East Midlands Gateway
Phase 2 (EMG2)

Document DCO 6.11/MCO 6.11

ENVIRONMENTAL STATEMENT

Volume 1 Main Statement

Chapter 11

Lighting

July 2025

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The East Midlands Gateway Phase 2 and Highway Order 202X and The East Midlands Gateway Rail Freight and Highway (Amendment) Order 202X

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11. Lighting

11.1. Introduction

11.1.1. This chapter forms the Lighting Impact Assessment for the two applications for the **EMG2 Project** as described in full in **Chapter 3: Project Description (Document DCO 6.3/MCO 6.3).**

11.1.2. In brief, the **EMG2 Project** comprises three main components as follows:

Main Component	Details	Works Nos.
DCO Application/DCO Scheme		
EMG2 Works	Logistics and advanced manufacturing development located on the EMG2 Main Site south of East Midlands Airport and the A453, and west of the M1 motorway. Together with an upgrade to the EMG1 substation and provision of a community park.	DCO Works Nos. 1 to 5 as described in the draft DCO. DCO Works Nos. 20 and 21 as described in the draft DCO.
Highway Works	Works to the highway network: the A453 EMG2 access junction works; significant improvements at Junction 24 of the M1 (referred to as the J24 Improvements) and works to the wider highway network including active travel works.	DCO Works Nos. 6 to 19 as described in the draft DCO.
MCO Application/MCO Scheme		
EMG1 Works	Additional warehousing development on Plot 16 together with works to increase the permitted height of the cranes at the EMG1 rail-freight terminal, improvements to the public transport interchange, site management building and the EMG1 access works.	MCO Works Nos. 3A, 3B, 5A, 5B, 5C, 6A and 8A in the draft MCO.

11.1.3. This chapter is based on both a Lighting Strategy and a Lighting Baseline Assessment.

11.1.4. The full list of supporting appendices and the corresponding DCO/MCO Document numbers is as follows:

- **Appendix 11A** Lighting Strategy (**Document DCO 6.11A/MCO 6.11A**)
- **Appendix 11B** Lighting Baseline Assessment (**Document DCO6.11B/MCO 6.11B**)
- **Appendix 11C** Lighting Receptor Locations (**Document DCO6.11C/MCO 6.11C**)
- **Appendix 11D** Obtrusive Light Calculation (**Document DCO 6.11D/MCO 6.11D**)
- **Appendix 11E** Highways Lighting Strategy (**Document DCO 6.11E/MCO 6.11E**)

11.1.5. In recognition that this chapter forms part of a single ES covering both the DCO Application/Scheme and the MCO Application/Scheme, it makes a clear distinction between the

component parts and, consistent with the dual application approach**,** assesses the impacts arising from the DCO Application and MCO Application separately and then together as the **EMG2 Project** in combination. An assessment of the cumulative impacts of the **EMG2 Project** with other existing and, or approved developments, has been completed using the list of projects identified in Appendix 21b to **Chapter 21: Cumulative Impacts (Document DCO 6.21/MCO 6.21)**.

11.2. Scope and Methodology of the Assessment

11.2.1. This section of the chapter is common to both the DCO Application and the MCO Application**.**

11.2.2. The EIA Regulations require the description of the forecasting methods used to assess the effects on the environment. Therefore, this assessment has been based on a widely used and accepted 'significance matrix assessment approach' which is based on the characteristics of the impact (magnitude and nature) and the sensitivity of the receptor as set out in **Table 1.5** within **Chapter 1: Introduction (Document DCO 6.1/MCO 6.1)**. This allows the relative significance of effects to be determined on a scale and ultimately the significant effects determined, as further explained in the following subsections.

Scope

11.2.3. The scope of this Chapter includes the assessment of the operational external (nighttime) lighting for both the DCO Scheme and the MCO Scheme as well the potential effects of the lighting that will facilitate the construction phase of both applications. Methodology

11.2.4. The assessment has been carried out in accordance with the published guidance documents from the Institution of Lighting Professionals (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.

11.2.5. The methodology employed for this Lighting Impact Assessment is appropriate to the location of both the DCO Application and the MCO Application.

11.2.6. It comprises a review of the legislative, policy and guidance context, consultation with the design team and relevant stakeholders, a desktop study and site survey in which the baseline conditions were established (Environmental Zone), and modelling of the proposed lighting to assesses the effects of the identified receptors.

11.2.7. The methodology takes guidance from the ILP PLG 04 document "Guidance on Undertaking Environmental Lighting Impact Assessments" and the Highways standard DMRB V11(LA104) model of assessing impact. These documents also provide the process of assessing the significance of an effect as detailed in **Table 11.3** – **Table 11.7** below.

PINS Scoping

11.2.8. The Scoping of this Assessment has been informed through the ES Scoping with PINS **(Document DCO 6.1D/MCO 6.1D)**, a summary of which as relevant to this chapter is provided below together with how matters have been addressed.

Table 11.1: PINS Scoping Responses

PINS ID	PINS Scoping Responses	How these have been Address Within this Chapter
2.17	The ES should describe the lighting requirements for the Proposed Development during construction and operation and include details of any temporary or permanent, daytime or night-time lighting. These details should be considered in the relevant assessments in the ES.	The lighting requirements for the different phases of the **EMG2 Project** are detailed within the Lighting Strategy (**Appendix 11A**). The assessment of lighting effects is based on these proposals, and lighting calculations have been conducted based on these proposals (**Appendix 11A**).
3.12	The Lighting Assessment proposed as an appendix to the ES should consider the potential for any night-time lighting from the Proposed Development.	The lighting assessment considers the potential for effects from any night-time lighting from the **EMG2 Project** and is included within this chapter of the ES and the assessment is based on the supporting appendices: 1. **Appendix 11A:** Lighting Strategy 2. **Appendix 11B:** Lighting Baseline Assessment 3. **Appendix 11C:** Lighting Receptor Locations 4. **Appendix 11D:** Obtrusive Light Calculations
326	The ES should consider potential effects from noise, lighting and dust as a result of the Proposed Development from all phases of the Proposed Development, where there is potential for significant effects	This ES Chapter provides an assessment of potential lighting effects of both the construction and operation phases of the **EMG2 Project**. This is detailed within **Section 11.5**.

Statutory Consultation

11.2.9. A six-week period of consultation was undertaken between Monday 3rd February 2025 and Monday 17th March 2025. This included the presentation of draft application material, including draft ES Chapters. **Table 11.2** summarises the comments relevant to this chapter received from statutory consultees to the consultation and provides commentary as required.

Table 11.2: Summary of Engagement

Consultee	Consultation Topic	Summary of Consultation
North West Leicestershire District Council - Environmental Protection Team	Suitability on the methodology for the chapter and baseline assessment.	Agreements on the suitability of the methodology employed for this Chapter and the lighting baseline survey were reached. This included: • The assessment of the environmental zone as E2 • The suitability of the on-site survey • The method for selecting receptors

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Consultee	Consultation Topic	Summary of Consultation
		• The methodology for carrying out the assessment of lighting effects
North West Leicestershire District Council - Environmental Protection Team	Lighting Chapter review	During review of the lighting chapter, NWLDC agreed with the approach detailed for lighting, however they requested further information to accompany the theory. The appendices accompanying this chapter were then provided to NWLDC's satisfaction and no further questions were raised.

Study Area

11.2.10. The study area of lighting effects extends 4km from a point at the centre of the **EMG2 Project** as outlined within **Appendix 11C (Document DCO 6.11C/MCO 6.11C)**.

11.2.11. This area includes all receptors that could experience effects of lighting and includes the towns/villages of:

- Castle Donington;
- Lockington;
- Hemington;
- Kegworth;
- Long Whatton;
- Diseworth;
- Kingston on Soar; and
- Sutton Bonington.

Classification of Environmental Zone

11.2.12. To understand the restrictions needed to keep the implementation of lighting to a minimum it is common practice to use what is classified as an environmental zone. These zones are rated from E0 to E4 and are given their designation based on the context of the surrounding environment as defined within ILP guidance in GN01:2021.

11.2.13. To determine the applicable environmental zone both desktop sources and lighting baseline surveys have been used as provided in **Appendix 11B** (**Document DCO 6.11B/MCO 6.11B**).

Potential Effects from Artificial Light

11.2.14. 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 (**Table 11.8** and **Table 11.9** below), outlines restrictions on such things as light intrusion, luminous source intensity, upward light spill (or sky glow).

11.2.15. As the needs of ecology differ from those of a human amenity or human safety receptor a separate set of guidance, GN08/2023 (**Table 11.10** below), is used to evaluate the effects of lighting on the most light sensitive ecology receptors (Bats). This document gives

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recommendations on the acceptable levels of illuminance that can reach areas of ecological interest.

Significance Criteria

11.2.16. 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.

11.2.17. The sensitivity of the receptor is classified as either Very High, High, Medium, Low, or Negligible according to the descriptions provided in **Table 11.3** below.

11.2.18. The magnitude of change is determined as being Major, Moderate, Minor, Negligible, or No Change. Descriptions for each are provided in **Table 11.4** below.

11.2.19. The significance of effect is derived through a matrix by comparing the sensitivity of the receptor with the magnitude of change (**Table 11.5** below). This then provides the residual effect, the descriptions of which are detailed in **Table 11.6** below.

11.2.20. The criteria for the assessment of significance are taken from Institution of Lighting Professionals (ILP) PLG 04 document "Guidance on Undertaking Environmental Lighting Impact Assessments" and the Highways standard DMRB V11(LA104) model of assessing impact.

Table 11.3: Criteria for receptor Sensitivity

Sensitivity	Description of Criteria
Very High	Very high importance and rarity, international scale and very limited potential for substitution. The environment is fragile, and an impact is likely to leave it in an altered state from which recovery would likely be impossible.
High	High importance and rarity, national scale, and limited potential for substitution. The environment is fragile, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. 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.
Low	Low or medium importance and rarity, local scale. The environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.
Negligible	Very low importance and rarity, local scale. Receptor has little or no night-time activity.

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Table 11.4: Criteria for Magnitude of change (+/- = Baseline – Proposed Design)

Magnitude of Change		Definition of Change
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No Change		No Change from baseline condition, this will be deemed "negligible" when assessed as a magnitude of change.

Table 11.5: Significance of Effect Matrix (Score +/- based on Magnitude of Impact)

Significance of Effect Matrix		Magnitude of Change				
		No Change	Negligible	Minor	Moderate	Major
Sensitivity	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

11.2.21. Effects categorised as Moderate and above may be considered significant depending on the change taking place. This is decided using reasonable professional judgment based on the lighting baseline and the change occurring (as assessed against obtrusive light guidance).

11.2.22. Effects categorised as Large or Very Large will be considered significant.

Table 11.6: Definitions of significance categories (Magnitude of change x receptor sensitivity)

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 11.7: Definitions of Duration of Impacts

Duration	Definition
Short Term	The effects would be of short duration and would not last more than 2-5 years
Medium Term	The effects would take 5-15 years to be mitigated
Long Term	The effects would be reasonably mitigated over a long period of time (15 years or more)

11.3. Policy, Guidance and Legislative Context

11.3.1. This section of the chapter is common to both the DCO Application and the MCO Application.

Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

11.3.2. 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".*

National Networks National Policy Statement 2014 (Revised 2024)

11.3.3. The National Networks National Policy Statement (NPS) (Department for Transport, 2024) sets out the UK Government's policy for the delivery of nationally significant road and rail networks. It sets out requirements for a range of emissions, including artificial light at Paragraphs 5.117 – 5.125. The NPS makes note that:

> *5.117. The construction and operation of national networks infrastructure has the potential to create a range of emissions such as odour, dust, steam, smoke and artificial light. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990.*

11.3.4. Paragraphs 5.120 – 5.122 requires the applicant to assess the potential for emissions of artificial light to have a detrimental impact on amenity. The assessment should describe:

- the type and quantity of emissions
- aspects of the development which may give rise to emissions during
- construction, operation and decommissioning

- premises, locations or species that may be affected by the emission
- effects of the emission on identified premises or locations
- measures to be employed in preventing or mitigating the emissions

11.3.5. The NPS also states that the applicant provides sufficient information to show that any necessary mitigation will be put into place. In particular, the Secretary of State should consider whether to require the applicant to abide by a scheme of management and mitigation concerning emissions of artificial light from the development to reduce any loss to amenity which might arise during the construction and operation of the development.

