Tritax Symmetry (Hinckley) Limited HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Environmental Statement Technical Appendix

ES Appendix 3.2 - Lighting Strategy

Report Prepared by: BWB Consulting Ltd

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Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

This document forms a part of the Environmental Statement for the Hinckley National Rail Freight Interchange project.

Tritax Symmetry (Hinckley) Limited (TSH) has applied to the Secretary of State for Transport for a Development Consent Order (DCO) for the Hinckley National Rail Freight Interchange (HNRFI).

To help inform the determination of the DCO application, TSH has undertaken an environmental impact assessment (EIA) of its proposals. EIA is a process that aims to improve the environmental design of a development proposal, and to provide the decision maker with sufficient information about the environmental effects of the project to make a decision.

The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

Further details about the proposed Hinckley National Rail Freight Interchange are available on the project website:

http://www.hinckleynrfi.co.uk/

The DCO application and documents relating to the examination of the proposed development can be viewed on the Planning Inspectorate's National Infrastructure Planning website:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/hinckley-national-rail-freight-interchange/

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1. INTRODUCTION

Instruction

1.1. BWB Consulting (BWB) was instructed by Tritax Symmetry to carry out a Lighting Strategy to support the planning application for the Hinckley National Rail Freight Interchange (HNRFI) as described in Environmental Statement Volume 1: Main Statement, Chapter 3: Project Description (Document reference 6.1.3), hereafter referred to as the 'Proposed Development'.

Scope of Works

- 1.2. This report details the relevant lighting policy and guidance that have been reflected when setting the proposed lighting design parameters and criteria for the Proposed Development. This includes details of optics, mounting heights, light direction and proposed luminaires. Performance criteria for average Lux level and uniformity are defined for each type of area, task or activity throughout the Proposed Development. An indicative lighting design has been appended to this report.
- 1.3. This report describes the main forms of obtrusive light as described by the applicable national guidance. It sets out the maximum acceptable light pollution limits within the Proposed Development and explains how the external lighting design can be completed within these limits and any resultant obtrusive light can be mitigated against as much as possible.
- 1.4. This report provides mitigation methods to minimise any potentially adverse impact caused by a new lighting installation for the proposed development. The assessment of the likely effects of light pollution upon sensitive human and ecological receptors is set out in Chapters 10 and 11 of the Environmental Statement (Volume 1) which accompanies the application to the Planning Inspectorate.
- 1.5. The Lighting Strategy has been revised for submission at Deadline 7 to include a Technical Note for Obtrusive Light (Appendix 3) plus an Obtrusive Light Layout (Appendix 4). The primary objective of the Technical Note was to reach a common agreement between Tritax Symmetry and relevant stakeholders in respect to external lighting at the Proposed Development by:
 - Demonstrating, by calculated examples, that the Proposed Development can be provided with an external lighting installation that complies with the criteria as set out in the Lighting Strategy, while not exceeding the obtrusive light limitations outlined herein.
 - Providing additional clarification, information and criteria for reference to applicable elements that was not specifically covered in the original Lighting Strategy.

2. RELEVANT POLICY AND GUIDANCE

2.1. The relevant international, national, and local policy documents are summarised in this section and have been considered in the production of this Lighting Strategy.

International Guidance

Commission Internationale De L'Eclairage (CIE 150)

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

Guidelines for Minimising Sky Glow (CIE 126)

2.3. These guidelines prepared by Commission Internationale De L'Eclairage provide general guidance for lighting designers and policy makers on the reduction of sky glow. The report gives recommendations about maximum permissible values for lighting installations. These values must be regarded as limiting values. Lighting designers should seek to meet the lowest specifications for the design. Other uses of the open air areas at night will usually result in less stringent sky-glow requirements. Practical implementation of the general guidance is left to National Regulations.

National Guidance

Lighting in the Countryside: Towards Good Practice

2.4. The Office of the Deputy Prime Minister (ODPM – now Department for Communities and Local Government) in conjunction with the Countryside Commission published 'Lighting in the Countryside: Towards Good Practice' in July 1997, and a revised issue in 2001. The guidance was developed to 'provide practical advice on the prevention and control of lighting effects through appropriate action by all those involved with lighting in the countryside'. Its objective is 'to identify good practice in the planning and design of lighting in rural areas; and advise on how it can be achieved, using case study examples'. The guide aims to provide an overview and common understanding of all aspects of good lighting practice stating that close co-operation and participation is required for all those involved in planning, designing, and installing lighting schemes. The guidance provides valuable information on lighting best practice and the standard methodology outlined in this guidance document has been followed as part of this assessment. Whilst the guidance relates to 'lighting in the countryside', it is considered best practice to adopt many of the principles contained within the guidance to sites of a more urban nature.

National Planning Policy Framework

2.5. The National Planning Policy Framework (NPPF) provides guidance relating to planning and pollution control for new development in England. The purpose of the planning system is to contribute to achievement of sustainable development. In relation to lighting, Paragraph 180 states: "Planning policies and decisions should also ensure that new development is

appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes, and nature conservation.

National Planning Practice Guidance

2.6. Light Pollution Planning Practice Guidance (http://planningguidance.planningportal. gov.uk/blog/ light-pollution) advises on how to consider light within the planning system. It recognises that artificial light provides valuable benefits to society, including extending opportunities for sport, recreation, and commerce, and can be essential to a new development. Equally, inappropriate artificial light has the potential to be obtrusive and to cause light pollution. It can be a source of annoyance, harm wildlife, and undermine enjoyment of the countryside and views of the night sky.

The National Planning Policy Statement for National Networks

- 2.7. The National Networks National Policy Statement sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. It states that lighting impact on amenity for local communities is likely to be unavoidable but impacts should be kept to a minimum and should be at a level that is acceptable.
- 2.8. The National Networks National Policy Statement states that the Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions artificial light. This should include the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

SLL Lighting Guide 1: The Industrial Environment

- 2.9. The scope of this guide is concerned with lighting for the industrial environment. In staff areas used for operational purposes, where specific tasks require a particular lighting treatment, the requirements which differ from the general recommendations of the SLL Code for Lighting are specified.
- 2.10. The Lighting Guide includes reference to the exterior lighting requirements of BS 5489 and emergency lighting as defined by BS 5266.

SLL Lighting Guide 15: Transport Buildings

- 2.11. This Lighting Guide covers all public areas of transport buildings and their related access environments such as airport terminal forecourts and railway station platforms. In staff areas used for operational purposes, where specific tasks require a particular lighting treatment, the requirements which differ from the general recommendations of the SLL Code for Lighting are specified.
- 2.12. Guidance is also given in respect of the interface between road and rail vehicle lighting and the transport installations they serve. The Lighting Guide includes reference to the exterior lighting requirements of BS 5489 and emergency lighting as defined by BS 5266.

British Standards

BS 5489: Code of Practice for the Design of Road Lighting – Part 1: Lighting of Roads and Public Amenity Areas

2.13. This standard provides recommendations on the general principles, aesthetic and technical aspects of road lighting and advises on statutory provisions, operation, and maintenance of lighting. The standard provides recommendations for the design of lighting for all types of highways and public thoroughfares, including those specifically for pedestrians and cyclists, and for pedestrian subways and bridges.

BS 13201: Road Lighting – Part 1, 2, 3, 4: Performance Requirements

2.14. This standard defines lighting classes for road lighting according to photometric requirements and aiming at the visual needs of road users. It also considers environmental aspects of road lighting.

BS EN 12464-2: Lighting of Workplaces. Outdoor Work

- 2.15. This standard focuses on the recommendations for outdoor workplaces that are used at night. BS EN 12464-2 includes important recommendations on how obtrusive light can be limited, to keep night skies free of light pollution.
- 2.16. The degree of visibility and comfort required in a wide range of outdoor work places is governed by the type and duration of activity.
- 2.17. This standard specifies requirements for lighting of tasks in most outdoor work places and their associated area in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice.
- 2.18. It is important that all clauses of the standard are followed although the specific requirements are tabulated in the schedule of lighting requirements.

Local Guidance

Blaby District Council Core Strategy (2013)

- 2.19. Policies CS2, CS12, CS14, CS16, CS17, CS18 and CS23 contain the following strategic objective:
 - 'vi) to protect the important areas of the District's natural environment (species and habitats), landscape and geology and to improve biodiversity, wildlife habitats and corridors through the design of new developments and the management of existing areas by working with partners;'

Blaby District Local Plan (2019)

- 2.20. Development Management Policies 1 and 2 state that development proposals will:
 - 'Provide a satisfactory relationship with nearby uses that would not be significantly detrimental to the amenities enjoyed by the existing or new occupiers, including but not limited to, consideration of: i. privacy, light, noise, disturbance and overbearing effect;'
- 2.21. Development Management Policy 13 'Land Contamination and Pollution' seeks to ensure that development proposals are not affected by or cause land contamination or pollution.

The following clauses are included in relation to Lighting:

- 'The NPPF encourages good design to limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'
- 'Artificial light provides valuable benefits, including safety and security of people and premises, extending opportunities for sport and recreation, and can be essential to a new development. Equally, artificial light is not always necessary, has the potential to become what is termed 'light pollution' or 'obtrusive light' and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky. For maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time.'
- 'Development proposals will be supported where they are accompanied by a detailed investigation of the issues and appropriate mitigation measures are identified to avoid any adverse impact upon the site or adjacent areas:

Clause d) Close to a source of noise or light pollution and/or the proposal may be a source of noise or light pollution.'

