
APPENDIX 4.2
UPDATED LIGHTING ASSESSMENT REPORT

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Lighting Assessment Report - Updated

Herbata Data Centre Campus

Naas, County Kildare

June 2, 2025

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Foreword

This report is an updated version of a report previously submitted to Kildare County Council (KCC) as part of a planning submission Ref: 2460740, for Herbata Ltd for their proposed data centre campus (the Proposed Development) at Jigginstown near Naas, Co. Kildare.

HDR had been commissioned by Herbata Ltd to undertake an assessment of the Proposed Development against Ireland's current national, and local energy, climate, and planning policies.

In response to the planning submission, a series of Further Information Requests (FIRs) have been made by KCC, a number of which relate to Energy Policy; Herbata has therefore asked HDR to review these requests and update this report accordingly.

This report has been updated to reflect changes made to the proposed sitewide layout. Those changes are as follows:

CCGT & Water Demand

The inclusion of Combined Cycle Gas Turbines has necessitated the addition of supporting service compounds to the masterplan, specifically at the rear of DC1-3, DC5, and DC6. For DC4, the service compound has been integrated within the building envelope. This modification has affected the placement of the Sprinkler Tank and Fuel Compounds. Additionally, the introduction of Combined Cycle Gas Turbines has led to the incorporation of rainwater harvesting drainage and underground water storage units to meet the Industrial Process Water Demand.

DC 4 Hall

Following additional archaeological survey studies, an additional Fulacht Fiadh was identified at the southern corner of the previously designated location of DC4. As a result, the size of DC4 has been significantly reduced in size and shape, leading to necessary adaptations to the perimeter road, attenuation pond, fence line, and the main access road running through the site.

Cycle and Pedestrian areas

Following consultation with Transportation Infrastructure Ireland, the cycle and pedestrian lane along the R409 have been revised to pass behind the proposed bus stop. Additionally, the alignment of the cycle and pedestrian lane has been set back from the main entrance and egress of the site, enhancing visibility for passing vehicles intending to enter.

This report has been updated to address RFIs:

RFI Item No. 25

The specific updates to this report are:

Figure 1-1, Figure 4-1 and Figure 4-3 - Updated to reflect most up to date masterplan overlay

Figure 4-2 – LUX contours adjusted on DC4 to suit change in shape of building.

4.2.4 Lighting calculations overview – Layouts- Updated to reflect most up to date masterplan overlay

Appendix A, Appendix B and Appendix D - Updated to reflect most up to date masterplan overlay

1 Introduction

This lighting assessment document has been prepared by HDR to accompany planning application to Kildare County Council for the Herbata Data Centre Campus project. Its purpose is to set out design criteria for external lighting and to establish the baseline consideration of the area surrounding the proposed development while describing methods (at design and installation stages). This will be applied to limit the impact of light spillage on surrounding area (obtrusive light), limit its impact on bats' colonies close by, including light spillage into the night sky (sky glow) from the new development.

External lighting design scope:

New external lighting will be provided to the following areas:

