

HOARE LEA LIGHTING

Illumination Impact Profile – RAIL CENTRAL
Appendix 21.3 – SRFI Illumination Impact Profile

APPENDIX 21.3-DOC-1602403-20180301-Rail Central-DDM-IIP 001-P9
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2.0 Summary of Adversities, Further Mitigation and Residual Effect

0.0 Introduction

This Appendix of the PEIR has been prepared by Hoare Lea to present quantitative information regarding pre and post development operational illuminance effects (Lux) for residential, ecological / waterbody and heritage locations.

IIP – Illumination Impact Profile

The following provides an Illumination Impact Profile, in tandem with the DCO application, which gives assessment of the exterior lighting design proposal's impact on the surrounding Environmental Zone. With the passing into law of the 'Clean Neighbourhood and Environmental Act' 2005 this issue has now become a major deliverable for exterior lighting projects.

The intention of the Illumination Impact Profile package is to convey how the Proposed Developments will affect the illumination profile of the area and how that will comply with relevant legislation requirements and best practise Design Guidance.

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

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

Completed Development Lighting Parameters

Appendix 22.2 provides the External Operational Lighting Parameters for the typical lighting arrangements and their locations in relation to the proposed uses within the 'Order Limits'. This includes for the modelling of precautionary external lighting parameters throughout the 'Order Limits' and sets clear parameters to inform the detailed lighting design stages (to be submitted for approval to South Northamptonshire Council).

Assessment Criteria for the Completed Development

For the purposes of demonstrating a robust assessment, the following standard industry precautionary measures are applied to the assessment calculation:

- It has been assumed that all relevant external lighting is operational simultaneously for the relevant pre or post curfew operational condition (i.e. a maximum adverse scenario);
- A unity Maintenance Factor 1.0 is applied to represent the maximum adverse condition from initial installation;
- As per standard industry practise existing and proposed landscape bunding and planting / trees have not been included within the assessment calculations.
- Reflected sky glow component should be taken into account where landscape surfaces are relatively light in colour and typically >30%. In the case of this assessment, it is assumed that the typical landscape reflectance value is <30% and will not provide significant contribution, by reflection.
- A number baseline sensitivity locations are identified as falling within the PDA boundary and being replaced by the development proposals. Therefore, the assessment of future effects is excluded.

I.0 Results

Overview

R1 to R27 – Residential

The data represented in **Table 1.1** is relevant to identified **Residential Locations** where pre and post curfew vertical illuminance to windows (as opposed to horizontal illuminance) and luminaire source intensity are the recognised key indicators.

Table 2.1 summarises the cause and magnitude of impacts and then applies mitigation to determine the Residual Significance of Effect.

Application Site – Direct Sky Glow (SGI)

Direct Sky glow is assessed as a Site Wide impact and is based on a scenario where the most onerous of lighting impact is applied relative to the potential uses within each area. In accordance with CIE 150 Section 5.5.2 the Upward Direct Light Ratio is calculated and referenced against ILP sky glow guidance.

Figure 1.1 illustrates the pre curfew horizontal illuminance levels (Edown) at 1.0m below the lowest luminaire within the Application Site. **Figure 1.2** illustrates the pre curfew horizontal illuminance levels (Eup) at 1.0m above the highest luminaire.

The data represented in **Table 1.2** is relevant to identified **Direct Sky Glow** where pre and post curfew calculated direct sky glow is assessed as the key indicator.

Table 2.1 summarises the cause and magnitude of impacts and then applies potential further recognised mitigation (where possible) to determine the Residual Significance of Effect.

H1 to H4 – Heritage

Alongside baseline data provided the following impact values (proposed development only) are provided to inform the heritage assessment.

The data represented in **Table 1.3** is relevant to identified **Representative Heritage Locations** where pre and post curfew vertical illuminance to windows (as opposed to horizontal illuminance) are the recognised key indicators.

Ecology Receptors (E1-E25) Ecology Receptor Areas - Bat Commuting / Foraging / Potential Roost

Ecology – Waterbody – Grand Union Canal (C1 – C4) and Northampton Arm (C5 – C8)

Tabulated within **Table 1.4** reference points E1 to E25 and C1 to C8 provide measured baseline conditions, peak / resultant horizontal and vertical light impacts (2m, 5m and 10m) at the respective ecology locations to inform the ecology assessment.