National Planning Policy Framework 2024

11.3.6. The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how they are expected to be applied and provides a framework for local plans. With regard to light pollution, the NPPF was updated in December 2024 and states that the following elements are to be considered:

> *198. 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:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
>
> *c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

Planning Practice Guidance

11.3.7. Guidance for assessing the effects of proposed artificial lighting is outlined in the planning practice guidance (PPG) published in November 2019. In paragraph 002 Reference ID: 31-002-20191101, the guidance states:

> *"Does an existing lighting installation make the proposed location for a development unsuitable, or suitable only with appropriate mitigation? For example, this might be because:*
>
> *the artificial light has a significant effect on the locality; and/or*
>
> *users of the Proposed Development (e.g., a hospital) may be particularly sensitive to light intrusion from the existing light source.*

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Where necessary, development proposed in the vicinity of existing activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme, reflecting the agent of change principle. Additional guidance on applying this principle is set out in the planning practice guidance on noise.

Will a new development, or a proposed change to an existing site, be likely to materially alter light levels in the environment around the site and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?

Will the impact of new lighting conflict with the needs of specialist facilities requiring low levels of surrounding light (such as observatories, airports and general aviation facilities)? Impacts on other activities that rely on low levels of light such as astronomy may also be a consideration but will need to be considered in terms of both their severity and alongside the wider benefits of the development.

Is the development in or near a protected area of dark sky or an intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting?

Would new lighting have any safety impacts, for example in creating a hazard for road users?

Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed.

Does the Proposed Development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies? (As it may change natural light, creating polarised light pollution that can affect wildlife behaviour.)"

Local Policy

North West Leicestershire Local Plan (2021)

11.3.8. The relevant Local Authority for the **EMG2 Project** is North West Leicestershire District Council. The adopted Local Plan (2011-2031) provides the current planning policies for the District. The most relevant policies to lighting within the North West Leicestershire District Council Local Plan are:

Policy D2 - Amenity

Policy D2 states the following*:*

"Proposals for development should be designed to minimise their impact on the amenity and quiet enjoyment of both existing and future residents within the development and close to it. As such, development proposals will be supported where:

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1) They do not have a significant adverse effect on the living conditions of existing and new residents through loss of privacy, excessive overshadowing and overbearing impact.

2) They do not generate a level of activity, noise, vibration, pollution or unpleasant odour emission, which cannot be mitigated to an appropriate standard and so, would have an adverse impact on amenity and living conditions.

Development which is sensitive to noise or unpleasant odour emissions will not be permitted where it would adversely affect future occupants.

Proposals for external lighting schemes should be designed to minimise position pollution from glare or spillage of light. The intensity of lighting should be necessary to achieve its purpose, and the benefits of the lightings scheme must be shown to outweigh any adverse effects.

The council will prepare a Supplementary Planning Document which will include new Development Guidelines."

Policy Ec5 – East Midlands Airport: Safeguarding

Policy Ec5 states the following:

"(1) Development which would adversely affect the operation, safety or planned growth of East Midlands Airport will not be permitted.

(2) The outer boundary of the Safeguarded Area is shown on the Policies Map and within this area consultation with East Midlands Airport is required on the following proposals:

(a) All buildings, structures, erections and works that exceed the height specified on the safeguarding map;

(b) Any proposed development in the vicinity of East Midlands Airport which may have the potential to interfere with the operation of its navigational aids, radio aids and telecommunication systems;

(c) The lighting elements of a development which may have the potential to distract or confuse pilots, particularly in the immediate vicinity of the aerodrome and of the aircraft approach paths;

(d) Any proposal for aviation use within a 13km circle centred on East Midlands Airport;

(e) Any proposal within a 13km circle centred on East Midlands Airport which has the potential to attract large numbers of birds. Such proposals include:

(i) significant landscaping or tree planting;

(ii) minerals extraction or quarrying;

(iii) waste disposal or management;

(iv) reservoirs or other significant water bodies;

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(v) land restoration schemes;

(vi) sewage works;

(vii) nature reserves;

(viii) bird sanctuaries.

(f) Any proposal for a wind turbine development within a 30km circle centred on East Midlands Airport."

British Standards

11.3.9. The British Standards relevant to the lighting of the **EMG2 Project** are detailed in **Appendix 11A (Document DCO 6.11A/MCO 6.11A)** and therefore are not repeated here.

Guidance

Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals GN01:2021)

11.3.10. This Chapter 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.

11.3.11. This Chapter is informed by the most relevant sections of GN01:2021 that has been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

Table 11.8: Environmental Zone Descriptions

Zones	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.

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Table 11.9: Obtrusive Light Criteria

Zones	Sky Glow ULR[1] (Max %)	Light Trespass (Into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew[2]	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

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

11.3.12. 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.

Table 11.10: Ecology Lighting Guidance

Guidance Parameter	GN08:2023 Description
Illuminance (Lux) Levels	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).
Lighting Zonation	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."

CAST Aerodrome Safeguarding Advice Note 2 – Lighting Near Aerodromes April 2024

11.3.13. This advice note, published by the Civil Aviation Authority (CAA), considers the location, height, brightness, type, and pattern of lights around the aerodrome, with an overall caveat that no light should be directed or pointed towards any aircraft.

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

[2] 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

11.3.14. It further states that:

> *"Various types of lighting have the potential to cause issues for example:*
>
> - *Temporary lighting, e.g. construction lighting, light shows, temporary installations*
> - *Advertisements*
> - *Lighting of buildings and other structures*
> - *Street and car park lighting*
> - *Flood lighting at sporting venues or similar including special events in temporary locations*
>
> *No lighting should be displayed which could distract pilots or confuse them by being mistaken for aeronautical ground lights."*

11.3.15. The advice also references use of Road Lighting Standards BS 5489-1:202014 and BS EN 13201-2:201515, which inform the Lighting Strategy as detailed in **Appendix 11A (Document DCO 6.11A/MCO 6.11A)** and **Appendix 11E (Document DCO 6.11E/MCO 6.11E)**.

Guidance on Undertaking Environmental Lighting Impact Assessments (Institution of Lighting Professionals PLG04:2013)

11.3.16. This document focuses on the assessment of the lighting aspects of development applications, including design and assessment. While most of these are effects on people, their perception of the surroundings and the direct effects of lighting on them, guidance is also provide on assessing effects on flora and fauna.

11.3.17. The aim of this document is to outline good practice in lighting design an provide practical guidance on producing assessment of lighting impacts with new developments.

LA 104 Environmental Assessment and Monitoring (Design Manual for Roads and Bridges (DMRB))

11.3.18. This document sets out the requirements for environmental assessment of projects, including reporting and monitoring of significant adverse environmental effects.

11.3.19. This document is used as supplementary guidance to ILP PLG04:2013.

11.4. Baseline Conditions

Summary of Lighting Baseline

DCO Application

11.4.1. The lighting baseline conditions within and surrounding the DCO Application is detailed in **Appendix 11B (Document DCO 6.11B)** and summarised here.

11.4.2. The area surrounding the DCO Application is a broad mixture of commercial uses, rural settlement and more suburban settlement interspersed with agricultural land.

11.4.3. There is a large volume of existing artificial lighting in the area, but this is primarily concentrated on the East Midland Airport, its associated infrastructure and the highway network. This existing lighting is visible across the landscape and is affecting the district brightness of the surrounding area.

11.4.4. Due to the above the surrounding area can be classified as either an E2 or E3 environmental zone based on the descriptions from ILP GN01:2021 **Table 11.8**.

11.4.5. Guidance from ILP GN01:2021 recommends that in cases such as this, that the environmental zone with the most rigorous restrictions is used. As such, the DCO Application will be assessed against E2 environmental zone limitations (**8**). The use of an E2 environmental zone was confirmed as acceptable with the Environmental Protection Team at North West Leicestershire District Council on the 21st November 2024 provided as **Appendix 11B (Document DCO 6.11B**).

MCO Application

11.4.6. The lighting baseline conditions within and surrounding the MCO Application is detailed in **Appendix 11B (Document MCO 6.11B)** and summarised here.

11.4.7. The surrounding area is predominantly commercial uses, with rural settlement and agricultural land to the north.

11.4.8. There is a large volume of existing artificial lighting in the area, but this is primarily concentrated on the East Midland Airport, its associated infrastructure, the highway network and the existing EMG1 lighting. This existing lighting is visible across the landscape and is affecting the district brightness of the surrounding area.

11.4.9. Due to the above the surrounding area can be classified as either an E2 or E3 environmental zone based on the descriptions from ILP GN01:2021 **Table 11.8** below.

11.4.10. Guidance from ILP GN01:2021 recommends that in cases such as this, that the environmental zone with the most rigorous restrictions is used. As such, the applications will be assessed against E2 environmental zone limitations (**Table 11.8**). The use of an E2 environmental zone was confirmed as acceptable with the Environmental Protection Team at North West Leicestershire District Council on the 21st November 2024 (**Appendix 11B (Document MCO 6.11B**).

Lighting Receptor Identification

11.4.11. Receptors for the effects of lighting have been identified.

11.4.12. These receptors are organised into three main categories:

- Human Amenity Receptors (PHAR)
- Human Safety Receptors (PSR)

- Ecology Receptors (PSER)

11.4.13. The receptor tables have been spilt into different sections based on the proximity of the receptors to the DCO Application and the MCO Application and whether the receptor has potential views of the different components of the **EMG2 Project**.

11.4.14. The locations of all the identified receptors to lighting are detailed in **Appendix 11C (Document DCO 6.11C/MCO 6.11C)**.