Hinckley & Bosworth Borough Council Site Allocations and Development Management Policies DPD (2006-2026)

- 2.22. The Site Allocations and Development Management Policies Document (DPD) allocates land to deliver the development requirements outlined in the Hinckley and Bosworth Core Strategy such as housing, employment, recreation, green spaces, community uses and leisure uses.
- 2.23. Policy DM7 'Preventing Pollution and Flooding' states the following in relation to Light Pollution:
 - Light pollution (also known as obtrusive light) is caused by excessive artificial light being directed into the night sky. Outdoor lighting can cause intrusive and unnecessary light pollution in urban, suburban and rural areas, although it is in the countryside that light pollution is most noticeable. Excessive artificial light at night is visually intrusive impacting on local amenity, intrinsically dark landscapes, nature conservation and can cause physiological problems, in addition to it being a significant waste of energy. It is therefore vital to ensure appropriate controls on external lighting to avoid or mitigate against these adverse effects.
 - The Guidance Notes for the Reduction of Obtrusive Light (2020) highlight the elements of obtrusive light which cause the greatest impact. These are defined as:
 - Sky Glow, which is the brightening of the night sky;
 - Glare, the uncomfortable brightness of a light source when viewed against a darker background; and
 - o Light Intrusion, the spilling of light beyond the boundary of the area being lit.
 - The reduction of light pollution should not compromise crime prevention and public safety and alternative technological solutions should be explored to ensure these elements are not compromised whilst also mitigating against obtrusive light.
- 2.24. Policy DM10 'Development and Design' states that Developments will be permitted

providing that the following requirements are met:

• a) It would not have a significant adverse effect on the privacy and amenity of nearby residents and occupiers of adjacent buildings, including matters of lighting, air quality (including odour), noise, vibration and visual intrusion.

Institute of Lighting Professionals (ILP) Guidance

ILP Guidance Notes for the Reduction of Obtrusive Light (Guidance Note 01/21)

- 2.25. This guide is intended to be used in the planning context and can be applied through planning conditions. It sets out best practice for lighting design and control of obtrusive light (light pollution), defines environmental zone categories based on their capacity to absorb lighting effects, and gives guidance on the limitation of obtrusive light in terms of sky glow, glare and light trespass for each category. It therefore echoes the approach set out in the National Planning Policy Framework that impacts can and should be controlled by appropriate design rather than refusal.
- 2.26. This Guidance Note recommends that the immediate environment is classified into an environmental zone based on ambient lighting levels in the surrounding area. The environmental zones are detailed in **Table 2.1**. Zone E0 requires the most strict level of control and E4 the lowest.

Table 2.1: Environmental Zones.

Zone	Surrounding	Lighting Environment	Examples
EO	Protected	Dark	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places.
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations.
E3	Suburban	Medium district brightness	Small town centres or suburban locations.
E4	Urban	High district brightness	Town/city centres with high levels of night- time activity.

ILP Guidance Note 08 for Bats and artificial lighting in the UK.

- 2.27. 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.
- 2.28. The Guidance Note provides recommendations for appropriate external lighting

specification:

- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
- Column heights should be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used.
- Luminaires should always be mounted on the horizontal, i.e., no upward tilt.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

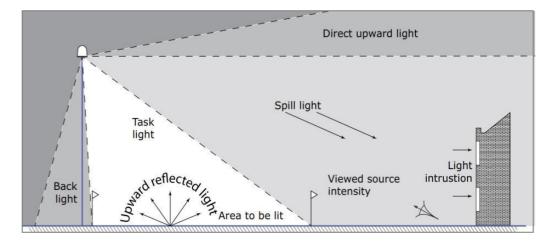
ILP Professional Guidance 05 for The Brightness of Illuminated Advertisements

- 2.29. This document is intended to provide pragmatic guidance to all people involved with exterior illuminated signage and advertisements within the British Isles.
- 2.30. This document provides clear guidance on illuminated signage.
- 2.31. Illuminated signage and advertisements have become an integral part of our street scene and they are designed to have an impact. When considering any application for illuminated signage, thought should be given to how it is to be viewed within the street scene. One sign on its own may have a minimal impact on the street scene however many signs may have a negative impact on the street scene confusing the visual task or visual amenity.

3. LIGHT POLLUTION

3.1. Light pollution is a generic term for all the adverse impacts that artificial lighting can have after dark. The main types of light pollution are shown diagrammatically in **Figure 3.1**.

Figure 3.1: Types of Light Pollution – Source: ILP Guidance Note 01/21.



3.2. Contributing to these direct effects are three design aspects that should be considered alongside the purpose for a new lighting installation and the type of sensitive receptors found in the local area. These are described later in this report.

Types of Light Pollution

Light Spill (Light intrusion, back light)

- 3.3. Light spill is 'the spilling of light beyond the boundary of the site on which a light source is located', such that it causes a noticeably adverse effect. More simply, light spill is often termed as the intrusion of light into homes. It can also have a negative effect on wildlife and ecological systems local to an installation.
- 3.4. As set out in the ILP Guidance Notes, the limits for light spill vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design. Through careful design, it can readily be ensured that this impact is prevented and that the illumination falling within any residential property can be reduced to zero. This is incorporated into the Lighting Strategy contained within this report.

Sky Glow (Direct upward light)

- 3.5. Sky glow is the 'the brightening of the night sky' above illuminated areas. The brightness created is constantly varying as a function of many parameters such as direct upward-lighting, ground surface reflectance, overhead cloud cover, and the degree of water droplets in the atmosphere rain, fog/mist, and snow, for example, exacerbate the effect.
- 3.6. Mitigation is achieved by complying with the recommended limits in the ILP Guidance Notes for upward light emission. The limits vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design. The Lighting Strategy will ensure that these limits can be met for the Proposed Development.
- 3.7. To mitigate sky glow as much as possible, lighting must be accurately targeted and kept to a minimum, and this design principle is incorporated into the Lighting Strategy.

3.8. The magnitude of the impact is a matter of judgement, taking into account the existing night-time view. The magnitude is lessened for those views where an observer is subject to direct illumination from, say, a nearby streetlight, or where light spill from a nearby light source illuminates the foreground, because the observer's vision is not fully dark adapted.

Glare (Viewed source intensity)

3.9. Glare occurs when an individual experiences visual discomfort or disability stemming from direct views of lamp sources, or high contrast of a lighting installation against a dark background. The placement of luminaires, their photometric characteristics, and the viewing context contribute to glare, which has been noted to result from uncontrolled private lighting installations, security lighting, street lighting mounted at high level near residences or habitat.

Design Aspects

Building Luminance

3.10. This considers the appropriateness and scale of brightness for the lighting / highlighting of built structures. Design criteria is included within ILP guidance notes as more of a main effect. While this is addressed independently, building luminance can also be considered as an indirect contributor to light spill, sky glow and glare.

Light Levels

3.11. Light levels, both as designed and installed, have the potential to create areas which have a noticeable difference in brightness. A new lighting installation in an area that has not been lit or is significantly brighter than the surrounding area may affect both adjacent receptors in the form of light spill or glare, and those over a larger area by contributing to sky glow through over-lighting.

Light Colour

3.12. Light colour has the potential to alter an individual's perception of their environment with respect to colour and clarity, as the human eye responds best to whiter light with higher quantities of ultraviolet wavelengths. Various wildlife species may respond differently to spectral composition depending on how reliant they are on darkness; many nocturnal animals continue their social habits and feeding behaviours with increased activity in the area while others may decrease their activity and possibly desert their habitat. This type of impact could affect pedestrians, vehicle operators and wildlife, and is likely to occur where new lighting is placed.

4. BASELINE CONDITIONS

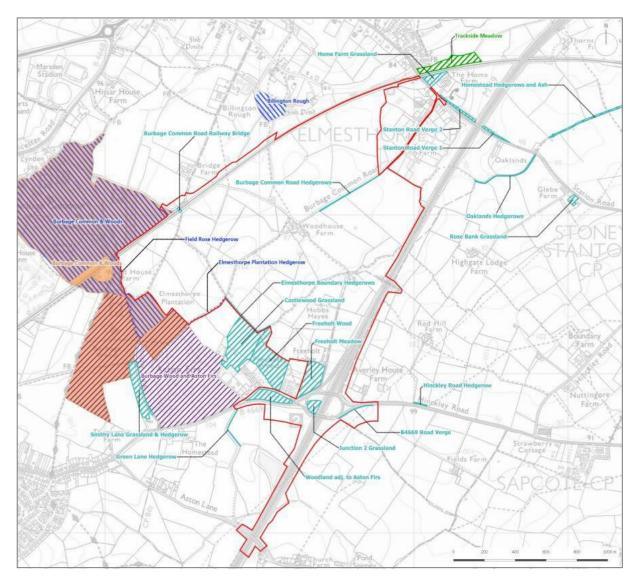
Introduction

- 4.1. The study area includes the application site, the surrounding areas and any sensitive receptors which may have a direct view towards external lighting proposals and/or which may be affected during the construction and operation of the proposed development. Coverage extends as far outside of the boundary as the distance where modelling indicates that illuminance sourced from lighting associated with the development could exceed a threshold of 1 Lux. Assessment of designation, use, habitat and external lighting condition dictates the classification of Environmental Zone across the proposed site location and surrounding areas.
- 4.2. The Proposed Development is set in a rural area. The site and immediate surroundings include some areas of natural unlit landscape however situated in relative close proximity is Stoney Stanton and Elmesthorpe, both containing illuminated highway. Also located in close proximity is the A47 highway which is also illuminated. With reference to **Table 2.1** it is therefore deemed that the Site falls into Environmental Zone E2, defined as a rural surrounding with low district brightness.
- 4.3. The following categories have been determined as potential sensitive receptors which could be impacted by any external lighting proposals of the proposed development:
 - Ecological potential bat roost, foraging and commuting (hedgerows, waterways or treelines);
 - Residential both occupied dwellings and potential residential development;
 - Heritage;
 - Direct Sky Glow;
 - Highway lit and unlit; and
 - Railway.
- 4.4. No receptors have been excluded.

