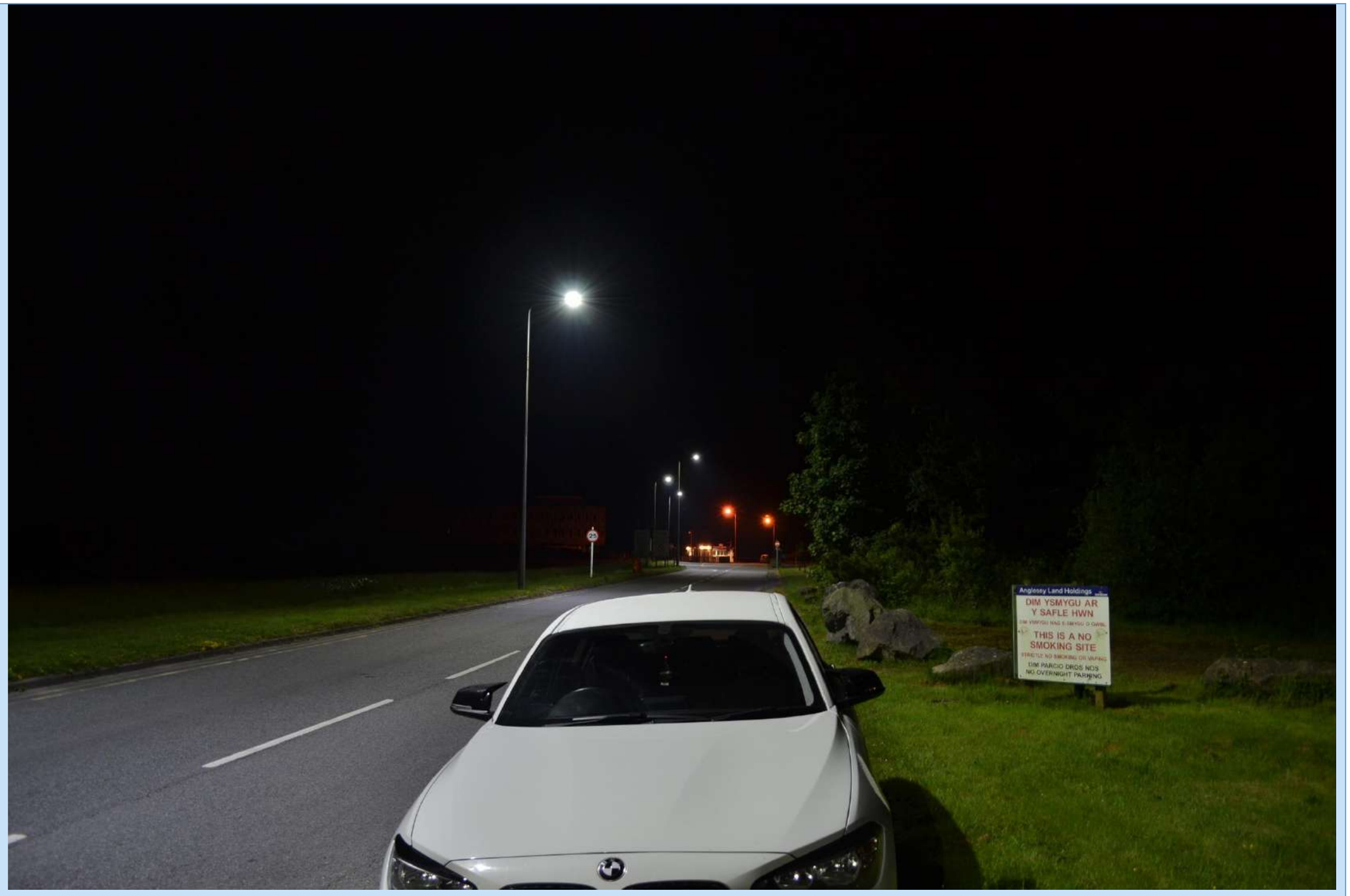
Exposure time: 1 sec

ISO Speed: ISO-100

Exposure Bias: 0 Step

Focal Length: 18 mm

Max Aperture: 3.6



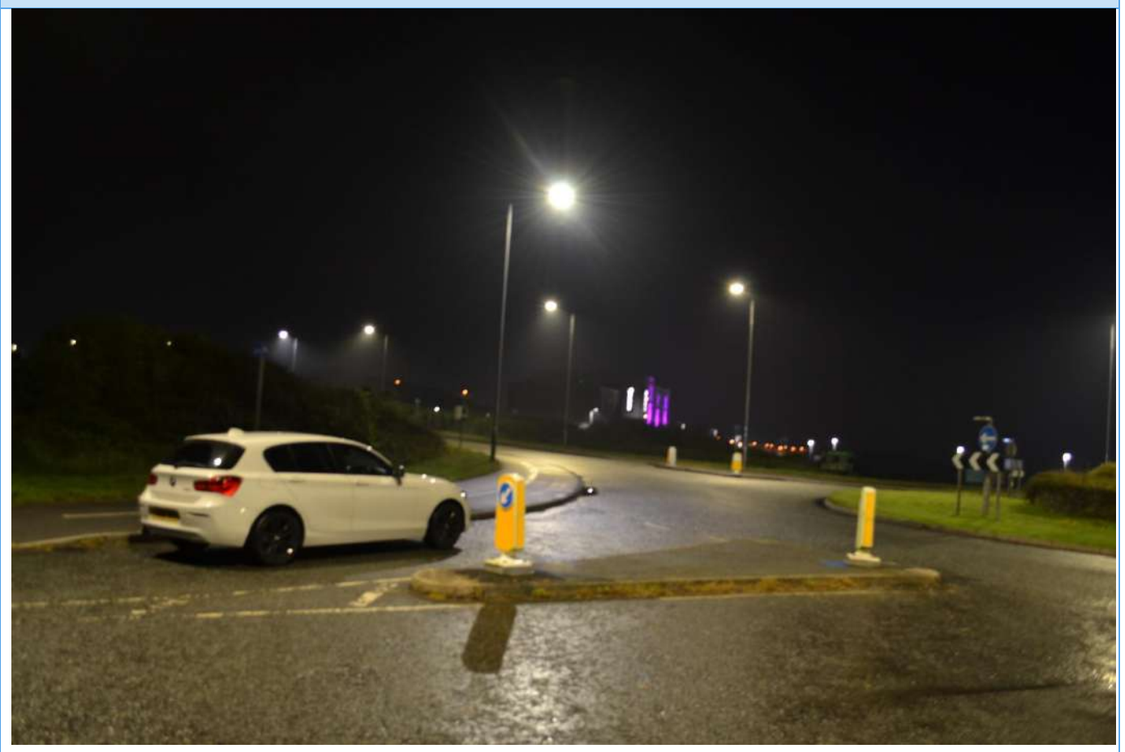
Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	

Table 39: Photo Location 005

Outside of Application Site

Figure 41: Photography Locations outside the Application Site

Photo Location 006

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/11 Exposure time: 1/400 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.7	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6

	
Camera Model: NIKON D3100 F-Stop: f/11 Exposure time: 1/400 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.7	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6

Table 40: Photo Location 006

Photo Location 007

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/10 Exposure time: 1/320 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 20 mm Max Aperture: 3.8	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 24 mm Max Aperture: 4

	
	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 24 mm Max Aperture: 4

Table 41: Photo Location 007

Photo Location 008

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/8 Exposure time: 1/250 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/5.6 Exposure time: 1 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 48 mm Max Aperture: 5

Camera Model: NIKON D3100

F-Stop: f/8

Exposure time: 1/250 sec

ISO Speed: ISO-100

Exposure Bias: 0 Step

Focal Length: 18 mm

Max Aperture: 3.6

Camera Model: NIKON D3100

F-Stop: f/4.5

Exposure time: 1 sec

ISO Speed: ISO-200

Exposure Bias: 0 Step

Focal Length: 24 mm

Max Aperture: 4

Camera Model: NIKON D3100

F-Stop: f/11

Exposure time: 1/400 sec

ISO Speed: ISO-400

Exposure Bias: 0 Step

Focal Length: 18 mm

Max Aperture: 3.6

Camera Model: NIKON D3100

F-Stop: f/4.5

Exposure time: 1/200 sec

ISO Speed: ISO-200

Exposure Bias: 0 Step

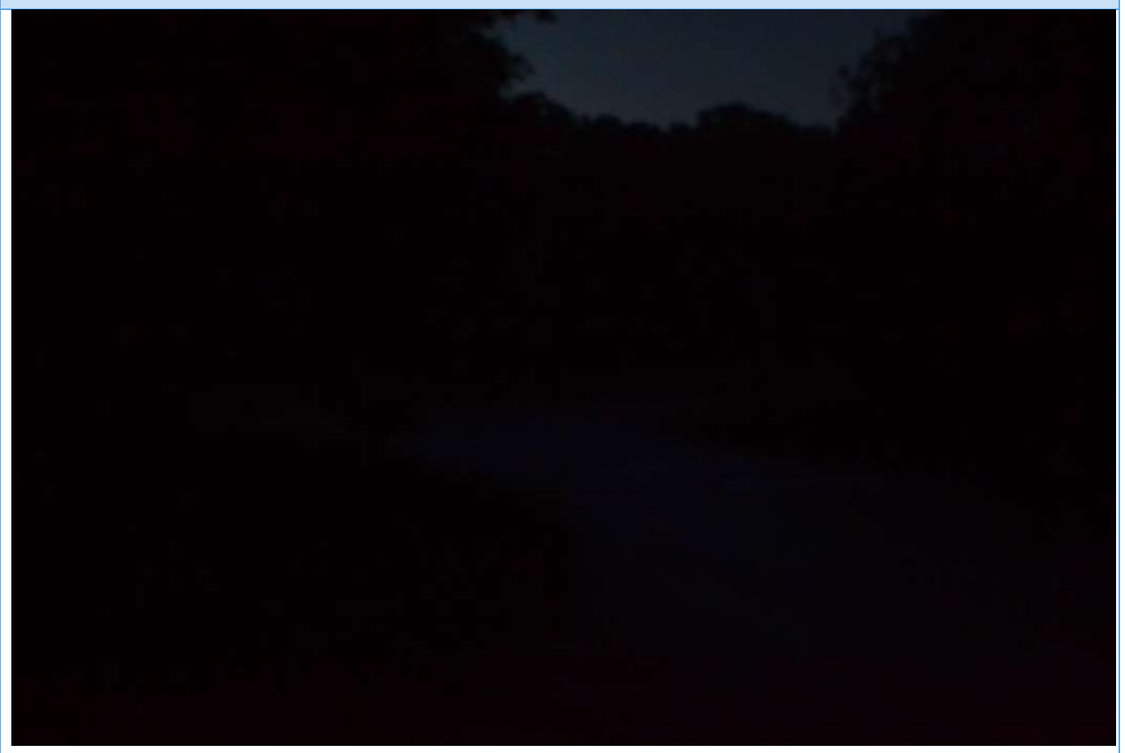
Focal Length: 24 mm

Max Aperture: 4

	
Camera Model: NIKON D3100 F-Stop: f/8 Exposure time: 1/250 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1/200 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 24 mm Max Aperture: 4

Table 42: Photo Location 008

Photo Location 009

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/10 Exposure time: 1/200 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 20 mm Max Aperture: 3.8	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-3200 Exposure Bias: 0 Step Focal Length: 30 mm Max Aperture: 4.4

	
Camera Model: NIKON D3100 F-Stop: f/7.1 Exposure time: 1/125 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 20 mm Max Aperture: 3.8	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-800 Exposure Bias: 0 Step Focal Length: 30 mm Max Aperture: 4.4

	
Camera Model: NIKON D3100 F-Stop: f/7.1 Exposure time: 1/200 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 20 mm Max Aperture: 3.8	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-300 Exposure Bias: 0 Step Focal Length: 30 mm Max Aperture: 4.4

Table 43: Photo Location 009

Photo Location 010

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/5 Exposure time: 1/100 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 22 mm Max Aperture: 3.9	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-3200 Exposure Bias: 0 Step Focal Length: 30 mm Max Aperture: 4.4

Camera Model: NIKON D3100

F-Stop: f/9

Exposure time: 1/100 sec

ISO Speed: ISO-400

Exposure Bias: 0 Step

Focal Length: 22 mm

Max Aperture: 3.9

Camera Model: NIKON D3100

F-Stop: f/4.5

Exposure time: 1 sec

ISO Speed: ISO-3200

Exposure Bias: 0 Step

Focal Length: 30 mm

Max Aperture: 4.4

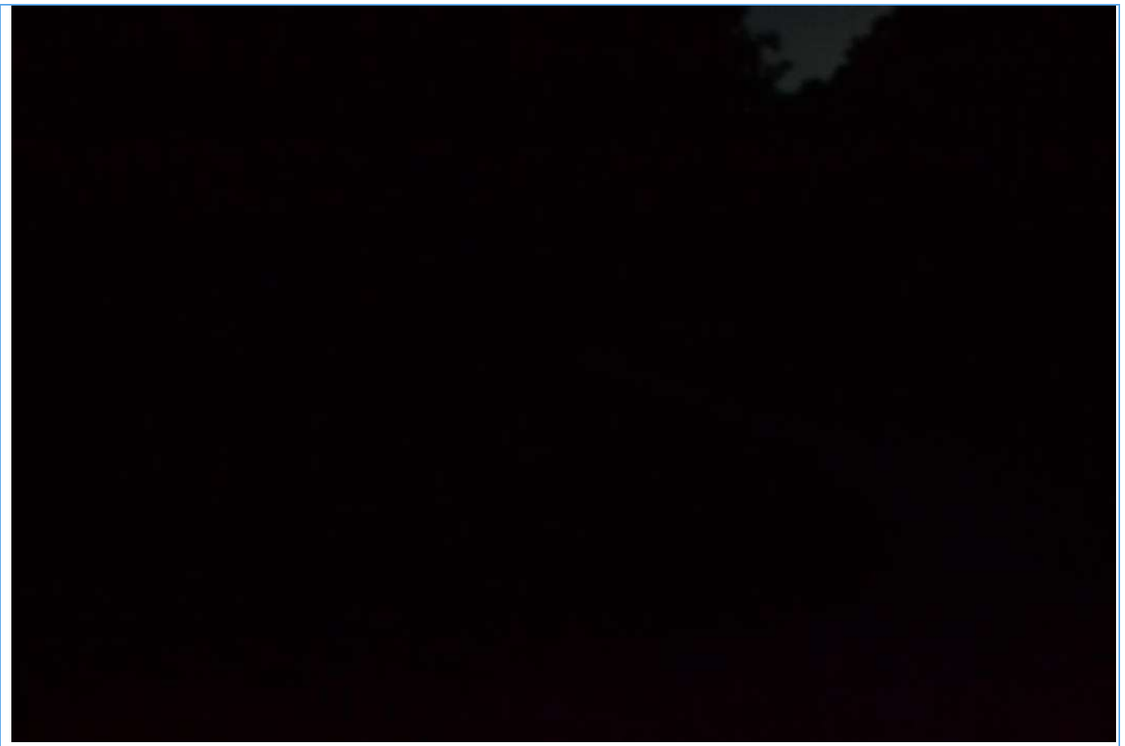
	
Camera Model: NIKON D3100 F-Stop: f/6.3 Exposure time: 1/100 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 22 mm Max Aperture: 3.9	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-3200 Exposure Bias: 0 Step Focal Length: 30 mm Max Aperture: 4.4

Table 44: Photo Location 010

Photo Location 011

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/8 Exposure time: 1/250 sec ISO Speed: ISO-100 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-1600 Exposure Bias: 0 Step Focal Length: 24 mm Max Aperture: 4

Camera Model: NIKON D3100

F-Stop: f/11

Exposure time: 1/400 sec

ISO Speed: ISO-400

Exposure Bias: 0 Step

Focal Length: 18 mm

Max Aperture: 3.6

Camera Model: NIKON D3100

F-Stop: f/4.5

Exposure time: 1 sec

ISO Speed: ISO-3200

Exposure Bias: 0 Step

Focal Length: 24 mm

Max Aperture: 4

	
Camera Model: NIKON D3100 F-Stop: f/11 Exposure time: 1/500 sec ISO Speed: ISO-320 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-1600 Exposure Bias: 0 Step Focal Length: 24 mm Max Aperture: 4

Table 45: Photo Location 011

Photo Location 012

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/11 Exposure time: 1/400 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.7	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-800 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6

Camera Model: NIKON D3100

F-Stop: f/4.5

Exposure time: 1 sec

ISO Speed: ISO-800

Exposure Bias: 0 Step

Focal Length: 18 mm

Max Aperture: 3.6

	
	Camera Model: NIKON D3100 F-Stop: f/4.5 Exposure time: 1 sec ISO Speed: ISO-800 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6

Table 46: Photo Location 012

Photo Location 013

Day	Night
	
Camera Model: NIKON D3100 F-Stop: f/10 Exposure time: 1/250 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/5.3 Exposure time: 1 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 40 mm Max Aperture: 4.8

Camera Model: NIKON D3100

F-Stop: f/10

Exposure time: 1/320 sec

ISO Speed: ISO-400

Exposure Bias: 0 Step

Focal Length: 26 mm

Max Aperture: 4.2

Camera Model: NIKON D3100

F-Stop: f/5.3

Exposure time: 1 sec

ISO Speed: ISO-200

Exposure Bias: 0 Step

Focal Length: 40 mm

Max Aperture: 4.8

	
Camera Model: NIKON D3100 F-Stop: f/10 Exposure time: 1/250 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 18 mm Max Aperture: 3.6	Camera Model: NIKON D3100 F-Stop: f/5.6 Exposure time: 1 sec ISO Speed: ISO-200 Exposure Bias: 0 Step Focal Length: 55 mm Max Aperture: 5

Camera Model: NIKON D3100

F-Stop: f/5.6

Exposure time: 1 sec

ISO Speed: ISO-200

Exposure Bias: 0 Step

Focal Length: 50 mm

Max Aperture: 5

Camera Model: NIKON D3100

F-Stop: f/10

Exposure time: 1/320 sec

ISO Speed: ISO-400

Exposure Bias: 0 Step

Focal Length: 26 mm

Max Aperture: 4.2

Camera Model: NIKON D3100

F-Stop: f/5.6

Exposure time: 1 sec

ISO Speed: ISO-200

Exposure Bias: 0 Step

Focal Length: 55 mm

Max Aperture: 5

	
Camera Model: NIKON D3100 F-Stop: f/10 Exposure time: 1/320 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 26 mm Max Aperture: 4.2	Camera Model: NIKON D3100 F-Stop: f/5.6 Exposure time: 1/200 sec ISO Speed: ISO-400 Exposure Bias: 0 Step Focal Length: 55 mm Max Aperture: 5

Table 47: Photo Location 013

APPENDIX 5

Indicative Horizontal Light Spill Diagrams

See accompanying document:

3444-DFL-ELG-XX-LD-EO-13001-S3

3444-DFL-ELG-XX-LD-EO-13002-S3

3444-DFL-ELG-XX-LD-EO-13003-S3

APPENDIX 6

Indicative Vertical Light Spill Diagrams

See accompanying documents:

3444-DFL-ELG-XX-LD-EO-13004-S3

3444-DFL-ELG-XX-LD-EO-13005-S3

TECHNICAL DECRIPTIONS, DEFINITIONS & ABBREVIATIONS

PHAR: is an abbreviation for a potential human amenity receptor, a location where an observer could have the potential to be affected by the proposed lighting to be installed *Abbreviation used by DFL LI&P.*

PSER: is an abbreviation for an area identified as or treated as a location that may host a potentially sensitive ecological receptor. This is generally used where light sensitive bats have the potential to live, forage or use as a flight path, other ecologically sensitive receptors such as (but not limited to) the Great Crested Newt may also be identified by this term. *Abbreviation used by DFL LI&P.*

PSR: is an abbreviation for an area where an individual maybe susceptible to light brightness (Light intensity) which may have the potential to cause a hazardous situation. *Abbreviation used by DFL LI&P.*

Obtrusive Light: refers to excessive or bothersome artificial light that goes where it shouldn't, causing discomfort and disruption. *Spill light which because of quantitative, directional or spectral attributes in a given context gives rise to annoyance, discomfort, distraction or reduction in the ability to see essential information.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Sky glow: When lights are directed upwards or light is scattered by particles in the air, like dust or water droplets, it creates a glow that makes it hard to see stars. *The increase in diffuse illuminance of the night sky above that produced by natural sources such as the moon and visible star.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Vertical Illuminance: is how much light lands on upright surfaces like walls. It's measured in lux or footcandles and matters for places where the view from a vertical angle is important. *Lighting of vertical surfaces such as walls, windows, statues, sculptures and people's faces*. CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Correlated colour temperature (CCT): the appearance of light emitted by a light source measured in Kelvin (K), Lower CCT values such as 2700K represent warmer, more yellowish light, *similar to the light from older incandescent lamps. (Tcp)The temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions, measured in absolute temperature on the kelvin (K) scale.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lux: measures the brightness of light as perceived by the human eye at a specific point on a surface. *The SI derived unit of illuminance, measuring luminous flux per unit area (1 lux =1 lumen/m2).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lumens: measure how bright a light appears to our eyes. *The SI derived unit of luminous flux; a measure of the total quantity of visible light emitted by a source or received by a surface (unit: lumen).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Glare: refers to an excess of bright light that makes you uncomfortable or hinders your vision. It happens when there's a big difference between a bright light and the rest of the surroundings. *Glare: condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or by extreme contrasts.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.1.8

Luminous intensity: is light brightness or how intense the light source is. light intensity is how intense a light source is emitted or received in a particular direction, this is measured candelas and is termed as luminous intensity *Iv <of a source, in a given direction> quotient of the luminous flux, dΦv, leaving the source and propagated in the element of solid angle dΩ containing the given direction, by the element of solid angle (unit: cd =lm · sr -1.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.2.