The DCO Application Receptors

EMG2 Works Receptors

Table 11.11: EMG2 Works Identified Human Amenity Receptors (PHAR)

Receptor Number	Description	Sensitivity
PHAR 001	Dwellings in Diseworth	Medium
PHAR 002	The Birches	Medium
PHAR 003	Dwellings in Long Whatton	Medium
PHAR 004	Farmhouse off The Grn	Medium
PHAR 009	Night Sky	Low

Table 11.12: EMG2 Works Identified Human Safety Receptors (PSR)

Receptor Number	Description	Sensitivity
PSR 001	East Midlands Airport (Air Traffic)	High
PSR 002	Motorists on the A435 and M1 Roundabout	Low
PSR 003	Motorists on the A435	Low
PSR 004	Motorists on the A435 and M1	Low
PSR 005	Motorists on the M1	Low

Table 11.13: EMG2 Works Identified Ecology Receptors (PSER)

Receptor Number	Description	Sensitivity
PSER 001	Green Space within the Main Site	High
PSER 002	Existing Green Space East of the Main Site	High

Highway Works Receptors

Table 11.14: Highway Works Identified Human Amenity Receptors (PHAR)

Receptor Number	Description	Sensitivity
PHAR 003	Dwellings in Long Whatton	Medium
PHAR 004	Farmhouse off The Grn	Medium
PHAR 007	Dwellings in Lockington	Medium

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PHAR 008	Dwellings in Kegworth	Medium
PHAR 009	Night Sky	Low

Table 11.15: Highway Works Identified Human Safety Receptors (PSR)

Receptor Number	Description	Sensitivity
PSR 001	East Midlands Airport (Air Traffic)	High
PSR 002	Motorists on the A435 and M1 Roundabout	Low
PSR 003	Motorists on the A435	Low
PSR 004	Motorists on the A435 and M1	Low
PSR 005	Motorists on the M1	Low

Table 11.16: Highway Works Identified Ecology Receptors (PSER)

Receptor Number	Description	Sensitivity
PSER 002	Existing Green Space East of the Main Site	High
PSER 003	March Covert Ancient Woodland	High
PSER 004	Woodland adjacent to Plot 16 001	High

The MCO Application Receptors

EMG1 Works Receptors

Table 11.17: EMG1 Works Identified Human Amenity Receptors (PHAR)

Receptor Number	Description	Sensitivity
PHAR 005	Dwellings in Castle Donington	Medium
PHAR 006	Dwellings in Hemmington	Medium
PHAR 007	Dwellings in Lockington	Medium
PHAR 008	Dwellings in Kegworth	Medium
PHAR 009	Night Sky	Low

Table 11.18: EMG1 Works Identified Human Safety Receptors (PSR)

Receptor Number	Description	Sensitivity
PSR 001	East Midlands Airport (Air Traffic)	High
PSR 005	Motorists on the M1	Low

Table 11.19 EMG1 Works Identified Ecology Receptors (PSER)

Receptor Number	Description	Sensitivity
PSER 003	March Covert Ancient Woodland	High

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PSER 004	Woodland adjacent to Plot 16 001	High
PSER 005	Woodland adjacent to Plot 16 002	High

11.5. Potential Impacts

11.5.1. This section of the chapter separately considers the potential impacts of the DCO Application and the MCO Application. For each it first outlines the embedded mitigation before continuing with the potential impact assessments.

The DCO Application

Embedded Mitigation

11.5.2. Embedded mitigation is all the mitigation measures that are embedded into the lighting strategy as is detailed in **Appendix 11A** (**Document DCO 6.11A**)**,** which also contains example images of this mitigation and proposed luminaires.

11.5.3. Due to this mitigation being embedded into the lighting strategy, the obtrusive lighting calculations that have been conducted thus far include this mitigation where possible at this stage. The embedded mitigation measures set out in **Table 11.20** below are considered within the Potential Impacts section.

Table 11.20: Embedded Mitigation Measures (DCO Application)

Embedded Mitigation Name	Description of Mitigation	Installation Location
Restricting the Upward Light Output Ratio	All luminaires will have an Upward Light Output Ratio of 0%.	**EMG2 Works and Highway Works**
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: This is required to achieve a standard lighting level on the task or area, and This will not result in any significant effects on the surrounding receptors.	**EMG2 Works and Highway Works**
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 control. Where this is not available, traditional back light shields can be used.	**EMG2 Works and Highway Works** Where luminaires are installed on the boundary of an area facing into the site.
Using the lowest possible Correlated Colour Temperature	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 substations, the Correlated Colour Temperature may be increased to ≤ 4000K. However, a risk	**EMG2 Works and Highway Works**

Embedded Mitigation Name	Description of Mitigation	Installation Location
	assessment needs to be undertaken to justify this increase if this does not form part of a local authority or National Highway specification.	
Using the lowest applicable lighting levels for tasks and areas	All areas and task will be lit using the lowest applicable lighting levels as defined in the relevant British Standards. This will ensure a standard and recognised levels of light is provided for all areas while ensuring 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.	**EMG2 Works and Highway Works**
Centralised Lighting Controls	Centralised lighting control system/s will be used. This will ensure lighting is only active as required 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: When a car park is experiencing low use over night the lighting can be dimmed, 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.	**EMG2 Works and Highways Works**
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, buildings and landscape screening 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.	**EMG2 Works and Highways Works**
Using appropriate optics for the areas being illuminated	The luminaire optic used will be specific to the area being lit. This will ensure the task and area is lit to a standard level of light, while also allowing the lux contours to be shaped to the specific areas. This will help reduce light spill out of areas and the either over lighting or under lighting of areas.	**EMG2 Works and Highways Works**
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. This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are reported and minimised or mitigated.	**EMG2 Main Site and Highways Works**
The creation of mitigation mounding	The **EMG2 Works** proposes mitigation mounding around the perimeter of the site including a significant buffer to the west. This will reduce the visibility of luminaires and lighting within the landscape and from the identified receptors.	**EMG2 Works** As shown on the Parameters Plan (**Document DCO 2.5**)
The creation of green buffer zone	The **EMG2 Works** has a green buffer zone proposed.	**EMG2 Works.** As shown on the Parameters Plan.

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Embedded Mitigation Name	Description of Mitigation	Installation Location
	This assists in increase the distance of lit areas from the boundaries of the and provides the distance require of the other mitigation to work effectively.	(**Document DCO 2.5**)

11.5.4. The potential effects on the identified receptors are assessed using the results of indicative lighting calculations, and qualitative assessment where these calculations have not been possible to complete.

11.5.5. 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 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).

11.5.6. Full details of the obtrusive light calculations that have been conducted for this assessment can be found in **Appendix 11D** (**Document DCO 6.11D**) and these are summarised in this section.

Construction Phase

Magnitude of Change

11.5.7. The magnitude of change resulting from the construction phase of the DCO Application is assessed qualitatively. This is based on the typical illuminance levels used for construction tasks, the types of luminaires typically used, the lighting baseline assessment that has been carried out, and with consideration of the embedded mitigation.

Table 11.21: Construction Phase Assessment of Magnitude of Change (DCO Application)

Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PHAR 001	This receptor location will not have views of the majority of the **Highway Works**. This receptor is, however, adjacent to the **EMG2 Works**. The area of the **EMG2 Works** directly adjacent to this receptor is proposed as open land/landscaping areas and landscape screen bunding. These areas are not likely to require night working, so construction lighting will not be used adjacent to this receptor. This means that direct effects of lighting on this receptor during construction will not alter the lighting baseline in this location, and the mitigation detailed in **Table 11.20** and **Appendix 11A** will ensure this is the case by requiring lighting to be aimed away from this receptor.	Minor Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	It is likely that this receptor will experience an increase in the visibility of lighting in the landscape during construction, but the effects of this will be reduced by the embedded mitigation. Therefore, the magnitude of change is assessed as Minor.		
PHAR 002	This receptor location will not have views of the majority of the **Highway Works**. This receptor is, however, within 160m of the **EMG2 Works** and **Highway Works**. The area of the **EMG2 Works** directly adjacent to this receptor is proposed as open land/landscaping areas and landscape screen bunding. These areas are not likely to require night working, so construction lighting will not be used adjacent to this receptor. In addition to this, the areas of highway immediately to the northeast of this receptor contains existing lighting, and the **Highway Works** in this location will be viewed against this existing lighting. The proposed **Highway Works** are approximately 200m from this receptor, and any lighting used for these work will not increase the lighting baseline at this receptor over this distance. This means that direct effects of lighting on this receptor during construction will not alter the lighting baseline in this location, and the mitigation detailed in **Table 11.20** and **Appendix 11A** will ensure this is the case. It is likely that this receptor will experience an increase in the visibility of lighting in the landscape during construction, but the effects of this will be reduced by the embedded mitigation. Therefore, the magnitude of change is assessed as Minor.	Minor Adverse	Medium Term
PHAR 003	This receptor location will not have views of the majority of the **Highway Works**. This receptor may have partial views of the **EMG2 Works**, but only across the existing lit M1 and	Negligible Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	A42, and through a significant volume of existing landscape screening outside the **EMG2 Works**. This receptor is approximately 640m from the closest area of works (that being the **EMG2 Works**), at this distance there will be no measurable change in the lighting baseline at this receptor location. Due to the above, the magnitude of change is assessed as Negligible.		
PHAR 004	This receptor location will not have views of the **Highway Works**. It will however, have views of the **EMG2 Works**. This receptor location is approximately 450m from the south boundary of the **EMG2 Works**. At this distance there will be no change in the lighting baseline at this location from the construction lighting. There will be an increase in the visibility of lighting in the landscape at this receptor during the construction phase, however this will only be minimally visible because of the distance between the **EMG2 Works** and the undulation of the topography between this receptor and the **EMG2 Works.** As this change in lighting will only be minimally visible and there will be no change in the lighting baseline at this receptor location, the magnitude of change is assessed as Minor.	Minor Adverse	Medium Term
PHAR 007	This receptor is approximately 260m from the closest area of the **Highways Works** to it. At this distance there will be no measurable change in the lighting baseline at this receptor location. Several dwellings within this receptor location will have views of the proposed lighting for some areas of **Highways Works**. This receptor will not have views of the **EMG2 Works**. This receptor location benefits from existing screening that is outside of the Order Limits in the form of woodland. This will partially reduce views of any proposed lighting. The proposed lighting is also only visible in the context of a significant volume of existing lighting, which the proposed lighting will only result in a minor change against.	Minor Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	Therefore, the magnitude of change is assessed as Minor.		
PHAR 008	This receptor is approximately 170m from the proposed **Highway Works** on the M1. The area of the M1 visible from this receptor location is already lit, and the construction lighting will not significantly change the effect of lighting on the M1 and therefore will not result in a change in the lighting baseline at this receptor location at this distance. As such, the magnitude of change is assessed as Negligible.	Negligible Adverse	Medium Term
PHAR 009	The construction lighting will use luminaires with a 0% upward light output ratio, and the tilt of all luminaires will be limited to a maximum of 5° and only where this can be demonstrated not to result in significant effects. This will prevent all direct upward light. There will be some effects of reflected lighting, but this will be limited by ensuring that no area is over lit by only achieving the minimum safe and acceptable light levels detailed in British Standards. The baseline sky quality in the surrounding area is low, with the existing sky brightness being very high. This is likely to result in some minor increase in sky brightness compared to the baseline, so this change is assessed as Minor.	Minor Adverse	Medium Term
PSR 001	As the use of lighting within the construction site will follow the phases of construction and will not be lit all at once or throughout the night. Additionally, the lighting for the construction phase will not use the same colours in the same arrangement as that for the East Midlands Airport Runway. These two things will prevent pilots being distracted by the construction lighting, and it will remain clear where the runway for the East Midlands Airport is. No lighting during the construction phase will be aimed into the sky, and no luminaires will have the lumen output required to cause glare to pilots. As such, the magnitude of change is assessed a Negligible.	Negligible Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PSR 002	This receptor location will have views of the EMG2 Access Works component of the **EMG2 Works** and the **Highway Works**. This receptor is an existing part of the highway network and the proposed changes to the highway will be integrated into this network. Lighting for the proposed highway work will be to the National Highway standard and will not result in any change to the safety of drivers in this location. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSR 003	These receptor locations are near the **EMG2 Works**. This section of highway is adjacent to a section of highway that will be changed as part of the EMG2 Access Works, and the construction lighting for these proposals will be integrated into this section of highway. This will not result in a change in the safety of drivers in this location. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSR 004		No Change	Medium Term
PSR 005	This receptor will not have direct views of the **EMG2 Works**. It does, however, pass the **Highway Works**. Lighting for the proposed highway work will be to the National Highway standard and will be accompanied by a full set of construction safety measures to ensure driver safety. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSER 001	This receptor is a proposed part of the **EMG2 Works**, and therefore will require construction works within it during the construction phase. These works are not likely to require construction lighting, or at least not likely to require construction lighting across its whole area. The mitigation embedded into the lighting strategy (**Appendix 11A**) combined with the above, will ensure that large areas of darkness are maintained in this area during construction.	Minor Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	As such, the magnitude of change is assessed as Minor.		
PSER 002	This receptor location is adjacent to the east boundary of the **EMG2 Works** and is between this are the **Highway Works** on the M1 J23a. The approach to the M1 J23a is lit by an existing lighting system, and any construction lighting in this location will not noticeably alter the light level reaching the boundary of this receptor. Construction lighting may be installed within the **EMG2 Works** near this location, and is likely to result in isolated illuminance levels along the boundary that would exceed 0.5 Lux. Due to the proposed mitigation, this will not extend across this receptor location and the vast majority of this location will be maintained as dark. Therefore, the magnitude of change at this receptor is assessed a Minor.	Minor Adverse	Medium Term
PSER 003	This receptor is too far from the **EMG2 Works** to experience any effects of lighting from here. It is, however, approximately 100m from the nearest proposed **Highway Works**. These proposed highway works are taking place in an area that contains existing lighting for the approach to the M1 J24 roundabout. The construction lighting in this location will not significantly change the lighting levels here, or produce changes in lighting levels at this receptor. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSER 004	This receptor is too far from the **EMG2 Works** to experience any effects of lighting from here. It is, however, approximately 1450m from the nearest proposed Highway Works. These proposed highway works are taking place in an area that contains existing lighting for the approach to the M1 J24 roundabout and on the A453 roundabout.	No Change	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	The construction lighting in this location will not significantly change the lighting here, or produce changes in lighting levels at this receptor. Therefore, the magnitude of change is assessed as No Change.		