Figure 1.3 illustrates the adversely affected locations **Ecology / Waterbody and Heritage Receptors**.

I.0 Results

R1 to R25 – Residential

Table I.1 - Summary of existing, calculated and resultant data values relating to obtrusive light at identified Residential Sensitive Receptors

SENSITIVE RECEPTOR RESIDENTIAL	Sensitivity	Environmental Zone	LIGHT TRESPASS						GLARE		
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux) Pre Curfew / Post Curfew	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd) Pre Curfew / Post Curfew	Calculated Max. Peak Viewed Source Intensity (cd)	
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew	Post Curfew
R1	HIGH	E2	5 / 1	0.25	0.00	0.00	0.25	0.25	7500 / 500	139	139
Magnitude of Change							Negligible	Negligible		Negligible	Low
R1 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R2	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	116	116
Magnitude of Change							Negligible	Negligible		Negligible	Low
R2 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R3	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	94	94
Magnitude of Change							Negligible	Negligible		Negligible	Low
R3 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R4	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT										
Magnitude of Change											
R4 - Pre – Mitigation Significance of Effect											
R5	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT										
Magnitude of Change											
R5 - Pre – Mitigation Significance of Effect											

Note:

- Pre Mitigation refers to assessment inclusive of the proposed good practise embedded mitigation.
- Pre Curfew – All lighting on
- Post Curfew – All lighting on
- As per standard industry practise, for worst case assessment, calculated results do not include for potential reduced impacts provided by natural screening.

I.0 Results

R1 to R25 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	SENSITIVITY	Environmental Zone	LIGHT TRESPASS						GLARE			
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux)	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd)	Calculated Max. Peak Viewed Source Intensity (cd)		
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew / Post Curfew	Pre Curfew	Post Curfew
R6	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT											
Magnitude of Change												
R6 - Pre – Mitigation Significance of Effect												
R7	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT											
Magnitude of Change												
R7 - Pre – Mitigation Significance of Effect												
R8	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	67	67	
Magnitude of Change							Negligible	Negligible		Negligible	Low	
R8 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor	
R9	HIGH	E2	5 / 1	0.13	0.02	0.02	0.15	0.15	7500 / 500	73	73	
Magnitude of Change							Negligible	Negligible		Negligible	Low	
R9 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor	
R10	HIGH	E2	5 / 1	2.72	0.13	0.13	2.85	2.85	7500 / 500	107	107	
Magnitude of Change							Negligible	Negligible		Negligible	Low	
R10 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor	

I.0 Results

R1 to R25 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	SENSITIVITY	Environmental Zone	LIGHT TRESPASS						GLARE		
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux)	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd)	Calculated Max. Peak Viewed Source Intensity (cd)	
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew	Post Curfew
R11	HIGH	E2	5 / 1	0.13	0.03	0.03	0.16	0.16	7500 / 500	85	85
Magnitude of Change							Negligible	Negligible		Negligible	Low
R11 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R12	HIGH	E2	5 / 1	0.13	0.01	0.01	0.14	0.14	7500 / 500	106	106
Magnitude of Change							Negligible	Negligible		Negligible	Low
R12 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R13	HIGH	E2	5 / 1	0.13	0.01	0.01	0.14	0.14	7500 / 500	101	101
Magnitude of Change							Negligible	Negligible		Negligible	Low
R13 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R14	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	82	82
Magnitude of Change							Negligible	Negligible		Negligible	Low
R14 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Minor
R15	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	2	2
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R15 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible

I.0 Results

R1 to R25 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	SENSITIVITY	Environmental Zone	LIGHT TRESPASS						GLARE		
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux)	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd)	Calculated Max. Peak Viewed Source Intensity (cd)	
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew	Post Curfew
R16	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	0	0
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R16 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R17	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	26	26
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R17 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R18	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	19	19
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R18 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R19	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	15	15
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R19 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R20	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	14	14
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R20 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible