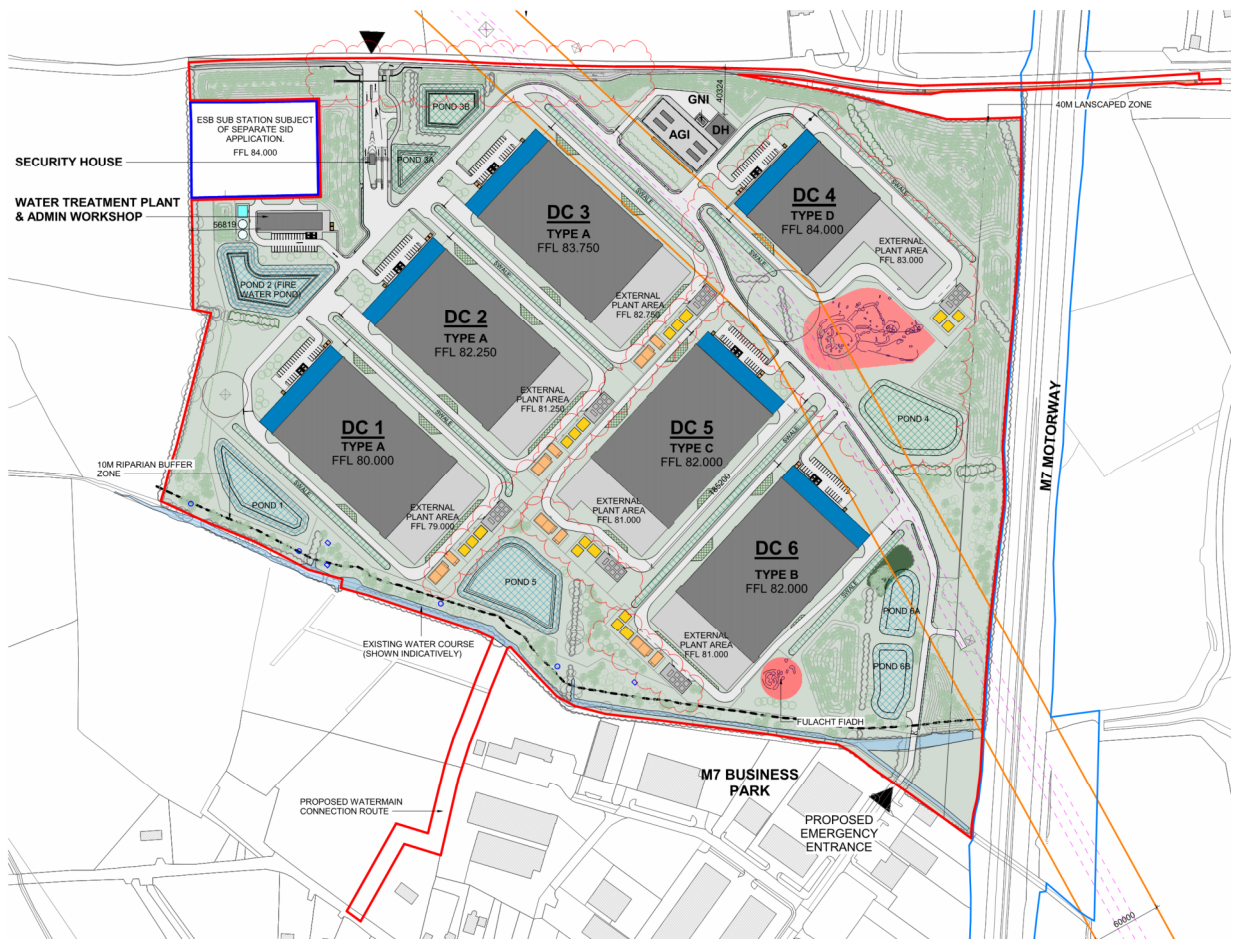
- Access roads within the site
- Car park
- Site security lighting (including emergency escape lighting)

Lighting design strategy has been developed to complement the new landscape design and be integrated into the existing surroundings.

The site will operate as a 'DARK' site with minimal and controlled lighting at the entrance / parking areas, together with low level lighting around the site only used for emergency.

Lighting will also be provided along the R409 which is detailed in in the Engineering Planning Report Ref: 10360452-HDR-XX-XX-RP-ZZ-000002. Due to the distance between R409 and nearest bat house location, approximately 300m, it is assumed that there should be no light pollution impact to the bat houses.

Figure 1-1. Site Location and Boundary Lines



2 Lighting Design Criteria

The following mandatory, legislative, and regulatory requirements including Irish Standards, Codes of Practice and Best Practice professional guidance publications will form the design criteria parameters of the external lighting installation:

2.1 Planning Policy and Legislations - Regional Planning Policy

The Kildare County Development Plan sets out policies/objectives/ standards for public lighting in the following documentation.

2.1.1 Chapter 5: Sustainable Mobility Transport

'Document Aim: To promote and facilitate ease of movement within and through County Kildare, by integrating sustainable land use planning and a high-quality integrated transport system; and to support and prioritise investment in more sustainable modes of travel, the transition to a lower carbon transport system, and the development of a safer, efficient, inclusive, and connected transport system.'