Ecology Receptors

- 4.5. The impact on biodiversity receptors that could be adversely affected is discussed in the **Environmental Statement: Chapter 11: Ecology and Biodiversity**.
- 4.6. **Figure 4.1** illustrates the Ecological designations plan (courtesy of EDP).

Figure 4.1: Ecological designations plan (courtesy of EDP).



- 4.7. The nearby Sites of Special Scientific Interest (SSSI) include:
 - Burbage Wood; and
 - Aston Firs.
- 4.8. The nearby local nature reserve sites include:
 - Burbage Common and Woods.
- 4.9. The nearby local wildlife sites include:
 - Billington Rough;
 - Burbage Common and Woods;
 - Field Rose Hedgerow; and
 - Elmesthorpe Plantation Hedgerow.
- 4.10. The nearby candidate local wildlife sites (cLWS) include:

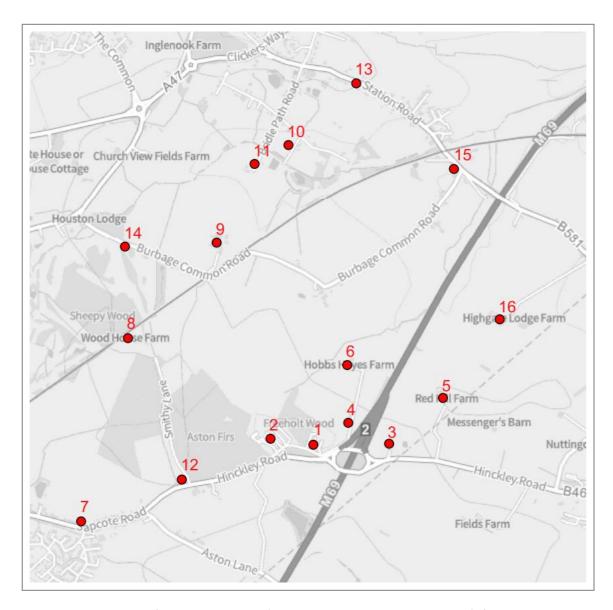
- Trackside Meadow (adjacent to the Home Farm).
- 4.11. The nearby potential local wildlife sites (pLWS) include:
 - Home Farm grassland;
 - Homestead hedgerows and ash;
 - Stanton Road verge 1;
 - Stanton Road verge 2;
 - Oaklands hedgerows;
 - Rose Bank grassland;
 - Burbage Common Road hedgerows;
 - Burbage Common Road railway bridge;
 - Elmesthorpe boundary hedgerows;
 - Castlewood grassland;
 - Freeholt Wood;
 - Freeholt Meadow;
 - Hinckley Road hedgerow;
 - B4669 verge;
 - M69 Junction 2 grassland;
 - Woodland adjacent to Aston Firs;
 - Smithy Lane grassland and hedgerow; and
 - Green Lane hedgerow.

Residential Receptors

- 4.12. The residential receptors surrounding the site are illustrated in **Figure 4.2** and have been determined as follows:
 - 1. Aston Firs Caravan Park;
 - 2. Castlewood Mobile Home Park;
 - 3. Averley House Farm;
 - 4. Freeholt Lodge;
 - 5. Red Hill Farm;
 - 6. Hobbs Hayes Farm;
 - 7. Residences along Hinckley Road / Sapcote Road;
 - 8. Wood House Farm;
 - 9. Bridge Farm;

- 10. Residences along Billington Road East;
- 11. Residences along Bridle Path Road;
- 12. Residences along Hinckley Road / Sapcote Road;
- 13. Residences within Elmesthorpe;
- 14. Residences along Burbage Common Road;
- 15. Residences along Stanton Road; and
- 16. Highgate Lodge Farm.

Figure 4.2: Residential receptors (indicated in red).



4.13. The limits for light intrusion (Illuminance in the vertical plane) for each Environmental Zone are described in **Table 4.1**, extracted from the ILP GN01/21 guidance.

Table 4.1: Maximum values of vertical illuminance on properties.

Light Technical Parameter	Application Conditions	Environmental Zones				
		EO	E1	E2	E3	E4
Illuminance in the vertical plane (E _v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx	1 lx	2 lx	5 lx

Natural - Sky Glow Receptors

- 4.14. The ILP GN01/20 guidance provides limitations for maximum allowable sky glow percentage for each Environmental Zone as shown in **Table 4.2**.
- 4.15. Sky glow is measured as ULR (Upward Light Ratio), the percentage of luminaire flux of a luminaire or a lighting installation that is emitted above the horizontal. Sky glow limitations depend on the Environmental Zone of the lighting installation as set out in the ILP guidance notes. The Environmental Zone categories are previously defined in this report in **Table 2.1**.

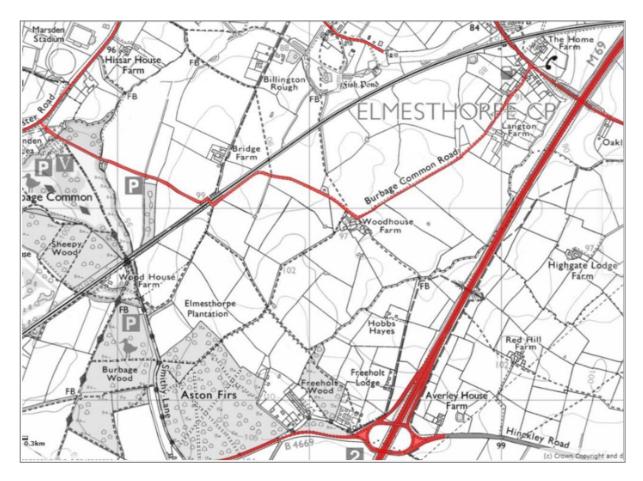
Table 4.2: Maximum values of upward light ratio (ULR) of luminaires.

Light Technical Parameter	Environmental Zones				
	EO	E1	E2	E3	E4
Upward light ratio (ULR) %	0	0	2.5	5	15

Highway Receptors

- 4.16. The nearby highway receptors have been identified as follows,
 - The B4668 (Leicester Road);
 - The B4669 (Hinckley Road);
 - The M69, specifically Junction 2;
 - Billington Road East;
 - Burbage Common Road; and
 - Station Road.
- 4.17. The nearby highway receptors are illustrated in Figure 4.3.

Figure 4.3: Highway receptors (indicated in red).



4.18. The ILP Guidance Notes for the Reduction of Obtrusive Light provide limitations for the maximum threshold increment (TI) and veiling luminance (LV) for each road classification type, as shown in **Table 4.3**.

Table 4.3: Obtrusive light limitations for exterior lighting installations – road users.

Road Classification	Threshold Increment (TI)	Veiling Luminance (L _V)
No road lighting	15% based on adaptation luminance of 0.1cd/m ²	0.037
M6 / M5	15% based on adaptation luminance of 1cd/m²	0.23
M4 / M3	15% based on adaptation luminance of 2cd/m²	0.40
M2 / M1	15% based on adaptation luminance of 5cd/m²	0.84

Road Classification — as given in BS EN 13201-2:2015 Road lighting performance requirements. Limits apply where users of transport systems are subject to a reduction in the ability to see essential information. Values given are for relevant positions and for viewing directions in the path of travel.

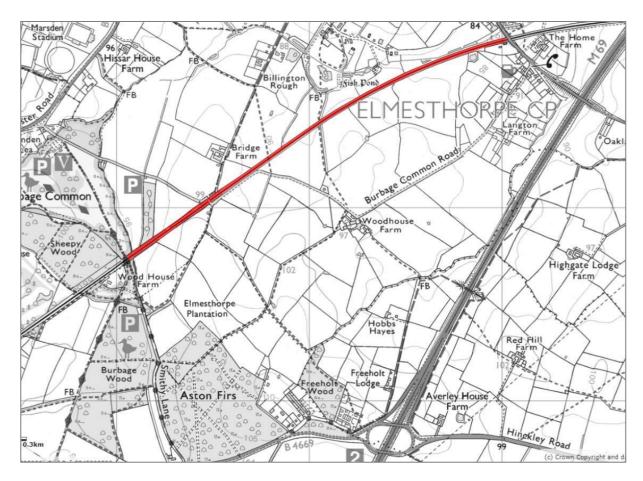
 $\underline{\mathsf{TI}}$ - The measure of disability glare expressed as the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present. Note: Higher values of TI correspond to greater disability glare, the reduction in visibility caused by intense light sources in the field of view.