I.0 Results

R1 to R25 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	SENSITIVITY	Environmental Zone	LIGHT TRESPASS						GLARE		
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux)	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd)	Calculated Max. Peak Viewed Source Intensity (cd)	
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew	Post Curfew
R21	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	26	26
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R21 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R22	HIGH	E2	5 / 1	0.13	0.01	0.01	0.14	0.14	7500 / 500	28	28
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R22 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R23	HIGH	E2	5 / 1	0.13	0.03	0.03	0.16	0.16	7500 / 500	29	29
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R23 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R24	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	0	0
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R24 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R25	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	13	13
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R25 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible

I.0 Results

R26 to R27 – Representative Residential Zones (Milton Malsor and Blisworth)

SENSITIVE RECEPTOR RESIDENTIAL	SENSITIVITY	Environmental Zone	LIGHT TRESPASS						GLARE		
			Vertical Illuminance Max. into Windows (ILP Guidance Notes 2011) (Lux)	Existing Vertical Illuminance (Lux) (1.5m AFL)	Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Resultant Calculated Max. Vertical Illuminance (Lux) (maximum value to elevation)		Source Intensity Max. (ILP Guidance Notes 2011) (cd)	Calculated Max. Peak Viewed Source Intensity (cd)	
					Pre Curfew	Post Curfew	Pre Curfew	Post Curfew		Pre Curfew	Post Curfew
R26 (Representative Zone)	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	0	0
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R26 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible
R27 (Representative Zone)	HIGH	E2	5 / 1	0.13	0.00	0.00	0.13	0.13	7500 / 500	6	6
Magnitude of Change							Negligible	Negligible		Negligible	Negligible
R27 - Pre – Mitigation Significance of Effect							Negligible	Negligible		Negligible	Negligible

1.0 Results

Natural Receptor – Direct Sky Glow (SGI)

The upward spill of light into the sky, which can cause a glowing effect and is often seen above cities when viewed from a dark area.

Direct Sky glow is assessed as a Site Wide impact and is based on a scenario where the most onerous of lighting impact is applied relative to the potential uses within each area.

The sample area reflects the overall Site and provides assessment for all types and variants of luminaire types.

In accordance with CIE 150 Section 5.5.2 the Upward Direct Light Ratio is calculated as follows:

The Direct ULR for the installation is calculated from the following equation:

$$ULR = Eup / (Edown + Eup)$$

Eup – Resultant average illuminance taken from a grid 1.0m above the highest luminaire

Edown – Resultant average illuminance taken from a grid 1.0m below the highest luminaire

For the purposes of direct sky glow assessment the majority of the Site is currently considered to be representative Environmental Zone classification of an E2: Rural, low district brightness.

In maintaining a no change / improved environment the ILP Guidance Notes for the Reduction of Obtrusive Light (2011) provides a limiting sky glow percentage of 2.5%.

Figure 3.1 illustrates the pre curfew horizontal illuminance levels (Edown) at 1.0m below the lowest luminaire within the Application Site. **Figure 3.2** illustrates the pre curfew horizontal illuminance levels (Eup) at 1.0m above the highest luminaire.

$$ULR = Eup / (Edown + Eup)$$

$$ULR = 0 / (1.0 + 0)$$

$$ULR = 0.0\% < 2.5\%$$

Table 1.2 - Summary comparison of existing, calculated and resultant totals relating to obtrusive light for Site Wide Direct Sky Glow.

SENSITIVE RECEPTOR NATURAL - DIRECT SKYGLOW	SENSITIVITY	DIRECT SKY GLOW		
		Existing Condition	Sky Glow ULR (Max. %) (ILP Guidance Notes 2011) (cd)	Calculated Direct Sky Glow %
SGI – DIRECT SKYGLOW	MODERATE	Representative of an E2 site wide night sky classification	2.5%	0
Magnitude of Change				Negligible
SGI - Pre – Mitigation Significance of Effect				Negligible

Note:

- Pre Mitigation refers to assessment inclusive of the proposed good practise embedded mitigation.
- Pre Curfew – All lighting on
- Post Curfew – All lighting on
- As per standard industry practise, for worst case assessment, calculated results do not include for potential reduced impacts provided by natural screening.