Significance of Effect

11.5.8. The significant of effect is calculated using the matrix in **Table 11.5** by comparing the sensitivity of a receptor with the magnitude of change. It is therefore considered that none of these effects would be significant in EIA terms.

Table 11.22: Construction Phase Assessment of Significance of Effect (DCO Application)

Receptor No.	Sensitivity	Magnitude of Change	Significance of Effect
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral
PHAR 004	Medium	Minor Adverse	Slight
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Negligible Adverse	Neutral
PHAR 009	Low	Minor Adverse	Neutral
PSR 001	High	Negligible Adverse	Neutral
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Minor Adverse	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	No Change	Neutral
PSER 005	High	No Change	Neutral

Operational Phase

Obtrusive Light Calculations

11.5.9. The embedded mitigation for the lighting design has been included in the Obtrusive light Calculations that form part of the lighting effects assessment. As such, embedded mitigation in is included in the assessment of effects.

11.5.10. The obtrusive light calculations have been conducted for the **EMG2 Works** only.

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11.5.11. Full details of the obtrusive light calculations and the horizontal light spill diagram can be seen in **Appendix 11D** (**Document DCO 6.11D**).

Table 11.23: Human Amenity Illuminance Receptors (DCO Application)

Receptor No.	GN01:2021 Recommendation (Lux)		Maximum Calculated Vertical Illuminance (Lux)	Compliance with Guidance
	Pre-Curfew	Post-Curfew		
PHAR 001	5	1	0.01	Yes
PHAR 002	5	1	0.01	Yes
PHAR 003	5	1	0.00	Yes
PHAR 004	5	1	0.01	Yes
PHAR 007	5	1	0.01	Yes
PHAR 008	5	1	0.00	Yes

Table 11.24: Upward Light Ratio Assessment (DCO Application)

Receptor No.	GN01:2021 Recommendation (ULR %)	Proposed ULR based on Luminaire Specifications	Compliance with Guidance
PHAR 009	2.5	0%	Yes

Table 11.25: Ecology Receptors Illuminance Calculations (DCO Application)

Receptor No.	GN08:2023 Recommendation (Lux)	Maximum Calculated Vertical Illuminance (Lux)	Compliance with Guidance
PSER 001	0.40	The effects on this receptor are assessed using the Light Spill Diagram shown in **Appendix 11D** for the **EMG2 Works**.	
PSER 002	0.40	0.02	Yes
		0.17	Yes
PSER 003	0.40	0.00	Yes
PSER 004	0.40	0.79	These illuminance levels are reached on the northeast boundary only and the rest of the receptor location is maintained below 0.5Lux.
PSER 005	0.40	0.01	Yes

Magnitude of Change

11.5.12. The magnitude of change is assessed using on the lighting baseline at the identified receptors, the obtrusive lighting calculations that have been conducted for the identified receptors, and a qualitative assessment of the likely perception of change by the receptor.

11.5.13. The operation lighting for the proposed **Highway Works** will be fully incorporated into the highway networks at operational stage, and therefore will be providing a function for roadway users including assisting in hazard identification. The effects of highway lighting on areas of

highway is therefore not assessed, and the assessment on highways safety is from the lighting for the **EMG2 Works**.

Table 11.26: Operational Phase Assessment of Magnitude of Change (DCO Application)

Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PHAR 001	As shown in **Table 11.21** and **Appendix 11D**, the illuminance levels reaching PHAR 001 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have views of the proposed lighting for the **EMG2 Works** and some areas of **Highways Works**. These views of the **EMG2 Works** will be reduced by the proposed landscape screening and the retained and improved green space in the west of the **EMG2 Works**. As such, the magnitude of change is assessed as Minor.	Minor Adverse	Long Term
PHAR 002	As shown in **Table 11.23** and **Appendix 11D**, the illuminance levels reaching PHAR 002 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have views of the proposed lighting for the **EMG2 Works** and some areas of **Highway Works**. These views of the **EMG2 Works** will be reduced by the proposed landscape screening and the retained and improved green space in the south and west of the **EMG2 Works**. As such, the magnitude of change is assessed as Minor.	Minor Adverse	Long Term
PHAR 003	As shown in **Table 11.23** and **Appendix 11D**, the illuminance levels reaching PHAR 003 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location may have partially views of the **EMG2 Works**, but only across the existing lit M1 and A42, and through a	Negligible Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	significant volume of existing landscape screening outside the **EMG2 Works**. These views of the **EMG2 Works** will be reduced by the proposed landscape screening and the retained and improved green space in the south and east of the **EMG2 Works**. As such, the magnitude of change is assessed as Negligible.		
PHAR 004	As shown in **Table 11.23** and **Appendix 11D**, the illuminance levels reaching PHAR 004 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have partial views of the proposed lighting for the **EMG2 Works** and some areas of **Highway Works**. These views of the **EMG2 Works** will be reduced by the proposed landscape screening and the retained and improved green space in the south and east of the **EMG2 Works.** In addition to this, the section of the M1 near this receptor location contains existing lighting, which all the lighting for the **EMG2 Works** and the proposed highways works will be viewed against. This will reduce contrast with the proposed lighting, making it visibility less noticeable. As such, the magnitude of change is assessed as Negligible.	Negligible Adverse	Long Term
PHAR 007	As shown in **Table 11.23** and **Appendix 11D**, the illuminance levels reaching PHAR 007 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have views of the proposed lighting for some areas of **Highway Works**. This receptor will not have views of the **EMG2 Works**. This receptor location benefits from existing screening that is outside of the Order Limits in the form of woodland. This will partially reduce views of any proposed lighting.	Minor Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	The proposed lighting is also only visible in the context of a significant volume of existing lighting, which the proposed lighting will only result in a minor change against. Therefore, the magnitude of change is assessed as Minor.		
PHAR 008	As shown in **Table 11.23** and **Appendix 11D**, the illuminance levels reaching PHAR 008 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have views of the proposed lighting for some areas of **Highway Works**. This receptor will also have very limited views of the **EMG2 Works**. All views of the proposed lighting will be through areas of existing lighting, and this will reduce the contrast with the proposed lighting, thus reducing its noticeability in the landscape. However, there will be an increase in the height of the installed lighting due to the proposed Terminal gantry crane, which means lighting will become more visible from this receptor. As the lighting baseline at this receptor will not change as a result of the proposed lighting, but there will be a minor increase in the visibility of the lighting, the magnitude of change is assessed as Minor.	Minor Adverse	Long Term
PHAR 009	The proposed lighting will use luminaires with a 0% upward light output ratio, and the tilt of all luminaires will be limited to a maximum of 5° and only where this can be demonstrated not to result in significant effects. This will prevent all direct upward light. There will be some effects of reflected lighting, but this will be limited by ensuring that no area is over lit by only achieving the minimum safe and acceptable light levels detailed in British Standards. The baseline sky quality in the surrounding area is low, with the existing sky brightness being very high. This is likely to result in some minor increase in sky brightness compared to the baseline, so this change is assessed as Minor.	Minor Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PSR 001	Lighting for the operational phase will be typical of commercial uses and highways lighting. This lighting is not similar to that of an airport or runway. Additionally, the lighting for the operational phase will not use the same colours in the same arrangement as that for the East Midlands Airport Runway. These two things will prevent pilots being distracted by the operational lighting, and it will remain clear where the runway for the East Midlands Airport is. No lighting during the operational phase will be aimed into the sky, and no luminaires will have the lumen output required to cause glare to pilots.	Negligible Adverse	Long Term
PSR 002	This receptor location will not have direct views of the proposed lighting for the **EMG2 Works**, and therefore safety in this location cannot be impacted by the proposed lighting in these locations. This receptor is an existing part of the highway network and the proposed changes to the highway will be integrated into this network. Lighting for the **Highway Works** will be to the National Highway standard and will not result in any change to the safety of drivers in this location. Therefore, the magnitude of change is assessed as No Change.	No Change	Long Term
PSR 003	These receptor locations are near the **EMG2 Works.**	No Change	Long Term
PSR 004	This section of highway is adjacent to a section of highway that will be changed as part of the access arrangement for the **EMG2 Works**, and the proposed lighting for these proposals will be integrated into this section of highway. This will not result in a change in the safety of drivers in this location. These receptor also benefits from the proposed landscape screening, which will assist in protecting this area from effects of lighting. Therefore, the magnitude of change is assessed as No Change.	No Change	Long Term
PSER 001	The effects on this receptor are assessed using the light spill diagram shown in **Appendix 11D** for the **EMG2 Works**.	Minor Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	This shows that there are locations within this receptor location where light spill from the proposed lighting will reach above 1 Lux. This only happens in isolated locations and directly adjacent to areas that will be lit for the purpose of health and safety. This light spill diagram also shows that the majority of this receptor location will be maintained in darkness. This is shown by the areas outside of the red 0.2 Lux contour line. As only isolated locations will experience illuminance levels above 1 Lux and there will be a consistent dark corridor maintained in this location, the magnitude of change is assessed as Minor.		
PSER 002	As shown in **Table 11.25** and **Appendix 11D**, the illuminance levels reaching PSER 002 from the proposed lighting reaches a maximum of 0.17 Lux. This is significantly lower than the recommended limits detailed in GN08:2023. This shows that this location will remain dark and therefore any light sensitive species within this location will not be significantly affected by lighting.	Negligible Adverse.	Long Term
PSER 003	As shown in **Table 11.25** and **Appendix 11D**, the illuminance levels reaching PSER 003 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the recommended limits detailed in GN08:2023. This shows that this location will remain dark and therefore any light sensitive species within this location will not be significantly affected by lighting.	No Change	Long Term
PSER 004	As shown in **Table 11.25** and **Appendix 11D**, the illuminance levels reaching PSER 002 from the proposed lighting reaches a maximum of 0.79 Lux. The maximum level is calculated on the northeast boundary of this receptor location, and all other locations along this boundary contain lower illuminance levels. Viewing the light spill diagram for this area in **Appendix 11D**, it is clear that the vast majority of this area is retained as a dark space. Therefore, this location is maintained as dark but there will be a minor change to this location resulting from the proposed lighting.	Minor Adverse.	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	Therefore, the magnitude of change is assessed as Minor.		
PSER 005	As shown in **Table 11.25** and **Appendix 11D**, the illuminance levels reaching PSER 005 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the recommended limits detailed in GN08:2023. This shows that this location will remain dark and therefore any light sensitive species within this location will not be significantly affected by lighting.	No Change	Long Term

Significance of Effect

11.5.14. The significant of effect is calculated using the matrix in **Table 11.5** by comparing the sensitivity of a receptor with the magnitude of change. It is therefore considered that none of these effects would be significant in EIA terms.