 \underline{Lv} -The luminance that would need to be superimposed on a scene in object space to reduce the scene's contrast by an amount equal to the added retinal illuminance from scattered light on the scene's retinal image. It is most commonly used to describe the contrast-reducing effect of a glare source in the field of view.

Railway Receptors

- 4.19. The railway receptors of the site have been identified as follows:
 - The Birmingham to Peterborough railway line to the North West of the site.
- 4.20. The nearby railway receptors are illustrated in Figure 4.4.

Figure 4.4: Railway receptors (indicated in red).

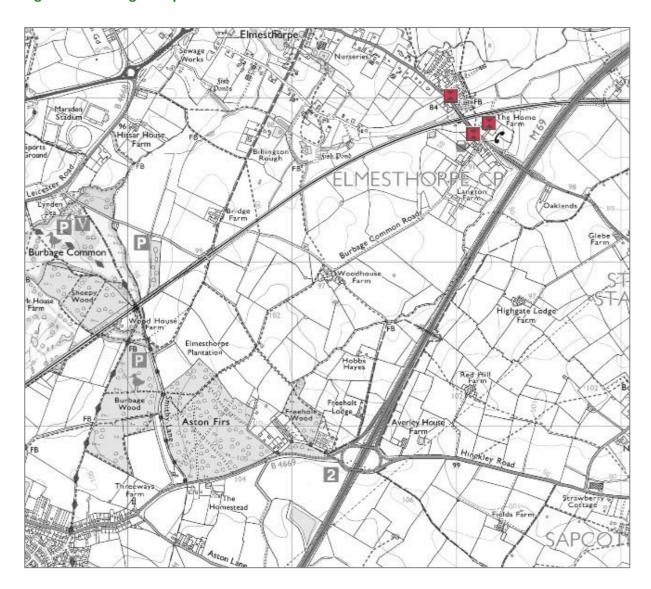


- 4.21. BS 5489-1 provides qualitative guidance on minimising light spill and glare to railway lines but does not contain specific threshold limits. The following guidance shall be put in place:
 - Light spill should be minimised in the vicinity of a railway bridge crossing/passing above a road;
 - Columns should be placed as far away as practicable from a rail bridge or the fence line of railway track;
 - Unwanted glare should be minimised for the train driver by the use of luminaires confirming to an appropriate G class selected from BS EN 13201-2:2015 or shielding.

Heritage Receptors

- 4.22. The heritage receptors are shown in **Figure 4.5**. These have been identified as follows:
 - The Home Farm (Grade II Listed);
 - The Wentworth Arms (Grade II listed); and
 - Grade II listed residences along Station Road.

Figure 4.5: Heritage receptors.



5. LIGHTING STRATEGY

Introduction

- 5.1. This section sets out the design principles and external lighting strategy for the Proposed Development.
- 5.2. An indicative external lighting design has been prepared which meets all parameters and criteria as set out in this report. The external lighting design is included in **Appendix 1**.
- 5.3. A modern external lighting installation is vitally important to the Proposed Development for many reasons including, but not limited to, the following:
 - To provide safety for pedestrians from moving vehicles, railway and cranage;
 - To provide ease of wayfinding and navigation for staff and visitors;
 - To provide security and deter antisocial behaviour;
 - To set the architectural scene and urban landscape;
 - To control direction signage and their relationship with other illuminated material;
 - To protect installations from accidental or deliberate damage; and
 - To allow safe access and maintenance.
- 5.4. It is important that the lighting applications provide both an aesthetic quality and also the appropriate levels of illumination required for the space they inhabit.
- 5.5. This section focuses primarily on the operational phase lighting strategy. A sub-section specific to construction phase lighting strategy is included at the end of this section.

Proposed Development

- 5.6. The Proposed Development covers an area of approximately 268 hectares (ha). The Main HNRFI Site covers an area of approximately 187 ha and is for up to 850,000 square metres gross internal area of warehousing and ancillary buildings.
- 5.7. The Site lies 3 km to the north-east of Hinckley, in Blaby District in Leicestershire, in a level area of mixed farmland to the north-west of M69 Junction 2. The Nuneaton to Felixstowe railway forms the north-western boundary of the site, with the M69 motorway defining the south-eastern boundary. To the south-west of the Site are blocks of deciduous woodland, including Burbage Wood (an ancient woodland), Aston Firs and Freeholt Wood, and two traveller community sites. Beyond the north-eastern Site boundary lies the village of Elmesthorpe, a linear settlement on the B581 Station Road.

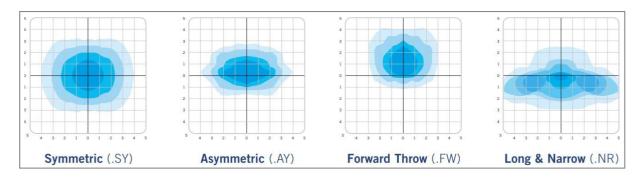
Design Parameters

- 5.8. All external lighting shall be provided in accordance the Relevant Policies and Guidance. It will be designed to minimise obtrusive light and optimise energy use. Lighting will comply with recommendations for Environmental Zone E2 given in ILP Guidance Notes for the Reduction of Obtrusive Light (Guidance Note 01/21).
- 5.9. Luminaires will be LED light source to provide optimum energy efficiency and accurate targeting of light output to keep obtrusive light effects to the absolute minimum.
- 5.10. High mast lighting shall be introduced where standard column mounted lighting is deemed impractical. The use of high mast lighting shall be limited to the Rail Terminal, including the

Railway Chord and Container Handling Area, and the Railport Returns Area.

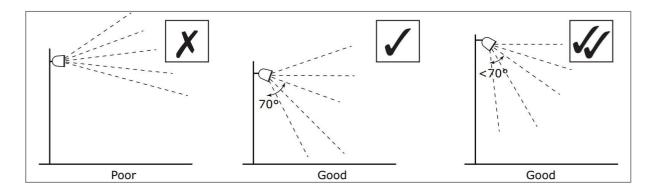
- 5.11. External lighting will be provided wherever necessary to provide a safe and secure environment for staff and other users after dark. 'Secured by Design' principles will be adopted and emphasis will be placed on achieving good uniformity of light distribution. All illumination levels will be set as low as practicable while complying with safety and security recommendations. Spill of light onto building facades and outside of the target area for illumination will be minimised through careful design, specification and positioning of lighting equipment.
- 5.12. At the outer edges of the Proposed Development luminaires will as far as practicable be positioned so that they are out of view of sensitive receptors. Mounding, fencing and planting that is being provided for visual and noise reduction reasons will be recruited to assist in achieving this.
- 5.13. At the outer edges of the Proposed Development luminaires will be complete with back light shields or optics with sharp cut off will be used where required to minimise impact on sensitive receptors.
- 5.14. Luminaires shall generally be mounted on buildings and on standard lighting columns and shall be arranged to maximise the amount of light reaching trafficked hard surfacing while minimising spill light onto adjacent areas.
- 5.15. Lighting levels will be suitable for pedestrian, vehicular and railway access, and the operation of a CCTV system. Lighting will be installed to provide sufficient illumination for safe circulation and to promote a feeling of safety and security.
- 5.16. G4 compliant luminaires shall be utilised for the road and area lighting. The G rating of a luminaire relates to the luminous intensity of light emitted at angles of 70, 80 and 90 degrees when the luminaire is mounted at a tilt of zero degrees to the finished surface that it is lighting.
- 5.17. Luminaires must utilise optimum optical distribution to direct exactly where needed while allowing maximum spacing between luminaries and minimise the required number of columns. Examples are illustrated in **Figure 5.1**.

Figure 5.1: Light Distributions.



5.18. Luminaires shall be of the directional type that emit all their light below the horizontal plane. Glare shall be kept to a minimum by ensuring that the main beam angle of all luminaires directed towards any potential observer is no greater than 70° in line with the recommendations in ILP Guidance Note 01/21, demonstrated in **Figure 5.2**.

Figure 5.2: Luminaire aiming angles – Source: ILP Guidance Note 01/21.



Illuminated Signage

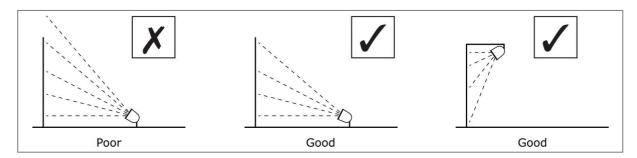
- 5.19. Any proposed Illuminated signage shall comply with the following guidance given in ILP PLG 05 'The Brightness of Illuminated Advertisements':
 - Lighting shall be static;
 - No intermittent light sources, flashing lights, moving parts or features, no exposed cathode tubing, animation or reflective material;
 - Illumination in a manner reasonably required to fulfil the purpose of advertisement; and,
 - Maximum permitted luminance levels in line with **Table 5.1**.