'Provide new or upgraded lighting for all footpath and cycle track schemes subject to the consideration of ecology and impacts on wildlife. Appropriate environmental assessments will be required and may result in unlit sections which may include some parts of the county's Greenways. Where applicable, all species-specific mitigation will be included within the relevant sections of the Appropriate Assessment.' (As per Action TM A19)

Chapter 15: Development Management Standards

'Development management is a statutory process that ensures that development takes place in an orderly and efficient manner. Specific control measures are outlined to ensure that new development is of high quality and relates to the character, scale, layout, and form of the area in question. Development will be managed by means of established and proven principles aided by guiding standards, in particular guidelines issued to the Planning Authority by the Minister regarding its functions, under Section 28 of the Planning and Development Act 2000.'

Street lighting should, at a minimum, comply with the standards set out in the most recent revision of the Kildare County Council document 'Street Lighting Technical Specification' and Section 5.12 of this Plan (as per section 15.7.9)

Kildare Technical Specification for Street Lighting Rev 03, 04 06 2019

Kildare County Council Lighting Policy - Kildare County Council's general principles and requirements for street lighting are set out in the Kildare County Council Lighting Policy: Street Lighting Technical Specification.

Lighting Guides and Regulations

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

This Guidance Note is updated version of the previous document, and it considers industry comment regarding the assessment and definition of obtrusive lighting. It states – Good lighting practice is the provision of the right light, at the right time, in the right place, controlled by the right system.

CIE (The International Commission on Illumination) 150: 2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations

The purpose of this Guide is to help formulate guidelines for assessing the environmental impacts of outdoor lighting and to give recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. The guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. (page VI in the document).

CIE 126: 1997 Guidelines for Minimising Sky Glow

This Technical Report gives general guidance for lighting designers and policy makers on the reduction of the sky glow. The report discusses briefly the theoretical aspects of sky glow, and it gives recommendations about maximum permissible values for lighting installations in relation to the needs of astronomical observations - casual sky viewing included. (Page V in the document).

ILP (The Institution of Lighting Professionals) Guidance Notes 08/23 Bats & Artificial Lighting

The Bat Conservation Trust in partnership with the Institution for Lighting Professionals (ILP) and Clarkson & Woods ecological consultants have published this latest practical guidance on considering the impact upon bats when designing lighting schemes.

Eurobats: Guidelines 8_ Light Pollution

In October 2018 new Eurobats guidance on bats and artificial lighting was published. This was drafted by a panel of experts including BCT and uses the currently available research and knowledge to look at solutions to avoid, mitigate and compensate the negative impacts of artificial light. It is broad international guidance that complements the nationally drafted BCT / ILP guidance (as above).

Code of Practice for Road Lighting-Part 1

Irish Standards Institution, IE 5489-1:2020

Code of Practice for Road Lighting-Part 2 Performance requirements

Irish Standards Institution, IE EN 13201-2: 2015

IE EN 12464-2: 2024 Light and lighting – Lighting of workplaces Part 2:

Outdoor workplaces

This standard specifies requirements for lighting of tasks in most outdoor workplaces and their associated areas in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice.

2.2 General Approach and Performance Criteria

Our approach to lighting design of the external spaces will be holistic to embrace the existing and new landscape environment and to create visual connection, interest, and flow between the spaces. Adequate and properly distributed light (limiting obtrusive light/light pollution and minimising the sky glow) of a suitable colour will be provided to ensure safety and security at night while ensuring minimal disruption to ecological aspects of surrounding area (bats habitat).