Table 11.27: Operational Phase Assessment of Significance of Effect (DCO Application)

Receptor No.	Sensitivity	Magnitude of Change	Significance of Effect
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral
PHAR 004	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Minor Adverse	Slight
PHAR 009	Low	Minor Adverse	Slight
PSR 001	High	Negligible Adverse	Slight
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Negligible Adverse.	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse.	Slight
PSER 005	High	No Change	Neutral

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MCO Application

Embedded Mitigation

11.5.15. Embedded mitigation is broadly similar for the MCO Application as for the DCO Application and set out in the lighting strategy detailed in **Appendix 11A (Document MCO 6.11A),** which also contains example images of this mitigation and proposed luminaires. The only difference is that the mitigation mounding and Community Park buffer zone embedded in the **EMG2 Works** do not apply in the same way, albeit the **EMG1 Works** does already benefit to a degree from the mitigation mounding and landscaping provided as part of the EMG1 development.

11.5.16. The obtrusive lighting calculations that have been conducted thus far include this mitigation where possible at this stage. The embedded mitigation measures set out in **Table 11.28** below are considered within the Potential Impacts section.

Table 11.28: Embedded Mitigation Measures (The MCO Application)

Embedded Mitigation Name	Description of Mitigation	Installation Location
Restricting the Upward Light Output Ratio	All luminaires will have an Upward Light Output Ratio of 0%.	**EMG1 Works**
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: This is required to achieve a standard lighting level on the task or area, and This will not result in any significant effects on the surrounding receptors.	**EMG1 Works**
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 control. Where this is not available, traditional back light shields can be used.	**EMG1 Works**: Where luminaires are installed on the boundary of an area facing into the site.
Using the lowest possible Correlated Colour Temperature	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 substations, the Correlated Colour Temperature may be increased to ≤ 4000K. However, a risk assessment needs to be undertaken to justify this increase if this does not form part of a local authority or National Highway specification.	**EMG1 Works**
Using the lowest applicable lighting levels for tasks and areas	All areas and task will be lit using the lowest applicable lighting levels as defined in the relevant British Standards.	**EMG1 Works**

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Embedded Mitigation Name	Description of Mitigation	Installation Location
	This will ensure a standard and recognised levels of light is provided for all areas, while ensuring 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.	
Centralised Lighting Controls	Centralised lighting control system/s will be used throughout. This will ensure lighting is only active as required 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: When a car park is experiencing low use over night the lighting can be dimmed, 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.	**EMG1 Works**
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, buildings and landscape screening 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.	**EMG1 Works**
Using appropriate optics for the areas being illuminated	The luminaire optic used will be specific to the area being lit. This will ensure the task and area is lit to a standard level of light, while also allowing the lux contours to be shaped to the specific areas. This will help reduce light spill out of areas and the either over lighting or under lighting of areas.	**EMG1 Works**
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. This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are reported and minimised or mitigated.	**EMG1 Works**
Existing mitigation mounding	The **EMG1 Works** benefit from existing EMG1 mitigation mounding . This will reduce the visibility of luminaires and lighting within the landscape and from the identified receptors.	**EMG1 Works**

11.5.17. The potential effects on the identified receptors are assessed using the results of indicative lighting calculations, and qualitative assessment where these calculations have not been possible to complete.

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11.5.18. 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 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).

11.5.19. Full details of the obtrusive light calculations that have been conducted for this assessment can be found in **Appendix 11D (Document MCO 6.11D)** and these are summarised in this section.

Construction Phase

Magnitude of Change

11.5.20. The magnitude of change resulting from the construction phase is assessed qualitatively. This is based on the typical illuminance levels used for construction tasks, the types of luminaires typically used, the lighting baseline assessment that has been carried out, and with consideration of the embedded mitigation.

Table 11.29: Construction Phase Assessment of Magnitude of Change (MCO application)

Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PHAR 005	No dwellings within this receptor location will have views of the **EMG1 Works**. This is due to the screening effects of two existing areas of woodland, the East Midlands Airport and the existing commercial facilities between the receptor location and the proposed works. As such, the magnitude of change is assessed as Negligible.	Negligible Adverse	Medium Term
PHAR 006	This receptor will not have direct views of the **EMG1 Works**. The proposed lighting may be partially visible through existing woodland between this receptor location and the **EMG1 Works** but compared to the existing views of lighting this receptor has this will be a negligible change. Therefore, the magnitude of change is assessed as Negligible.	Negligible Adverse	Medium Term
PHAR 007	This receptor is approximately 260m from the closest area of the **EMG1 Works**. At this distance there will be no measurable change in the lighting baseline at this receptor location. Several dwellings within this receptor location will have views of the proposed lighting for the **EMG1 Works**	Minor Adverse	Medium Term

Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	This receptor location benefits from existing screening that is outside of the Order Limits in the form of woodland. This will partially reduce views of any proposed lighting. The proposed lighting is also only visible in the context of a significant volume of existing lighting, which the proposed lighting will only result in a minor change against. Therefore, the magnitude of change is assessed as Minor.		
PHAR 008	The closest area of **EMG1 Works** is the Gantry Cranes. These are unlikely to require additionally lighting over the existing lighting to be installed and therefore there will be no effect on this receptor from construction lighting in this location. This receptor is also likely to have some partial views of the works at Plot 16. The construction lighting in this location is too far from this receptor to result in a change in the lighting baseline, but may be visible when in use. This construction lighting will only be visible against the existing lighting which will reduce its presence in views by reducing contrast. As such, the magnitude of change is assessed as Negligible.	Negligible Adverse	Medium Term
PHAR 009	The construction lighting will use luminaires with a 0% upward light output ratio, and the tilt of all luminaires will be limited to a maximum of 5° and only where this can be demonstrated not to result in significant effects. This will prevent all direct upward light. There will be some effects of reflected lighting, but this will be limited by ensuring that no area is over lit by only achieving the minimum safe and acceptable light levels detailed in British Standards. The baseline sky quality in the area surrounding the **EMG1 Works** is low, with the existing sky brightness being very high. This is likely to result in some minor increase in sky brightness compared to the baseline, so this change is assessed as Minor.	Minor Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PSR 001	The lighting for the construction phase will not use the same colours in the same arrangement as that for the East Midlands Airport Runway. This will prevent pilots being distracted by the construction lighting, and it will remain clear where the runway for the East Midlands Airport is. No lighting during the construction phase will be aimed into the sky, and no luminaires will have the lumen output required to cause glare to pilots. As such, the magnitude of change is assessed a Negligible.	Negligible Adverse	Medium Term
PSR 005	This receptor will pass the existing EMG1 rail yard, and will have partial views of the proposed terminal gantry crane proposed within the **EMG1 Works**. This proposed lighting for the terminal gantry crane is likely to be minimally visible through existing boundary planting from this receptor. However, these are unlikely to require additionally lighting over the existing lighting to be installed and therefore there will be no effect on this receptor from construction lighting in this location. As this proposed lighting will only be minimally visible through boundary planting and contrast with this proposed lighting will be reduced by existing lighting, there will not be a change in driver safety resulting from the proposed lighting. As such, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSER 003	This receptor is too far from the **EMG1 works** to experience any effects of lighting from them. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term
PSER 004	This receptor location is directly adjacent to the **EMG1 Works**. The mitigation embedded into the lighting strategy (**Appendix 11A**) will reduce the effects of lighting on this receptor, but there is likely to be locations on the northeast boundary of this receptor that exceed 0.5 Lux below the mounting height of the luminaires.	Minor Adverse	Medium Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	Due to the proposed mitigation, this will not extend across this receptor location and the vast majority of this location will be maintained as dark. Therefore, the magnitude of change at this receptor is assessed a Minor.		
PSER 005	This receptor location is approximately 180m from the closest area of the **EMG1 Works**. At this distance, there will be no effect of lighting on this receptor and the illuminance levels in this location will not exceed 0.5 Lux from the construction phase. The mitigation embedded into the lighting strategy (**Appendix 11A**) will ensure that there is not a change in the lighting baseline along the boundary of this receptor locations. Therefore, the magnitude of change is assessed as No Change.	No Change	Medium Term

Significance of Effect

11.5.21. The significant of effect is calculated using the matrix in **Table 11.5** by comparing the sensitivity of a receptor with the magnitude of change. It is therefore considered that none of these effects would be significant in EIA terms.

Table 11.30: Construction Phase Assessment of Significance of Effect (MCO Application)

Receptor No.	Sensitivity	Magnitude of Change	Significance of Effect
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Negligible Adverse	Neutral
PHAR 009	Low	Minor Adverse	Neutral
PSR 001	High	Negligible Adverse	Neutral
PSR 005	Low	No Change	Neutral
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse	Slight
PSER 005	High	No Change	Neutral

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Operational Phase

Obtrusive Light Calculations

11.5.22. The embedded mitigation for the lighting design has been included in the Obtrusive light Calculations that form part of the lighting effects assessment. As such, embedded mitigation in is included in the assessment of effects.

11.5.23. The obtrusive light calculations have been conducted for the Plot 16 works only.

11.5.24. Full details of the obtrusive light calculations and the horizontal light spill diagram can be seen in **Appendix 11D (Document MCO 6.11D)**.

Table 11.31: Human Amenity Illuminance Receptors (MCO Application)

Receptor No.	GN01:2021 Recommendation (Lux)		Maximum Calculated Vertical Illuminance (Lux)	Compliance with Guidance
	Pre-Curfew	Post-Curfew		
PHAR 005	5	1	0.00	Yes
PHAR 006	5	1	0.00	Yes
PHAR 007	5	1	0.01	Yes
PHAR 008	5	1	0.00	Yes

Notes to **Table 11.31**:

- The results for PHAR 005 and PHAR 006 are based on the result for PHAR 007 and PSER 005. These receptors are significantly closer to any proposed lighting than PHAR 005 and PHAR 006, therefore the lighting effects on PHAR 005 and PHAR 006 will be lower by comparison.

Table 11.32: Upward Light Ratio Assessment (MCO Application)

Receptor No.	GN01:2021 Recommendation (ULR %)	Proposed ULR based on Luminaire Specifications	Compliance with Guidance
PHAR 009	2.5	0%	Yes

Table 11.33: Ecology Receptors Illuminance Calculations (MCO Application)

Receptor No.	GN08:2023 Recommendation (Lux)	Maximum Calculated Vertical Illuminance (Lux)	Compliance with Guidance
PSER 003	0.40	0.00	Yes
PSER 004	0.40	0.79	These illuminance levels are reached on the northeast boundary only and the rest of the receptor location is maintained below 0.5Lux.
PSER 005	0.40	0.01	Yes

Magnitude of Change

11.5.25. The magnitude of change is assessed using on the lighting baseline at the identified receptors, the obtrusive lighting calculations that have been conducted for the identified receptors, and a qualitative assessment of the likely perception of change by the receptor.

11.5.26. The assessment on highways safety is from the lighting for the proposed gantry cranes and Plot 16 components of the **EMG1 Works**.