Table 5.1: Signage luminance limits in England

Illuminated area	Maximum luminance (cdm²)
More than 10m2	300
Not more than 10m2	600

5.20. When lighting vertical structures such as advertising signs, light shall be directed downwards wherever possible. If there is no alternative to up-lighting, the use of luminaires with the correct optical distribution, coupled where required with shields, baffles and louvres, will help minimise spill light around and over the structure. This is demonstrated in **Figure 5.3**.

Figure 5.3: Facade illumination – Source: ILP Guidance Note 01/21.



Residential Receptors

- 5.21. The indicative external lighting design, included in **Appendix 1**, has been produced in industry standard lighting calculation software. The design includes Lux level contour lines which assume a level, clear site. In practice, the effect of changes in elevation and obstructions such as trees and hedges will contain the light spill further than is shown in the plot, i.e., the Lux level contour lines represents the absolute worst case scenario.
- 5.22. As previously established, the maximum permissible illuminance in the vertical plane (Ev) for an Environmental Zone E2 area is 1 Lux. The residential receptors previously identified are located significantly beyond the 1 Lux contour line as demonstrated in **Appendix 1**. As such the proposed lighting scheme meets the ILP obtrusive light limitations and is therefore not considered to result in unacceptable impacts on residential properties. Any deviation to the indicative lighting design must also demonstrate this prior to any approval or installation.

Natural – Sky Glow Receptors

- 5.23. The indicative external lighting design, included in **Appendix 1**, provides details of lighting units and any associated tilt angle required to achieve the target lighting performance requirements.
- 5.24. As previously established, the maximum permissible upward light ratio (ULR) for an Environmental Zone E2 area is 2.5%. The indicative lighting design utilises luminaires that emit downward light only at zero tilt and demonstrates that the Proposed Development can be adequately lit with a 0% ULR. As such the indicative external lighting scheme demonstrates the Proposed Development can be adequately lit while not exceeding the limitations for ULR. Any deviation to the indicative lighting design must also demonstrate this prior to any approval or installation.

Special Measures close to Biodiversity-sensitive areas

- 5.25. Light spill has the potential to affect both flora (plants etc) and fauna (insects, reptiles, wild animals etc). Light spill can disrupt feeding patterns and force ecological receptors to leave their habitat.
- 5.26. There are a number of ecological areas that will be sensitive to lighting effects. Where lighting is to be sited close to such areas there is the potential for such effects to be significant unless special measures are employed. This is particularly true for the ancient woodland and rail corridor. It is also necessary to prevent lighting effects on the proposed new bunds and landscaping around the perimeter of the Main Site.
- 5.27. All lighting sited close to ecologically sensitive areas has been designed to minimise light spill. The indicative external lighting design has been produced in collaboration with the appointed Ecologist. The design process was iterative and was reviewed by the Ecologist at

each stage to ensure light was managed at specific areas of ecological value. In cases where light spill needed to be further controlled the introduction of back light shields, optics with sharp cut off or a reduction in mounting height have been introduced to reduce as far as practicable whilst still providing adequate illumination.

- 5.28. Potential biodiversity receptors that could be adversely affected are discussed in the Environmental Statement: Chapter 11: Ecology and Biodiversity.
- 5.29. In order to minimise disturbance to potential bat habitat the following measures should be introduced, in line with the recommendations of ILP Guidance Note 08 for Bats and artificial lighting in the UK:
 - All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
 - LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
 - Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
 - Column heights should be carefully considered to minimise light spill.
 - Only luminaires with an upward light ratio of 0% and with good optical control should be used.
 - Luminaires should always be mounted on the horizontal, ie no upward tilt.
 - As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.
- 5.30. Where bats are likely to be present guidance from ILP Guidance Note 08 for Bats and artificial lighting in the UK will be followed. Lighting will be LED type, free of UV emissions to prevent adverse effects on flying insect and bat populations.

Performance Requirements

5.31. All illumination levels will be set as low as practicable while complying with safety and security recommendations and the design levels set out in BS EN 12464 'Light and lighting – Lighting of work places – Part 2: Outdoor work places' and BS 5489-1 'Design of road lighting- Lighting of roads and public amenity areas'. A summary of the applicable design levels is detailed in Table 5.2.

Table 5.2: Proposed External Lighting Minimum Design Levels.

Type of area, task, or activity	Maintained illuminance,	Illuminance uniformity,
	Em (Lux)	U0
Internal Access Roads	15	0.25
Link Road	20	0.40
Service Areas / Yards	30	0.40

Rail Terminal - Crane Gantry and Container Handling	50	0.40
Lorry Parks	20	0.25
Car Parks	10	0.25
Walkways	10	0.25

5.32. Supplementary floodlights may also be provided to service yard areas positioned to provide local illumination of 150 Lux in front of loading doors in line with the recommendations of SLL Lighting Guide 1: The Industrial Environment.

Internal Access Roads

- 5.33. Internal Access Roads are considered all internal roads providing access to the proposed Units from the Link Road. Lighting shall be provided from standalone lighting columns with a limited mounting height not exceeding eight metres.
- 5.34. Luminaires shall be complete with purposely designed road optics to distribute the light as efficiently as possibly whilst controlling and minimising any light spill and to assist in reducing the number of columns required.
- 5.35. Lighting will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places' and the target average illuminance will be 15 lux.

Link Road

- 5.36. The Link Road connects M69 Junction 2 with the A47. Lighting shall be provided from standalone lighting columns with a limited mounting height not exceeding 10 metres.
- 5.37. The Link Road lighting shall comply with the lighting policies of Highways England and Leicestershire Highways that are current at the time of design. Lighting design will consider the environment in which the lighting will be situated.
- 5.38. Luminaires shall be complete with purposely designed road optics to distribute the light as efficiently as possibly whilst controlling and minimising any light spill and to assist in reducing the number of columns required.
- 5.39. Lighting will comply with the recommendations given in BS 5489-1 'Design of road lighting-Lighting of roads and public amenity areas', and the target average illuminance will be 20 lux.

Service Areas / Yards

- 5.40. Lighting for service areas / yards will be provided from column mounted luminaires around the perimeter of the yard and directed towards the building. Maximum column height will be 10 metres; a lower mounting height will be used wherever practicable. Additional luminaires may also be located over loading bays/lorry dock areas and aimed downwards, mounted at a maximum height of 10 metres.
- 5.41. Lighting will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places' and the target average illuminance will be 30 lux.

Rail Terminal

- 5.42. For areas where gantry cranes are operating, the underside of the gantry cranes will carry floodlights to illuminate the working area immediately below the crane.
- 5.43. Lighting will generally be provided from high mast and column mounted luminaires positioned to provide optimum light distribution with minimal light spill to minimise the quantity of masts. High mast luminaires will be limited to a maximum height of 25 metres; a lower mounting height will be used wherever practicable.
- 5.44. Lighting to the container stack will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places' and the target average illuminance will be 50 lux.
- 5.45. Lighting to the rail chord will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places' and the target average illuminance will be 30 lux. Low level low output lighting may be provided between tracks if deemed a requirement for safety and security.
- 5.46. Lighting to the cripple sidings will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places' and the target average illuminance will be 10 lux.

Lorry Parks and Car Parks

- 5.47. Lorry parks and car parks will be lit by luminaires mounted on standalone lighting columns. Maximum column height will be 10 metres; lower mounting heights will be used wherever practicable.
- 5.48. The lighting will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places'. The target average illuminance will be 10 lux for car parks and 20 lux for lorry parks.

Walkways

- 5.49. Walkways shall be illuminated during hours of low natural light and darkness predominantly for safety and security. Lighting shall be provided by luminaires mounted on lighting columns of as low a height as reasonably practicable. Where possible low level illuminated bollards shall be utilised.
- 5.50. Luminaires shall be complete with purposely designed pathway optics to distribute the light as efficiently as possibly whilst controlling and minimising any light spill, this also assists in reducing the number of columns / bollards required to achieve the lighting levels and uniformity.
- 5.51. External walkway lighting will comply with the recommendations given in BS EN 12464 'Light and lighting Lighting of work places Part 2: Outdoor work places'. The target average illuminance will be 10 lux.
- 5.52. Lighting to the proposed underpass under the rail chord will comply with the recommendations given in BS 5489-1 'Design of road lighting- Lighting of roads and public amenity areas' to give higher levels during daylight hours, which can be switched to lower levels of illuminance during the hours of darkness. Switching can be carried out by either time switch or photocell. The target average illuminance will be 350 lux (daytime) and 20 lux (night time).

Luminaire Selection

- 5.53. The indicative external lighting design presented has been produced with high quality luminaires as manufactured by Holophane Lighting and Urbis Schreder. A full luminaire schedule is included in **Appendix 1**.
- 5.54. The final detailed design may deviate from the indicative external lighting design presented but must meet all parameters and criteria as set out in this report and demonstrate equal to or less than the quantity of light spill achieved. An adequate and safe level of lighting must be provided for site tasks, amenity, and security, whilst maintaining acceptable impact on the site surroundings, environment, railway and neighbouring properties.
- 5.55. Included within **Appendix 2** is the manufacturer's literature.

Table 5.3: Proposed luminaires.