Candela: is a measurement for the brightness of a light source, taking into account the direction in which the light is emitted. *Base unit of luminous intensity in the International System of Units (SI); the luminous power per unit solid angle emitted by a point light source in a particular direction.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Uniformity (Uo): is an explanation for the even distribution of light across an area or surface. *The overall uniformity shall be calculated as the ratio of the lowest luminance, occurring at any grid point in the field of calculation, to the average luminance.* BS EN 13201-3-2015, Calculation of Performance Section 8.3.

Luminance: is how bright a surface appears to our eyes. It considers the light coming from or reflected by an object. *Lv <in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: cd · m-2 = lm · m-2 · sr-1)* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.3.

Illuminance is how much light lands on a surface per square meter. It's measured in lux. More lux means a brighter area. *Ev (unit: lx = lm · m-2) 1. <at a point of a surface> quotient of the luminous flux dΦv incident on an element of the surface containing the point, by the area dA of that element 2. <at a point of a surface> equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.10.

Luminaire: a light fixture, this is also sometimes referred to as a lantern or a light fitting, is a product that produces artificial light. *apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.3

ULOR: upward light output ratio or ULOR refers to the amount of light the light fixture will produce upwards as a percentage of its total light output. *RULO <of a luminaire> ratio of the upward luminous flux of the luminaire, measured under specified practical conditions with its own lamp(s) and equipment, to the sum of the individual luminous fluxes of the same lamp(s) when operated outside the luminaire with the same equipment, under specified conditions* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.12.

Maintenance factor (MF): is an allowance for how well the lights keep working overtime. It considers things like dirt on the light fittings and "wear and tear". *DEPRECATED: light loss factor ratio of illuminance produced by the lighting installation after a certain period to the illuminance produced by the installation when new Note 1 to entry: The term depreciation factor has been formerly used to designate the reciprocal of the above ratio. Note 2 to entry: The maintenance factor takes into account light losses caused by dirt accumulation on luminaires and room surfaces (in interiors) or other relevant surfaces (in exteriors, where appropriate), and the decrease of the luminous flux of lamps*. BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.5.18.

***Tilt**: is how much the luminaire is lifted based on the fitting facing flat to the ground.*

***Outreach:** how far away the fitting is from the column/wall its mounted on to the light source*.

This isn't the end...

We don't just have the solution for what you need today. We also have the solutions you might need for the future. We have dedicated teams that deliver.

- **Lighting Impact and Planning** teams that focus on delivering the most effective and sensitive lighting solutions to support planning.
- **Residential** teams that cover all aspects of new development and redevelopment spanning private, section 38 and section 278 design packages.
- **Public Realm** teams that are experts in enhancing night-time public spaces to create inviting spaces and opportunity for local economies to thrive during the hours of darkness.
- **Electrical** teams – we don't just put a light in the ground, we can help you get power to it as well! Additionally, we also offer design services for EV charging. As this market rapidly expands, make sure you have the experts managing the load, otherwise your EV charging solutions might not live up to expectations.
- **Strategic Infrastructure** teams that offer Lighting and Electrical expertise for complex transport networks and interchanges.
- **Consultancy Services** teams that help when you know what you want but you need someone to help you turn the idea into a project.

Finally, as innovators, you might be facing something bespoke or niche. Don't worry – we might have the answer you need. Feel free to get in touch!

THE POWER TO MAKE LIGHT WORK

Daniel Spreadborough
Senior Engineer

+44 (0)1962 855080
daniel.spreadborough@dfl-uk.com
www.dfl-uk.com/
17/18 City Business Centre, Hyde Street, Winchester, Hampshire, SO23 7TA

	Luminaire A	Luminaire B	Luminaire C	Luminaire D	Luminaire E	Luminaire F	Luminaire G
Supplier	D W Windsor	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Philips
Type	Sephora Halo, 1[LED], 3k, D1, CL O.350mA UMSUG.42.0053.0000...	VMXII.1.LB043.V2.F4Q1.W024 (TZ)	VMXII.1.LB083.V1.L5L5.W054	VMXII.1.LB033.V1.L4L4.W021 (TZ)	DWL.1.LA044.FW.W025	DWL.1.LA024.AY.W011	BVP651 DX50
Lamp(s)	16 x 3k LED	LED C.4000 Lumens	LED C.8000 Lumens	LED C.3000 Lumens	LED C.4,000 Lumens	LED C.2,000 Lumens	LED-HB 5.1S
Lamp Flux (klm)	5.57	3.98	7.76	3.28	3.82	1.44	44.00
Maintenance Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No. in Project	78	228	52	37	94	82	88

Light Spill 001 Horizontal Illuminance (lux)

381495.68m

380745.68m

225793.11m

226293.11m

Block A
Block B
Block C
Block D
Block E
Block H
PARC BUSNES PENRHOS
PENRHOS BUSINESS PARK
Pond
Drain
A 5
A55
Sand
4.2m
Tank
Bach
Path (um)
El Sub Sta
Sewage Ppg Sta
Sewage Works
Ppg Sta
Sluice
Weighbridge
SP
GVC
MP 0.25
Path

DFL
LIGHTING DESIGN-ELECTRICAL-SMART CITIES-ENERGY REDUCTION-LIGHTING IMPACT

PROJECT NAME:
Prosperity Parc

PROJECT No:
3444-DFL-ELG-XX-LD-EO-13001

SCALE: **1:1250**

DATE: **6 November 2024**

CALCULATION:
Horizontal Illuminance (lux)

DESIGNER:
DFL-UK (DS)

Indicative light spill diagram.
> Not for construction.
> Initial light levels shown.
> Light spill diagram does not consider blocking or shading effects of light limiting objects and represents worst-case horizontal light spill at ground floor level.
>This Light Spill Diagram is based on the Proposed Develeopment Master Plan and shows one way that the Proposed Development may be lit.
> Light spill diagram must be read in conjunction with the Lighting Impact Assessment: 3444-DFL-ELG-XX-RP-EO-13001-S3

Isolux contours shown:
0.5 Lux: Red
0.2 Lux: Purple

Page Size: A1
Scale: 1:1250

CHECKED BY: **AS**

APPROVED BY: **AS**

REVISION: **P02**

SUITABILITY: **S3**

PREPARED BY:

DFL-UK
+44 (0)1962 855080
17/18 City Business Centre,
Winchester Hants,
SO23 7TA.
e-mail: info@dfl-uk.com
website: www.dfl-uk.com

9750176002

	Luminaire A	Luminaire B	Luminaire C	Luminaire D	Luminaire E	Luminaire F	Luminaire G
Supplier	D W Windsor	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Philips
Type	Sephora Halo, TRI FD, 3k, D1, CL O 350mA UMSUG 42 0053 0000...	VMXII.1.LB043.V2.F4Q1.W024 (TZ)	VMXII.1.LB083.V1.L5L5.W054	VMXII.1.LB033.V1.L4L4.W021 (TZ)	DWL.1.LA044.FW.W025	DWL.1.LA024.AY.W011	BVP651 DX50
Lamp(s)	16 x 3k LED	LED C.4000 Lumens	LED C.8000 Lumens	LED C.3000 Lumens	LED C.4,000 Lumens	LED C.2,000 Lumens	LED-HB 5.1S
Lamp Flux (klm)	5.57	3.98	7.76	3.28	3.82	1.44	44.00
Maintenance Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No. in Project	78	228	52	37	94	82	88

Light Spill 002 Horizontal Illuminance (lux)

381445.72m

380595.72m
226290.50m

226790.50m

RHOS BEACH ROAD
Brynglas
Penrhos Lodge
LONDON ROAD
11.4m
Path (um)
Drain
Tank
Chy
GVC
MP 0.25
MP 262.0
WB
LC
ED Bdy
Penrhos Works
Pond
Telephone Pillar
Lay-by

PROJECT NAME:	**Prosperity Parc**
PROJECT No:	**3444-DFL-ELG-XX-LD-EO-13002**
SCALE: **1:1250**	DATE: **6 November 2024**
CALCULATION:	**Horizontal Illuminance (lux)**
DESIGNER:	**DFL-UK (DS)**

Indicative light spill diagram.
> Not for construction.
> Initial light levels shown.
> Light spill diagram does not consider blocking or shading effects of light limiting objects and represents worst-case horizontal light spill at ground floor level.
>This Light Spill Diagram is based on the Proposed Development Master Plan and shows one way that the Proposed Development may be lit.
> Light spill diagram must be read in conjunction with the Lighting Impact Assessment: 3444-DFL-ELG-XX-RP-EO-13001-S3

Isolux contours shown:
0.5 Lux: Red
0.2 Lux: Purple

Page Size: A1
Scale: 1:1250

CHECKED BY: **AS**	APPROVED BY: **AS**
REVISION: **P02**	SUITABILITY: **S3**

PREPARED BY:
DFL-UK
+44 (0)1962 855080
17/18 City Business Centre,
Winchester Hants,
SO23 7TA.
e-mail: info@dfl-uk.com
website: www.dfl-uk.com

9750176002

	Luminaire A	Luminaire B	Luminaire C	Luminaire D	Luminaire E	Luminaire F	Luminaire G
Supplier	D W Windsor	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Holophane Europe	Philips
Type	Sephora Halo, 1RLED, 3k, D1, CLO 350mA UMSUG 42 0053 0000...	VMXII.1.LB043.V2.F4Q1.W024 (TZ)	VMXII.1.LB083.V1.L5L5.W054	VMXII.1.LB033.V1.L4L4.W021 (TZ)	DWL.1.LA044.FW.W025	DWL.1.LA024.AY.W011	BVP651 DX50
Lamp(s)	16 x 3k LED	LED C.4000 Lumens	LED C.8000 Lumens	LED C.3000 Lumens	LED C.4,000 Lumens	LED C.2,000 Lumens	LED-HB 5.1S
Lamp Flux (klm)	5.57	3.98	7.76	3.28	3.82	1.44	44.00
Maintenance Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No. in Project	78	228	52	37	94	82	88

Light Spill 003 Horizontal Illuminance (lux)

381323.49m

380473.49m

226786.11m

227286.11m

Parc Glannau Penrhos

Penrhos

The Tower

The Bungalow

Homewood

Wr Twr

Erw Deg

Gardener's Cottage

Playing Field

Pond

Track

Folly

Mast

Hopper

Works

Tank

Telephone Pillar

Lay-by

MP 0.75

A55

LONDON ROAD

Drain

Path

Path (um)

PROJECT NAME:	**Prosperity Parc**
PROJECT No:	**3444-DFL-ELG-XX-LD-EO-13003**
SCALE:	**1:1250**
DATE:	**6 November 2024**
CALCULATION:	**Horizontal Illuminance (lux)**
DESIGNER:	**DFL-UK (DS)**

Indicative light spill diagram.
> Not for construction.
> Initial light levels shown.
> Light spill diagram does not consider blocking or shading effects of light limiting objects and represents worst-case horizontal light spill at ground floor level.
>This Light Spill Diagram is based on the Proposed Development Master Plan and shows one way that the Proposed Development may be lit.
> Light spill diagram must be read in conjunction with the Lighting Impact Assessment: 3444-DFL-ELG-XX-RP-EO-13001-S3

Isolux contours shown:
0.5 Lux: Red
0.2 Lux: Purple

Page Size: A1
Scale: 1:1250

CHECKED BY: **AS**	APPROVED BY: **AS**
REVISION: **P02**	SUITABILITY: **S3**

PREPARED BY:

DFL-UK
+44 (0)1962 855080
17/18 City Business Centre,
Winchester Hants,
SO23 7TA.
e-mail: info@dfl-uk.com
website: www.dfl-uk.com

DATE:	**7 June 2024**
DESIGNER:	**DFL-UK (DS)**
PROJECT No:	**3444-DFL-ELG-XX-LD-EO-13004**
PROJECT NAME:	**Prosperity Parc**

Vertical light spill calculations have been carried out for the identified receptors surrounding the Application Site.

This document details the vertical light spill calculations for the identified human amenity receptors and heritage receptors.

The lighting calculations do not consider blocking or shading effects of light limiting objects and represents worst-case vertical light spill at the identified receptors. A maintenance factor of 1 has been used.

This lighting calculation report must be read in conjunction with the Lighting Impact Assessment: 3444-DFL-ELG-XX-RP-EO-13001-S3.

Receptor locations are shown in Appendix 2 of 3444-DFL-ELG-XX-RP-EO-13001-S3.

Outdoor Lighting Report

PREPARED BY:

DFL-UK
+44 (0)1962 855080
17/18 City Business Centre,
Winchester Hants,
SO23 7TA.
e-mail: info@dfl-uk.com
website: www.dfl-uk.com

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	PHAR 001	224995.14	381042.51	60.00	6.00	1.50	0.86
2	PHAR 002	225020.05	381158.40	70.00	6.00	1.49	0.86
3	PHAR 003	225077.34	381224.91	60.00	6.00	1.50	0.86
4	PHAR 004	225863.30	381568.57	99.99	6.00	1.49	0.86
5	PHAR 005	226634.23	381507.72	69.99	6.00	1.49	0.86
6	PHAR 006	227016.62	381112.75	70.00	6.00	1.49	0.86
7	PHAR 007	226015.52	380019.14	50.00	6.00	1.47	0.86
8	PHAR 008	225961.16	380237.06	60.01	6.00	1.50	0.86
9	PHAR 009	226679.09	380223.49	60.00	6.00	1.50	0.86
10	PHAR 010	227524.95	380391.30	45.01	6.00	1.50	0.86
11	PSHR 001	225860.53	380576.82	43.11	6.00	1.49	1.50

Luminaires

Luminaire A Data

Supplier	D W Windsor
Type	Sephora Halo- 16LED- 3k- D1- CLO 350mA U MSUG 42 0053 0000 100
Lamp(s)	16 x 3k LED
Lamp Flux (klm)	5.57
File Name	Sephora Halo- 16LED- 3k- D1- CLO_350mA UMSUG 42 0053 0000 100.ies
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	78

Luminaire B Data

Supplier	Holophane Europe
Type	VMXII.1.LB043.V2.F4Q1.W024 (TZ)
Lamp(s)	LED C.4000 Lumens
Lamp Flux (klm)	3.98
File Name	VMXII.1.LB043.V2.F4Q1.W024 (TZ).IES
Maintenance Factor	1.00
Lum. Int. Class	G4
No. in Project	231

Luminaire C Data

Supplier	Holophane Europe
Type	VMXII.1.LB083.V1.L5L5.W054
Lamp(s)	LED C.8000 Lumens
Lamp Flux (klm)	7.76
File Name	VMXII.1.LB083.V1.L5L5.W054 .IES
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	52

Luminaire D Data

Supplier	Holophane Europe
Type	VMXII.1.LB033.V1.L4L4.W021 (TZ)
Lamp(s)	LED C.3000 Lumens
Lamp Flux (klm)	3.28
File Name	VMXII.1.LB033.V1.L4L4.W021 (TZ).IES
Maintenance Factor	1.00
Lum. Int. Class	G6
No. in Project	37

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Luminaires

Luminaire E Data

Supplier	Holophane Europe
Type	DWL.1.LA044.FW.W025
Lamp(s)	LED C.4,000 Lumens
Lamp Flux (klm)	3.82
File Name	DWL.1.LA044.FW.W025.IES
Maintenance Factor	1.00
Lum. Int. Class	G1
No. in Project	94

Luminaire F Data

Supplier	Holophane Europe
Type	DWL.1.LA024.AY.W011
Lamp(s)	LED C.2,000 Lumens
Lamp Flux (klm)	1.44
File Name	DWL.1.LA024.AY.W011.IES
Maintenance Factor	1.00
Lum. Int. Class	G2
No. in Project	82

Luminaire G Data

Supplier	Philips
Type	BVP651 DX50
Lamp(s)	LED-HB 5.1S
Lamp Flux (klm)	44.00
File Name	Clearflood Large_BVP651_DX50_44000_5.1 S_L90 CLO_CW.ies
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	88