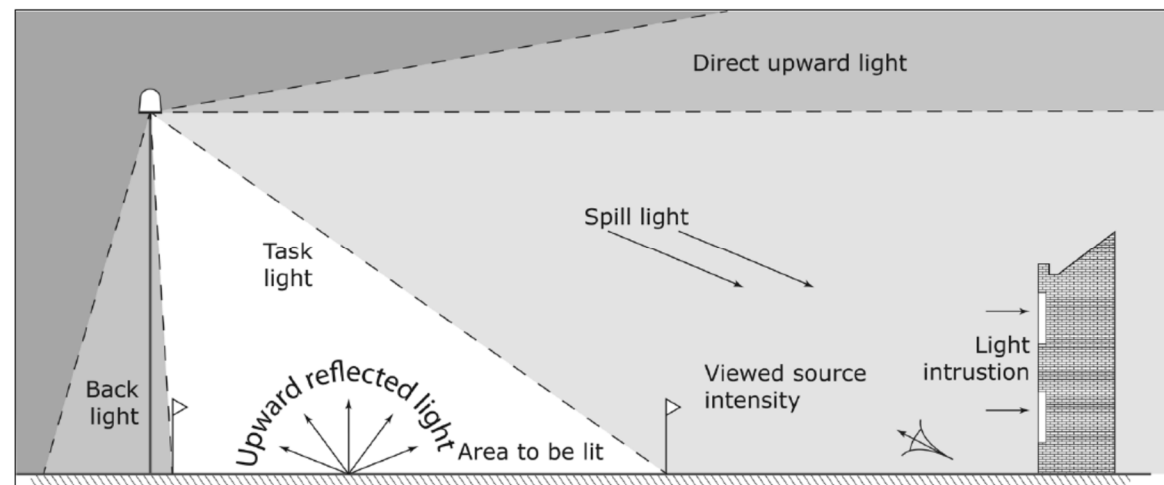
Lighting design will be based on the following considerations:

2.2.1 Obtrusive light

ILP Guidance Note 01/21 The Reduction of Obtrusive Light document outlines different forms of obtrusive light such as:

- Sky glow: the brightening of the night sky
- Glare: the uncomfortable brightness of a light source when viewed against a darker background
- Light spill: the spilling of light beyond the boundary of the area being lit
- Light intrusion ('Nuisance'): are all forms of obtrusive light which may cause nuisance to others including the passage of light from the external sources into the building.

Figure 2-1. ILP Guidance Note 01/21 -Types of Intrusive Light



Obtrusive light (light pollution) is minimised at design stage by appropriate selection of the four lighting elements: a light source, a luminaire (together with its optical control system), method of installation and lighting controls.

2.2.2 Quality of light - Light sources and Luminaires

The external lighting to all areas will be designed using energy efficient LED light sources with good colour rendering properties and colour temperature to compliment the landscape design.

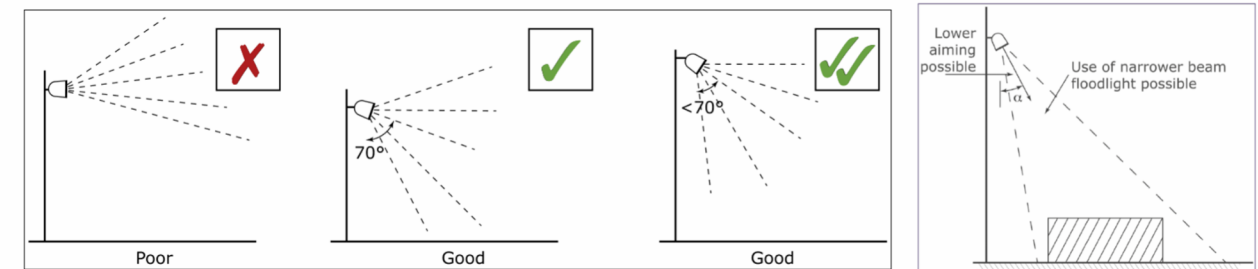
All luminaires will be specified with the correct optics and be mounted at the right height to deliver light to the specific task/area and minimise light pollution while saving energy usage.

All luminaire optics will be selected with downward light distribution and without upward lighting component as per ILP Guidance Note 01/21.

2.2.3 Installation and light direction

All luminaires will be mounted at the correct height and aimed (as required) away from any adjacent areas to prevent light spill into this area or creating a glare problem (to drivers, cyclists or pedestrians).

Figure 2-2. ILP Guidance Note 01/21 -Luminaire Aiming Angles



2.2.4 Surfaces and Reflectance

Luminaire selection with good optics and careful positioning of the light fixtures across the site will minimise the light spilling up. However, the light which arrives at the ground can be reflected back up into the night sky. Reducing the reflectance of the ground surface will reduce the reflected light but could also give the impression of dark surface. During detail design stage the reflectance of the surface and contrast between, will be considered to provide the balance between the safety and reflected light spill.