Luminaire type	Manufacturer information	Image
Column mounted	Holophane Lighting – D-Series	
Building mounted	Mounting height 6m – 12m	
	2,000 – 30,000 Lumens	
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK10	_
High mast	Holophane Lighting - HMAO	
	Mounting height 20m – 30m	
	30,000 – 100,000 Lumens	
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK07	
Column Mounted	Urbis Schreder – Ampera Evo 3	
A47 Link Road	Mounting height 8m – 10m	The state of the s
	600 – 21200 Lumens	11
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK09	

Construction Phase Lighting

- 5.56. While construction phase lighting for the Proposed Development and associated highway mitigation works is expected to be short term and reversible it is important to define the parameters to minimise light pollution.
- 5.57. Lighting will operate in all external areas used by construction workers after dark in order to provide a safe and secure working environment without over lighting. High quality LED light sources with high colour rendering index (CRI) shall be utilised to maximise visibility with efficient light output.
- 5.58. Lighting shall be provided to meet the target lux level as set out in BS 12464-2 Lighting of Outdoor Workplaces without over lighting. Luminaires shall be mounted at the lowest practical mounting height, providing lighting only where lighting is required.
- 5.59. The Contractor shall specify working hours, uses of lighting, location of temporary floodlights and construction compound and agreeing these with the local council to reduce duration of impact.
- 5.60. Lighting controls should be employed to dim or switch off any lighting that is not needed.
- 5.61. Lighting that needs to be sited close to the perimeter or ecologically sensitive areas should be fitted with shielding or be switched off or dimmed when not in use.
- 5.62. Lighting should be controlled in such a way to illuminate high activity, hazardous or high security areas while reducing lighting levels at less pertinent areas.
- 5.63. The Contractor should act responsibly to adjust any temporary lighting reported as causing nuisance.

6. CONCLUSION

- 6.1. The Proposed Development Lighting Strategy supports relevant policy and guidance. An indicative external lighting design has been produced that minimises light pollution and complies with relevant policy and guidance while meeting the performance requirements set out in this report.
- 6.2. The final detailed design may deviate from the indicative external lighting design presented but must meet all parameters and criteria as set out in this document and demonstrate equal to or less than the quantity of light spill achieved.
- 6.3. An adequate and safe level of lighting must be provided for site tasks, amenity, and security, whilst maintaining acceptable impact on the site surroundings, environment, railway and neighbouring properties.
- 6.4. The reduction of light pollution should not compromise crime prevention and public safety and alternative technological solutions should be explored to ensure these elements are not compromised whilst also mitigating against obtrusive light.
- 6.5. This report will be referenced in Chapters 10 and 11 of the Environmental Statement (Volume 1) to assess external lighting impact on Biodiversity and Landscape and Views.

References

- Blaby District Council Core Strategy (2013)
- Blaby District Local Plan (2019)
- Hinckley & Bosworth Borough Council Site Allocations and Development Management Policies DPD (2006-2026)
- National Planning Policy Framework (February 2019)
- ILP Guidance Notes for the Reduction of Obtrusive Light GN01 (2021)
- ILP Guidance Note 8 Bats and Artificial Lighting (2018)
- ILP Professional Lighting Guide 05 The Brightness of Illuminated Advertisements (2014)
- Lighting in the Countryside: Towards Good Practice (2001)
- SLL Lighting Guide 1: The Industrial Environment (2018)
- SLL Lighting Guide 15: Transport Buildings (2017)
- BS 5489: Code of Practice for the Design of Road Lighting Part 1: Lighting of Roads and Public Amenity Areas (2020)
- BS 13201: Road Lighting Part 1, 2, 3, 4: Performance Requirements (2015)
- BS EN 12464-2: Lighting of Workplaces. Outdoor Work (2014)
- Commission Internationale De L'Eclairage (CIE 150) (2003)
- Guidelines for Minimising Sky Glow (CIE 126) (1997)
- National Planning Practice Guidance (2014)

Abbreviations

CEMP	Construction Environmental Management Plan
CRI	Colour Rendering Index
EIA	Environmental Impact Assessment
ES	Environmental Statement
Em	Maintained Illuminance
E _v	Illuminance in the Vertical Plane
ILP	Institute of Lighting Professionals
LED	Light Emitting Diode
NPPF	National Planning Policy Framework
ODPM	Office of the Deputy Prime Minister
u0	Illuminance Uniformity
ULR	Upward Light Ratio

ENVIRONMENTAL STATEMENT ♦ HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

Technical Appendix: Lighting Strategy

UV Ultraviolet

APPENDICES

Appendix 3: Technical Note for Obtrusive Light

Tritax Symmetry (Hinckley) Limited HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Technical Note for Obtrusive Light

Report Prepared by: BWB Consulting Ltd

Revision: 04

October 2023

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

This document forms a part of the Environmental Statement for the Hinckley National Rail Freight Interchange project.

Tritax Symmetry (Hinckley) Limited (TSH) has applied to the Secretary of State for Transport for a Development Consent Order (DCO) for the Hinckley National Rail Freight Interchange (HNRFI).

To help inform the determination of the DCO application, TSH has undertaken an environmental impact assessment (EIA) of its proposals. EIA is a process that aims to improve the environmental design of a development proposal, and to provide the decision maker with sufficient information about the environmental effects of the project to make a decision.

The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

Further details about the proposed Hinckley National Rail Freight Interchange are available on the project website:

http://www.hinckleynrfi.co.uk/

The DCO application and documents relating to the examination of the proposed development can be viewed on the Planning Inspectorate's National Infrastructure Planning website:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/hinckley-national-rail-freight-interchange/

DOCUMENT ISSUE RECORD

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Appendix 1: Obtrusive Light Layout
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1. INTRODUCTION

Instruction

- 1.1. BWB Consulting (BWB) was instructed by Tritax Symmetry to carry out a Technical Note to supplement the Lighting Strategy (ES Appendix 3.2, Document reference: 6.2.3.2, APP-132 to APP-134) for the Proposed Development.
- 1.2. This Technical Note has been produced to provide additional information to supplement the original Lighting Strategy following requests made by consultees as part of the Statement of Common Ground (SoCG) process.
- 1.3. The full project description is in included in Environmental Statement Volume 1: Main Statement, Chapter 3: Project Description (Document reference 6.1.3, APP-112), hereafter referred to as the 'Proposed Development'.

Scope of Works

- 1.1. The primary objective of this Technical Note is to reach a common agreement between Tritax Symmetry and relevant stakeholders in respect to external lighting at the Proposed Development by:
 - Demonstrating, by calculated examples, that the Proposed Development can be provided with an external lighting installation that complies with the criteria as set out in the Lighting Strategy, while not exceeding the obtrusive light limitations outlined herein.
 - Provide additional clarification, information and criteria for reference to applicable elements that was not specifically covered in the original Lighting Strategy.

2. RELEVANT POLICY AND GUIDANCE

2.1. Relevant international, national, and local policy documents are summarised in this section and are provided to supplement the documents referenced in Section 2 of the Lighting Strategy.

International Guidance

Glare Evaluation System (CIE 112)

- 2.2. This technical report describes a practical glare evaluation system for outdoor sports- and area lighting. The system can be used both for checking the glare situation of existing installations, provided suitable measuring instrumentation is available, and for predicting the degree of glare at the design stage for new installations, but the validity of the system is restricted to viewing directions below eye level. For the main categories of these applications, general glare rating limits are specified.
- 2.3. CIE 112 provides a nine-point glare assessment scale which is summarised in **Table 2.1.** This scale provides insight in the practical meaning of differences in glare ratings for the purposes of evaluating predicted glare.

Table 2.1: Nine-point glare assessment scale

Glare control mark GF		Glare rating GR
1	Unbearable	90
2		80
3	Disturbing	70
4		60
5	Just admissible	50
6		40
7	Noticeable	30
8		20
9	Unnoticeable	10

2.4. CIE 112 also provides recommendations for glare rating limits for various types of application. This table is summarised in **Table 2.2**.

Table 2.2: Recommended glare rating limits

Type of	GR _{max}	
Lighting for		
	Low Risk	55
Safety and Security	Medium Risk	50
	High Risk	45
	Pedestrians only	55
Movement and Safety	Slow moving traffic	50
	Normal traffic	45
	Very rough	55
Work	Rough – medium	50
	Rough – fine	45

Institute of Lighting Professionals (ILP) Guidance

ILP Professional Lighting Guide (PLG) 04 - Guidance on Undertaking Environmental Lighting Impact Assessments (2013)

2.6. This document is designed to provide and explanation of, and guidance on, the process for producing a Lighting Assessment. It can also be used as a prompt for the lighting designer on important aspects of specific projects which should be used to remove or minimise potential environmental problems.

ILP Guidance Notes for the Reduction of Obtrusive Light (Guidance Note 01/21)

- 2.7. This guide is intended to be used in the planning context and can be applied through planning conditions. It sets out best practice for lighting design and control of obtrusive light (light pollution), defines environmental zone categories based on their capacity to absorb lighting effects, and gives guidance on the limitation of obtrusive light in terms of sky glow, glare and light trespass for each category.
- 2.8. The limits for the luminous intensity (Glare) of bright luminaires are dependent on the viewing distance d, (between the observer and the bright luminaire(s)) and the projected area A_p, of the bright part of the luminaire in the direction of the observer.
- 2.9. The ILP GN 01/21 provides limits for the luminous intensity of bright luminaires. **Table 2.3** shows the maximum values for the luminous intensity of luminaires in designated directions where views of bright surfaces of luminaires are likely to be a nuisance to occupants of premises. This table is referenced from Commission International e L'Eclairage (CIE 150:2017) *Guide on the Limitation of Effects of Obtrusive Light from Outdoor Lighting Installations*.