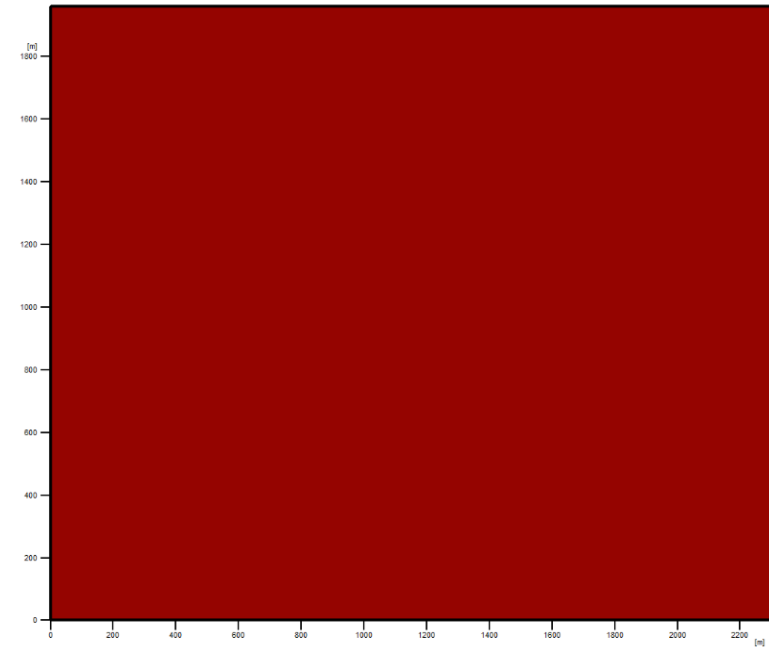
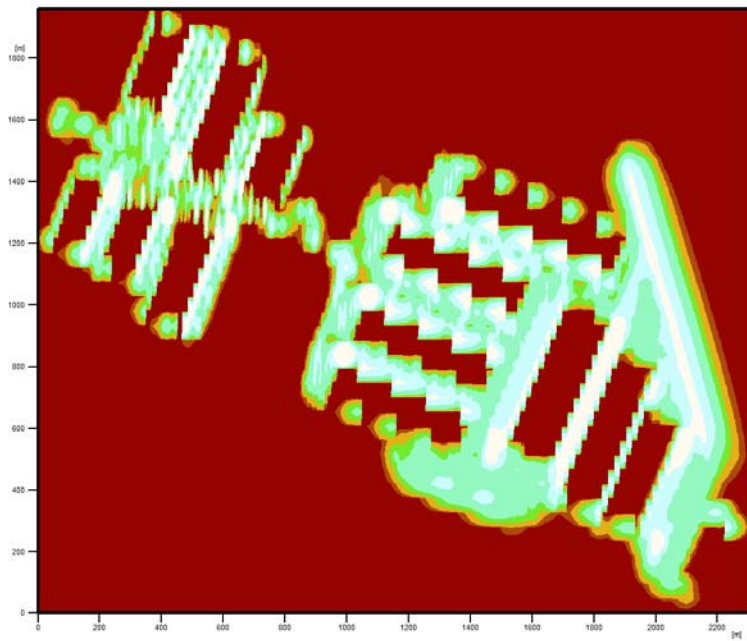
1.0 Results

Direct Illuminance DOWN @1.0m
below lowest luminaire = 1.0 lux
(average)

Figure 1.1 - The downwards light element as horizontal illuminance levels 1.0 m below the lowest external luminaire

Direct Illuminance UP @1.0m
above highest luminaire = 0.0 lux
(average)

Figure 1.2 - The upwards light element as inverted horizontal illuminance levels 1.0 m above the highest external luminaire





I.0 Results

Representative Heritage Locations H1 to H4

Overview:
No change in condition

Table I.3 - Summary comparison of existing, calculated and resultant totals relating to obtrusive light at each affected receptor.