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	226021.20	381190.79	6.00	40.00	0.00	0.00	0.00			
2	A	226036.81	381171.72	6.00	40.00	0.00	0.00	0.00			
3	A	226008.50	381181.27	6.00	40.00	0.00	0.00	0.00			
4	A	226024.42	381161.72	6.00	40.00	0.00	0.00	0.00			
5	A	225996.00	381171.24	6.00	40.00	0.00	0.00	0.00			
6	A	226012.26	381151.37	6.00	40.00	0.00	0.00	0.00			
7	A	226043.22	381138.79	6.00	40.00	0.00	0.00	0.00			
8	A	226059.94	381118.48	6.00	40.00	0.00	0.00	0.00			
9	A	226031.05	381128.54	6.00	40.00	0.00	0.00	0.00			
10	A	226047.81	381108.06	6.00	40.00	0.00	0.00	0.00			
11	A	226063.19	381089.32	6.00	40.00	0.00	0.00	0.45			
12	B	226003.74	381209.10	6.00	311.00	0.00	0.00	0.45			
13	B	225983.94	381192.65	6.00	311.00	0.00	0.00	0.45			
14	B	225982.10	381161.54	6.00	37.00	0.00	0.00	0.45			
15	B	225998.93	381140.97	6.00	39.00	0.00	0.00	0.45			
16	B	226018.29	381117.29	6.00	41.00	0.00	0.00	0.45			
17	B	226034.20	381097.93	6.00	41.00	0.00	0.00	0.45			
18	B	226050.50	381078.02	6.00	41.00	0.00	0.00	0.45			
19	B	226076.14	381074.41	6.00	130.00	0.00	0.00	0.45			
20	B	226076.33	381100.11	6.00	219.00	0.00	0.00	0.45			
21	B	226075.65	381125.86	6.00	224.00	0.00	0.00	0.45			
22	B	226054.08	381152.30	6.00	224.00	0.00	0.00	0.45			
23	B	226048.60	381183.95	6.00	224.00	0.00	0.00	0.45			
24	B	226033.30	381202.68	6.00	224.00	0.00	0.00	0.45			
25	B	226024.91	381219.98	6.00	307.00	0.00	0.00	0.45			
26	B	226038.92	381231.64	6.00	303.00	0.00	0.00	0.45			
27	B	226061.18	381167.07	6.00	130.00	0.00	0.00	0.45			
28	B	226064.85	381139.13	6.00	224.00	0.00	0.00	0.45			
29	A	226203.99	381150.83	6.00	224.00	0.00	0.00	0.00			
30	A	226216.00	381161.51	6.00	224.00	0.00	0.00	0.00			
31	A	226220.34	381131.59	6.00	224.00	0.00	0.00	0.00			
32	A	226231.96	381142.63	6.00	224.00	0.00	0.00	0.00			
33	A	226235.58	381113.50	6.00	224.00	0.00	0.00	0.00			
34	A	226247.58	381124.15	6.00	224.00	0.00	0.00	0.00			
35	B	226229.68	381171.66	6.00	224.00	0.00	0.00	0.45			
36	B	226245.12	381153.29	6.00	224.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
37	B	226261.85	381133.58	6.00	224.00	0.00	0.00	0.45			
38	B	226190.77	381140.12	6.00	41.00	0.00	0.00	0.45			
39	B	226207.31	381120.53	6.00	41.00	0.00	0.00	0.45			
40	B	226223.74	381101.18	6.00	41.00	0.00	0.00	0.45			
41	B	226247.94	381096.91	6.00	130.00	0.00	0.00	0.45			
42	B	226190.18	381164.78	6.00	310.28	0.00	0.00	0.45			
43	B	226263.32	381109.97	6.00	130.00	0.00	0.00	0.45			
44	B	226204.58	381176.98	6.00	310.28	0.00	0.00	0.45			
45	B	226263.38	381099.37	6.00	222.00	0.00	0.00	0.45			
46	A	226668.96	381347.62	6.00	220.00	0.00	0.00	0.00			
47	A	226684.92	381328.47	6.00	220.00	0.00	0.00	0.00			
48	A	226700.98	381309.42	6.00	220.00	0.00	0.00	0.00			
49	A	226712.87	381320.22	6.00	220.00	0.00	0.00	0.00			
50	A	226721.46	381285.09	6.00	220.00	0.00	0.00	0.00			
51	A	226733.23	381296.10	6.00	220.00	0.00	0.00	0.00			
52	A	226737.16	381266.62	6.00	220.00	0.00	0.00	0.00			
53	A	226749.55	381276.75	6.00	220.00	0.00	0.00	0.00			
54	A	226765.19	381258.11	6.00	220.00	0.00	0.00	0.00			
55	A	226753.00	381247.81	6.00	220.00	0.00	0.00	0.00			
56	B	226655.66	381337.07	6.00	38.00	0.00	0.00	0.45			
57	B	226672.13	381317.46	6.00	39.00	0.00	0.00	0.45			
58	B	226688.15	381298.23	6.00	39.00	0.00	0.00	0.45			
59	B	226708.14	381274.69	6.00	39.00	0.00	0.00	0.45			
60	B	226724.78	381254.86	6.00	39.00	0.00	0.00	0.45			
61	B	226740.80	381235.79	6.00	39.00	0.00	0.00	0.45			
62	B	226656.32	381362.09	6.00	310.00	0.00	0.00	0.45			
63	B	226682.59	381357.87	6.00	224.00	0.00	0.00	0.45			
64	B	226698.59	381338.90	6.00	224.00	0.00	0.00	0.45			
65	B	226727.14	381329.79	6.00	222.00	0.00	0.00	0.45			
66	B	226746.07	381307.25	6.00	219.00	0.00	0.00	0.45			
67	B	226763.10	381287.08	6.00	217.00	0.00	0.00	0.45			
68	B	226778.86	381268.36	6.00	220.00	0.00	0.00	0.45			
69	B	226765.46	381232.89	6.00	309.00	0.00	0.00	0.45			
70	B	226778.12	381243.30	6.00	310.00	0.00	0.00	0.45			
71	B	226799.22	381260.06	6.00	307.00	0.00	0.00	0.45			
72	B	226713.93	381294.25	6.00	132.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
73	B	226755.46	381223.82	6.00	316.00	0.00	0.00	0.45			
74	B	226726.19	381304.53	6.00	132.00	0.00	0.00	0.45			
75	A	226811.71	381221.42	6.00	220.00	0.00	0.00	0.00			
76	A	226828.07	381202.04	6.00	220.00	0.00	0.00	0.00			
77	A	226844.22	381182.86	6.00	220.00	0.00	0.00	0.00			
78	A	226797.93	381238.01	6.00	220.00	0.00	0.00	0.00			
79	B	226824.45	381232.61	6.00	220.00	0.00	0.00	0.45			
80	B	226840.87	381213.18	6.00	220.00	0.00	0.00	0.45			
81	B	226856.83	381194.41	6.00	220.00	0.00	0.00	0.45			
82	B	226798.15	381210.80	6.00	39.00	0.00	0.00	0.45			
83	B	226815.04	381191.11	6.00	39.00	0.00	0.00	0.45			
84	B	226831.17	381171.96	6.00	39.00	0.00	0.00	0.45			
85	B	226847.44	381152.82	6.00	39.00	0.00	0.00	0.45			
86	B	226863.52	381133.82	6.00	39.00	0.00	0.00	0.45			
87	B	226861.24	381164.46	6.00	219.00	0.00	0.00	0.45			
88	B	226880.30	381134.31	6.00	216.00	0.00	0.00	0.45			
89	A	226906.15	381109.89	6.00	220.00	0.00	0.00	0.00			
90	A	226922.64	381090.44	6.00	220.00	0.00	0.00	0.00			
91	A	226939.06	381071.08	6.00	220.00	0.00	0.00	0.00			
92	B	226893.99	381097.94	6.00	39.00	0.00	0.00	0.45			
93	B	226878.93	381117.02	6.00	310.00	0.00	0.00	0.45			
94	B	226918.79	381121.27	6.00	220.00	0.00	0.00	0.45			
95	B	226895.63	381126.65	6.00	310.00	0.00	0.00	0.45			
96	B	226935.99	381101.00	6.00	220.00	0.00	0.00	0.45			
97	B	226951.75	381074.71	6.00	220.00	0.00	0.00	0.45			
98	B	226909.07	381080.13	6.00	40.00	0.00	0.00	0.45			
99	B	226925.63	381060.60	6.00	41.00	0.00	0.00	0.45			
100	B	226941.28	381042.16	6.00	40.00	0.00	0.00	0.45			
101	B	226958.07	381022.33	6.00	38.00	0.00	0.00	0.45			
102	B	226954.95	381053.90	6.00	220.00	0.00	0.00	0.45			
103	B	226971.95	381033.77	6.00	220.00	0.00	0.00	0.45			
104	C	225985.06	381454.60	8.00	180.00	0.00	0.00	0.45			
105	C	225976.96	381421.57	8.00	14.00	0.00	0.00	0.45			
106	C	225995.62	381393.29	8.00	202.00	0.00	0.00	0.45			
107	C	225998.94	381358.35	8.00	23.00	0.00	0.00	0.45			
108	C	226019.01	381331.43	8.00	199.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
109	C	226021.50	381298.83	8.00	22.00	0.00	0.00	0.45			
110	C	226042.19	381270.18	8.00	201.00	0.00	0.00	0.45			
111	C	226044.80	381236.91	8.00	22.00	0.00	0.00	0.45			
112	C	226056.27	381205.83	8.00	20.00	0.00	0.00	0.45			
113	C	226077.72	381147.92	8.00	22.00	0.00	0.00	0.45			
114	C	226075.23	381181.33	8.00	204.00	0.00	0.00	0.45			
115	C	226098.83	381122.48	8.00	211.00	0.00	0.00	0.45			
116	C	226104.71	381089.20	8.00	26.00	0.00	0.00	0.45			
117	C	226128.21	381061.80	8.00	211.00	0.00	0.00	0.45			
118	C	226155.18	381037.38	8.00	111.00	0.00	0.00	0.45			
119	C	226182.49	381058.35	8.00	292.00	0.00	0.00	0.45			
120	C	226215.23	381061.61	8.00	112.00	0.00	0.00	0.45			
121	B	226269.91	381093.89	8.00	290.00	0.00	0.00	0.45			
122	C	226285.45	381081.67	8.00	43.00	0.00	0.00	0.45			
123	C	226241.76	381082.38	8.00	295.00	0.00	0.00	0.45			
124	C	226312.60	381064.20	8.00	216.00	0.00	0.00	0.45			
125	C	226325.46	381034.45	8.00	37.00	0.00	0.00	0.45			
126	C	226353.87	381015.19	8.00	216.00	0.00	0.00	0.45			
127	C	226368.22	380983.58	8.00	37.00	0.00	0.00	0.45			
128	C	226395.92	380965.20	8.00	216.00	0.00	0.00	0.45			
129	C	226410.13	380934.01	8.00	42.00	0.00	0.00	0.45			
130	C	226436.79	380916.77	8.00	216.00	0.00	0.00	0.45			
131	C	226450.63	380885.95	8.00	38.00	0.00	0.00	0.45			
132	C	226438.03	380952.77	8.00	307.00	0.00	0.00	0.45			
133	C	226470.33	380968.00	8.00	129.00	0.00	0.00	0.45			
134	C	226489.37	380996.48	8.00	306.00	0.00	0.00	0.45			
135	C	226519.50	381009.86	8.00	134.00	0.00	0.00	0.45			
136	C	226536.94	381036.82	8.00	307.00	0.00	0.00	0.45			
137	C	226567.33	381050.54	8.00	134.00	0.00	0.00	0.45			
138	C	226587.56	381079.92	8.00	310.00	0.00	0.00	0.45			
139	C	226617.19	381092.91	8.00	129.00	0.00	0.00	0.40			
140	C	226635.52	381120.79	8.00	309.00	0.00	0.00	0.45			
141	C	226665.40	381133.95	8.00	134.00	0.00	0.00	0.45			
142	C	226683.96	381161.99	8.00	310.00	0.00	0.00	0.45			
143	C	226715.68	381176.66	8.00	134.00	0.00	0.00	0.45			
144	C	226734.17	381204.58	8.00	312.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
145	C	226697.32	381132.30	8.00	222.00	0.00	0.00	0.45			
146	C	226711.29	381101.41	8.00	40.00	0.00	0.00	0.45			
147	C	226739.36	381082.63	8.00	222.00	0.00	0.00	0.45			
148	C	226754.18	381050.64	8.00	40.00	0.00	0.00	0.45			
149	C	226777.42	381023.28	8.00	40.00	0.00	0.00	0.45			
150	C	226804.64	381005.60	8.00	221.00	0.00	0.00	0.45			
151	C	226818.28	380975.09	8.00	40.00	0.00	0.00	0.45			
152	C	226846.38	380956.34	8.00	220.00	0.00	0.00	0.45			
153	C	226860.60	380925.15	8.00	40.00	0.00	0.00	0.45			
154	C	226798.61	381048.03	8.00	309.00	0.00	0.00	0.45			
155	C	226828.63	381061.34	8.00	131.00	0.00	0.00	0.45			
156	C	226847.19	381089.28	8.00	308.00	0.00	0.00	0.45			
157	B	226871.29	381097.48	8.00	133.00	0.00	0.00	0.45			
158	A	226200.16	380975.92	6.00	134.00	0.00	0.00	0.00			
159	A	226219.53	380992.27	6.00	134.00	0.00	0.00	0.00			
160	A	226239.07	381008.85	6.00	134.00	0.00	0.00	0.00			
161	A	226258.08	381024.97	6.00	134.00	0.00	0.00	0.00			
162	A	226276.63	381040.66	6.00	134.00	0.00	0.00	0.00			
163	A	226287.29	381028.65	6.00	134.00	0.00	0.00	0.00			
164	A	226267.55	381011.88	6.00	134.00	0.00	0.00	0.00			
165	A	226248.68	380995.96	6.00	134.00	0.00	0.00	0.00			
166	A	226229.47	380979.72	6.00	134.00	0.00	0.00	0.00			
167	A	226210.59	380963.71	6.00	134.00	0.00	0.00	0.00			
168	A	226221.41	380951.98	6.00	134.00	0.00	0.00	0.00			
169	A	226240.87	380968.42	6.00	134.00	0.00	0.00	0.00			
170	A	226260.05	380984.69	6.00	134.00	0.00	0.00	0.00			
171	A	226278.93	381000.65	6.00	134.00	0.00	0.00	0.00			
172	A	226298.33	381017.07	6.00	134.00	0.00	0.00	0.00			
173	A	226308.19	381004.54	6.00	134.00	0.00	0.00	0.00			
174	A	226289.22	380988.43	6.00	134.00	0.00	0.00	0.00			
175	A	226269.81	380971.95	6.00	134.00	0.00	0.00	0.00			
176	A	226250.38	380955.45	6.00	134.00	0.00	0.00	0.00			
177	A	226231.06	380939.15	6.00	134.00	0.00	0.00	0.00			
178	B	226184.60	380963.56	6.00	40.00	0.00	0.00	0.45			
179	B	226265.29	381053.27	6.00	-49.79	0.00	0.00	0.45			
180	B	226241.96	380926.21	6.00	130.21	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
181	B	226246.21	381037.14	6.00	-49.79	0.00	0.00	0.45			
182	B	226216.27	380926.25	6.00	41.00	0.00	0.00	0.45			
183	B	226227.13	381021.01	6.00	-49.79	0.00	0.00	0.45			
184	B	226261.03	380942.33	6.00	130.21	0.00	0.00	0.45			
185	B	226208.05	381004.88	6.00	-49.79	0.00	0.00	0.45			
186	B	226200.08	380945.36	6.00	37.00	0.00	0.00	0.45			
187	B	226188.98	380988.76	6.00	-49.79	0.00	0.00	0.45			
188	B	226280.10	380958.45	6.00	130.21	0.00	0.00	0.45			
189	B	226290.90	381053.02	6.00	221.00	0.00	0.00	0.45			
190	B	226299.18	380974.57	6.00	130.21	0.00	0.00	0.45			
191	B	226321.93	381016.46	6.00	223.00	0.00	0.00	0.45			
192	B	226318.25	380990.70	6.00	130.21	0.00	0.00	0.45			
193	B	226307.12	381040.34	6.00	308.00	0.00	0.00	0.45			
194	B	226440.91	380970.09	6.00	128.00	0.00	0.00	0.45			
195	B	226460.27	380986.50	6.00	131.00	0.00	0.00	0.45			
196	B	226479.69	381002.77	6.00	131.00	0.00	0.00	0.45			
197	B	226504.50	381023.66	6.00	133.00	0.00	0.00	0.45			
198	B	226523.69	381039.82	6.00	130.00	0.00	0.00	0.45			
199	B	226542.72	381055.84	6.00	132.00	0.00	0.00	0.45			
200	B	226550.89	381081.30	6.00	220.00	0.00	0.00	0.45			
201	B	226523.00	381077.24	6.00	308.00	0.00	0.00	0.45			
202	B	226503.20	381060.45	6.00	308.00	0.00	0.00	0.45			
203	B	226483.99	381044.30	6.00	308.00	0.00	0.00	0.45			
204	B	226461.03	381024.93	6.00	308.00	0.00	0.00	0.45			
205	B	226440.71	381007.84	6.00	308.00	0.00	0.00	0.45			
206	B	226421.49	380991.85	6.00	308.00	0.00	0.00	0.45			
207	B	226412.86	380965.50	6.00	38.00	0.00	0.00	0.45			
208	A	226432.05	380981.63	6.00	308.00	0.00	0.00	0.00			
209	A	226451.97	380997.98	6.00	308.00	0.00	0.00	0.00			
210	A	226471.03	381014.07	6.00	308.00	0.00	0.00	0.00			
211	A	226494.68	381034.08	6.00	308.00	0.00	0.00	0.00			
212	A	226513.40	381049.79	6.00	308.00	0.00	0.00	0.00			
213	A	226533.29	381066.53	6.00	308.00	0.00	0.00	0.00			
214	B	226497.05	381011.66	6.00	217.00	0.00	0.00	0.45			
215	A	226650.70	380709.96	6.00	133.00	0.00	0.00	0.00			
216	A	226670.34	380726.58	6.00	133.00	0.00	0.00	0.00			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
217	A	226689.56	380742.76	6.00	133.00	0.00	0.00	0.00			
218	A	226708.82	380759.21	6.00	133.00	0.00	0.00	0.00			
219	A	226718.55	380746.51	6.00	133.00	0.00	0.00	0.00			
220	A	226699.49	380730.40	6.00	133.00	0.00	0.00	0.00			
221	A	226680.33	380713.99	6.00	133.00	0.00	0.00	0.00			
222	A	226661.17	380697.85	6.00	133.00	0.00	0.00	0.00			
223	A	226672.14	380686.05	6.00	133.00	0.00	0.00	0.00			
224	A	226691.02	380702.17	6.00	133.00	0.00	0.00	0.00			
225	A	226709.90	380718.23	6.00	133.00	0.00	0.00	0.00			
226	A	226729.27	380734.56	6.00	133.00	0.00	0.00	0.00			
227	A	226739.11	380722.02	6.00	133.00	0.00	0.00	0.00			
228	A	226719.57	380705.31	6.00	133.00	0.00	0.00	0.00			
229	A	226700.69	380689.49	6.00	133.00	0.00	0.00	0.00			
230	A	226682.35	380673.85	6.00	133.00	0.00	0.00	0.00			
231	B	226640.06	380723.27	6.00	310.00	0.00	0.00	0.45			
232	B	226659.23	380739.54	6.00	310.00	0.00	0.00	0.45			
233	B	226678.08	380755.47	6.00	310.00	0.00	0.00	0.45			
234	B	226697.20	380771.67	6.00	310.00	0.00	0.00	0.45			
235	B	226750.72	380709.58	6.00	131.00	0.00	0.00	0.45			
236	B	226731.81	380693.41	6.00	130.00	0.00	0.00	0.45			
237	B	226712.12	380676.79	6.00	130.00	0.00	0.00	0.45			
238	B	226692.36	380660.08	6.00	130.00	0.00	0.00	0.45			
239	B	226636.22	380697.40	6.00	41.00	0.00	0.00	0.45			
240	B	226667.08	380661.00	6.00	34.00	0.00	0.00	0.45			
241	B	226649.97	380672.58	6.00	130.00	0.00	0.00	0.45			
242	B	226721.82	380770.13	6.00	217.00	0.00	0.00	0.45			
243	B	226752.92	380733.67	6.00	217.00	0.00	0.00	0.45			
244	B	226737.29	380751.98	6.00	217.00	0.00	0.00	0.45			
245	A	226848.81	380853.03	6.00	217.00	0.00	0.00	0.00			
246	A	226864.83	380834.07	6.00	217.00	0.00	0.00	0.00			
247	B	226835.84	380842.11	6.00	39.00	0.00	0.00	0.45			
248	B	226852.60	380822.11	6.00	39.00	0.00	0.00	0.45			
249	B	226862.30	380863.52	6.00	217.00	0.00	0.00	0.45			
250	B	226878.75	380843.99	6.00	217.00	0.00	0.00	0.45			
251	B	226894.75	380825.08	6.00	217.00	0.00	0.00	0.45			
252	B	226910.65	380805.98	6.00	217.00	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
253	B	226927.00	380786.80	6.00	217.00	0.00	0.00	0.45			
254	B	226943.39	380767.34	6.00	217.00	0.00	0.00	0.45			
255	B	226959.63	380748.03	6.00	217.00	0.00	0.00	0.45			
256	B	226866.95	380903.62	6.00	309.00	0.00	0.00	0.45			
257	B	226846.41	380886.23	6.00	309.00	0.00	0.00	0.45			
258	B	226825.29	380868.33	6.00	309.00	0.00	0.00	0.45			
259	B	226879.91	380814.59	6.00	38.00	0.00	0.00	0.45			
260	B	226896.40	380794.80	6.00	38.00	0.00	0.00	0.45			
261	B	226912.48	380775.97	6.00	38.00	0.00	0.00	0.45			
262	B	226928.60	380756.75	6.00	38.00	0.00	0.00	0.45			
263	B	226944.76	380737.54	6.00	38.00	0.00	0.00	0.45			
264	D	226476.39	380867.91	6.00	225.00	0.00	0.00	0.40			
265	D	226494.37	380846.49	6.00	225.00	0.00	0.00	0.40			
266	D	226512.24	380825.33	6.00	225.00	0.00	0.00	0.40			
267	D	226530.17	380804.11	6.00	225.00	0.00	0.00	0.40			
268	D	226548.02	380782.97	6.00	225.00	0.00	0.00	0.40			
269	D	226566.05	380761.64	6.00	225.00	0.00	0.00	0.40			
270	D	226583.99	380740.39	6.00	225.00	0.00	0.00	0.40			
271	D	226601.87	380719.17	6.00	225.00	0.00	0.00	0.40			
272	D	226619.88	380697.93	6.00	225.00	0.00	0.00	0.40			
273	D	226637.73	380676.77	6.00	225.00	0.00	0.00	0.40			
274	D	226657.73	380656.90	6.00	242.00	0.00	0.00	0.40			
275	D	226684.31	380648.52	6.00	250.00	0.00	0.00	0.40			
276	D	226711.35	380641.88	6.00	255.00	0.00	0.00	0.40			
277	D	226738.46	380635.19	6.00	255.00	0.00	0.00	0.40			
278	D	226765.51	380628.51	6.00	255.00	0.00	0.00	0.40			
279	D	226792.44	380621.83	6.00	255.00	0.00	0.00	0.40			
280	D	226817.89	380608.69	6.00	76.00	0.00	0.00	0.40			
281	D	226845.11	380602.04	6.00	76.00	0.00	0.00	0.40			
282	D	226873.92	380603.89	6.00	120.00	0.00	0.00	0.40			
283	D	226895.53	380622.05	6.00	131.00	0.00	0.00	0.40			
284	D	226916.64	380640.13	6.00	131.00	0.00	0.00	0.40			
285	D	226937.77	380658.08	6.00	131.00	0.00	0.00	0.40			
286	D	226954.39	380676.92	6.00	275.00	0.00	0.00	0.40			
287	D	226970.70	380656.23	6.00	43.00	0.00	0.00	0.40			
288	D	226988.65	380635.29	6.00	43.00	0.00	0.00	0.40			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
289	D	227006.66	380614.11	6.00	46.00	0.00	0.00	0.40			
290	D	227028.56	380602.78	6.00	103.00	0.00	0.00	0.40			
291	D	227054.42	380605.62	6.00	235.00	0.00	0.00	0.40			
292	D	227077.52	380589.73	6.00	234.00	0.00	0.00	0.40			
293	D	227100.52	380574.02	6.00	234.00	0.00	0.00	0.40			
294	D	227123.38	380558.23	6.00	234.00	0.00	0.00	0.40			
295	D	227145.12	380545.50	6.00	258.00	0.00	0.00	0.40			
296	D	227168.50	380551.74	6.00	137.00	0.00	0.00	0.40			
297	D	227186.99	380572.06	6.00	139.00	0.00	0.00	0.40			
298	D	227206.02	380592.64	6.00	139.00	0.00	0.00	0.40			
299	D	227224.41	380613.13	6.00	139.00	0.00	0.00	0.40			
300	D	227243.32	380632.66	6.00	139.00	0.00	0.00	0.40			
301	E	225961.15	381364.94	6.00	326.00	0.00	0.00	0.00			
302	E	225914.00	381299.98	6.00	326.00	0.00	0.00	0.00			
303	E	225930.50	381322.68	6.00	326.00	0.00	0.00	0.00			
304	E	225946.35	381344.21	6.00	326.00	0.00	0.00	0.00			
305	E	225895.81	381275.69	6.00	321.00	0.00	0.00	0.00			
306	E	225840.50	381214.88	6.00	326.00	0.00	0.00	0.00			
307	E	225859.78	381236.07	6.00	326.00	0.00	0.00	0.00			
308	E	225878.52	381256.59	6.00	326.00	0.00	0.00	0.00			
309	E	225974.83	381301.25	6.00	45.00	0.00	0.00	0.00			
310	E	226004.75	381271.14	6.00	45.00	0.00	0.00	0.00			
311	E	225989.78	381286.14	6.00	45.00	0.00	0.00	0.00			
312	E	225960.33	381299.12	6.00	135.00	0.00	0.00	0.00			
313	E	225893.87	381289.30	6.00	45.00	0.00	0.00	0.00			
314	E	225958.57	381379.34	6.00	50.00	0.00	0.00	0.00			
315	E	226002.87	381256.98	6.00	320.00	0.00	0.00	0.00			
316	B	225998.75	381337.95	6.00	200.00	0.00	0.00	0.45			
317	E	226086.13	381239.42	6.00	295.00	0.00	0.00	0.00			
318	E	226111.63	381249.20	6.00	295.00	0.00	0.00	0.00			
319	E	226099.80	381200.39	6.00	110.00	0.00	0.00	0.00			
320	E	226129.29	381211.53	6.00	110.00	0.00	0.00	0.00			
321	E	226153.33	381126.33	6.00	310.00	0.00	0.00	0.00			
322	E	226168.59	381138.98	6.00	310.00	0.00	0.00	0.00			
323	B	226166.76	381108.13	6.00	132.00	0.00	0.00	0.45			
324	B	226184.17	381123.01	6.00	132.00	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
325	F	226141.28	381116.05	6.00	307.00	0.00	0.00	0.00			
326	F	226148.99	381114.28	6.00	222.00	0.00	0.00	0.00			
327	F	226133.30	381118.47	6.00	222.00	0.00	0.00	0.00			
328	F	226133.02	381126.07	6.00	132.00	0.00	0.00	0.00			
329	F	226135.89	381133.54	6.00	132.00	0.00	0.00	0.00			
330	F	226144.47	381136.74	6.00	132.00	0.00	0.00	0.00			
331	F	226162.03	381150.93	6.00	132.00	0.00	0.00	0.00			