Table 11.34: Operational Phase Assessment of Magnitude of Change (MCO Application)

Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
PHAR 005	As shown in **Table 11.31** and **Appendix 11D**, the illuminance levels reaching PHAR 005 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. No dwellings within this receptor location will have views of the **EMG1 Works**. This is due to the screening effects of two existing areas of woodland, the East Midlands Airport and the existing commercial facilities between the receptor location and the proposed works. As such, the magnitude of change is assessed as Negligible.	Negligible Adverse	Long Term
PHAR 006	As shown in **Table 11.31** and **Appendix 11D**, the illuminance levels reaching PHAR 006 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. This receptor will not have direct views of the **EMG1 Works**. The proposed lighting may be partially visible through existing woodland between this receptor location and the **EMG1 Works**, but compared to the existing views of lighting this receptor has this will be a negligible change. Therefore, the magnitude of change is assessed as Negligible.	Negligible Adverse	Long Term
PHAR 007	As shown in **Table 11.31** and **Appendix 11D**, the illuminance levels reaching PHAR 007 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location.	Minor Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	Several dwellings within this receptor location will have views of the proposed lighting for the **EMG1 Works**. This receptor location benefits from existing screening that is outside of the Order Limits in the form of woodland. This will partially reduce views of any proposed lighting. The proposed lighting is also only visible in the context of a significant volume of existing lighting, which the proposed lighting will only result in a minor change against. Therefore, the magnitude of change is assessed as Minor.		
PHAR 008	As shown in **Table 11.31** and **Appendix 11D**, the illuminance levels reaching PHAR 008 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the post-curfew E2 environment zone limit, and will not result in a change in the lighting baseline at this location. Several dwellings within this receptor location will have views of the proposed lighting for the **EMG1 Works.** All views of the proposed lighting will be through areas of existing lighting, and this will reduce the contrast with the proposed lighting, thus reducing its noticeability in the landscape. However, there will be an increase in the height of the installed lighting due to the proposed Terminal gantry crane, which means lighting will become more visible from this receptor. As the lighting baseline at this receptor will not change as a result of the proposed lighting, but there will be a minor increase in the visibility of the lighting, the magnitude of change is assessed as Minor.	Minor Adverse	Long Term
PHAR 009	The proposed lighting will use luminaires with a 0% upward light output ratio, and the tilt of all luminaires will be limited to a maximum of 5° and only where this can be demonstrated not to result in significant effects. This will prevent all direct upward light.	Minor Adverse	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	There will be some effects of reflected lighting, but this will be limited by ensuring that no area is over lit by only achieving the minimum safe and acceptable light levels detailed in British Standards. The baseline sky quality in the surrounding area is low, with the existing sky brightness being very high. The **EMG1 Works** is likely to result in some minor increase in sky brightness compared to the baseline, so this change is assessed as Minor.		
PSR 001	Lighting for the operational phase of the **EMG1 Works** will be typical of commercial uses and highways lighting. This lighting is not similar to that of an airport or runway. Additionally, the lighting for the operational phase will not use the same colours in the same arrangement as that for the East Midlands Airport Runway. These two things will prevent pilots being distracted by the operational lighting, and it will remain clear where the runway for the East Midlands Airport is. No lighting during the operational phase will be aimed into the sky, and no luminaires will have the lumen output required to cause glare to pilots.	Negligible Adverse	Long Term
PSR 005	This receptor will not have direct views of the proposed works at Plot 16. It does, however, pass the EMG1 rail yard, and will have partial views of the proposed terminal gantry crane. This proposed lighting for the Terminal Gantry Crane is likely to be minimally visible through existing boundary planting from this receptor. However, the luminaire will not directly face drivers on this road, and will only be visible through the existing lighting. This will reduce contrast with the proposed lighting, which will reduce the likelihood of glare to be perceived by drivers. As this proposed lighting will only be minimally visible through boundary planting and contrast with this proposed lighting will be reduced by existing lighting, there will not be a change in driver safety resulting from the proposed lighting.	No Change	Long Term

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Receptor No.	Description of Change	Magnitude of Change	Duration of Effect
	As such, the magnitude of change is assessed as No Change.		
PSER 003	As shown in **Table 11.33** and **Appendix 11D**, the illuminance levels reaching PSER 003 from the proposed lighting reaches a maximum of 0.00 Lux. This is significantly lower than the recommended limits detailed in GN08:2023. This shows that this location will remain dark and therefore any light sensitive species within this location will not be significantly affected by lighting.	No Change	Long Term
PSER 004	As shown in **Table 11.33** and **Appendix 11D**, the illuminance levels reaching PSER 002 from the proposed lighting reaches a maximum of 0.79 Lux. The maximum level is calculated on the northeast boundary of this receptor location, and all other locations along this boundary contain lower illuminance levels. Viewing the light spill diagram for this area in **Appendix 11D**, it is clear that the vast majority of this area is retained as a dark space. Therefore, this location is maintained as dark but there will be a minor change to this location resulting from the proposed lighting. Therefore, the magnitude of change is assessed as Minor.	Minor Adverse.	Long Term
PSER 005	As shown in **Table 11.33** and **Appendix 11D**, the illuminance levels reaching PSER 005 from the proposed lighting reaches a maximum of 0.01 Lux. This is significantly lower than the recommended limits detailed in GN08:2023. This shows that this location will remain dark and therefore any light sensitive species within this location will not be significantly affected by lighting.	No Change	Long Term

Significance of Effect

11.5.27. The significant of effect is calculated using the matrix in **Table 11.5** by comparing the sensitivity of a receptor with the magnitude of change. It is therefore considered that none of these effects would be significant in EIA terms.

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Table 11.35: Operational Phase Assessment of Significance of Effect (MCO Application)

Receptor No.	Sensitivity	Magnitude of Change	Significance of Effect
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Minor Adverse	Slight
PHAR 009	Low	Minor Adverse	Slight
PSR 001	High	Negligible Adverse	Slight
PSR 005	Low	No Change	Neutral
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse.	Slight
PSER 005	High	No Change	Neutral

11.6. Mitigation Measures

11.6.1. This section of the chapter considers the additional mitigation measures (over and above the embedded mitigation measures explained in Section 5, of the DCO Application and the MCO Application.

DCO Application

11.6.2. This section details the additional mitigation measures that will be applied to the lighting design for the DCO Application.

Additional Mitigation

Table 11.36: Additional Mitigation Measures (DCO Application)

Additional Mitigation Name	Description of Mitigation	Installation Location
CEMP (**Document DCO 6.3A**)	As detailed within the submitted CEMP provided as **Appendix 3A** (**Document DCO 3A**) construction work within the development site will be confined to the following: • 07:00-19:00 hours Monday to Friday • 07:00-16:00 hours Saturday No works will be undertaken on Sundays or public holidays, save in exceptional circumstances only and with prior notification to the LPA, and any changes to the above working hours will also be agreed with the LPA.	**EMG2 Works and Highway Works**

	No works within the **EMG2 Works** are planned to be undertaken in periods of darkness and therefore it is unlikely that task lighting will be required. However, unplanned events can occur for which task lighting may be required for short periods; in this event each P-CEMP, which will be submitted shall set out the maximum height of lighting lanterns and the average lux levels. The P-CEMP for any component of the **Highway Works** shall provide details of requirements for night working and any associated proposals for lighting, which will be approved by the relevant authority prior to work starting.	
The use of solid hoarding during the construction phase	The installation of solid hoarding surrounding construction compounds would reduce the visibility of any construction lighting, and would contain any light spill produced by this lighting.	The boundaries of construction compounds and other suitable areas of work
Phasing construction so the proposed landscape screen bunding is in place during construction	Phasing construction in this way would ensure this mitigation, which is embedded into the operational phase, would also provide mitigation from the visibility of lighting and from light spill during construction.	The locations of the bunding as shown on the Parameters Plan (**Document DCO 2.5**).

MCO Application

11.6.3. The additional mitigation measures that will be applied to the lighting design for the **EMG1 Works** will arise from the CEMP to be submitted pursuant to Requirement 11 of the EMG1 DCO which will accord with the Construction Management Framework Plan that was approved with the EMG1 DCO.

11.7. Residual Effects

11.7.1. This section details the final residual effects of the proposed lighting after all mitigation is applied to the DCO Application and the MCO Application and then considers the **EMG2 Project** as a whole.

DCO Application

Table 11.37: Residual Effects Assessment (DCO Application)

Receptor No.	Sensitivity	Magnitude of Change after all Mitigation is Applied	Residual Effect
Construction			
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral

PHAR 004	Medium	Minor Adverse	Slight
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Negligible Adverse	Neutral
PHAR 009	Low	Minor Adverse	Neutral
PSR 001	High	Negligible Adverse	Neutral
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Minor Adverse	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	No Change	Neutral
PSER 005	High	No Change	Neutral
Operation			
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral
PHAR 004	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Minor Adverse	Slight
PHAR 009	Low	Minor Adverse	Slight
PSR 001	High	Negligible Adverse	Slight
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Negligible Adverse.	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	No Change	Neutral
PSER 005	High	No Change	Neutral

11.7.2. As none of the residual effects are assessed as being Moderate or higher, these effects of lighting are not considered significant on the identified receptors.

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MCO Application

Table 11.38: Residual Effects Assessment (MCO Application)

Receptor No.	Sensitivity	Magnitude of Change after all Mitigation is Applied	Residual Effect
Construction			
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Negligible Adverse	Neutral
PHAR 009	Low	Minor Adverse	Neutral
PSR 001	High	Negligible Adverse	Neutral
PSR 005	Low	No Change	Neutral
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse	Slight
PSER 005	High	No Change	Neutral
Operation			
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Minor Adverse	Slight
PHAR 009	Low	Minor Adverse	Slight
PSR 001	High	Negligible Adverse	Slight
PSR 005	Low	No Change	Neutral
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse.	Slight
PSER 005	High	No Change	Neutral

11.7.1. As none of the residual effects are assessed as being Moderate or higher, these effects of lighting are not considered significant on the identified receptors.

EMG2 Project

Table 11.39: Residual Effects Assessment (EMG2 Project)

Receptor No.	Sensitivity	Magnitude of Change after all Mitigation is Applied	Residual Effect
Construction			
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral

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PHAR 004	Medium	Minor Adverse	Slight
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Negligible Adverse	Neutral
PHAR 009	Low	Minor Adverse	Neutral
PSR 001	High	Negligible Adverse	Neutral
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Minor Adverse	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse	Slight
PSER 005	High	No Change	Neutral
Operation			
PHAR 001	Medium	Minor Adverse	Slight
PHAR 002	Medium	Minor Adverse	Slight
PHAR 003	Medium	Negligible Adverse	Neutral
PHAR 004	Medium	Negligible Adverse	Neutral
PHAR 005	Medium	Negligible Adverse	Neutral
PHAR 006	Medium	Negligible Adverse	Neutral
PHAR 007	Medium	Minor Adverse	Slight
PHAR 008	Medium	Minor Adverse	Slight
PHAR 009	Low	Minor Adverse	Slight
PSR 001	High	Negligible Adverse	Slight
PSR 002	Low	No Change	Neutral
PSR 003	Low	No Change	Neutral
PSR 004	Low	No Change	Neutral
PSR 005	Low	No Change	Neutral
PSER 001	High	Minor Adverse	Slight
PSER 002	High	Negligible Adverse.	Slight
PSER 003	High	No Change	Neutral
PSER 004	High	Minor Adverse.	Slight
PSER 005	High	No Change	Neutral

11.7.1. As none of the residual effects are assessed as being Moderate or higher, these effects of lighting are not considered significant on the identified receptors.

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11.8. Cumulative Effects

EMG2 Project

Inter-Project Effects

11.8.1. **Table 11.40** lists the cumulative sites that have been identified in **Chapter 21: Cumulative Impacts (Document DCO 6.21/MCO 6.21)** surrounding the **EMG2 Project** as a whole. These sites have been assessed for the potential of having cumulative effects of lighting alongside the **EMG2 Project**, and these effects have been categorised into direct effects (light spill, light intrusion and glare) and indirect effects (upward light and sky glow) on the identified sensitive receptors. This initial assessment is based on the distance of the cumulative sites from the **EMG2 Project** and the lighting baseline between the **EMG2 Project** and the cumulative site.