SENSITIVE RECEPTOR HERITAGE	LIGHT TRESPASS		
	Baseline Existing illuminance Measurements (Lux)	Impact Calculated Max. Illuminance (Lux)	Resultant Vertical Illuminance (Lux) (1.5m AFL)
H1	0.13 Vertical @ 1.5m AFL	0.00 Vertical @ 1.5m AFL	0.13 Vertical @ 1.5m AFL
H2	0.13 Vertical @ 1.5m AFL	0.00 Vertical @ 1.5m AFL	0.13 Vertical @ 1.5m AFL
H3	0.13 Vertical @ 1.5m AFL	0.00 Vertical @ 1.5m AFL	0.13 Vertical @ 1.5m AFL
H4	0.13 Vertical @ 1.5m AFL	0.00 Vertical @ 1.5m AFL	0.13 Vertical @ 1.5m AFL

Note:

- As per standard industry practise, for worst case assessment, calculated results do not include for potential reduced impacts provided by natural screening.
- All lighting on 100%
- Unity Maintenance Factor: 1.0

1.0 Results

ECOLOGY ASSESSMENT LOCATIONS E1 - E25 / C1 - C8

Table 1.4 - Reference points E1 to E25 and C1 to C8 provide measured baseline conditions, peak / resultant horizontal and vertical light impacts (2m, 5m and 10m) at the respective ecology locations

Overview:

Increase of greater than 1.0 Lux over baseline condition @ E6, E7, E8, E10 & E12

Refer to Figure 1.3

ECOLOGY LOCATIONS	LIGHT TRESPASS									
	Baseline Existing Horizontal Illuminance (Lux) (Ground)	Baseline Existing Vertical Illuminance (Lux) (@ 1.5m AFL)	Impact Max. Horizontal Illuminance (Lux) (Ground)	Impact Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 10m AFL)	Resultant Max. Horizontal Illuminance (Lux) (Ground)	Resultant Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 10.0m AFL)
E1	0.10	0.13	0.00	0.03	0.02	0.02	0.10	0.16	0.15	0.15
E2	0.10	0.13	0.00	0.03	0.02	0.02	0.10	0.16	0.15	0.15
E3 *	0.10	0.13	0.01	0.12	0.08	0.04	0.11	0.25	0.21	0.17
E4	0.10	0.13	0.00	0.00	0.00	0.00	0.10	0.13	0.13	0.13
E5	0.10	0.13	0.00	0.00	0.00	0.00	0.10	0.13	0.13	0.13
E6 *	0.10	0.13	77.4	43.50	51.32	64.38	77.50	43.63	51.45	64.51
E7 *	0.10	0.13	26.00	0.51	0.16	0.00	26.10	0.64	0.29	0.13
E8 *	0.10	0.13	29.80	0.65	0.19	0.00	29.90	0.78	0.32	0.13
E9	0.10	0.13	Excluded from assessment due to proposed Unit 5 building location							
E10 *	0.10	0.13	75.10	34.19	34.87	0.20	75.20	34.32	35.00	0.33
E11	0.10	0.13	Excluded from assessment due to proposed Unit 6 building location							
E12 *	0.10	0.13	73.70	71.80	40.61	0.00	73.80	71.93	40.74	0.13

* Existing Ecology Areas within the Site Boundary and subject to landscape changes associated with the Proposed Developments

Note:

- As per standard industry practise, for worst case assessment, calculated results do not include for potential reduced impacts provided by natural screening.
- All lighting on 100%
- Unity Maintenance Factor: 1.0
- Yellow indicates where resultant impact values exceed 1.0 Lux.

I.0 Results

Overview:

Increase of greater than 1.0 Lux over baseline condition @ E14, E15, E16 & E21
Refer to Figure I.3

ECOLOGICAL LOCATIONS	LIGHT TRESPASS									
	Baseline Existing Horizontal Illuminance (Lux) (Ground)	Baseline Existing Vertical Illuminance (Lux) (@ 1.5m AFL)	Impact Max. Horizontal Illuminance (Lux) (Ground)	Impact Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 10m AFL)	Resultant Max. Horizontal Illuminance (Lux) (Ground)	Resultant Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 10.0m AFL)
E13	0.10	0.13	Excluded from assessment due to proposed Unit 6 building location							
E14 *	0.10	0.13	23.50	14.96	2.87	0.01	23.60	15.09	3.00	0.14
E15 *	0.10	0.13	49.20	2.27	0.50	0.04	49.30	2.40	0.63	0.17
E16 *	0.10	0.13	5.80	5.06	2.40	0.04	5.90	5.19	2.53	0.17
E17 *	0.10	0.13	0.05	0.1	0.00	0.00	0.15	0.23	0.13	0.13
E18	0.10	0.13	0.00	0.00	0.00	0.00	0.10	0.13	0.13	0.13
E19 *	0.10	0.13	0.01	0.04	0.01	0.00	0.11	0.17	0.14	0.13
E20 *	0.10	0.13	0.00	0.01	0.00	0.00	0.10	0.14	0.13	0.13
E21 *	0.10	0.13	0.99	1.10	0.07	0.00	1.09	1.23	0.20	0.13
E22	0.10	0.13	Excluded from assessment due to proposed Unit 4 building location							
E23	0.10	0.13	0.00	0.02	0.01	0.00	0.10	0.15	0.14	0.13
E24 *	0.10	0.13	0.23	0.30	0.08	0.00	0.33	0.43	0.21	0.13
E25	0.10	0.13	0.00	0.01	0.00	0.00	0.10	0.14	0.13	0.13