332	F	226171.75	381150.60	6.00	42.00	0.00	0.00	0.00			
333	F	226153.82	381144.23	6.00	132.00	0.00	0.00	0.00			
334	F	226109.46	381160.53	6.00	290.00	0.00	0.00	0.00			
335	F	226152.28	381176.98	6.00	290.00	0.00	0.00	0.00			
336	F	226123.40	381165.93	6.00	290.00	0.00	0.00	0.00			
337	F	226138.23	381171.58	6.00	290.00	0.00	0.00	0.00			
338	F	226146.02	381207.02	6.00	20.00	0.00	0.00	0.00			
339	F	226153.05	381188.81	6.00	20.00	0.00	0.00	0.00			
340	F	226091.08	381187.15	6.00	205.00	0.00	0.00	0.00			
341	F	226098.64	381167.69	6.00	205.00	0.00	0.00	0.00			
342	F	226063.67	381265.89	6.00	205.00	0.00	0.00	0.00			
343	F	226071.77	381244.91	6.00	205.00	0.00	0.00	0.00			
344	F	226119.89	381260.50	6.00	20.00	0.00	0.00	0.00			
345	F	226110.93	381284.11	6.00	20.00	0.00	0.00	0.00			
346	F	226067.89	381275.62	6.00	110.00	0.00	0.00	0.00			
347	F	226102.43	381288.90	6.00	110.00	0.00	0.00	0.00			
348	F	226079.40	381280.08	6.00	110.00	0.00	0.00	0.00			
349	F	226090.27	381284.39	6.00	110.00	0.00	0.00	0.00			
350	F	226094.93	381145.65	6.00	45.00	0.00	0.00	0.00			
351	E	226161.05	381018.15	6.00	20.00	0.00	0.00	0.00			
352	E	226167.03	381002.27	6.00	25.00	0.00	0.00	0.00			
353	E	226191.95	381024.18	6.00	225.00	0.00	0.00	0.00			
354	E	226223.23	381049.64	6.00	40.00	0.00	0.00	0.00			
355	F	226190.46	381035.40	6.00	125.00	0.00	0.00	0.00			
356	F	226212.54	381053.31	6.00	125.00	0.00	0.00	0.00			
357	F	226201.16	381044.09	6.00	125.00	0.00	0.00	0.00			
358	E	226741.69	380665.62	6.00	315.00	0.00	0.00	0.00			
359	E	226724.56	380651.13	6.00	315.00	0.00	0.00	0.00			
360	E	226892.35	380672.10	6.00	130.00	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
361	E	226909.64	380686.75	6.00	135.00	0.00	0.00	0.00			
362	E	226998.10	380653.37	6.00	315.00	0.00	0.00	0.00			
363	E	227011.79	380664.74	6.00	315.00	0.00	0.00	0.00			
364	E	227039.98	380688.37	6.00	315.00	0.00	0.00	0.00			
365	E	227026.85	380677.39	6.00	315.00	0.00	0.00	0.00			
366	E	227051.30	380698.03	6.00	315.00	0.00	0.00	0.00			
367	F	226971.85	380676.64	6.00	220.00	0.00	0.00	0.00			
368	F	226988.72	380656.53	6.00	220.00	0.00	0.00	0.00			
369	F	226979.75	380667.03	6.00	220.00	0.00	0.00	0.00			
370	F	227050.81	380707.49	6.00	45.00	0.00	0.00	0.00			
371	F	227042.69	380717.20	6.00	45.00	0.00	0.00	0.00			
372	F	227034.16	380727.67	6.00	45.00	0.00	0.00	0.00			
373	F	226978.55	380689.79	6.00	130.00	0.00	0.00	0.00			
374	F	226999.25	380707.24	6.00	130.00	0.00	0.00	0.00			
375	F	227021.28	380725.56	6.00	135.00	0.00	0.00	0.00			
376	F	226098.71	381134.32	6.00	225.00	0.00	0.00	0.00			
377	B	226119.83	381143.65	6.00	127.00	0.00	0.00	0.45			
378	B	226176.90	381180.41	6.00	226.00	0.00	0.00	0.45			
379	B	226134.49	381237.57	6.00	203.00	0.00	0.00	0.45			
380	B	226076.96	381208.59	6.00	108.00	0.00	0.00	0.45			
382	E	226514.31	380930.16	8.00	220.27	0.00	0.00	0.00			
383	E	226532.41	380908.80	8.00	220.27	0.00	0.00	0.00			
384	E	226550.50	380887.44	8.00	220.27	0.00	0.00	0.00			
385	E	226568.59	380866.08	8.00	220.27	0.00	0.00	0.00			
386	E	226586.69	380844.72	8.00	220.27	0.00	0.00	0.00			
387	E	226604.78	380823.35	8.00	220.27	0.00	0.00	0.00			
388	E	226622.88	380801.99	8.00	220.27	0.00	0.00	0.00			
389	E	226640.97	380780.63	8.00	220.27	0.00	0.00	0.00			
390	E	226667.38	381059.84	8.00	40.28	0.00	0.00	0.00			
391	E	226685.39	381038.60	8.00	40.28	0.00	0.00	0.00			
392	E	226703.39	381017.35	8.00	40.28	0.00	0.00	0.00			
393	E	226721.40	380996.10	8.00	40.28	0.00	0.00	0.00			
394	E	226739.40	380974.85	8.00	40.28	0.00	0.00	0.00			
395	E	226757.41	380953.61	8.00	40.28	0.00	0.00	0.00			
396	E	226775.41	380932.36	8.00	40.28	0.00	0.00	0.00			
397	E	226793.42	380911.11	8.00	40.28	0.00	0.00	0.00			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
397	G	226689.96	381114.98	8.00	220.32	0.00	0.00	0.50			
398	E	226675.22	380774.02	8.00	310.21	0.00	0.00	0.00			
399	E	226692.29	380788.45	8.00	310.21	0.00	0.00	0.00			
400	E	226709.35	380802.88	8.00	310.21	0.00	0.00	0.00			
401	E	226726.42	380817.31	8.00	310.21	0.00	0.00	0.00			
402	E	226743.49	380831.74	8.00	310.21	0.00	0.00	0.00			
403	E	226760.56	380846.17	8.00	310.21	0.00	0.00	0.00			
404	E	226777.62	380860.60	8.00	310.21	0.00	0.00	0.00			
405	E	226794.69	380875.03	8.00	310.21	0.00	0.00	0.00			
406	E	226513.20	380965.46	8.00	130.22	0.00	0.00	0.00			
407	E	226530.29	380979.91	8.00	130.22	0.00	0.00	0.00			
408	E	226547.38	380994.36	8.00	130.22	0.00	0.00	0.00			
409	E	226564.47	381008.81	8.00	130.22	0.00	0.00	0.00			
410	E	226581.55	381023.26	8.00	130.22	0.00	0.00	0.00			
411	E	226598.64	381037.70	8.00	130.22	0.00	0.00	0.00			
412	E	226615.73	381052.15	8.00	130.22	0.00	0.00	0.00			
413	E	226632.82	381066.60	8.00	130.22	0.00	0.00	0.00			
414	G	226721.09	381078.30	8.00	220.32	0.00	0.00	0.50			
415	G	226752.22	381041.62	8.00	220.32	0.00	0.00	0.50			
416	G	226783.36	381004.94	8.00	220.32	0.00	0.00	0.50			
417	G	226814.49	380968.26	8.00	220.32	0.00	0.00	0.50			
418	G	226845.62	380931.58	8.00	220.32	0.00	0.00	0.50			
419	G	226454.84	380915.57	8.00	40.24	0.00	0.00	0.50			
420	G	226480.71	380885.00	8.00	40.24	0.00	0.00	0.50			
421	G	226506.57	380854.43	8.00	40.24	0.00	0.00	0.50			
422	G	226532.44	380823.86	8.00	40.24	0.00	0.00	0.50			
423	G	226558.31	380793.29	8.00	40.24	0.00	0.00	0.50			
424	G	226584.17	380762.72	8.00	40.24	0.00	0.00	0.50			
425	G	226610.04	380732.15	8.00	40.24	0.00	0.00	0.50			
426	B	226640.07	380723.29	6.00	130.00	0.00	0.00	0.45			
427	B	226659.22	380739.52	6.00	130.00	0.00	0.00	0.45			
428	B	226678.06	380755.46	6.00	130.00	0.00	0.00	0.45			
429	B	226697.20	380771.69	6.00	130.00	0.00	0.00	0.45			
430	B	226841.39	380893.33	6.00	130.48	0.00	0.00	0.45			
431	B	226816.87	380872.40	6.00	130.48	0.00	0.00	0.45			
432	B	226792.34	380851.46	6.00	130.48	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
433	B	226767.81	380830.53	6.00	130.48	0.00	0.00	0.45			
434	B	226743.28	380809.60	6.00	130.48	0.00	0.00	0.45			
435	B	226718.76	380788.67	6.00	130.48	0.00	0.00	0.45			
436	B	226462.16	380948.38	6.00	314.00	0.00	0.00	0.45			
437	B	226652.65	381110.36	6.00	317.00	0.00	0.00	0.45			
438	G	226945.42	380939.24	6.00	40.32	0.00	0.00	0.50			
439	G	226965.02	380916.15	6.00	40.32	0.00	0.00	0.50			
440	G	226984.62	380893.05	6.00	40.32	0.00	0.00	0.50			
441	G	227004.21	380869.96	6.00	40.32	0.00	0.00	0.50			
442	G	227023.81	380846.87	6.00	40.32	0.00	0.00	0.50			
443	G	227043.40	380823.78	6.00	40.32	0.00	0.00	0.50			
444	B	226883.80	380916.64	6.00	310.22	0.00	0.00	0.45			
445	B	226907.76	380936.89	6.00	310.22	0.00	0.00	0.45			
446	B	226931.71	380957.15	6.00	310.22	0.00	0.00	0.45			
447	B	226955.67	380977.40	6.00	310.22	0.00	0.00	0.45			
448	G	226986.49	380976.13	8.00	220.31	0.00	0.00	0.50			
449	G	227008.19	380950.55	8.00	220.31	0.00	0.00	0.50			
450	G	227029.89	380924.97	8.00	220.31	0.00	0.00	0.50			
451	G	227051.59	380899.38	8.00	220.31	0.00	0.00	0.50			
452	G	227056.51	380869.05	8.00	220.30	0.00	0.00	0.50			
453	G	227075.15	380845.88	8.00	220.30	0.00	0.00	0.50			
454	E	226973.49	380757.27	4.00	310.35	0.00	0.00	0.00			
455	E	226987.82	380769.45	4.00	310.35	0.00	0.00	0.00			
456	E	227002.16	380781.63	4.00	310.35	0.00	0.00	0.00			
457	E	227016.50	380793.81	4.00	310.35	0.00	0.00	0.00			
458	E	227030.83	380805.99	4.00	310.35	0.00	0.00	0.00			
459	E	227045.17	380818.17	4.00	310.35	0.00	0.00	0.00			
460	E	226870.46	380879.74	4.00	130.28	0.00	0.00	0.00			
461	E	226884.13	380891.32	4.00	130.28	0.00	0.00	0.00			
462	E	226897.80	380902.90	4.00	130.28	0.00	0.00	0.00			
463	E	226911.47	380914.49	4.00	130.28	0.00	0.00	0.00			
464	E	226925.13	380926.07	4.00	130.28	0.00	0.00	0.00			
465	E	226938.80	380937.66	4.00	130.28	0.00	0.00	0.00			
466	E	226872.40	380870.80	6.00	220.28	0.00	0.00	0.00			
467	E	226887.73	380852.71	6.00	220.28	0.00	0.00	0.00			
468	E	226903.06	380834.62	6.00	220.28	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
469	E	226918.38	380816.54	6.00	220.28	0.00	0.00	0.00			
470	E	226933.71	380798.45	6.00	220.28	0.00	0.00	0.00			
471	E	226949.04	380780.36	6.00	220.28	0.00	0.00	0.00			
472	E	226964.37	380762.27	6.00	220.28	0.00	0.00	0.00			
473	G	226860.97	381061.30	6.00	40.23	0.00	0.00	0.50			
474	G	226878.52	381040.55	6.00	40.23	0.00	0.00	0.50			
475	G	226896.07	381019.81	6.00	40.23	0.00	0.00	0.50			
476	G	226913.62	380999.06	6.00	40.23	0.00	0.00	0.50			
477	G	226931.17	380978.31	6.00	40.23	0.00	0.00	0.50			
478	G	226756.81	381184.38	6.00	40.29	0.00	0.00	0.50			
479	G	226773.88	381164.24	6.00	40.29	0.00	0.00	0.50			
480	G	226790.95	381144.10	6.00	40.29	0.00	0.00	0.50			
481	G	226808.03	381123.96	6.00	40.29	0.00	0.00	0.50			
482	G	226825.10	381103.82	6.00	40.29	0.00	0.00	0.50			
483	B	226798.15	381210.82	6.00	220.00	0.00	0.00	0.45			
484	B	226815.06	381191.11	6.00	220.00	0.00	0.00	0.45			
485	B	226831.20	381171.93	6.00	220.00	0.00	0.00	0.45			
486	B	226847.40	381152.87	6.00	220.00	0.00	0.00	0.45			
487	B	226863.50	381133.81	6.00	220.00	0.00	0.00	0.45			
488	B	226909.08	381080.09	6.00	220.00	0.00	0.00	0.45			
489	B	226893.99	381097.85	6.00	220.00	0.00	0.00	0.45			
490	B	226925.69	381060.64	6.00	220.00	0.00	0.00	0.45			
491	B	226941.30	381042.07	6.00	220.00	0.00	0.00	0.45			
492	B	226958.12	381022.24	6.00	220.00	0.00	0.00	0.45			
493	G	226538.34	381384.82	8.00	40.11	0.00	0.00	0.50			
494	G	226562.78	381355.81	8.00	40.11	0.00	0.00	0.50			
495	G	226587.22	381326.81	8.00	40.11	0.00	0.00	0.50			
496	G	226611.66	381297.80	8.00	40.11	0.00	0.00	0.50			
497	G	226636.10	381268.79	8.00	40.11	0.00	0.00	0.50			
498	G	226660.54	381239.78	8.00	40.11	0.00	0.00	0.50			
499	G	226684.98	381210.77	8.00	40.11	0.00	0.00	0.50			
500	B	226612.04	381384.20	6.00	220.24	0.00	0.00	0.45			
501	B	226626.98	381366.52	6.00	220.24	0.00	0.00	0.45			
502	B	226641.66	381349.05	6.00	220.24	0.00	0.00	0.45			
503	B	226656.40	381331.51	6.00	220.24	0.00	0.00	0.45			
504	B	226671.15	381313.94	6.00	220.24	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
505	B	226685.85	381296.37	6.00	220.24	0.00	0.00	0.45			
506	B	226700.73	381278.87	6.00	220.24	0.00	0.00	0.45			
507	B	226715.42	381261.44	6.00	220.24	0.00	0.00	0.45			
508	B	226730.17	381243.84	6.00	220.24	0.00	0.00	0.45			
509	B	226586.06	381389.39	6.00	220.00	0.00	0.00	0.45			
510	B	226723.37	381223.64	6.00	131.00	0.00	0.00	0.45			
511	G	226430.86	381305.65	8.00	130.12	0.00	0.00	0.50			
512	G	226454.76	381325.79	8.00	130.12	0.00	0.00	0.50			
513	G	226478.66	381345.93	8.00	130.12	0.00	0.00	0.50			
514	G	226502.56	381366.07	8.00	130.12	0.00	0.00	0.50			
515	G	226526.46	381386.21	8.00	130.12	0.00	0.00	0.50			
516	F	226431.66	381293.94	3.00	220.08	0.00	0.00	0.00			
517	F	226444.29	381278.94	3.00	220.08	0.00	0.00	0.00			
518	F	226456.91	381263.93	3.00	220.08	0.00	0.00	0.00			
519	F	226469.54	381248.93	3.00	220.08	0.00	0.00	0.00			
520	F	226482.17	381233.92	3.00	220.08	0.00	0.00	0.00			
521	F	226494.80	381218.92	3.00	220.08	0.00	0.00	0.00			
522	F	226507.42	381203.91	3.00	220.08	0.00	0.00	0.00			
523	F	226520.05	381188.91	3.00	220.08	0.00	0.00	0.00			
524	F	226532.68	381173.90	3.00	220.08	0.00	0.00	0.00			
525	F	226545.31	381158.89	3.00	220.08	0.00	0.00	0.00			
526	F	226557.93	381143.89	3.00	220.08	0.00	0.00	0.00			
527	F	226570.56	381128.88	3.00	220.08	0.00	0.00	0.00			
528	F	226583.19	381113.88	3.00	220.08	0.00	0.00	0.00			
529	F	226592.60	381114.64	3.00	310.11	0.00	0.00	0.00			
530	F	226604.84	381124.95	3.00	310.11	0.00	0.00	0.00			
531	F	226617.08	381135.26	3.00	310.11	0.00	0.00	0.00			
532	F	226629.32	381145.57	3.00	310.11	0.00	0.00	0.00			
533	F	226641.56	381155.88	3.00	310.11	0.00	0.00	0.00			
534	F	226653.79	381166.19	3.00	310.11	0.00	0.00	0.00			
535	F	226666.03	381176.50	3.00	310.11	0.00	0.00	0.00			
536	F	226678.27	381186.81	3.00	310.11	0.00	0.00	0.00			
537	F	226690.51	381197.12	3.00	310.11	0.00	0.00	0.00			
538	F	226274.91	381217.18	3.00	130.18	0.00	0.00	0.00			
539	F	226287.04	381227.43	3.00	130.18	0.00	0.00	0.00			
540	F	226299.17	381237.67	3.00	130.18	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
541	F	226311.31	381247.92	3.00	130.18	0.00	0.00	0.00			
542	F	226323.44	381258.17	3.00	130.18	0.00	0.00	0.00			
543	F	226335.57	381268.41	3.00	130.18	0.00	0.00	0.00			
544	F	226347.70	381278.66	3.00	130.18	0.00	0.00	0.00			
545	F	226437.12	381027.13	3.00	310.17	0.00	0.00	0.00			
546	F	226448.88	381037.06	3.00	310.17	0.00	0.00	0.00			
547	F	226460.64	381046.99	3.00	310.17	0.00	0.00	0.00			
548	F	226472.40	381056.92	3.00	310.17	0.00	0.00	0.00			
549	F	226484.16	381066.85	3.00	310.17	0.00	0.00	0.00			
550	F	226495.92	381076.78	3.00	310.17	0.00	0.00	0.00			
551	F	226507.68	381086.71	3.00	310.17	0.00	0.00	0.00			
552	G	226276.28	381208.20	8.00	220.13	0.00	0.00	1.00			
553	G	226301.42	381178.37	8.00	220.13	0.00	0.00	1.00			
554	G	226326.57	381148.54	8.00	220.13	0.00	0.00	1.00			
555	G	226351.71	381118.72	8.00	220.13	0.00	0.00	1.00			
556	G	226376.86	381088.89	8.00	220.13	0.00	0.00	1.00			
557	G	226402.00	381059.06	8.00	220.13	0.00	0.00	1.00			
558	G	226427.14	381029.23	8.00	220.13	0.00	0.00	1.00			
559	G	226356.73	381274.24	8.00	40.08	0.00	0.00	1.00			
560	G	226381.46	381244.84	8.00	40.08	0.00	0.00	1.00			
561	G	226406.20	381215.45	8.00	40.08	0.00	0.00	1.00			
562	G	226430.93	381186.06	8.00	40.08	0.00	0.00	1.00			
563	G	226455.66	381156.66	8.00	40.08	0.00	0.00	1.00			
564	G	226480.39	381127.27	8.00	40.08	0.00	0.00	1.00			
565	G	226505.12	381097.88	8.00	40.08	0.00	0.00	1.00			
566	B	226232.61	381174.48	6.00	40.17	0.00	0.00	0.45			
567	B	226248.85	381155.25	6.00	40.17	0.00	0.00	0.45			
568	B	226265.08	381136.02	6.00	40.17	0.00	0.00	0.45			
569	B	226281.32	381116.79	6.00	40.17	0.00	0.00	0.45			
570	B	226297.56	381097.55	6.00	40.17	0.00	0.00	0.45			
571	B	226313.80	381078.32	6.00	40.17	0.00	0.00	0.45			
572	B	226330.03	381059.09	6.00	40.17	0.00	0.00	0.45			
573	B	226346.27	381039.86	6.00	40.17	0.00	0.00	0.45			
574	B	226362.51	381020.62	6.00	40.17	0.00	0.00	0.45			
575	B	226378.74	381001.39	6.00	40.17	0.00	0.00	0.45			
576	B	226395.82	381313.37	6.00	220.06	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
577	B	226410.78	381295.58	6.00	220.06	0.00	0.00	0.45			
578	B	226425.74	381277.79	6.00	220.06	0.00	0.00	0.45			
579	B	226440.70	381260.00	6.00	220.06	0.00	0.00	0.45			
580	B	226455.66	381242.22	6.00	220.06	0.00	0.00	0.45			
581	B	226470.61	381224.43	6.00	220.06	0.00	0.00	0.45			
582	B	226485.57	381206.64	6.00	220.06	0.00	0.00	0.45			
583	B	226500.53	381188.86	6.00	220.06	0.00	0.00	0.45			
584	B	226515.49	381171.07	6.00	220.06	0.00	0.00	0.45			
585	B	226530.45	381153.28	6.00	220.06	0.00	0.00	0.45			
586	B	226545.40	381135.49	6.00	220.06	0.00	0.00	0.45			
587	E	226066.39	381048.64	3.00	39.29	0.00	0.00	0.00			
588	E	226075.93	381036.98	3.00	39.29	0.00	0.00	0.00			
589	E	226085.47	381025.32	3.00	39.29	0.00	0.00	0.00			
590	E	226095.00	381013.67	3.00	39.29	0.00	0.00	0.00			
591	E	226104.54	381002.01	3.00	39.29	0.00	0.00	0.00			
592	E	226114.08	380990.35	3.00	39.29	0.00	0.00	0.00			
593	E	226123.62	380978.70	3.00	39.29	0.00	0.00	0.00			
594	E	226133.15	380967.04	3.00	39.29	0.00	0.00	0.00			
595	E	226142.69	380955.38	3.00	39.29	0.00	0.00	0.00			
596	G	226059.09	380877.72	8.00	309.27	0.00	0.00	0.50			
597	G	226087.24	380900.73	8.00	309.27	0.00	0.00	0.50			
598	G	226115.38	380923.74	8.00	309.27	0.00	0.00	0.50			
599	G	226143.53	380946.75	8.00	309.27	0.00	0.00	0.50			
600	G	225898.48	381063.67	8.00	219.38	0.00	0.00	0.50			
601	G	225923.54	381033.14	8.00	219.38	0.00	0.00	0.50			
602	G	225948.60	381002.61	8.00	219.38	0.00	0.00	0.50			
603	G	225973.66	380972.09	8.00	219.38	0.00	0.00	0.50			
604	G	225998.72	380941.56	8.00	219.38	0.00	0.00	0.50			
605	G	226023.78	380911.03	8.00	219.38	0.00	0.00	0.50			
606	G	226048.84	380880.50	8.00	219.38	0.00	0.00	0.50			
607	B	225862.32	381021.50	6.00	39.22	0.00	0.00	0.45			
608	B	225878.63	381001.52	6.00	39.22	0.00	0.00	0.45			
609	B	225894.94	380981.54	6.00	39.22	0.00	0.00	0.45			
610	B	225911.25	380961.56	6.00	39.22	0.00	0.00	0.45			
611	B	225927.56	380941.58	6.00	39.22	0.00	0.00	0.45			
612	B	225943.87	380921.60	6.00	39.22	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
613	B	225960.17	380901.61	6.00	39.22	0.00	0.00	0.45			
614	B	225976.48	380881.63	6.00	39.22	0.00	0.00	0.45			
615	B	226000.41	380877.31	6.00	39.20	0.00	0.00	0.45			
616	B	226017.29	380856.79	6.00	39.20	0.00	0.00	0.45			
617	B	226071.22	380836.77	6.00	128.00	0.00	0.00	0.45			
618	B	226181.71	380927.34	6.00	128.00	0.00	0.00	0.45			
619	B	226095.40	380836.51	6.00	129.28	0.00	0.00	0.45			
620	B	226111.50	380849.68	6.00	129.28	0.00	0.00	0.45			
621	B	226127.60	380862.85	6.00	129.28	0.00	0.00	0.45			
622	B	226143.70	380876.02	6.00	129.28	0.00	0.00	0.45			
623	B	226159.80	380889.19	6.00	129.28	0.00	0.00	0.45			
624	B	226175.90	380902.36	6.00	129.28	0.00	0.00	0.45			
625	B	225898.05	381069.42	3.00	129.28	0.00	0.00	0.00			
626	B	225910.51	381079.62	3.00	129.28	0.00	0.00	0.00			
627	B	225922.98	381089.81	3.00	129.28	0.00	0.00	0.00			
628	B	225935.44	381100.01	3.00	129.28	0.00	0.00	0.00			
629	B	225947.90	381110.20	3.00	129.28	0.00	0.00	0.00			
630	B	225960.37	381120.39	3.00	129.28	0.00	0.00	0.00			
631	B	225972.83	381130.59	3.00	129.28	0.00	0.00	0.00			
632	B	225985.29	381140.78	3.00	129.28	0.00	0.00	0.00			
633	B	225993.12	381138.01	3.00	39.32	0.00	0.00	0.00			
634	B	226004.13	381124.56	3.00	39.32	0.00	0.00	0.00			
635	B	226015.15	381111.11	3.00	39.32	0.00	0.00	0.00			
636	B	226026.17	381097.66	3.00	39.32	0.00	0.00	0.00			
637	B	226037.19	381084.21	3.00	39.32	0.00	0.00	0.00			
638	B	226048.21	381070.76	3.00	39.32	0.00	0.00	0.00			
639	B	226059.22	381057.31	3.00	39.32	0.00	0.00	0.00			
640	G	226241.80	380897.83	8.00	220.25	0.00	0.00	0.50			
641	G	226265.50	380869.83	8.00	220.25	0.00	0.00	0.50			
642	G	226289.20	380841.83	8.00	220.25	0.00	0.00	0.50			
643	G	226312.91	380813.83	8.00	220.25	0.00	0.00	0.50			
644	G	226336.61	380785.83	8.00	220.25	0.00	0.00	0.50			
645	G	226360.32	380757.83	8.00	220.25	0.00	0.00	0.50			
646	G	226371.04	380753.68	8.00	310.22	0.00	0.00	0.50			
647	G	226393.73	380772.86	8.00	310.22	0.00	0.00	0.50			
648	G	226416.41	380792.05	8.00	310.22	0.00	0.00	0.50			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
649	G	226439.10	380811.23	8.00	310.22	0.00	0.00	0.50			
650	G	226317.46	380963.26	8.00	40.06	0.00	0.00	0.50			
651	G	226341.23	380934.99	8.00	40.06	0.00	0.00	0.50			
652	G	226365.00	380906.73	8.00	40.06	0.00	0.00	0.50			
653	G	226388.77	380878.46	8.00	40.06	0.00	0.00	0.50			
654	G	226412.54	380850.19	8.00	40.06	0.00	0.00	0.50			
655	G	226436.31	380821.92	8.00	40.06	0.00	0.00	0.50			
656	F	226240.96	380905.68	3.00	130.30	0.00	0.00	0.00			
657	F	226252.42	380915.41	3.00	130.30	0.00	0.00	0.00			
658	F	226263.89	380925.13	3.00	130.30	0.00	0.00	0.00			
659	F	226275.35	380934.85	3.00	130.30	0.00	0.00	0.00			
660	F	226286.81	380944.57	3.00	130.30	0.00	0.00	0.00			
661	F	226298.27	380954.29	3.00	130.30	0.00	0.00	0.00			
662	F	226309.74	380964.01	3.00	130.30	0.00	0.00	0.00			