Table 2.3: Limits for the luminous intensity of bright luminaires

Light	Application	Luminaire group (projected area A _p in m²)					
technical	conditions	0 <a<sub>p</a<sub>	0.002 <a<sub>p</a<sub>	0.01 <a<sub>p</a<sub>	0.03< A _p	0.13 <a<sub>p</a<sub>	$A_p > 0.5$
parameter		≤0.002	≤0.01	≤0.03	≤0.13	≤0.50	
	EO						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
Maximum	Pre-curfew	0.29 d	0.3 d	1.3 d	2.5 d	5.1 d	2,500
luminous	Post-curfew	0	0	0	0	0	0
intensity	E2						
emitted	Pre-curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
by	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
luminaire	E3						
(I in cd)	Pre-curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000
	E4						
	Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
Aid to gauging A _p		2 to 5cm	5 to 10cm	10 to 20cm	20 to 40cm	40 to 80cm	>80cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Correspond representat	ing A _P ive area (m2)	0.0008	0.004	0.016	0.063	0.251	>0.5

NOTE:

- 1. 'd' is the distance between the observer and the glare source in meters;
- 2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut off in the designated directions;
- 3. A_P is the apparent surface of the light source seen from the observer position;
- 4. For further information refer to Annex C of CIE 150
- 5. Upper limits for each zone shall be taken as those with column Ap>0.5
- 2.10. The limits for light intrusion (Illuminance in the vertical plane) for each Environmental Zone are described in **Table 2.4**, extracted from the ILP GN01/21 guidance.

Table 2.4: Maximum values of vertical illuminance on properties.

Light Technical Parameter	Application Conditions	Environmental Zones				
		EO	E1	E2	E3	E4
Illuminance in the vertical plane (E_{ν})	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx	1 lx	2 lx	5 lx

3. METHODOLOGY

Introduction

- 3.1. The original lighting model, used to generate the indicative lighting layout which was appended to the Lighting Strategy, shall be rebuilt in alternative lighting calculation software to enable additional detailed assessment of the lighting installation. AGi32 is an advanced industry standard lighting design software package, capable of undertaking luminous intensity assessments on residential receptors based on the CIE 150:2017 methodology and calculating glare rating for assessment against the CIE 112 glare assessment scale.
- 3.2. For the purpose of the obtrusive light assessment, all luminaires reasonably considered to contribute to any quantity of obtrusive light upon the receptors identified shall be modelled.
- 3.3. The Maintenance Factor for all luminaires shall be set to 1.0 to represent a worst-case scenario for the obtrusive light assessment. This shall enable the scheme to be assessed based on the "day-one" lumen output for all luminaires. This is in accordance with the recommendations of ILP PLG 04 (2013). The original indicative lighting design as part of the Lighting Strategy based on a Maintenance Factor of 0.9 in line with the applicable guidance for external lighting design to allow for the luminaire degradation over time.
- 3.4. In order to accurately assess obtrusive light at the identified sensitive receptors, all calculation planes and points shall be inserted into the model based on existing topographical information and the proposed earthworks levels of the Proposed Development.
- 3.5. The lighting model shall not consider any existing vegetation and off-site buildings. Any existing screening therefore shall not be accounted for to simulate a conservative worst-case scenario for the assessment of obtrusive light.

Obtrusive Light Limits

- 3.1. The following obtrusive light limitations have been established based on the methodology provided by ILP GN01/21, CIE 150 and CIE 112.
- 3.2. To demonstrate acceptable levels of obtrusive light, the lighting model shall prove that these limitations are not exceeded. Acceptable levels shall be proven based on an external lighting scheme that complies with the criteria as set out in the Lighting Strategy which is to be used for any proposed lighting design at detailed stage.

Residential Receptors

- 3.3. ILP GN01/21 and CIE 150 methodology shall be utilised to undertake obtrusive light assessments on the identified residential receptors.
- 3.4. As established in the Lighting Strategy, the Site has been deemed to fall into Environmental Zone E2, defined as a rural surrounding with low district brightness. Obtrusive light calculations on residential properties shall therefore be undertaken based on the criteria set out in **Table 2.3** and **2.4**. Post-curfew criteria shall be utilised in order to demonstrate the worst-case scenario.
- 3.5. The exact positions of the residential property windows assessed can not be accurately established therefore the full extents of all elevations of residential properties shall be calculated.
- 3.6. The maximum acceptable illuminance in the vertical plane (E_v) for an Environmental Zone E2

area (post-curfew) is 1 lux. The maximum allowable glare (source intensity) value is calculated from CIE 150:2017 and varies by Projected Area sq.m., Distance Factor and Viewing Angle. Calculations shall be undertaken AGi32, resulting in a confirmed PASS/FAIL result for each receptor.

Railway and Highway Receptors

- 3.7. The CIE 112 glare assessment methodology shall be utilised to undertake obtrusive light assessments on railway and highway receptors.
- 3.8. With reference to **Table 2.2** both railway and highway applications are considered as Normal Traffic Areas. The glare rating limit (GR_{max}) for this application is 45, which is also the most sensitive limit noted in CIE 112. In practical terms, with reference to **Table 2.1**, this limit is considered to fall between *Noticeable* (30) and *Just Admissible* (50).
- 3.9. A number of sample railway and highway receptor points shall be included in the assessment. The receptors shall be positioned 1.5m above their respective existing elevation based on the topographical information. Calculations shall be undertaken AGi32 and shall be assessed against the limits set out above.

4. OBTRUSIVE LIGHT ASSESSMENT

Lighting Model Development

- 4.1. The original lighting model was used to produce the indicative lighting layout which was appended to the Lighting Strategy was based on horizontal average lux levels and uniformity values. For the additional assessments proposed the original lighting model has since been reproduced in AGi32.
- 4.2. The new lighting model used to form the basis of this assessment replicates the Design Parameters and Performance Criteria set out in the Lighting Strategy.
- 4.3. This assessment has been undertaken in accordance with the methodology set out above.
- 4.4. The lighting model has been further developed to demonstrate that the Proposed Development can be provided with an external lighting installation that complies with the criteria as set out in the Lighting Strategy, while not exceeding the obtrusive light limitations outlined above.
- 4.5. The lighting model has been utilised to produce an Obtrusive Light Layout drawing which can be viewed in **Appendix 1**. This drawing illustrates the luminaires modelled, receptor locations, sample on-site calculations and horizontal lux contours. The drawing also includes a schedule of luminaires used within the model and a detailed summary of the calculation results.
- 4.6. **Table 4.1** summarises the key design developments that have been implemented to the lighting model and explains the reasons behind the amendments.

Table 4.1: Key Developments to the Lighting Model

Design Development	Reason
Substitution of Luminaire Type 'A', on a	Improved luminous intensity at angles towards sensitive
'point-for-point' basis	receptors
Substitution of Luminaire Type 'J', on a	Improved luminous intensity at angles towards sensitive
point-for-point basis	receptors
Reconfiguration of Luminaire Type 'L-	Improved calculated glare rating on the railway
Twin' and 'K' at the extreme ends of	
the rail chord	

4.7. Sample on-site calculations have been provided at areas within the immediate vicinity of where design development has taken place to demonstrate the Performance Criteria as set out in the Lighting Strategy can still be achieved. The calculation results at areas which are considered to have been affected are provided in **Table 4.2**. The calculated results appear slightly higher than the target results owing to the 1.0 Maintenance Factor.

Table 4.2: Sample On-Site Calculations

Type of area, task, or activity	Target Maintained illuminance, Em (Lux)	Target Illuminance uniformity, U0	Calculated Maintained illuminance, Em (Lux)	Calculated Illuminance uniformity, U0
Container Stack	50	0.40	59.3	0.72
Railport Returns	30	0.40	35.2	0.50
Service Yard	30	0.40	36.2	0.41

Residential Receptors

- 4.8. Obtrusive light assessments have been undertaken at the following residential properties.
 - Travellers Site (Aston Firs Caravan Park);
 - Bridge Farm; and,
 - Langton Farm.
- 4.9. Any residential properties situated further away from the Proposed Development, relative to the above properties, are reasonably assumed to experience less obtrusive light and have therefore not been considered as part of the additional assessment.

Light Intrusion

4.10. The calculated light intrusion results are summarised in **Table 4.3**.

Table 4.3: Light Intrusion Assessment

Receptor	Light Intrusion Limit (lux)	Calculated Maximum Light Intrusion (lux)	Result
Travellers Site	1.0	0.0	PASS
Bridge Farm	1.0	0.1	PASS
Langton Farm	1.0	0.0	PASS

4.11. **Table 4.3** demonstrates that the calculated levels of light intrusion comply with the ILP GN01/21 and CIE 150 guidance limits for Environmental Zone E2 post-curfew conditions.