Table 11.40: Cumulative Sites (EMG2 Project)

ID	Application Ref.	Location	Description of Development	Distance from EMG2 Project	Potential for Cumulative Effects of Lighting	
					Direct	Indirect
1b	24/01200/FULM	Land at Sawley Interchange, adj to Aldi Distribution Centre, Tamworth Road	Employment building (Use Class B2/B8) with total floorspace of 59,910 sq.m.	2.5km to north of EMG1 Works	No	Yes
3	20/00316/OUTM and 22/00954/REMM and 24/00575/VCIM	Land at Netherfields Lane, Sawley	4no. Logistics buildings with a total floorspace of 77,480sq.m.	2.5km to north of EMG1 Works	No	Yes
4	19/01496/OUT / APP/G2435/W/22/3292404 and 24/00074/REMM	Land south of Jct 1 of the A50, Castle Donington	Employment development of up to 92,500sq.m. (E(g), B2, B8)	2km to north-west of EMG1 Works	No	Yes
7	n/a	Land North and South of Park Lane, Castle Donington	Residential development of approx. 1,076 dwellings	2.5km to north-west of EMG2 Works	No	Yes
10	23/01712/FULM	Donington Park Service Area, Jct 23A (Moto Services Solar Farm)	Ground-mounted solar farm with a generation capacity of 7.15MW	Immediately adj. to EMG2 Works	Yes	Yes

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ID	Application Ref.	Location	Description of Development	Distance from EMG2 Project	Potential for Cumulative Effects of Lighting	
					Direct	Indirect
12	n/a	Isley Woodhouse	Residential development of approx. 4,500 dwelling and 23,000 sq.m. of employment floorspace	2km to west of EMG2 Works	Yes	Yes
13	n/a	Land West of Hilltop Farm, Castle Donington	Circa 6,000sq.m. of offices and 11,850sq.m. of B2/small scale B8	2km to north-west of EMG2 Works	No	Yes
14	n/a	Land north of Derby Road (A6), Kegworth	Circa 30,000sq.m. of B2/small scale B8	Immediately adj. to Order Limits for Highways Works	Yes	Yes
15	n/a	Land north of Remembranc e Way (A453)	Circa 40,000sq.m. of B2/small scale B8	Immediately adj. to Order Limits for Highways Works	Yes	Yes
16	n/a	East Midlands Airport and Gateway Industrial Cluster (EMAGIC) - excluding EMG1 and EMG2	Freeport designation for logistics and advanced manufacturing space	1-2km to west of EMG2 Works	No	Yes
17	22/01339/LD O	Ratcliffe-on-Soar Power Station (Freeport designation)	Redevelopment of power station site for 810,000sq.m. of employment floorspace including up to 180,000 sq.m. of B8, energy storage and generation, and neighbourhood centre	3km to north-east of EMG1 Works and Highway Works at Jct 24 M1	No	No
20	P/14/1833/2 and various RM approvals for both housing	Garendon Park Development	Sustainable Urban Extension to Loughborough comprising 3,200 homes and 16ha of	5km to south-east of EMG2 Works	No	No

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ID	Application Ref.	Location	Description of Development	Distance from EMG2 Project	Potential for Cumulative Effects of Lighting	
					Direct	Indirect
	and employment		employment land			

11.8.2. Those sites in **Table 11.40** that have been identified as being capable of having either/or direct or indirect effects alongside the **EMG2 Project** will be assessed in more detail in **Table 11.41** below and the cumulative significance of the effect is identified in **Table 11.42** below.

Table 11.41: Cumulative Magnitude of Change (EMG2 Project)

Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
1b	PHAR 005 PHAR 006 PHAR 007	This cumulative site is approximately 2.5km north of the **EMG1 Works**, and a minimum of 1km from PHAR 005, PHAR 006 and PHAR 007. At these distances there will not be any direct cumulative effects of lighting, but there is likely to be an increase in the visibility of lighting. This conclusion is supported by the published light spill diagram for this cumulative site and the lighting calculations in **Appendix 11D**. Both show that the effects of the proposed lighting are retained within close proximity to the Order Limits. As such, the magnitude of change on the relevant receptors from direct effects is considered Negligible.	Negligible Adverse
	PHAR 009	Both the cumulative site and the **EMG1 Works** are proposed modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effect of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light	Minor Adverse

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors (PHAR 009) from indirect effects is considered Minor.	
3	PHAR 006 PHAR 007	This cumulative site is approximately 2.5km north of the **EMG1 Works**, and a minimum of 1km from PHAR 006 and PHAR 007. At these distances there will not be any direct cumulative effects of lighting, but there is likely to be an increase in the visibility of lighting. This conclusion is supported by the published light spill diagram for this cumulative site and the lighting calculations in **Appendix 11D**. Both show that the effects of the proposed lighting are retained within close proximity to the Order Limits. As such, the magnitude of change on the relevant receptors from direct effects is considered Negligible.	Negligible Adverse
	PHAR 009	Both the cumulative site and the **EMG1 Works** are proposing modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is no direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effect of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors from	Minor Adverse

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		indirect effects is considered Minor.	
4	PHAR 005 PHAR 006 PHAR 007 PHAR 009	This cumulative site is approximately 2.5km north of the **EMG1 Works**, and a minimum of 0.5km from PHAR 005, PHAR 006 and PHAR 007. At these distances there will not be any direct cumulative effects of lighting, but there is likely to be an increase in the visibility of lighting. The lack of significant cumulative direct effects on receptors is supported by both the appeal statement for this cumulative site, which states no significant effects and **Appendix 11D**. As such, the magnitude of change on the relevant receptors from direct effects is considered Negligible.	Negligible Adverse
	PHAR 009	Both the cumulative site and the **EMG1 Works** are proposing modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effect of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors from indirect effects is considered Minor.	Minor Adverse
7	PSR 001	This is an draft allocated site within the emerging North West Leicestershire local plan for approximately 1,076 homes, a local centre, small scale employment uses and large areas of public open space.	No Change

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		This receptor is not directly visible from any of the human amenity receptors identified for the **EMG2 Project** and is not close enough to the identified ecology receptors to have effect on them. This cumulative site is also only directly visible from one of the human safety receptors. This being PSR 001. The sensitivity at this receptor is pilots/planes only. As both the **EMG2 Project** and this cumulative will follow best practice for safe guarding aerodromes and the proposed lighting will not be characteristically similar to that of the runway, there will be no change to this receptor in terms of safety from cumulative effects.	
	PHAR 009	Both the cumulative site and the **EMG2 Project** are proposing modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effects of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors from indirect effects is considered Minor.	Minor Adverse
10	PSR 002 PSR 004 PHAR 001 PHAR 009	This cumulative site adjacent to the **EMG2 Works** does not propose large areas of operational lighting. Some small volume of operational lighting is likely to be needed for the battery storage containers, but this will only be	No Change

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		used as needed for spot maintenance in emergency situations. This very small volume of lighting is not going to be bright enough to have cumulative effects on any of the identified receptors.	
12	PSR 001	This cumulative site is draft allocated in the emerging North West Leicestershire Local Plan for residential-led mixed development of approximately 4,500 dwellings and 23,000 sqm. of employment floorspace. The plan published on the project website also shows allocation for sports facilities. Both this cumulative site and the **EMG2 Project** will use guidance for the protection of aerodromes when designing the proposed lighting, as well as following best practice for lighting design including complying with the upward light criteria for an E2 environmental zone. As such, the magnitude of change from cumulative effects on PSR 001 is Negligible.	Negligible
	PHAR 009	This cumulative site and the **EMG2 Works** are located on opposite sides of this receptor and therefore cannot have cumulative direct effects (through illuminance or glare) on this receptor. There are likely to be some ambient (indirect) effects of lighting and an increase in the visibility of lighting from this receptor, but this will affect different views and different locations. Due to this the magnitude of change from cumulative effects is assessed as Moderate.	Moderate Adverse
	PHAR 009	Both the cumulative site and the **EMG2 Project** will propose modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is no direct upward light from either development and that they are both compliant with the	Minor Adverse

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		GN01:2021 requirements for an E2 environmental zone. There will however be some effects of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors from indirect effects is considered Minor.	
13	PSR 001	This is a draft allocated site within the emerging North West Leicestershire local plan for approximately 6,000 sqm of offices and 11,850 sqm of industry/smaller warehousing. The uses proposed for this allocated site are similar to those within the **EMG2 Works** and Plot 16 within the **EMG1 Works**, and therefore any lighting proposed for this site will be similar to that proposed within **Appendix 11A** for both the **EMG2 Works** and Plot 16. Any proposed lighting for this cumulative site will be modern LED columns mounted systems which is likely to be supported by wall mounted luminaires. As with the proposed lighting for the **EMG2 Project**, this cumulative site will use best practice for safe guarding aerodromes. The lighting for both this cumulative site and the **EMG2 Project** will not be characteristically similar to that of the East Midlands Airport Runway, and will not produce enough upward light to result in glare to pilots or planes. Therefore, there will not be a	No Change

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		change in the safety of the airport through cumulative effects.	
	PHAR 009	Both the cumulative site and the **EMG2 Project** will proposes modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effects of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on the relevant receptors from indirect effects is considered Minor.	Minor Adverse
14	PHAR 007	This is a draft allocated site within the emerging North West Leicestershire local plan for around 30,000sqm of industry/smaller scale warehousing. This cumulative site is approximately 0.7km from PHAR 007. There is likely to be an increase in the visibility of lighting which will be viewed through the existing highways lighting between these two locations and also through the proposed lighting for the **Highway Works**. Due to the distance of the cumulative site from this receptor there will not be any measurable obtrusive light effects upon this receptor, which is also partially due to best practice for lighting design. Therefore, the magnitude of change from cumulative effects on this receptor are assessed as Negligible.	Negligible Adverse

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
	PHAR 008	This cumulative site is approximately 0.3km from PHAR 008 at its closest point. Views of this cumulative site from this receptor are partially blocked by existing development and the **Highways Works** are only partially visible within the same view. Due to the separation of the proposed lighting for the **EMG2 Project** and this cumulative site, there will not be direct measurable effects of obtrusive light at this location from the cumulation of lighting. However, there will be an increase in the visibility of lighting from this receptor resulting from both developments. As such, the magnitude of change is assessed at Minor.	Minor Adverse
	PSR 005	PSR 005 runs directly through the **Highway Works** and connects to these works, as well as running past this cumulative site. Lighting for the **EMG2 Project** and the cumulative site are required to comply with best practice for lighting design, and due to the uses will not propose luminaires that will directly result in increases in glare to this receptor. Therefore, the magnitude of change from cumulative effects on this receptor are assessed as Negligible.	Negligible Adverse
	PSER 003	PSER 003 is approximately 70m from this cumulative site and is approximately 250m from any proposed lighting for the **EMG2 Project**. Due to this distance there will be no cumulative effects of lighting on this receptor location. As such, the magnitude of change from cumulative effects is assessed as No Change.	No Change
	PHAR 009	Both the cumulative site and the **EMG2 Project** will propose modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the	Minor Adverse