2.2.5 Ecology and Bats

The light spilled into the surrounding area can have a negative impact on ecology of the site. The ecological issues have been identified as a key element for consideration due to the bat habitats identified to be near the site.

Based on information from both documents: Eurobats Guideline No.8 and the Institution of Lighting Professionals (ILP) Guidance Note No.8 (including other documents relevant to external lighting) we have outlined our approach to mitigating effect of ALAN (Artificial Light at Night).

Artificial lighting has a wide range of effect on bats, including their feeding, hibernation, and migratory habits.

The levels of illumination, bats are normally exposed to are very low, as low as 0.1 Lux produced from the stars and moonlight, so any levels above provided by artificial lighting will have an impact on bats and will disrupt bat patterns and their way of life.

The light spectrum ranges from short wave Ultra Violet (UV) to long wave infrared light. The effect of blue light (according to the publications) has negative effects on bats and therefore warm light colour is proposed.

Current site proposals have several sources of potential light pollution, some emanating from internal building lighting (Admin building), access road and car park lighting and other external practical/maintenance lighting such as security light.

To mitigate the impact of artificial lighting on bats our lighting design approach will be:

- Use of LED light source with good colour rendering (CRI>80) and no UV emission
- Use of warm colour temperature (2700K) and colour spectrum >550nm which has less impact on bats.
- Use of LED luminaires with a good optical control to provide the lighting where needed without spilling the light to the surrounding area. Luminaire upward light will be 0%.
- Light will be aimed to the surface being illuminated and luminaires will have a glare shield to minimise any potential light spill.
- The intensity of the light will be controlled via dimming, in order to minimise the ground surface reflections
- All external lighting will be controlled via lighting control system comprising of photocells/time clock/dimming/sensors etc. to provide 'dark periods' at night.



Luminaires to be mounted at short column and have a good optical light distribution.

2.2.6 Environmental Conditions

The following describes the area surrounding the proposed development and the site in relation to existing sources of lighting in the area.

Environmental Zone - ILP Guidance Note 01/21 lists five environmental Zones:

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones 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 of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

For the purpose of this assessment, it is considered that our development is an area of 'Low district brightness' (Zone E2). Therefore, the relevant maximum values from the tables above and below (shown in red) should be applied. Note. This zone selection will need to be confirmed by local authorities.

ILP Guidance Note 01/21 – Limitation of illuminance on surrounding premises (Light intrusion/ nuisance and management of spill light)

Table 2-1. CIE 150 table 2: Maximum values of vertical illuminance on premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

ILP Guidance Note 01/21 – Limitation of sky glow

Table 2-2. CIE 150 table 5: Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

2.2.7 Adjacent Zone consideration

Areas to be lit within visual distance of the boundary line will be carefully designed in order to avoid light spill to the surrounding area (this will be carried out by implementing luminaires with good optics, aiming the light where is required, correct luminaire mounting height and its location within the landscape).

2.2.8 Safety and security

Lighting will be provided to ensure safe movement to all: pedestrians, cyclists and vehicles within development boundary.

2.2.9 Sustainability

Lighting scheme will be energy efficient and sustainable. All lighting design methods (including use of the latest technology incorporating lighting controls) shall be employed in accordance with all mandatory legislations and regulations.

3 Lighting Design Strategy

3.1 Overall Design Criteria

Careful consideration at the planning and design stages can ensure that the task that requires lighting can be achieved whilst controlling light pollution.