Luminous intensity

4.12. The calculated luminous intensity results are summarised in **Table 4.4**.

Table 4.4: Luminous Intensity Assessment

Receptor	Luminous Intensity Limit (Cd)	Calculated Maximum Luminous Intensity (Cd)	Result
Travellers Site	See Note 1	132	PASS
Bridge Farm	See Note 1	306	PASS
Langton Farm	See Note 1	191	PASS

NOTE:

- 1. The luminous intensity limit varies for each receptor based on Projected Area sq.m., Distance Factor and Viewing Angle, in accordance with the CIE 150 methodology. AGi32 outputs a PASS result only in the instance where the specific limit is not exceeded.
- 4.13. **Table 4.4** demonstrates that the calculated levels of luminous intensity comply with the ILP GN01/21 and CIE 150 guidance limits for Environmental Zone E2 post-curfew conditions.

Railway and Highway Receptors

- 4.14. Obtrusive light assessments have been undertaken at the following railway and highways properties.
 - M69 Motorway; and,
 - Birmingham-Peterborough Railway.
- 4.15. Any railway and highway situated further away from the Proposed Development, relative to the above, are reasonably assumed to experience less obtrusive light and have therefore not been considered as part of the assessment.

Glare Rating

4.16. The calculated glare rating results are summarised in **Table 4.5**.

Table 4.5: Glare Rating Assessment

Receptor	Glare Rating Limit (GR _{max})	Calculated Glare Rating (GR)	Result
M69 North Obs 1	45	25.4	PASS
M69 North Obs 2	45	19.9	PASS
M69 North Obs 3	45	19.7	PASS
M69 North Obs 4	45	18.2	PASS
M69 North Obs 5	45	19.3	PASS
M69 North Obs 6	45	25.9	PASS
M69 South Obs 1	45	35.1	PASS
M69 South Obs 2	45	37.1	PASS
M69 South Obs 3	45	34.9	PASS
M69 South Obs 4	45	36.5	PASS
M69 South Obs 5	45	42.7	PASS
M69 South Obs 6	45	36.0	PASS
M69 South Obs 7	45	35.4	PASS
M69 South Obs 8	45	34.6	PASS
Railway Obs 1	45	31.0	PASS
Railway Obs 2	45	29.4	PASS
Railway Obs 3	45	30.1	PASS
Railway Obs 4	45	28.4	PASS
Railway Obs 5	45	30.2	PASS
Railway Obs 6	45	28.3	PASS
Railway Obs 7	45	30.2	PASS
Railway Obs 8	45	27.8	PASS

4.17. **Table 4.5** demonstrates that the calculated levels of glare on railway and highway receptors comply with the CIE 112 guidance limits for glare at Normal Traffic Areas.

Luminaire Selection

- 4.18. The lighting model has been produced with high quality luminaires as manufactured by Holophane Lighting, Urbis Schreder, Kingfisher Lighting and Kellwood Lighting. Manufacturer's Information can be viewed in **Appendix 2**.
- 4.19. The final detailed design may deviate from the lighting design presented and/or luminaires selected however any amended or updated design shall meet all parameters and criteria as set out the Lighting Strategy and demonstrate compliant levels of obtrusive light as per the assessments in this Technical Note. An adequate and safe level of lighting must be provided for site tasks, amenity, and security, whilst maintaining acceptable impact on the site surroundings, environment, railway and neighbouring properties.

Table 4.6: Proposed luminaires.

Luminaire type	Manufacturer information	Image
Column mounted	Holophane Lighting – D-Series	
Building mounted	Mounting height 6m – 12m	
	2,000 – 30,000 Lumens	
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK10	
Column mounted	Kingfisher Lighting – Zactis	
Building mounted	Mounting height 6m – 12m	
	16,790 - 46,768 Lumens	
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK10	
High mast	Kellwood Lighting – Ayrton Series	
	Mounting height 20m – 25m	
	58,420 - 116,840 Lumens	
	CRI>70	
	Variety of optics	
	Aluminium allow body IP67, IK07	

Column Mounted	Urbis Schreder – Ampera Evo 3	
A47 Link Road	Mounting height 8m – 10m	
	600 – 21200 Lumens	
	CRI>70	
	Variety of optics	
	Die-cast aluminium body IP65, IK09	

Clarifications

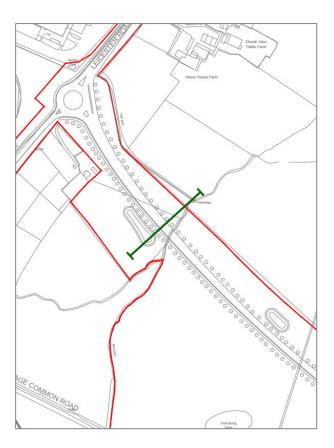
Car Park Lighting

- 4.20. The target maintained illuminance and uniformity in car park areas shall range between 10 20 lux at 0.25 uniformity. This range is in line with BS EN 12464-2:2014 Light and lighting Lighting of work places Part 2: Outdoor work places, Table 5.9.2 Parking areas, Medium traffic (10 lux) and Table 5.9.3 Parking areas, Heavy traffic (20 lux).
- 4.21. The final lux level shall be defined as part of the detailed design based upon the anticipated final use and/or end user criteria. The lux level shall be within the stated 10 20 lux.

Link Road Lighting

- 4.22. In reference to the proposed Link Road and clauses 5.36 to 5.39 of the Lighting Strategy, the proposed Link Road connects the M69 Junction 2 with a proposed roundabout on the B4668 to provide connectivity to the A47. Both the M69 Junction 2 and the B4668 are currently illuminated by adoptable standard street lighting at the locations where the Link Road is proposed to connect.
- 4.23. The Link Road is currently anticipated to be illuminated between the M69 Junction 2 and the railway bridge only, the remainder of the Link Road is not currently anticipated to be illuminated and will remain unlit as existing.
- 4.24. At the proposed junction on the B4668 lighting will be provided to the requirements of Leicestershire Highways and to match existing which is expected to extend as far as five seconds drive time from the proposed junction as indicated in **Figure 4.1**.

Figure 4.1: Five seconds driving time from the proposed junction on the B4668



Construction Phase Lighting

- 4.25. In addition to the measures outlined in the Lighting Strategy, the following additional measures should also be incorporated into the CEMP:
 - Lighting should not be aimed towards sensitive receptors, and where possible be downward facing.
 - To improve sustainability, lighting from diesel generators should be avoided where practicable.
 - If a construction compound is required for more than 1 year a more permanent lighting
 design should be required including columns to avoid overuse of temporary lighting
 units these units are historically harder to control light spill than traditional columnmounted lights.
 - Lighting should be controlled and on timers to ensure they are only on when needed. Regular checks by a contractor should be undertaken to ensure lights are not left on when not needed.

5. CONCLUSION

- 5.1. The Obtrusive Light Assessment provided within this report demonstrates that the Proposed Development can be provided with an external lighting installation that complies with the parameters and criteria as set out in the Lighting Strategy, while not exceeding the defined obtrusive light limitations set out in this report and the associated applicable guidance and standards identified.
- 5.2. The final detailed design of any phase of the Proposed Development may deviate from the lighting design presented within the Lighting Strategy and/or the Obtrusive Light layout however they shall meet all parameters and criteria as set out in the Lighting Strategy while not exceeding the defined obtrusive light limitations set out in this Technical Note.
- 5.3. The appointed Ecologist has reviewed the Obtrusive Light Layout included within **Appendix**1. The appointed Ecologist concluded that the light spill indicated is an overall improvement in terms of ecological impact in comparison to the original indicative lighting design presented as part of the Lighting Strategy.
- 5.4. In accordance with dDCO Requirement 31, each phase of the authorised development shall not be occupied until a scheme for all permanent lighting in that phase has been submitted to and approved by the relevant planning authority. The schemes submitted and approved must be in accordance with the lighting strategy.

References

- Commission Internationale De L'Eclairage Guide on the Limitation of Effects of Obtrusive Light from Outdoor Lighting Installations (CIE 150) (2017)
- Commission Internationale De L'Eclairage Glare Evaluation System (CIE 112) (1992)
- ILP Guidance Notes for the Reduction of Obtrusive Light GN01 (2021)
- ILP Professional Lighting Guide (PLG) 04 Guidance on Undertaking Environmental Lighting Impact Assessments (2013)

Abbreviations

CEMP	Construction Environmental Management Plan
CIE	Commission Internationale De L'Eclairage
CRI	Colour Rendering Index
EIA	Environmental Impact Assessment
ES	Environmental Statement
E _m	Maintained Illuminance
E _v	Illuminance in the Vertical Plane
GR	Glare Rating
GR_{max}	Maximum Glare Rating
ILP	Institute of Lighting Professionals
LED	Light Emitting Diode
u0	Illuminance Uniformity

APPENDICES

Appendix 4: Obtrusive Light Layout



Do not scale this drawing. All dimensions must be checked/ verified This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

All dimensions in millimetres unless noted otherwise. All levels in

For E2-Low District Brightness, Projected Area and Distance Factors (0.002, 0.29) (0.01, 0.63) (0.03, 1.3) (0.13, 2.5) (0.5, 5.1)

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TRITAX SYMMETRY

A TRITAX BIG BOX COMPANY

Hinckley National Rail Freight Interchange

Electrical Services
Obtrusive Light Layout
Proposed Site Plan

BWB Ref: NTT2814 Date: 06.09.23 Scale@A0: 1:2500