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		GN01:2021 requirements for an E2 environmental zone. There will however be some effects of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on PHAR 009 from indirect effects is considered Minor.	
15	PHAR 007	This is a draft allocated site within the emerging North West Leicestershire local plan for around 40,000sqm of industry/smaller scale warehousing. This cumulative site is approximately 0.5km from PHAR 007. There is likely to be an increase in the visibility of lighting which will be viewed through the existing highways lighting between these two locations and also through the proposed lighting for the **Highway Works**. Due to the distance of the cumulative site from this receptor there will not be any measurable obtrusive light effects upon this receptor, which is also partially due to best practice for lighting design. Therefore, the magnitude of change from cumulative effects on this receptor are assessed as Negligible.	Negligible
	PHAR 008	This cumulative site is approximately 0.7km from PHAR 008 at its closest point. Views of this cumulative site from this receptor are partially blocked by existing development and the **Highways Works** are only partially visible within the same view. Due to the separation of the proposed lighting for the **EMG2 Project** and this cumulative site, there will not be direct measurable effects of obtrusive light at this	Minor

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		location from the cumulation of lighting. However, there will be an increase in the visibility of lighting from this receptor resulting from both developments. As such, the magnitude of change is assessed at Minor.	
	PSR 005	PSR 005 runs directly through the **Highway Works** and connects to these works, as well as running past this cumulative site. Lighting for the **EMG2 Project** and the cumulative site are required to comply with best practice for lighting design, and due to the uses will not propose luminaires that will directly result in increases in glare to this receptor. Therefore, the magnitude of change from cumulative effects on this receptor are assessed as Negligible.	Negligible
	PSER 003	PSER 003 is directly adjacent to the northern parcel of this cumulative site but is approximately 250m from any proposed lighting for the **EMG2 Project**. Due to this distance there will be no cumulative effects of lighting on this receptor location. As such, the magnitude of change from cumulative effects is assessed as No Change.	No Change
	PHAR 009	Both the cumulative site and the **EMG2 Project** will propose modern LED luminaires with 0% ULOR, and both are proposing a maximum luminaire tilt of 5º. This will ensure that there is minimal direct upward light from either development and that they are both compliant with the GN01:2021 requirements for an E2 environmental zone. There will however be some effects of ambient and reflected light on sky quality. This will have a lesser effect than any direct upward light would, and due to the high level of existing sky glow this change is not likely to result in a change that is more than minimally noticeable. As such, the magnitude of change on PHAR	Minor

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Cumulative Site Number	Relevant Receptors	Description of Change	Magnitude of Change
		009 from indirect effects is considered Minor.	
16	PHAR 009	This cumulative site is for the development of Plots at East Midland Airport (air freight related use) that are separate to the **EMG2 Project**. The lighting for this cumulative site will be similar to that for the **EMG2 Project**, but rather than being new, is likely to be replacements or changes to existing lighting. Due to the significant volume of existing lighting in this location, any changes to the lighting here is not likely to result in any noticeable change to sky quality through cumulative effects. Therefore, the cumulative magnitude of change to PHAR 009 is assessed as No Change.	No Change
	PHAR 001	This cumulative site is approximately 1km northwest of PHAR 001 with the **EMG2 Project** being located a minimum of 200m east of this receptor. At this distance there will not to be breaches in E2 environmental zone criteria at this receptor. The same is evidenced in **Appendix 11D**. There however will be an increase in the visibility of lighting resulting from this cumulative site and the **EMG2 Project**. As such, the magnitude of change from cumulative effects is assessed as Minor.	Minor Adverse

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Table 11.42: Cumulative Significance of Effect (EMG2 Project)

Receptor No.	Relevant Receptors	Sensitivity	Magnitude of Change	Significance of Effect
1b	PHAR 005	Medium	Negligible Adverse	Neutral
	PHAR 006	Medium	Negligible Adverse	Neutral
	PHAR 007	Medium	Negligible Adverse	Neutral
	PHAR 009	Low	Minor Adverse	Slight
3	PHAR 006	Medium	Negligible Adverse	Neutral
	PHAR 007	Medium	Negligible Adverse	Neutral
	PHAR 009	Low	Minor Adverse	Slight
4	PHAR 005	Medium	Negligible Adverse	Neutral
	PHAR 006	Medium	Negligible Adverse	Neutral
	PHAR 007	Medium	Negligible Adverse	Neutral
	PHAR 009	Low	Minor Adverse	Slight
7	PSR 001	High	No Change	Neutral
	PHAR 009	Low	Minor Adverse	Slight
10	PSR 002	Low	No Change	Neutral
	PSR 004	Low	No Change	Neutral
	PHAR 001	Medium	No Change	Neutral
	PHAR 009	Low	No Change	Neutral
12	PSR 001	High	Negligible Adverse	Neutral
	PHAR 001	Medium	Moderate Adverse	Moderate
	PHAR 009	Low	Minor Adverse	Slight
13	PSR 001	High	No Change	Neutral
	PHAR 009	Low	Minor Adverse	Slight
14	PHAR 007	Medium	Negligible Adverse	Slight
	PHAR 008	Medium	Minor Adverse	Slight
	PSR 005	Low	Negligible Adverse	Neutral
	PSER 003	High	No Change	Neutral
	PHAR 009	Low	Minor Adverse	Slight

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Receptor No.	Relevant Receptors	Sensitivity	Magnitude of Change	Significance of Effect
15	PHAR 007	Medium	Negligible Adverse	Slight
	PHAR 008	Medium	Minor Adverse	Slight
	PSER 003	Low	Negligible Adverse	Neutral
	PSR 005	High	No Change	Neutral
	PHAR 009	Low	Minor Adverse	Slight
16	PHAR 001	Medium	Minor Adverse	Slight
	PHAR 009	Low	No Change	Neutral

11.8.3. Table 11.42 confirms that there will be no significant cumulative effects from lighting for the **EMG2 Project** with the other developments identified.

11.8.4. Taking all the cumulative sites into account there will be an urbanising change from lighting within the lighting study area. This change will take place with or without the **EMG2 Project** if all the cumulative sites are built.

11.8.5. It should be noted that this change will not result in a change to the environmental zone of the area from E2 (rural) to E3 (suburban).

Intra-Project Effects

11.8.6. The potential intra-project combined effects have been assessed as part of the assessment for the **EMG2 Project** within this chapter. [TBC]

11.9. Summary of Effects and Conclusions

Introduction

11.9.1. This chapter of the ES forms the Lighting Impact Assessment for the DCO Application and the MCO Application forming the **EMG2 Project**. The chapter has assessed the likely significant impacts on the identified receptors from any proposed nighttime lighting, both during construction and during operation. It also describes the methods used to assess the impacts; the baseline conditions currently existing; the mitigation measures required to prevent, reduce or offset any significant adverse effects of lighting; and the likely residual impacts after these measures have been adopted.

11.9.2. In recognition that this chapter forms part of a single ES covering both applications, a clear distinction has been made between the component parts and, consistent with the dual application approach, assesses the impacts arising from the DCO Application and MCO Application separately and then together as the **EMG2 Project**. The cumulative impacts of the **EMG2 Project** with other existing and, or approved developments has then also been assessed.

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Baseline Conditions

11.9.3. Full details of the lighting baseline assessment can be found in **Appendix 11B (Document DCO 6.11B/MCO 6.11B)**.

11.9.4. The surrounding area is a broad mixture of commercial uses, rural settlement and more suburban settlement interspersed with agricultural land.

11.9.5. There is a large volume of existing artificial lighting in the area, but this is primarily concentrated on the East Midland Airport, its associated infrastructure and the highway network. This existing lighting is visible across the landscape and is affecting the district brightness of the surrounding area.

11.9.6. Due to the above, the area can be classified as either an E2 or E3 environmental zone based on the descriptions from ILP GN01:2021.

11.9.7. Guidance from ILP GN01:2021 recommends that in cases such as this, that the environmental zone with the most rigorous restrictions is used. As such, Environmental Zone E2 (rural) has been used.

11.9.8. The baseline has been established through a survey for views of existing lighting and the existing lighting levels.

11.9.9. It has been found that the baseline is for the most part dark, but that it contains locations with significant views of lighting and location which are currently lit as set out within **Appendix 11B (Document DCO 6.11B/MCO 6.11B)**.

11.9.10. It has also been found that there are significant views of lighting within the landscape, and that this is a significant quality of the existing baseline.

Mitigation

11.9.11. The majority of mitigation for the effects of lighting need to be embedded into the lighting design for them to be effective. This mitigation is embedded into the Lighting Strategy for the DCO Application and the MCO Application.

11.9.12. The embedded mitigation includes the following:

- Using the lowest applicable colour temperature of light for the area being light
- Using the lowest applicable lighting levels for the tasks and areas
- Using the minimum practical mounting height
- Using luminaire optics that fit the area being lit, and only using luminaires where the photometry is available from the manufacture
- Restricting luminaire tilt to 0°
- Only using luminaires that have a 0% Upward Lighting Output Ratio (full cut off luminaires)
- Installing back light shields or using back lighting optics on luminaires

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- Using centralised lighting control systems
- In relation to the **EMG2 Works,** the creation of a green buffer zone to increase the distance of lit areas from the identified receptors
- In relation to the **EMG2 Works,** the creation of mitigation mounding to reduce the visibility of lighting from the identified receptors

11.9.13. Additional mitigation is also proposed – this includes:

- Adherence to the CEMP which will control construction hours to daytime only to reduce nighttime task lighting
- The use of solid hoarding during the construction phase to contain light spill during construction
- Phasing construction as set out in the CEMP so the proposed landscape screen bunding is in place during construction

11.9.14. This additional mitigation will be secured through draft DCO Requirement 11.

Likely Significant Effects

11.9.15. The overall residual effects with the mitigation in place are summarised in **Table 11.43** below.

Table 11.43: Overall Residual Effects

	DCO Application **Range of effects**	**MCO Application** **Range of effects**	**EMG2 Project** **Range of effects**
Construction	Neutral-Slight	Neutral-Slight	Neutral-Slight
Operation	Neutral-Slight	Neutral-Slight	Neutral-Slight

11.9.16. As can be seen, no effects of lighting are assessed as moderate or above this level. Therefore, the effects of lighting of the two applications, both individually and collectively**,** are assessed as being not significant on the identified receptors.

11.9.17. When considered alongside the cumulative effects of other proposals that have been identified in **Chapter 21: Cumulative Impacts (Document DCO 6.21/MCO 6.21)** the effects are summarised in **Table 11.44** below.

Table 11.44: Overall Residual Effects combined with Cumulative Effects

	DCO Application **Range of effects**	**MCO Application** **Range of effects**	**EMG2 Project** **Range of effects**
Construction	Neutral-Slight	Neutral-Slight	Neutral-Slight
Operation	Neutral-Moderate	Neutral-Slight	Neutral-Moderate

11.9.18. As can be seen, one receptor (Dwellings in Diseworth - PHAR 001) may experience moderate cumulative effects from lighting arising from the cumulative impacts from the proposed new settlement at Isley Woodhouse (Cumulative Site No. 12), but this will not result in breaches of E2 environmental zone criteria on this receptor. As such, this effect is not assessed as being significant.

11.9.19. Although the effects on the receptors are assessed as not being significant, it is acknowledged that the lighting baseline within the Order Limits will change as a result of the **EMG2 Project** .

11.9.20. There will also be a change to the lighting baseline in the wider area if all or some of the cumulative sites are constructed. This change, however, will not result in a change to the environmental zone of the area from E2 (rural) to E3 (suburban).

Conclusion

11.9.21. Through the implementation of the Lighting Strategy (which includes all the embedded mitigation) and the additional mitigation measures detailed within this Chapter, there will not be significant effects of lighting on the identified receptors for the DCO Application, the MCO Application, or the combined **EMG2 Project**.

11.9.22. When the EMG2 Project is assessed with other development it is recognised that there will be an increase in the lighting baseline and an increase in the visibility of lighting in the landscape, this however will not alter the environmental zone of the area which will remain as is assessed within this Chapter.

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