External lighting design will be based on the following drivers to provide the best lighting solution for this project:

- Defining the use of external space
- Aesthetic considerations, including architectural and landscape appropriateness
- Local infrastructure
- Local planning guidance and lighting master planning requirements
- Requirements of vehicular traffic in and around the area
- Colour and types of the landscape materials
- Changes in level and identification of obstructions
- Choice of light sources
- Choice of luminaire
- Visual impact of light fixtures by day
- Vulnerability to vandalism/strength of equipment
- Maintenance
- Access requirements (visually impaired and physically disabled people)
- Health and safety of the public and local fauna and flora
- Ecological consideration (bats habitat in the area surrounding the site)
- Environmental considerations
- Interference with adjacent transport routes
- Obtrusive light
- Energy usage
- Lighting controls

It is proposed that lighting systems will be provided to the exterior spaces including, but not limited to pedestrian footpaths, car parks, circulation routes within the site boundaries, entrances and exit areas. The purpose of the lighting is to identify and illuminate pedestrian and vehicular routes within the site and to secure the health and safety of its users throughout the hours of darkness. Sufficient lighting will be provided for a safe environment whilst limiting obtrusive light. This will be achieved by using luminaires that are directional and with optical control in order to illuminate only the task area concerned so upward light would only ever be from reflection.

Numerical lighting design criteria will be considered as per following documents:

Illumination levels (as references in the tables below) are defined as per IE EN 12464-2: 2024

Table 5.1 — General requirements for areas and for cleaning at outdoor work places

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

Note- The speed selection above will need to be confirmed by local authorities

Table 5.9 — Parking areas

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

IE EN 5489-1: 2020 Road lighting Part 1

Document (table referenced below) states different Lighting Class depending on the traffic flow:

Table A.5 — Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

IE EN 13201-2: 2015 Road lighting – Part 2: Performance Requirements

Document (table referenced below) states horizontal illumination for different Lighting Classes

Table 3 — P lighting classes

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

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

As previously stated, the development is located within an E2 environmental; zone and as such, the development will be considered as class P5 for the purpose of this assessment.

Class P4 has a requirement of 3 lux (average illumination) and 0.6lux (minimum illuminance) on the horizontal plane.

A detailed lighting design to meet some or all the following objectives:

- to provide safety for pedestrians from moving vehicles around within the site boundary
- to deter anti-social behaviour
- to ensure the safe movement of vehicles
- to match the lighting design and lighting equipment to the architecture and environment
- to illuminate road and directional signs
- to limit light pollution
- to mitigate the impact on bat habitat
- to maintain lighting installations and protect them from vandalism

to facilitate CCTV surveillance.

Lighting controls

It is recognised that suitable lighting control is required to be installed in order to maintain the site operation as a 'DARK' site and as such it is proposed that series of control measures are applied both for interior and exterior lighting.

Interior lighting

As a part of an energy-controlled measure together with control of spill light from internal spaces, all areas will have Passive Infra-Red (PIR) controlled lighting. The exception to this will be only emergency lighting that come on only in the event of power failure or testing under controlled condition. A provision of override switches will be made to allow security patrols to control the lighting.

External lighting

Control to all external lighting will be by automated switching where lighting is used only when required and switched off or blanked out 2 hours after sunset. This is to be confirmed.

External plant areas and roof areas will have localised minimal lighting which will normally be off with timers to ensure extinction. Sockets for occasional task lighting will be provided in the event of a need to access for emergency use.

Security cameras will not be provided with lighting in the visual range, instead only by infra-red flood lighting.

Road lighting shall be controlled through the use of photocells and time clocks. Photocells will be either integral to the luminaire or positioned so as to be local to the relevant lighting circuit. Timeclocks will override the photoelectric cells during hours post curfew (suggested as 23:00 hours by The Institute of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light 2021). This is to be discussed and agreed as required.

4 Lighting Calculations and Conclusions

Lighting calculations using DIALux software were carried out to determine two aspects of light spill to the area surrounding the proposed site development:

- Light spill from the internal to external space (Admin building predominantly)
- External lighting to parking area and access roads around the proposed site

Interior lighting calculations were carried out to ground floor and first floor office spaces. Horizontal calculation surfaces are set near the building outline. These are to show the light spill from an office space into the adjacent outdoor environment and to demonstrate its contribution toward the potential light pollution, as the street lighting will be switched off and only operational in emergency situations and evacuations.