* Existing Ecology Areas within the Site Boundary and subject to landscape changes associated with the Proposed Developments

I.0 Results

Overview:

No change in condition

WATERBODY LOCATIONS	LIGHT TRESPASS									
	Baseline Existing Horizontal Illuminance (Lux) (Ground)	Baseline Existing Vertical Illuminance (Lux) (@ 1.5m AFL)	Impact Max. Horizontal Illuminance (Lux) (Ground)	Impact Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Impact Max. Vertical Illuminance (Lux) (@ 10m AFL)	Resultant Max. Horizontal Illuminance (Lux) (Ground)	Resultant Max. Vertical Illuminance (Lux) (@ 2.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 5.0m AFL)	Resultant Max. Vertical Illuminance (Lux) (@ 10.0m AFL)
C1 - Grand Union Canal	0.07	0.14	0.00	0.00	0.00	0.00	0.07	0.14	0.14	0.14
C2 - Grand Union Canal	0.09	0.79	0.00	0.00	0.00	0.00	0.09	0.79	0.79	0.79
C3 - Grand Union Canal	0.03	0.04	0.00	0.01	0.00	0.00	0.03	0.05	0.04	0.04
C4 - Grand Union Canal	0.02	0.03	0.00	0.01	0.00	0.00	0.02	0.04	0.03	0.03
C5 - Northampton Arm	0.09	0.15	0.11	0.23	0.05	0.00	0.20	0.38	0.20	0.15
C6 - Northampton Arm	0.08	0.16	0.01	0.03	0.01	0.00	0.09	0.19	0.17	0.16
C7 - Northampton Arm	0.03	0.04	0.00	0.00	0.00	0.00	0.03	0.04	0.04	0.04
C8 - Northampton Arm	0.02	0.03	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.03

I.0 Results

Ecology / Waterbody and Heritage Receptor Overview

Of the identified receptors within the previous impact tables the following provides an overview of impact over the current baseline condition:

Ecology –

Increase of greater than 1.0 Lux over baseline condition @

E6, E7, E8, E10, E12, E14, E15, E16 & E21

Refer to Figure I.3 for locations, where it is noted that the only adversely affected locations fall within the Site Boundary and are subject to landscape changes associated with the Proposed Developments.

Waterbody – No change in condition (not illustrated)

Heritage – No change in condition (not illustrated)



Figure I.3: Adversely affected locations

2.0 Summary of Adversities, Further Mitigation and Residual Effect

The following tables provide the pre mitigation significance of effect and the residual (post mitigation) significance of effect operational condition. Where, cause and mitigation measures are outlined.

While effects are considered to fall into one of four effect categories ranging from 'negligible', 'minor', 'moderate', 'major' it is only those effects that fall within the range of 'moderate to minor' to 'major' categories that are considered to be the significant environmental effects arising from the operation of the Proposed Development.

The notable pre mitigation significance of effects vary between negligible to major adverse. For the most adverse cases it is also likely that ILP guidance limits are exceeded (in relation to potential glare for a post curfew condition - after 23:00 where limit values reduce).

However, from the implementation at design and installation stages the following further mitigation measures should be applied to reduce this effect, including:

- Considered luminaire positions and orientation;
- Potential application of post installation luminaires shields; and
- Part retention and proposed foliage / landscape bunds (*Illustrative Landscape Masterplan 04 - D*)

Resulting in a residual negligible significance of effect to all retained residential receptor locations, where, for the majority of locations, post curfew ILP guidance limits are met. The exception being at R10 (Property adjacent to James King Plant) where the baseline post curfew condition currently exceeds guidance due to the existing highway lighting to Northampton / Towcester Road.