Illuminance (lux)

PHAR 001

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

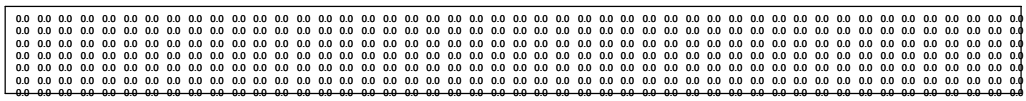
Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 002



Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 003

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 004

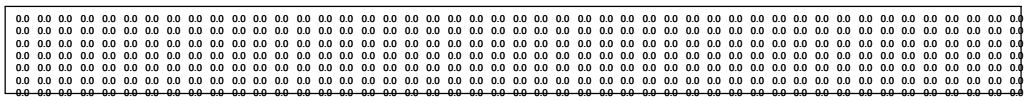
Results

Eav	0.01
Emin	0.00
Emax	0.03
Emin/Emax	0.11
Emin/Eav	0.24

9196176002

Illuminance (lux)

PHAR 005



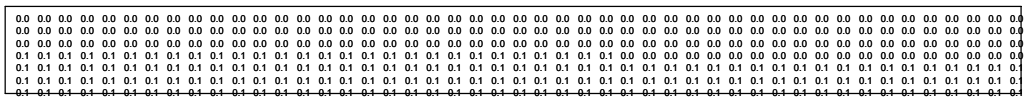
Results

Eav	0.02
Emin	0.00
Emax	0.03
Emin/Emax	0.13
Emin/Eav	0.24

9196176002

Illuminance (lux)

PHAR 006



Results

Eav	0.05
Emin	0.01
Emax	0.09
Emin/Emax	0.13
Emin/Eav	0.24

9196176002

Illuminance (lux)

PHAR 007

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

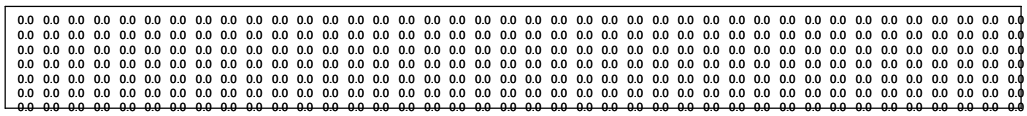
Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 008



Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 009

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

9196176002

Illuminance (lux)

PHAR 010

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

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Illuminance (lux)

PSHR 001

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Results

Eav	0.00
Emin	0.00
Emax	0.01
Emin/Emax	0.00
Emin/Eav	0.00

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DATE: 7 June 2024

DESIGNER: DFL-UK (DS)

PROJECT No: 3444-DFL-ELG-XX-LD-EO-13005

PROJECT NAME: Prosperity Parc

Vertical light spill calculations have been carried out for the identified receptors surrounding the Application Site.

This document details the vertical light spill calculations for the identified ecology receptors.

The lighting calculations do not consider blocking or shading effects of light limiting objects and represents worst-case vertical light spill at the identified receptors. A maintenance factor of 1 has been used.

This lighting calculation report must be read in conjunction with the Lighting Impact Assessment: 3444-DFL-ELG-XX-RP-EO-13001-S3.

Receptor locations are shown in Appendix 2 of 3444-DFL-ELG-XX-RP-EO-13001-S3.

Outdoor Lighting Report

PREPARED BY:

DFL-UK
+44 (0)1962 855080
17/18 City Business Centre,
Winchester Hants,
SO23 7TA.
e-mail: info@dfl-uk.com
website: www.dfl-uk.com

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	PSER 001 Grid 001	226005.48	381454.40	159.61	5.00	1.49	1.00
2	PSER 001 Grid 002	226058.23	381303.05	60.00	5.00	1.50	1.00
3	PSER 001 Grid 003	226114.85	381322.72	140.78	5.00	1.50	1.25
4	PSER 001 Grid 004	226192.65	381205.39	90.00	5.00	1.43	1.25
5	PSER 001 Grid 005	226261.13	381263.90	90.00	5.00	1.43	1.25
6	PSER 001 Grid 006	226329.57	381322.38	90.00	5.00	1.43	1.25
7	PSER 001 Grid 007	226398.06	381380.85	90.00	5.00	1.43	1.25

Luminaires

Luminaire A Data

Supplier	D W Windsor
Type	Sephora Halo- 16LED- 3k- D1- CLO 350mA U MSUG 42 0053 0000 100
Lamp(s)	16 x 3k LED
Lamp Flux (klm)	5.57
File Name	Sephora Halo- 16LED- 3k- D1- CLO_350mA UMSUG 42 0053 0000 100.ies
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	78

Luminaire B Data

Supplier	Holophane Europe
Type	VMXII.1.LB043.V2.F4Q1.W024 (TZ)
Lamp(s)	LED C.4000 Lumens
Lamp Flux (klm)	3.98
File Name	VMXII.1.LB043.V2.F4Q1.W024 (TZ).IES
Maintenance Factor	1.00
Lum. Int. Class	G4
No. in Project	231

Luminaire C Data

Supplier	Holophane Europe
Type	VMXII.1.LB083.V1.L5L5.W054
Lamp(s)	LED C.8000 Lumens
Lamp Flux (klm)	7.76
File Name	VMXII.1.LB083.V1.L5L5.W054 .IES
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	52

Luminaire D Data

Supplier	Holophane Europe
Type	VMXII.1.LB033.V1.L4L4.W021 (TZ)
Lamp(s)	LED C.3000 Lumens
Lamp Flux (klm)	3.28
File Name	VMXII.1.LB033.V1.L4L4.W021 (TZ).IES
Maintenance Factor	1.00
Lum. Int. Class	G6
No. in Project	37

Luminaires

Luminaire E Data

Supplier	Holophane Europe
Type	DWL.1.LA044.FW.W025
Lamp(s)	LED C.4,000 Lumens
Lamp Flux (klm)	3.82
File Name	DWL.1.LA044.FW.W025.IES
Maintenance Factor	1.00
Lum. Int. Class	G1
No. in Project	94

Luminaire F Data

Supplier	Holophane Europe
Type	DWL.1.LA024.AY.W011
Lamp(s)	LED C.2,000 Lumens
Lamp Flux (klm)	1.44
File Name	DWL.1.LA024.AY.W011.IES
Maintenance Factor	1.00
Lum. Int. Class	G2
No. in Project	82

Luminaire G Data

Supplier	Philips
Type	BVP651 DX50
Lamp(s)	LED-HB 5.1S
Lamp Flux (klm)	44.00
File Name	Clearflood Large_BVP651_DX50_44000_5.1 S_L90 CLO_CW.ies
Maintenance Factor	1.00
Lum. Int. Class	G3
No. in Project	88

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	226021.20	381190.79	6.00	40.00	0.00	0.00	0.00			
2	A	226036.81	381171.72	6.00	40.00	0.00	0.00	0.00			
3	A	226008.50	381181.27	6.00	40.00	0.00	0.00	0.00			
4	A	226024.42	381161.72	6.00	40.00	0.00	0.00	0.00			
5	A	225996.00	381171.24	6.00	40.00	0.00	0.00	0.00			
6	A	226012.26	381151.37	6.00	40.00	0.00	0.00	0.00			
7	A	226043.22	381138.79	6.00	40.00	0.00	0.00	0.00			
8	A	226059.94	381118.48	6.00	40.00	0.00	0.00	0.00			
9	A	226031.05	381128.54	6.00	40.00	0.00	0.00	0.00			
10	A	226047.81	381108.06	6.00	40.00	0.00	0.00	0.00			
11	A	226063.19	381089.32	6.00	40.00	0.00	0.00	0.45			
12	B	226003.74	381209.10	6.00	311.00	0.00	0.00	0.45			
13	B	225983.94	381192.65	6.00	311.00	0.00	0.00	0.45			
14	B	225982.10	381161.54	6.00	37.00	0.00	0.00	0.45			
15	B	225998.93	381140.97	6.00	39.00	0.00	0.00	0.45			
16	B	226018.29	381117.29	6.00	41.00	0.00	0.00	0.45			
17	B	226034.20	381097.93	6.00	41.00	0.00	0.00	0.45			
18	B	226050.50	381078.02	6.00	41.00	0.00	0.00	0.45			
19	B	226076.14	381074.41	6.00	130.00	0.00	0.00	0.45			
20	B	226076.33	381100.11	6.00	219.00	0.00	0.00	0.45			
21	B	226075.65	381125.86	6.00	224.00	0.00	0.00	0.45			
22	B	226054.08	381152.30	6.00	224.00	0.00	0.00	0.45			
23	B	226048.60	381183.95	6.00	224.00	0.00	0.00	0.45			
24	B	226033.30	381202.68	6.00	224.00	0.00	0.00	0.45			
25	B	226024.91	381219.98	6.00	307.00	0.00	0.00	0.45			
26	B	226038.92	381231.64	6.00	303.00	0.00	0.00	0.45			
27	B	226061.18	381167.07	6.00	130.00	0.00	0.00	0.45			
28	B	226064.85	381139.13	6.00	224.00	0.00	0.00	0.45			
29	A	226203.99	381150.83	6.00	224.00	0.00	0.00	0.00			
30	A	226216.00	381161.51	6.00	224.00	0.00	0.00	0.00			
31	A	226220.34	381131.59	6.00	224.00	0.00	0.00	0.00			
32	A	226231.96	381142.63	6.00	224.00	0.00	0.00	0.00			
33	A	226235.58	381113.50	6.00	224.00	0.00	0.00	0.00			
34	A	226247.58	381124.15	6.00	224.00	0.00	0.00	0.00			
35	B	226229.68	381171.66	6.00	224.00	0.00	0.00	0.45			
36	B	226245.12	381153.29	6.00	224.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
37	B	226261.85	381133.58	6.00	224.00	0.00	0.00	0.45			
38	B	226190.77	381140.12	6.00	41.00	0.00	0.00	0.45			
39	B	226207.31	381120.53	6.00	41.00	0.00	0.00	0.45			
40	B	226223.74	381101.18	6.00	41.00	0.00	0.00	0.45			
41	B	226247.94	381096.91	6.00	130.00	0.00	0.00	0.45			
42	B	226190.18	381164.78	6.00	310.28	0.00	0.00	0.45			
43	B	226263.32	381109.97	6.00	130.00	0.00	0.00	0.45			
44	B	226204.58	381176.98	6.00	310.28	0.00	0.00	0.45			
45	B	226263.38	381099.37	6.00	222.00	0.00	0.00	0.45			
46	A	226668.96	381347.62	6.00	220.00	0.00	0.00	0.00			
47	A	226684.92	381328.47	6.00	220.00	0.00	0.00	0.00			
48	A	226700.98	381309.42	6.00	220.00	0.00	0.00	0.00			
49	A	226712.87	381320.22	6.00	220.00	0.00	0.00	0.00			
50	A	226721.46	381285.09	6.00	220.00	0.00	0.00	0.00			
51	A	226733.23	381296.10	6.00	220.00	0.00	0.00	0.00			
52	A	226737.16	381266.62	6.00	220.00	0.00	0.00	0.00			
53	A	226749.55	381276.75	6.00	220.00	0.00	0.00	0.00			
54	A	226765.19	381258.11	6.00	220.00	0.00	0.00	0.00			
55	A	226753.00	381247.81	6.00	220.00	0.00	0.00	0.00			
56	B	226655.66	381337.07	6.00	38.00	0.00	0.00	0.45			
57	B	226672.13	381317.46	6.00	39.00	0.00	0.00	0.45			
58	B	226688.15	381298.23	6.00	39.00	0.00	0.00	0.45			
59	B	226708.14	381274.69	6.00	39.00	0.00	0.00	0.45			
60	B	226724.78	381254.86	6.00	39.00	0.00	0.00	0.45			
61	B	226740.80	381235.79	6.00	39.00	0.00	0.00	0.45			
62	B	226656.32	381362.09	6.00	310.00	0.00	0.00	0.45			
63	B	226682.59	381357.87	6.00	224.00	0.00	0.00	0.45			
64	B	226698.59	381338.90	6.00	224.00	0.00	0.00	0.45			
65	B	226727.14	381329.79	6.00	222.00	0.00	0.00	0.45			
66	B	226746.07	381307.25	6.00	219.00	0.00	0.00	0.45			
67	B	226763.10	381287.08	6.00	217.00	0.00	0.00	0.45			
68	B	226778.86	381268.36	6.00	220.00	0.00	0.00	0.45			
69	B	226765.46	381232.89	6.00	309.00	0.00	0.00	0.45			
70	B	226778.12	381243.30	6.00	310.00	0.00	0.00	0.45			
71	B	226799.22	381260.06	6.00	307.00	0.00	0.00	0.45			
72	B	226713.93	381294.25	6.00	132.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
73	B	226755.46	381223.82	6.00	316.00	0.00	0.00	0.45			
74	B	226726.19	381304.53	6.00	132.00	0.00	0.00	0.45			
75	A	226811.71	381221.42	6.00	220.00	0.00	0.00	0.00			
76	A	226828.07	381202.04	6.00	220.00	0.00	0.00	0.00			
77	A	226844.22	381182.86	6.00	220.00	0.00	0.00	0.00			
78	A	226797.93	381238.01	6.00	220.00	0.00	0.00	0.00			
79	B	226824.45	381232.61	6.00	220.00	0.00	0.00	0.45			
80	B	226840.87	381213.18	6.00	220.00	0.00	0.00	0.45			
81	B	226856.83	381194.41	6.00	220.00	0.00	0.00	0.45			
82	B	226798.15	381210.80	6.00	39.00	0.00	0.00	0.45			
83	B	226815.04	381191.11	6.00	39.00	0.00	0.00	0.45			
84	B	226831.17	381171.96	6.00	39.00	0.00	0.00	0.45			
85	B	226847.44	381152.82	6.00	39.00	0.00	0.00	0.45			
86	B	226863.52	381133.82	6.00	39.00	0.00	0.00	0.45			
87	B	226861.24	381164.46	6.00	219.00	0.00	0.00	0.45			
88	B	226880.30	381134.31	6.00	216.00	0.00	0.00	0.45			
89	A	226906.15	381109.89	6.00	220.00	0.00	0.00	0.00			
90	A	226922.64	381090.44	6.00	220.00	0.00	0.00	0.00			
91	A	226939.06	381071.08	6.00	220.00	0.00	0.00	0.00			
92	B	226893.99	381097.94	6.00	39.00	0.00	0.00	0.45			
93	B	226878.93	381117.02	6.00	310.00	0.00	0.00	0.45			
94	B	226918.79	381121.27	6.00	220.00	0.00	0.00	0.45			
95	B	226895.63	381126.65	6.00	310.00	0.00	0.00	0.45			
96	B	226935.99	381101.00	6.00	220.00	0.00	0.00	0.45			
97	B	226951.75	381074.71	6.00	220.00	0.00	0.00	0.45			
98	B	226909.07	381080.13	6.00	40.00	0.00	0.00	0.45			
99	B	226925.63	381060.60	6.00	41.00	0.00	0.00	0.45			
100	B	226941.28	381042.16	6.00	40.00	0.00	0.00	0.45			
101	B	226958.07	381022.33	6.00	38.00	0.00	0.00	0.45			
102	B	226954.95	381053.90	6.00	220.00	0.00	0.00	0.45			
103	B	226971.95	381033.77	6.00	220.00	0.00	0.00	0.45			
104	C	225985.06	381454.60	8.00	180.00	0.00	0.00	0.45			
105	C	225976.96	381421.57	8.00	14.00	0.00	0.00	0.45			
106	C	225995.62	381393.29	8.00	202.00	0.00	0.00	0.45			
107	C	225998.94	381358.35	8.00	23.00	0.00	0.00	0.45			
108	C	226019.01	381331.43	8.00	199.00	0.00	0.00	0.45			