Any further contribution to this condition (as a result of the PDA) is considered to be negligible (0.13 Lux).

Note:

With respect to ecology and heritage locations, Section 1.0 of this report provides baseline, operational illuminance levels and resultant values to inform and support the relevant assessments.

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

Note:
• Significant residual impact highlighted in bold

Table 2.1 summarises the cause and magnitude of impacts and then applies potential further recognised mitigation (where possible) to determine the Residual Significance of Effect.

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R1 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R1 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R2 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R2 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R3 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R3 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R4 - Pre Curfew	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT						
R4 - Post Curfew							

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

SENSITIVE RECEPTOR	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
RESIDENTIAL							
R5 - Pre Curfew	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT						
R5 - Post Curfew							
R6 - Pre Curfew	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT						
R6 - Post Curfew							
R7 - Pre Curfew	*PROPOSED DEVELOPMENT REPLACES SENSITIVE RECEPTOR LOCATION, AS SUCH THIS IS NO LONGER CONSIDERED AS PART OF THE ASSESSMENT						
R7 - Post Curfew							
R8 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R8 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R9 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R9 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R10 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R10 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	Negligible increase in light trespass but exceeds ILP limits (due to current non-compliant condition) An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass but exceeds ILP limits (due to current non-compliant condition) An increase in glare, but compliant to ILP threshold limits
R11 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R11 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R12 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R12 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R13 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R13 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R14 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R14 - Post Curfew	Light Trespass - Negligible Glare - Low	Light Trespass - Negligible Glare - Minor Adverse	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	Considered luminaire positions and orientation Potential application of post installation luminaires shields Retention and proposed foliage / landscape bunds	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R15 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R15 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare and exceeds ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

RI to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R16 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R16 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare and exceeds ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R17 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R17 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R18 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R18 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R19 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R19 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R20 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R20 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R21 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R21 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

RI to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R22 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R22 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R23 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R23 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R24 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R24 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	Negligible increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits

2.0 Summary of Adversities, Further Mitigation and Residual Effect

R1 to R27 – Residential

SENSITIVE RECEPTOR RESIDENTIAL	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
R25 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R25 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare and exceeds ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R26 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R26 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare and exceeds ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. An increase in glare, but compliant to ILP threshold limits
R27 - Pre Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. Negligible increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. Negligible increase in glare, but compliant to ILP threshold limits
R27 - Post Curfew	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. Negligible increase in glare, but compliant to ILP threshold limits	None	Light Trespass - Negligible Glare - Negligible	Light Trespass - Negligible Glare - Negligible	No increase in light trespass over baseline. Negligible increase in glare, but compliant to ILP threshold limits



2.0 Summary of Adversities, Further Mitigation and Residual Effect

Natural Receptor – Direct Sky Glow (SGI)

SENSITIVE RECEPTOR SKY GLOW	PRE MITIGATION MAGNITUDE OF CHANGE	PRE MITIGATION SIGNIFICANCE OF EFFECT	CAUSE / COMMENT	MITIGATION (in addition / consistency with embedded measures)	POST MITIGATION MAGNITUDE OF CHANGE	RESIDUAL SIGNIFICANCE OF EFFECT	CAUSE / COMMENT
SGI	Negligible	Negligible	ULR < 2.5% - Compliant	None	Negligible	Negligible	ULR < 2.5% - Compliant

Audit Sheet

Rev.	Description	Prepared and checked by	Reviewed by	Date by
P1	IIP - Review Issue	CC	LG	14.11.16
P2	IIP - Review Issue	LG	CC	24.11.16
P3	IIP - Review Issue	LG	CC	30.11.16
P4	IIP - Review Issue	LG	CC	30.11.16
P5	IIP - Review Issue	CC	LG	01.12.16
P6	Draft Issue	LG	CC	07.12.16
P7	Amended to Illustrative Masterplan	LG	CC	11.05.17
P8	General Amendments for 2 nd Draft	CC	DDM	07.07.17
P9	Final Issue	DDM	DDM	01.03.18

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