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Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
109	C	226021.50	381298.83	8.00	22.00	0.00	0.00	0.45			
110	C	226042.19	381270.18	8.00	201.00	0.00	0.00	0.45			
111	C	226044.80	381236.91	8.00	22.00	0.00	0.00	0.45			
112	C	226056.27	381205.83	8.00	20.00	0.00	0.00	0.45			
113	C	226077.72	381147.92	8.00	22.00	0.00	0.00	0.45			
114	C	226075.23	381181.33	8.00	204.00	0.00	0.00	0.45			
115	C	226098.83	381122.48	8.00	211.00	0.00	0.00	0.45			
116	C	226104.71	381089.20	8.00	26.00	0.00	0.00	0.45			
117	C	226128.21	381061.80	8.00	211.00	0.00	0.00	0.45			
118	C	226155.18	381037.38	8.00	111.00	0.00	0.00	0.45			
119	C	226182.49	381058.35	8.00	292.00	0.00	0.00	0.45			
120	C	226215.23	381061.61	8.00	112.00	0.00	0.00	0.45			
121	B	226269.91	381093.89	8.00	290.00	0.00	0.00	0.45			
122	C	226285.45	381081.67	8.00	43.00	0.00	0.00	0.45			
123	C	226241.76	381082.38	8.00	295.00	0.00	0.00	0.45			
124	C	226312.60	381064.20	8.00	216.00	0.00	0.00	0.45			
125	C	226325.46	381034.45	8.00	37.00	0.00	0.00	0.45			
126	C	226353.87	381015.19	8.00	216.00	0.00	0.00	0.45			
127	C	226368.22	380983.58	8.00	37.00	0.00	0.00	0.45			
128	C	226395.92	380965.20	8.00	216.00	0.00	0.00	0.45			
129	C	226410.13	380934.01	8.00	42.00	0.00	0.00	0.45			
130	C	226436.79	380916.77	8.00	216.00	0.00	0.00	0.45			
131	C	226450.63	380885.95	8.00	38.00	0.00	0.00	0.45			
132	C	226438.03	380952.77	8.00	307.00	0.00	0.00	0.45			
133	C	226470.33	380968.00	8.00	129.00	0.00	0.00	0.45			
134	C	226489.37	380996.48	8.00	306.00	0.00	0.00	0.45			
135	C	226519.50	381009.86	8.00	134.00	0.00	0.00	0.45			
136	C	226536.94	381036.82	8.00	307.00	0.00	0.00	0.45			
137	C	226567.33	381050.54	8.00	134.00	0.00	0.00	0.45			
138	C	226587.56	381079.92	8.00	310.00	0.00	0.00	0.45			
139	C	226617.19	381092.91	8.00	129.00	0.00	0.00	0.40			
140	C	226635.52	381120.79	8.00	309.00	0.00	0.00	0.45			
141	C	226665.40	381133.95	8.00	134.00	0.00	0.00	0.45			
142	C	226683.96	381161.99	8.00	310.00	0.00	0.00	0.45			
143	C	226715.68	381176.66	8.00	134.00	0.00	0.00	0.45			
144	C	226734.17	381204.58	8.00	312.00	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
145	C	226697.32	381132.30	8.00	222.00	0.00	0.00	0.45			
146	C	226711.29	381101.41	8.00	40.00	0.00	0.00	0.45			
147	C	226739.36	381082.63	8.00	222.00	0.00	0.00	0.45			
148	C	226754.18	381050.64	8.00	40.00	0.00	0.00	0.45			
149	C	226777.42	381023.28	8.00	40.00	0.00	0.00	0.45			
150	C	226804.64	381005.60	8.00	221.00	0.00	0.00	0.45			
151	C	226818.28	380975.09	8.00	40.00	0.00	0.00	0.45			
152	C	226846.38	380956.34	8.00	220.00	0.00	0.00	0.45			
153	C	226860.60	380925.15	8.00	40.00	0.00	0.00	0.45			
154	C	226798.61	381048.03	8.00	309.00	0.00	0.00	0.45			
155	C	226828.63	381061.34	8.00	131.00	0.00	0.00	0.45			
156	C	226847.19	381089.28	8.00	308.00	0.00	0.00	0.45			
157	B	226871.29	381097.48	8.00	133.00	0.00	0.00	0.45			
158	A	226200.16	380975.92	6.00	134.00	0.00	0.00	0.00			
159	A	226219.53	380992.27	6.00	134.00	0.00	0.00	0.00			
160	A	226239.07	381008.85	6.00	134.00	0.00	0.00	0.00			
161	A	226258.08	381024.97	6.00	134.00	0.00	0.00	0.00			
162	A	226276.63	381040.66	6.00	134.00	0.00	0.00	0.00			
163	A	226287.29	381028.65	6.00	134.00	0.00	0.00	0.00			
164	A	226267.55	381011.88	6.00	134.00	0.00	0.00	0.00			
165	A	226248.68	380995.96	6.00	134.00	0.00	0.00	0.00			
166	A	226229.47	380979.72	6.00	134.00	0.00	0.00	0.00			
167	A	226210.59	380963.71	6.00	134.00	0.00	0.00	0.00			
168	A	226221.41	380951.98	6.00	134.00	0.00	0.00	0.00			
169	A	226240.87	380968.42	6.00	134.00	0.00	0.00	0.00			
170	A	226260.05	380984.69	6.00	134.00	0.00	0.00	0.00			
171	A	226278.93	381000.65	6.00	134.00	0.00	0.00	0.00			
172	A	226298.33	381017.07	6.00	134.00	0.00	0.00	0.00			
173	A	226308.19	381004.54	6.00	134.00	0.00	0.00	0.00			
174	A	226289.22	380988.43	6.00	134.00	0.00	0.00	0.00			
175	A	226269.81	380971.95	6.00	134.00	0.00	0.00	0.00			
176	A	226250.38	380955.45	6.00	134.00	0.00	0.00	0.00			
177	A	226231.06	380939.15	6.00	134.00	0.00	0.00	0.00			
178	B	226184.60	380963.56	6.00	40.00	0.00	0.00	0.45			
179	B	226265.29	381053.27	6.00	-49.79	0.00	0.00	0.45			
180	B	226241.96	380926.21	6.00	130.21	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
181	B	226246.21	381037.14	6.00	-49.79	0.00	0.00	0.45			
182	B	226216.27	380926.25	6.00	41.00	0.00	0.00	0.45			
183	B	226227.13	381021.01	6.00	-49.79	0.00	0.00	0.45			
184	B	226261.03	380942.33	6.00	130.21	0.00	0.00	0.45			
185	B	226208.05	381004.88	6.00	-49.79	0.00	0.00	0.45			
186	B	226200.08	380945.36	6.00	37.00	0.00	0.00	0.45			
187	B	226188.98	380988.76	6.00	-49.79	0.00	0.00	0.45			
188	B	226280.10	380958.45	6.00	130.21	0.00	0.00	0.45			
189	B	226290.90	381053.02	6.00	221.00	0.00	0.00	0.45			
190	B	226299.18	380974.57	6.00	130.21	0.00	0.00	0.45			
191	B	226321.93	381016.46	6.00	223.00	0.00	0.00	0.45			
192	B	226318.25	380990.70	6.00	130.21	0.00	0.00	0.45			
193	B	226307.12	381040.34	6.00	308.00	0.00	0.00	0.45			
194	B	226440.91	380970.09	6.00	128.00	0.00	0.00	0.45			
195	B	226460.27	380986.50	6.00	131.00	0.00	0.00	0.45			
196	B	226479.69	381002.77	6.00	131.00	0.00	0.00	0.45			
197	B	226504.50	381023.66	6.00	133.00	0.00	0.00	0.45			
198	B	226523.69	381039.82	6.00	130.00	0.00	0.00	0.45			
199	B	226542.72	381055.84	6.00	132.00	0.00	0.00	0.45			
200	B	226550.89	381081.30	6.00	220.00	0.00	0.00	0.45			
201	B	226523.00	381077.24	6.00	308.00	0.00	0.00	0.45			
202	B	226503.20	381060.45	6.00	308.00	0.00	0.00	0.45			
203	B	226483.99	381044.30	6.00	308.00	0.00	0.00	0.45			
204	B	226461.03	381024.93	6.00	308.00	0.00	0.00	0.45			
205	B	226440.71	381007.84	6.00	308.00	0.00	0.00	0.45			
206	B	226421.49	380991.85	6.00	308.00	0.00	0.00	0.45			
207	B	226412.86	380965.50	6.00	38.00	0.00	0.00	0.45			
208	A	226432.05	380981.63	6.00	308.00	0.00	0.00	0.00			
209	A	226451.97	380997.98	6.00	308.00	0.00	0.00	0.00			
210	A	226471.03	381014.07	6.00	308.00	0.00	0.00	0.00			
211	A	226494.68	381034.08	6.00	308.00	0.00	0.00	0.00			
212	A	226513.40	381049.79	6.00	308.00	0.00	0.00	0.00			
213	A	226533.29	381066.53	6.00	308.00	0.00	0.00	0.00			
214	B	226497.05	381011.66	6.00	217.00	0.00	0.00	0.45			
215	A	226650.70	380709.96	6.00	133.00	0.00	0.00	0.00			
216	A	226670.34	380726.58	6.00	133.00	0.00	0.00	0.00			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
217	A	226689.56	380742.76	6.00	133.00	0.00	0.00	0.00			
218	A	226708.82	380759.21	6.00	133.00	0.00	0.00	0.00			
219	A	226718.55	380746.51	6.00	133.00	0.00	0.00	0.00			
220	A	226699.49	380730.40	6.00	133.00	0.00	0.00	0.00			
221	A	226680.33	380713.99	6.00	133.00	0.00	0.00	0.00			
222	A	226661.17	380697.85	6.00	133.00	0.00	0.00	0.00			
223	A	226672.14	380686.05	6.00	133.00	0.00	0.00	0.00			
224	A	226691.02	380702.17	6.00	133.00	0.00	0.00	0.00			
225	A	226709.90	380718.23	6.00	133.00	0.00	0.00	0.00			
226	A	226729.27	380734.56	6.00	133.00	0.00	0.00	0.00			
227	A	226739.11	380722.02	6.00	133.00	0.00	0.00	0.00			
228	A	226719.57	380705.31	6.00	133.00	0.00	0.00	0.00			
229	A	226700.69	380689.49	6.00	133.00	0.00	0.00	0.00			
230	A	226682.35	380673.85	6.00	133.00	0.00	0.00	0.00			
231	B	226640.06	380723.27	6.00	310.00	0.00	0.00	0.45			
232	B	226659.23	380739.54	6.00	310.00	0.00	0.00	0.45			
233	B	226678.08	380755.47	6.00	310.00	0.00	0.00	0.45			
234	B	226697.20	380771.67	6.00	310.00	0.00	0.00	0.45			
235	B	226750.72	380709.58	6.00	131.00	0.00	0.00	0.45			
236	B	226731.81	380693.41	6.00	130.00	0.00	0.00	0.45			
237	B	226712.12	380676.79	6.00	130.00	0.00	0.00	0.45			
238	B	226692.36	380660.08	6.00	130.00	0.00	0.00	0.45			
239	B	226636.22	380697.40	6.00	41.00	0.00	0.00	0.45			
240	B	226667.08	380661.00	6.00	34.00	0.00	0.00	0.45			
241	B	226649.97	380672.58	6.00	130.00	0.00	0.00	0.45			
242	B	226721.82	380770.13	6.00	217.00	0.00	0.00	0.45			
243	B	226752.92	380733.67	6.00	217.00	0.00	0.00	0.45			
244	B	226737.29	380751.98	6.00	217.00	0.00	0.00	0.45			
245	A	226848.81	380853.03	6.00	217.00	0.00	0.00	0.00			
246	A	226864.83	380834.07	6.00	217.00	0.00	0.00	0.00			
247	B	226835.84	380842.11	6.00	39.00	0.00	0.00	0.45			
248	B	226852.60	380822.11	6.00	39.00	0.00	0.00	0.45			
249	B	226862.30	380863.52	6.00	217.00	0.00	0.00	0.45			
250	B	226878.75	380843.99	6.00	217.00	0.00	0.00	0.45			
251	B	226894.75	380825.08	6.00	217.00	0.00	0.00	0.45			
252	B	226910.65	380805.98	6.00	217.00	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
253	B	226927.00	380786.80	6.00	217.00	0.00	0.00	0.45			
254	B	226943.39	380767.34	6.00	217.00	0.00	0.00	0.45			
255	B	226959.63	380748.03	6.00	217.00	0.00	0.00	0.45			
256	B	226866.95	380903.62	6.00	309.00	0.00	0.00	0.45			
257	B	226846.41	380886.23	6.00	309.00	0.00	0.00	0.45			
258	B	226825.29	380868.33	6.00	309.00	0.00	0.00	0.45			
259	B	226879.91	380814.59	6.00	38.00	0.00	0.00	0.45			
260	B	226896.40	380794.80	6.00	38.00	0.00	0.00	0.45			
261	B	226912.48	380775.97	6.00	38.00	0.00	0.00	0.45			
262	B	226928.60	380756.75	6.00	38.00	0.00	0.00	0.45			
263	B	226944.76	380737.54	6.00	38.00	0.00	0.00	0.45			
264	D	226476.39	380867.91	6.00	225.00	0.00	0.00	0.40			
265	D	226494.37	380846.49	6.00	225.00	0.00	0.00	0.40			
266	D	226512.24	380825.33	6.00	225.00	0.00	0.00	0.40			
267	D	226530.17	380804.11	6.00	225.00	0.00	0.00	0.40			
268	D	226548.02	380782.97	6.00	225.00	0.00	0.00	0.40			
269	D	226566.05	380761.64	6.00	225.00	0.00	0.00	0.40			
270	D	226583.99	380740.39	6.00	225.00	0.00	0.00	0.40			
271	D	226601.87	380719.17	6.00	225.00	0.00	0.00	0.40			
272	D	226619.88	380697.93	6.00	225.00	0.00	0.00	0.40			
273	D	226637.73	380676.77	6.00	225.00	0.00	0.00	0.40			
274	D	226657.73	380656.90	6.00	242.00	0.00	0.00	0.40			
275	D	226684.31	380648.52	6.00	250.00	0.00	0.00	0.40			
276	D	226711.35	380641.88	6.00	255.00	0.00	0.00	0.40			
277	D	226738.46	380635.19	6.00	255.00	0.00	0.00	0.40			
278	D	226765.51	380628.51	6.00	255.00	0.00	0.00	0.40			
279	D	226792.44	380621.83	6.00	255.00	0.00	0.00	0.40			
280	D	226817.89	380608.69	6.00	76.00	0.00	0.00	0.40			
281	D	226845.11	380602.04	6.00	76.00	0.00	0.00	0.40			
282	D	226873.92	380603.89	6.00	120.00	0.00	0.00	0.40			
283	D	226895.53	380622.05	6.00	131.00	0.00	0.00	0.40			
284	D	226916.64	380640.13	6.00	131.00	0.00	0.00	0.40			
285	D	226937.77	380658.08	6.00	131.00	0.00	0.00	0.40			
286	D	226954.39	380676.92	6.00	275.00	0.00	0.00	0.40			
287	D	226970.70	380656.23	6.00	43.00	0.00	0.00	0.40			
288	D	226988.65	380635.29	6.00	43.00	0.00	0.00	0.40			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
289	D	227006.66	380614.11	6.00	46.00	0.00	0.00	0.40			
290	D	227028.56	380602.78	6.00	103.00	0.00	0.00	0.40			
291	D	227054.42	380605.62	6.00	235.00	0.00	0.00	0.40			
292	D	227077.52	380589.73	6.00	234.00	0.00	0.00	0.40			
293	D	227100.52	380574.02	6.00	234.00	0.00	0.00	0.40			
294	D	227123.38	380558.23	6.00	234.00	0.00	0.00	0.40			
295	D	227145.12	380545.50	6.00	258.00	0.00	0.00	0.40			
296	D	227168.50	380551.74	6.00	137.00	0.00	0.00	0.40			
297	D	227186.99	380572.06	6.00	139.00	0.00	0.00	0.40			
298	D	227206.02	380592.64	6.00	139.00	0.00	0.00	0.40			
299	D	227224.41	380613.13	6.00	139.00	0.00	0.00	0.40			
300	D	227243.32	380632.66	6.00	139.00	0.00	0.00	0.40			
301	E	225961.15	381364.94	6.00	326.00	0.00	0.00	0.00			
302	E	225914.00	381299.98	6.00	326.00	0.00	0.00	0.00			
303	E	225930.50	381322.68	6.00	326.00	0.00	0.00	0.00			
304	E	225946.35	381344.21	6.00	326.00	0.00	0.00	0.00			
305	E	225895.81	381275.69	6.00	321.00	0.00	0.00	0.00			
306	E	225840.50	381214.88	6.00	326.00	0.00	0.00	0.00			
307	E	225859.78	381236.07	6.00	326.00	0.00	0.00	0.00			
308	E	225878.52	381256.59	6.00	326.00	0.00	0.00	0.00			
309	E	225974.83	381301.25	6.00	45.00	0.00	0.00	0.00			
310	E	226004.75	381271.14	6.00	45.00	0.00	0.00	0.00			
311	E	225989.78	381286.14	6.00	45.00	0.00	0.00	0.00			
312	E	225960.33	381299.12	6.00	135.00	0.00	0.00	0.00			
313	E	225893.87	381289.30	6.00	45.00	0.00	0.00	0.00			
314	E	225958.57	381379.34	6.00	50.00	0.00	0.00	0.00			
315	E	226002.87	381256.98	6.00	320.00	0.00	0.00	0.00			
316	B	225998.75	381337.95	6.00	200.00	0.00	0.00	0.45			
317	E	226086.13	381239.42	6.00	295.00	0.00	0.00	0.00			
318	E	226111.63	381249.20	6.00	295.00	0.00	0.00	0.00			
319	E	226099.80	381200.39	6.00	110.00	0.00	0.00	0.00			
320	E	226129.29	381211.53	6.00	110.00	0.00	0.00	0.00			
321	E	226153.33	381126.33	6.00	310.00	0.00	0.00	0.00			
322	E	226168.59	381138.98	6.00	310.00	0.00	0.00	0.00			
323	B	226166.76	381108.13	6.00	132.00	0.00	0.00	0.45			
324	B	226184.17	381123.01	6.00	132.00	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
325	F	226141.28	381116.05	6.00	307.00	0.00	0.00	0.00			
326	F	226148.99	381114.28	6.00	222.00	0.00	0.00	0.00			
327	F	226133.30	381118.47	6.00	222.00	0.00	0.00	0.00			
328	F	226133.02	381126.07	6.00	132.00	0.00	0.00	0.00			
329	F	226135.89	381133.54	6.00	132.00	0.00	0.00	0.00			
330	F	226144.47	381136.74	6.00	132.00	0.00	0.00	0.00			
331	F	226162.03	381150.93	6.00	132.00	0.00	0.00	0.00			
332	F	226171.75	381150.60	6.00	42.00	0.00	0.00	0.00			
333	F	226153.82	381144.23	6.00	132.00	0.00	0.00	0.00			
334	F	226109.46	381160.53	6.00	290.00	0.00	0.00	0.00			
335	F	226152.28	381176.98	6.00	290.00	0.00	0.00	0.00			
336	F	226123.40	381165.93	6.00	290.00	0.00	0.00	0.00			
337	F	226138.23	381171.58	6.00	290.00	0.00	0.00	0.00			
338	F	226146.02	381207.02	6.00	20.00	0.00	0.00	0.00			
339	F	226153.05	381188.81	6.00	20.00	0.00	0.00	0.00			
340	F	226091.08	381187.15	6.00	205.00	0.00	0.00	0.00			
341	F	226098.64	381167.69	6.00	205.00	0.00	0.00	0.00			
342	F	226063.67	381265.89	6.00	205.00	0.00	0.00	0.00			
343	F	226071.77	381244.91	6.00	205.00	0.00	0.00	0.00			
344	F	226119.89	381260.50	6.00	20.00	0.00	0.00	0.00			
345	F	226110.93	381284.11	6.00	20.00	0.00	0.00	0.00			
346	F	226067.89	381275.62	6.00	110.00	0.00	0.00	0.00			
347	F	226102.43	381288.90	6.00	110.00	0.00	0.00	0.00			
348	F	226079.40	381280.08	6.00	110.00	0.00	0.00	0.00			
349	F	226090.27	381284.39	6.00	110.00	0.00	0.00	0.00			
350	F	226094.93	381145.65	6.00	45.00	0.00	0.00	0.00			
351	E	226161.05	381018.15	6.00	20.00	0.00	0.00	0.00			
352	E	226167.03	381002.27	6.00	25.00	0.00	0.00	0.00			
353	E	226191.95	381024.18	6.00	225.00	0.00	0.00	0.00			
354	E	226223.23	381049.64	6.00	40.00	0.00	0.00	0.00			
355	F	226190.46	381035.40	6.00	125.00	0.00	0.00	0.00			
356	F	226212.54	381053.31	6.00	125.00	0.00	0.00	0.00			
357	F	226201.16	381044.09	6.00	125.00	0.00	0.00	0.00			
358	E	226741.69	380665.62	6.00	315.00	0.00	0.00	0.00			
359	E	226724.56	380651.13	6.00	315.00	0.00	0.00	0.00			
360	E	226892.35	380672.10	6.00	130.00	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
361	E	226909.64	380686.75	6.00	135.00	0.00	0.00	0.00			
362	E	226998.10	380653.37	6.00	315.00	0.00	0.00	0.00			
363	E	227011.79	380664.74	6.00	315.00	0.00	0.00	0.00			
364	E	227039.98	380688.37	6.00	315.00	0.00	0.00	0.00			
365	E	227026.85	380677.39	6.00	315.00	0.00	0.00	0.00			
366	E	227051.30	380698.03	6.00	315.00	0.00	0.00	0.00			
367	F	226971.85	380676.64	6.00	220.00	0.00	0.00	0.00			
368	F	226988.72	380656.53	6.00	220.00	0.00	0.00	0.00			
369	F	226979.75	380667.03	6.00	220.00	0.00	0.00	0.00			
370	F	227050.81	380707.49	6.00	45.00	0.00	0.00	0.00			
371	F	227042.69	380717.20	6.00	45.00	0.00	0.00	0.00			
372	F	227034.16	380727.67	6.00	45.00	0.00	0.00	0.00			
373	F	226978.55	380689.79	6.00	130.00	0.00	0.00	0.00			
374	F	226999.25	380707.24	6.00	130.00	0.00	0.00	0.00			
375	F	227021.28	380725.56	6.00	135.00	0.00	0.00	0.00			
376	F	226098.71	381134.32	6.00	225.00	0.00	0.00	0.00			
377	B	226119.83	381143.65	6.00	127.00	0.00	0.00	0.45			
378	B	226176.90	381180.41	6.00	226.00	0.00	0.00	0.45			
379	B	226134.49	381237.57	6.00	203.00	0.00	0.00	0.45			
380	B	226076.96	381208.59	6.00	108.00	0.00	0.00	0.45			
382	E	226514.31	380930.16	8.00	220.27	0.00	0.00	0.00			
383	E	226532.41	380908.80	8.00	220.27	0.00	0.00	0.00			
384	E	226550.50	380887.44	8.00	220.27	0.00	0.00	0.00			
385	E	226568.59	380866.08	8.00	220.27	0.00	0.00	0.00			
386	E	226586.69	380844.72	8.00	220.27	0.00	0.00	0.00			
387	E	226604.78	380823.35	8.00	220.27	0.00	0.00	0.00			
388	E	226622.88	380801.99	8.00	220.27	0.00	0.00	0.00			
389	E	226640.97	380780.63	8.00	220.27	0.00	0.00	0.00			
390	E	226667.38	381059.84	8.00	40.28	0.00	0.00	0.00			
391	E	226685.39	381038.60	8.00	40.28	0.00	0.00	0.00			
392	E	226703.39	381017.35	8.00	40.28	0.00	0.00	0.00			
393	E	226721.40	380996.10	8.00	40.28	0.00	0.00	0.00			
394	E	226739.40	380974.85	8.00	40.28	0.00	0.00	0.00			
395	E	226757.41	380953.61	8.00	40.28	0.00	0.00	0.00			
396	E	226775.41	380932.36	8.00	40.28	0.00	0.00	0.00			
397	E	226793.42	380911.11	8.00	40.28	0.00	0.00	0.00			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
397	G	226689.96	381114.98	8.00	220.32	0.00	0.00	0.50			
398	E	226675.22	380774.02	8.00	310.21	0.00	0.00	0.00			
399	E	226692.29	380788.45	8.00	310.21	0.00	0.00	0.00			
400	E	226709.35	380802.88	8.00	310.21	0.00	0.00	0.00			
401	E	226726.42	380817.31	8.00	310.21	0.00	0.00	0.00			
402	E	226743.49	380831.74	8.00	310.21	0.00	0.00	0.00			
403	E	226760.56	380846.17	8.00	310.21	0.00	0.00	0.00			
404	E	226777.62	380860.60	8.00	310.21	0.00	0.00	0.00			
405	E	226794.69	380875.03	8.00	310.21	0.00	0.00	0.00			
406	E	226513.20	380965.46	8.00	130.22	0.00	0.00	0.00			
407	E	226530.29	380979.91	8.00	130.22	0.00	0.00	0.00			
408	E	226547.38	380994.36	8.00	130.22	0.00	0.00	0.00			
409	E	226564.47	381008.81	8.00	130.22	0.00	0.00	0.00			
410	E	226581.55	381023.26	8.00	130.22	0.00	0.00	0.00			
411	E	226598.64	381037.70	8.00	130.22	0.00	0.00	0.00			
412	E	226615.73	381052.15	8.00	130.22	0.00	0.00	0.00			
413	E	226632.82	381066.60	8.00	130.22	0.00	0.00	0.00			
414	G	226721.09	381078.30	8.00	220.32	0.00	0.00	0.50			
415	G	226752.22	381041.62	8.00	220.32	0.00	0.00	0.50			
416	G	226783.36	381004.94	8.00	220.32	0.00	0.00	0.50			
417	G	226814.49	380968.26	8.00	220.32	0.00	0.00	0.50			
418	G	226845.62	380931.58	8.00	220.32	0.00	0.00	0.50			
419	G	226454.84	380915.57	8.00	40.24	0.00	0.00	0.50			
420	G	226480.71	380885.00	8.00	40.24	0.00	0.00	0.50			
421	G	226506.57	380854.43	8.00	40.24	0.00	0.00	0.50			
422	G	226532.44	380823.86	8.00	40.24	0.00	0.00	0.50			
423	G	226558.31	380793.29	8.00	40.24	0.00	0.00	0.50			
424	G	226584.17	380762.72	8.00	40.24	0.00	0.00	0.50			
425	G	226610.04	380732.15	8.00	40.24	0.00	0.00	0.50			
426	B	226640.07	380723.29	6.00	130.00	0.00	0.00	0.45			
427	B	226659.22	380739.52	6.00	130.00	0.00	0.00	0.45			
428	B	226678.06	380755.46	6.00	130.00	0.00	0.00	0.45			
429	B	226697.20	380771.69	6.00	130.00	0.00	0.00	0.45			
430	B	226841.39	380893.33	6.00	130.48	0.00	0.00	0.45			
431	B	226816.87	380872.40	6.00	130.48	0.00	0.00	0.45			
432	B	226792.34	380851.46	6.00	130.48	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
433	B	226767.81	380830.53	6.00	130.48	0.00	0.00	0.45			
434	B	226743.28	380809.60	6.00	130.48	0.00	0.00	0.45			
435	B	226718.76	380788.67	6.00	130.48	0.00	0.00	0.45			
436	B	226462.16	380948.38	6.00	314.00	0.00	0.00	0.45			
437	B	226652.65	381110.36	6.00	317.00	0.00	0.00	0.45			
438	G	226945.42	380939.24	6.00	40.32	0.00	0.00	0.50			
439	G	226965.02	380916.15	6.00	40.32	0.00	0.00	0.50			
440	G	226984.62	380893.05	6.00	40.32	0.00	0.00	0.50			
441	G	227004.21	380869.96	6.00	40.32	0.00	0.00	0.50			
442	G	227023.81	380846.87	6.00	40.32	0.00	0.00	0.50			
443	G	227043.40	380823.78	6.00	40.32	0.00	0.00	0.50			
444	B	226883.80	380916.64	6.00	310.22	0.00	0.00	0.45			
445	B	226907.76	380936.89	6.00	310.22	0.00	0.00	0.45			
446	B	226931.71	380957.15	6.00	310.22	0.00	0.00	0.45			
447	B	226955.67	380977.40	6.00	310.22	0.00	0.00	0.45			
448	G	226986.49	380976.13	8.00	220.31	0.00	0.00	0.50			
449	G	227008.19	380950.55	8.00	220.31	0.00	0.00	0.50			
450	G	227029.89	380924.97	8.00	220.31	0.00	0.00	0.50			
451	G	227051.59	380899.38	8.00	220.31	0.00	0.00	0.50			
452	G	227056.51	380869.05	8.00	220.30	0.00	0.00	0.50			
453	G	227075.15	380845.88	8.00	220.30	0.00	0.00	0.50			
454	E	226973.49	380757.27	4.00	310.35	0.00	0.00	0.00			
455	E	226987.82	380769.45	4.00	310.35	0.00	0.00	0.00			
456	E	227002.16	380781.63	4.00	310.35	0.00	0.00	0.00			
457	E	227016.50	380793.81	4.00	310.35	0.00	0.00	0.00			
458	E	227030.83	380805.99	4.00	310.35	0.00	0.00	0.00			
459	E	227045.17	380818.17	4.00	310.35	0.00	0.00	0.00			
460	E	226870.46	380879.74	4.00	130.28	0.00	0.00	0.00			
461	E	226884.13	380891.32	4.00	130.28	0.00	0.00	0.00			
462	E	226897.80	380902.90	4.00	130.28	0.00	0.00	0.00			
463	E	226911.47	380914.49	4.00	130.28	0.00	0.00	0.00			
464	E	226925.13	380926.07	4.00	130.28	0.00	0.00	0.00			
465	E	226938.80	380937.66	4.00	130.28	0.00	0.00	0.00			
466	E	226872.40	380870.80	6.00	220.28	0.00	0.00	0.00			
467	E	226887.73	380852.71	6.00	220.28	0.00	0.00	0.00			
468	E	226903.06	380834.62	6.00	220.28	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
469	E	226918.38	380816.54	6.00	220.28	0.00	0.00	0.00			
470	E	226933.71	380798.45	6.00	220.28	0.00	0.00	0.00			
471	E	226949.04	380780.36	6.00	220.28	0.00	0.00	0.00			
472	E	226964.37	380762.27	6.00	220.28	0.00	0.00	0.00			
473	G	226860.97	381061.30	6.00	40.23	0.00	0.00	0.50			
474	G	226878.52	381040.55	6.00	40.23	0.00	0.00	0.50			
475	G	226896.07	381019.81	6.00	40.23	0.00	0.00	0.50			
476	G	226913.62	380999.06	6.00	40.23	0.00	0.00	0.50			
477	G	226931.17	380978.31	6.00	40.23	0.00	0.00	0.50			
478	G	226756.81	381184.38	6.00	40.29	0.00	0.00	0.50			
479	G	226773.88	381164.24	6.00	40.29	0.00	0.00	0.50			
480	G	226790.95	381144.10	6.00	40.29	0.00	0.00	0.50			
481	G	226808.03	381123.96	6.00	40.29	0.00	0.00	0.50			
482	G	226825.10	381103.82	6.00	40.29	0.00	0.00	0.50			
483	B	226798.15	381210.82	6.00	220.00	0.00	0.00	0.45			
484	B	226815.06	381191.11	6.00	220.00	0.00	0.00	0.45			
485	B	226831.20	381171.93	6.00	220.00	0.00	0.00	0.45			
486	B	226847.40	381152.87	6.00	220.00	0.00	0.00	0.45			
487	B	226863.50	381133.81	6.00	220.00	0.00	0.00	0.45			
488	B	226909.08	381080.09	6.00	220.00	0.00	0.00	0.45			
489	B	226893.99	381097.85	6.00	220.00	0.00	0.00	0.45			
490	B	226925.69	381060.64	6.00	220.00	0.00	0.00	0.45			
491	B	226941.30	381042.07	6.00	220.00	0.00	0.00	0.45			
492	B	226958.12	381022.24	6.00	220.00	0.00	0.00	0.45			
493	G	226538.34	381384.82	8.00	40.11	0.00	0.00	0.50			
494	G	226562.78	381355.81	8.00	40.11	0.00	0.00	0.50			
495	G	226587.22	381326.81	8.00	40.11	0.00	0.00	0.50			
496	G	226611.66	381297.80	8.00	40.11	0.00	0.00	0.50			
497	G	226636.10	381268.79	8.00	40.11	0.00	0.00	0.50			
498	G	226660.54	381239.78	8.00	40.11	0.00	0.00	0.50			
499	G	226684.98	381210.77	8.00	40.11	0.00	0.00	0.50			
500	B	226612.04	381384.20	6.00	220.24	0.00	0.00	0.45			
501	B	226626.98	381366.52	6.00	220.24	0.00	0.00	0.45			
502	B	226641.66	381349.05	6.00	220.24	0.00	0.00	0.45			
503	B	226656.40	381331.51	6.00	220.24	0.00	0.00	0.45			
504	B	226671.15	381313.94	6.00	220.24	0.00	0.00	0.45			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
505	B	226685.85	381296.37	6.00	220.24	0.00	0.00	0.45			
506	B	226700.73	381278.87	6.00	220.24	0.00	0.00	0.45			
507	B	226715.42	381261.44	6.00	220.24	0.00	0.00	0.45			
508	B	226730.17	381243.84	6.00	220.24	0.00	0.00	0.45			
509	B	226586.06	381389.39	6.00	220.00	0.00	0.00	0.45			
510	B	226723.37	381223.64	6.00	131.00	0.00	0.00	0.45			
511	G	226430.86	381305.65	8.00	130.12	0.00	0.00	0.50			
512	G	226454.76	381325.79	8.00	130.12	0.00	0.00	0.50			
513	G	226478.66	381345.93	8.00	130.12	0.00	0.00	0.50			
514	G	226502.56	381366.07	8.00	130.12	0.00	0.00	0.50			
515	G	226526.46	381386.21	8.00	130.12	0.00	0.00	0.50			
516	F	226431.66	381293.94	3.00	220.08	0.00	0.00	0.00			
517	F	226444.29	381278.94	3.00	220.08	0.00	0.00	0.00			
518	F	226456.91	381263.93	3.00	220.08	0.00	0.00	0.00			
519	F	226469.54	381248.93	3.00	220.08	0.00	0.00	0.00			
520	F	226482.17	381233.92	3.00	220.08	0.00	0.00	0.00			
521	F	226494.80	381218.92	3.00	220.08	0.00	0.00	0.00			
522	F	226507.42	381203.91	3.00	220.08	0.00	0.00	0.00			
523	F	226520.05	381188.91	3.00	220.08	0.00	0.00	0.00			
524	F	226532.68	381173.90	3.00	220.08	0.00	0.00	0.00			
525	F	226545.31	381158.89	3.00	220.08	0.00	0.00	0.00			
526	F	226557.93	381143.89	3.00	220.08	0.00	0.00	0.00			
527	F	226570.56	381128.88	3.00	220.08	0.00	0.00	0.00			
528	F	226583.19	381113.88	3.00	220.08	0.00	0.00	0.00			
529	F	226592.60	381114.64	3.00	310.11	0.00	0.00	0.00			
530	F	226604.84	381124.95	3.00	310.11	0.00	0.00	0.00			
531	F	226617.08	381135.26	3.00	310.11	0.00	0.00	0.00			
532	F	226629.32	381145.57	3.00	310.11	0.00	0.00	0.00			
533	F	226641.56	381155.88	3.00	310.11	0.00	0.00	0.00			
534	F	226653.79	381166.19	3.00	310.11	0.00	0.00	0.00			
535	F	226666.03	381176.50	3.00	310.11	0.00	0.00	0.00			
536	F	226678.27	381186.81	3.00	310.11	0.00	0.00	0.00			
537	F	226690.51	381197.12	3.00	310.11	0.00	0.00	0.00			
538	F	226274.91	381217.18	3.00	130.18	0.00	0.00	0.00			
539	F	226287.04	381227.43	3.00	130.18	0.00	0.00	0.00			
540	F	226299.17	381237.67	3.00	130.18	0.00	0.00	0.00			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
541	F	226311.31	381247.92	3.00	130.18	0.00	0.00	0.00			
542	F	226323.44	381258.17	3.00	130.18	0.00	0.00	0.00			
543	F	226335.57	381268.41	3.00	130.18	0.00	0.00	0.00			
544	F	226347.70	381278.66	3.00	130.18	0.00	0.00	0.00			
545	F	226437.12	381027.13	3.00	310.17	0.00	0.00	0.00			
546	F	226448.88	381037.06	3.00	310.17	0.00	0.00	0.00			
547	F	226460.64	381046.99	3.00	310.17	0.00	0.00	0.00			
548	F	226472.40	381056.92	3.00	310.17	0.00	0.00	0.00			
549	F	226484.16	381066.85	3.00	310.17	0.00	0.00	0.00			
550	F	226495.92	381076.78	3.00	310.17	0.00	0.00	0.00			
551	F	226507.68	381086.71	3.00	310.17	0.00	0.00	0.00			
552	G	226276.28	381208.20	8.00	220.13	0.00	0.00	1.00			
553	G	226301.42	381178.37	8.00	220.13	0.00	0.00	1.00			
554	G	226326.57	381148.54	8.00	220.13	0.00	0.00	1.00			
555	G	226351.71	381118.72	8.00	220.13	0.00	0.00	1.00			
556	G	226376.86	381088.89	8.00	220.13	0.00	0.00	1.00			
557	G	226402.00	381059.06	8.00	220.13	0.00	0.00	1.00			
558	G	226427.14	381029.23	8.00	220.13	0.00	0.00	1.00			
559	G	226356.73	381274.24	8.00	40.08	0.00	0.00	1.00			
560	G	226381.46	381244.84	8.00	40.08	0.00	0.00	1.00			
561	G	226406.20	381215.45	8.00	40.08	0.00	0.00	1.00			
562	G	226430.93	381186.06	8.00	40.08	0.00	0.00	1.00			
563	G	226455.66	381156.66	8.00	40.08	0.00	0.00	1.00			
564	G	226480.39	381127.27	8.00	40.08	0.00	0.00	1.00			
565	G	226505.12	381097.88	8.00	40.08	0.00	0.00	1.00			
566	B	226232.61	381174.48	6.00	40.17	0.00	0.00	0.45			
567	B	226248.85	381155.25	6.00	40.17	0.00	0.00	0.45			
568	B	226265.08	381136.02	6.00	40.17	0.00	0.00	0.45			
569	B	226281.32	381116.79	6.00	40.17	0.00	0.00	0.45			
570	B	226297.56	381097.55	6.00	40.17	0.00	0.00	0.45			
571	B	226313.80	381078.32	6.00	40.17	0.00	0.00	0.45			
572	B	226330.03	381059.09	6.00	40.17	0.00	0.00	0.45			
573	B	226346.27	381039.86	6.00	40.17	0.00	0.00	0.45			
574	B	226362.51	381020.62	6.00	40.17	0.00	0.00	0.45			
575	B	226378.74	381001.39	6.00	40.17	0.00	0.00	0.45			
576	B	226395.82	381313.37	6.00	220.06	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
577	B	226410.78	381295.58	6.00	220.06	0.00	0.00	0.45			
578	B	226425.74	381277.79	6.00	220.06	0.00	0.00	0.45			
579	B	226440.70	381260.00	6.00	220.06	0.00	0.00	0.45			
580	B	226455.66	381242.22	6.00	220.06	0.00	0.00	0.45			
581	B	226470.61	381224.43	6.00	220.06	0.00	0.00	0.45			
582	B	226485.57	381206.64	6.00	220.06	0.00	0.00	0.45			
583	B	226500.53	381188.86	6.00	220.06	0.00	0.00	0.45			
584	B	226515.49	381171.07	6.00	220.06	0.00	0.00	0.45			
585	B	226530.45	381153.28	6.00	220.06	0.00	0.00	0.45			
586	B	226545.40	381135.49	6.00	220.06	0.00	0.00	0.45			
587	E	226066.39	381048.64	3.00	39.29	0.00	0.00	0.00			
588	E	226075.93	381036.98	3.00	39.29	0.00	0.00	0.00			
589	E	226085.47	381025.32	3.00	39.29	0.00	0.00	0.00			
590	E	226095.00	381013.67	3.00	39.29	0.00	0.00	0.00			
591	E	226104.54	381002.01	3.00	39.29	0.00	0.00	0.00			
592	E	226114.08	380990.35	3.00	39.29	0.00	0.00	0.00			
593	E	226123.62	380978.70	3.00	39.29	0.00	0.00	0.00			
594	E	226133.15	380967.04	3.00	39.29	0.00	0.00	0.00			
595	E	226142.69	380955.38	3.00	39.29	0.00	0.00	0.00			
596	G	226059.09	380877.72	8.00	309.27	0.00	0.00	0.50			
597	G	226087.24	380900.73	8.00	309.27	0.00	0.00	0.50			
598	G	226115.38	380923.74	8.00	309.27	0.00	0.00	0.50			
599	G	226143.53	380946.75	8.00	309.27	0.00	0.00	0.50			
600	G	225898.48	381063.67	8.00	219.38	0.00	0.00	0.50			
601	G	225923.54	381033.14	8.00	219.38	0.00	0.00	0.50			
602	G	225948.60	381002.61	8.00	219.38	0.00	0.00	0.50			
603	G	225973.66	380972.09	8.00	219.38	0.00	0.00	0.50			
604	G	225998.72	380941.56	8.00	219.38	0.00	0.00	0.50			
605	G	226023.78	380911.03	8.00	219.38	0.00	0.00	0.50			
606	G	226048.84	380880.50	8.00	219.38	0.00	0.00	0.50			
607	B	225862.32	381021.50	6.00	39.22	0.00	0.00	0.45			
608	B	225878.63	381001.52	6.00	39.22	0.00	0.00	0.45			
609	B	225894.94	380981.54	6.00	39.22	0.00	0.00	0.45			
610	B	225911.25	380961.56	6.00	39.22	0.00	0.00	0.45			
611	B	225927.56	380941.58	6.00	39.22	0.00	0.00	0.45			
612	B	225943.87	380921.60	6.00	39.22	0.00	0.00	0.45			

9196176002

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
613	B	225960.17	380901.61	6.00	39.22	0.00	0.00	0.45			
614	B	225976.48	380881.63	6.00	39.22	0.00	0.00	0.45			
615	B	226000.41	380877.31	6.00	39.20	0.00	0.00	0.45			
616	B	226017.29	380856.79	6.00	39.20	0.00	0.00	0.45			
617	B	226071.22	380836.77	6.00	128.00	0.00	0.00	0.45			
618	B	226181.71	380927.34	6.00	128.00	0.00	0.00	0.45			
619	B	226095.40	380836.51	6.00	129.28	0.00	0.00	0.45			
620	B	226111.50	380849.68	6.00	129.28	0.00	0.00	0.45			
621	B	226127.60	380862.85	6.00	129.28	0.00	0.00	0.45			
622	B	226143.70	380876.02	6.00	129.28	0.00	0.00	0.45			
623	B	226159.80	380889.19	6.00	129.28	0.00	0.00	0.45			
624	B	226175.90	380902.36	6.00	129.28	0.00	0.00	0.45			
625	B	225898.05	381069.42	3.00	129.28	0.00	0.00	0.00			
626	B	225910.51	381079.62	3.00	129.28	0.00	0.00	0.00			
627	B	225922.98	381089.81	3.00	129.28	0.00	0.00	0.00			
628	B	225935.44	381100.01	3.00	129.28	0.00	0.00	0.00			
629	B	225947.90	381110.20	3.00	129.28	0.00	0.00	0.00			
630	B	225960.37	381120.39	3.00	129.28	0.00	0.00	0.00			
631	B	225972.83	381130.59	3.00	129.28	0.00	0.00	0.00			
632	B	225985.29	381140.78	3.00	129.28	0.00	0.00	0.00			
633	B	225993.12	381138.01	3.00	39.32	0.00	0.00	0.00			
634	B	226004.13	381124.56	3.00	39.32	0.00	0.00	0.00			
635	B	226015.15	381111.11	3.00	39.32	0.00	0.00	0.00			
636	B	226026.17	381097.66	3.00	39.32	0.00	0.00	0.00			
637	B	226037.19	381084.21	3.00	39.32	0.00	0.00	0.00			
638	B	226048.21	381070.76	3.00	39.32	0.00	0.00	0.00			
639	B	226059.22	381057.31	3.00	39.32	0.00	0.00	0.00			
640	G	226241.80	380897.83	8.00	220.25	0.00	0.00	0.50			
641	G	226265.50	380869.83	8.00	220.25	0.00	0.00	0.50			
642	G	226289.20	380841.83	8.00	220.25	0.00	0.00	0.50			
643	G	226312.91	380813.83	8.00	220.25	0.00	0.00	0.50			
644	G	226336.61	380785.83	8.00	220.25	0.00	0.00	0.50			
645	G	226360.32	380757.83	8.00	220.25	0.00	0.00	0.50			
646	G	226371.04	380753.68	8.00	310.22	0.00	0.00	0.50			
647	G	226393.73	380772.86	8.00	310.22	0.00	0.00	0.50			
648	G	226416.41	380792.05	8.00	310.22	0.00	0.00	0.50			

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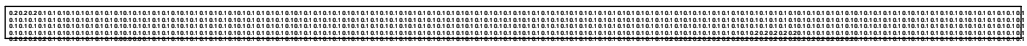
Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
649	G	226439.10	380811.23	8.00	310.22	0.00	0.00	0.50			
650	G	226317.46	380963.26	8.00	40.06	0.00	0.00	0.50			
651	G	226341.23	380934.99	8.00	40.06	0.00	0.00	0.50			
652	G	226365.00	380906.73	8.00	40.06	0.00	0.00	0.50			
653	G	226388.77	380878.46	8.00	40.06	0.00	0.00	0.50			
654	G	226412.54	380850.19	8.00	40.06	0.00	0.00	0.50			
655	G	226436.31	380821.92	8.00	40.06	0.00	0.00	0.50			
656	F	226240.96	380905.68	3.00	130.30	0.00	0.00	0.00			
657	F	226252.42	380915.41	3.00	130.30	0.00	0.00	0.00			
658	F	226263.89	380925.13	3.00	130.30	0.00	0.00	0.00			
659	F	226275.35	380934.85	3.00	130.30	0.00	0.00	0.00			
660	F	226286.81	380944.57	3.00	130.30	0.00	0.00	0.00			
661	F	226298.27	380954.29	3.00	130.30	0.00	0.00	0.00			
662	F	226309.74	380964.01	3.00	130.30	0.00	0.00	0.00			

Illuminance (lux)

PSER 001 Grid 001



Results

Eav	0.11
Emin	0.05
Emax	0.21
Emin/Emax	0.23
Emin/Eav	0.43

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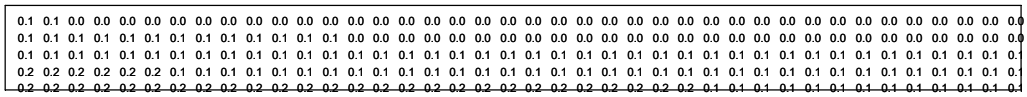
Illuminance (lux)

PSER 001 Grid 002



Results

Eav	0.09
Emin	0.01
Emax	0.21
Emin/Emax	0.03
Emin/Eav	0.08

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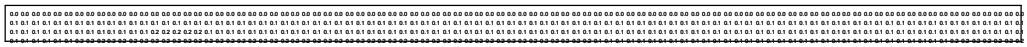
Illuminance (lux)

PSER 001 Grid 003

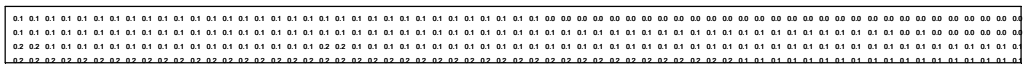


Results

Eav	0.10
Emin	0.02
Emax	0.22
Emin/Emax	0.07
Emin/Eav	0.16

Illuminance (lux)

PSER 001 Grid 004



Results

Eav	0.11
Emin	0.03
Emax	0.19
Emin/Emax	0.14
Emin/Eav	0.26

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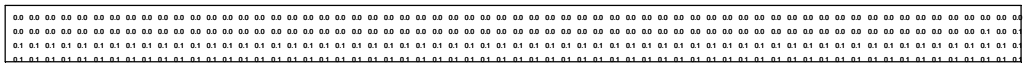
Illuminance (lux)

PSER 001 Grid 005



Results

Eav	0.05
Emin	0.02
Emax	0.13
Emin/Emax	0.16
Emin/Eav	0.39

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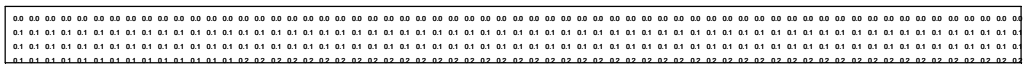
Illuminance (lux)

PSER 001 Grid 006



Results

Eav	0.09
Emin	0.03
Emax	0.20
Emin/Emax	0.16
Emin/Eav	0.33

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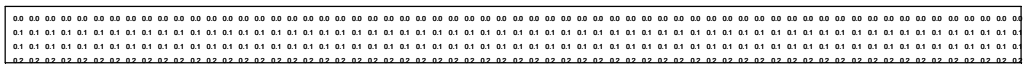
Illuminance (lux)

PSER 001 Grid 007



Results

Eav	0.10
Emin	0.03
Emax	0.21
Emin/Emax	0.14
Emin/Eav	0.27

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