4.1 Indoor Lighting (Internal Lighting Spill from Admin Building)

4.1.1 Office Lighting Calculation Assumptions:

Room Reflectance Values considered:

Ceiling (Standard Value) = 70%

Wall (paster) = 78%

Floor (Standard Value) = 20%

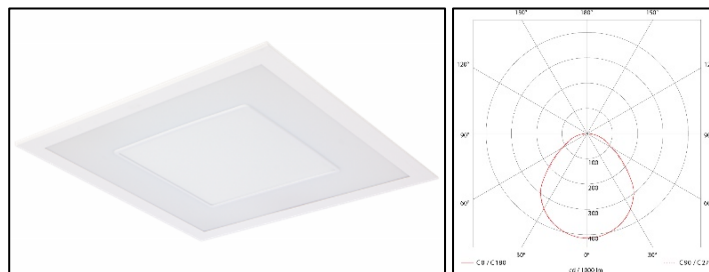
Windows Glass transmittance value 66%

Windows Glass Reflectance value 6%

Luminaire Mounting Height = 3.2m.

Lighting control system will be provided to allow for zone control and dimming.

Luminaire used (Tamlite Advance 600x600) typical arrangement:

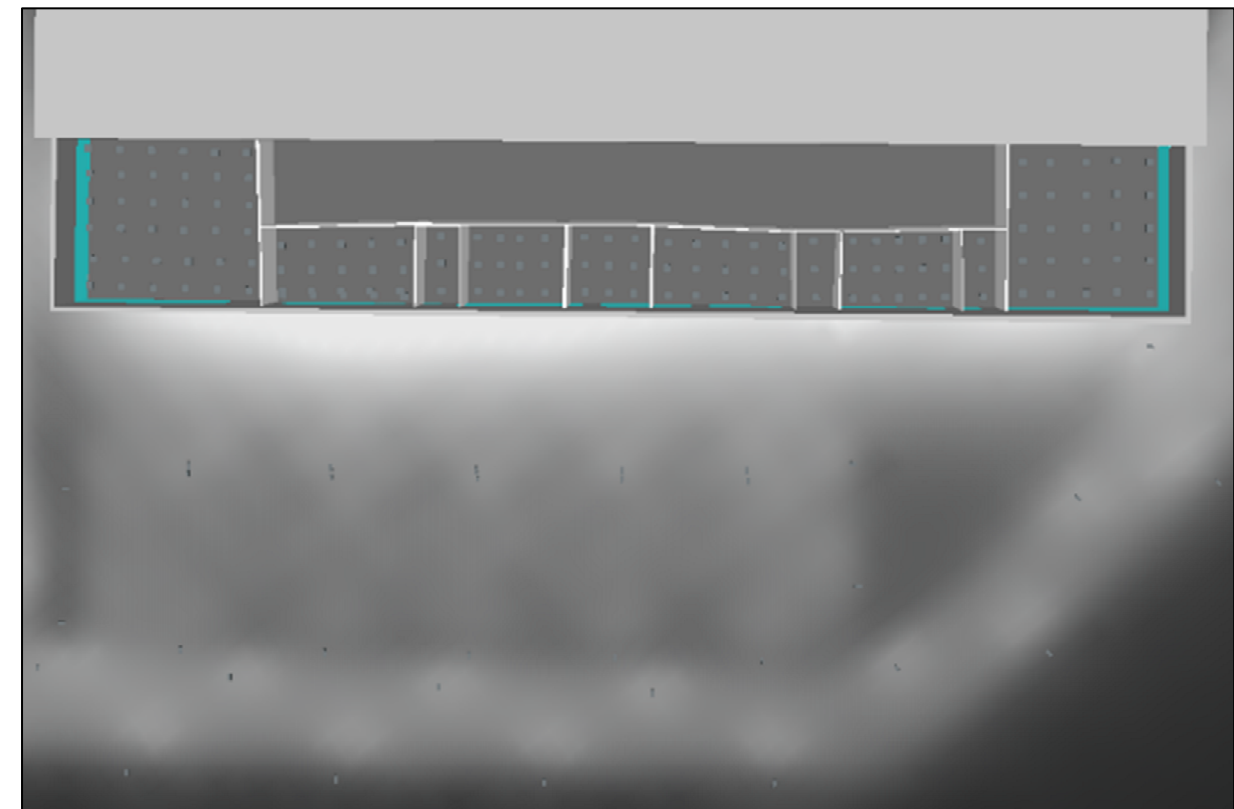
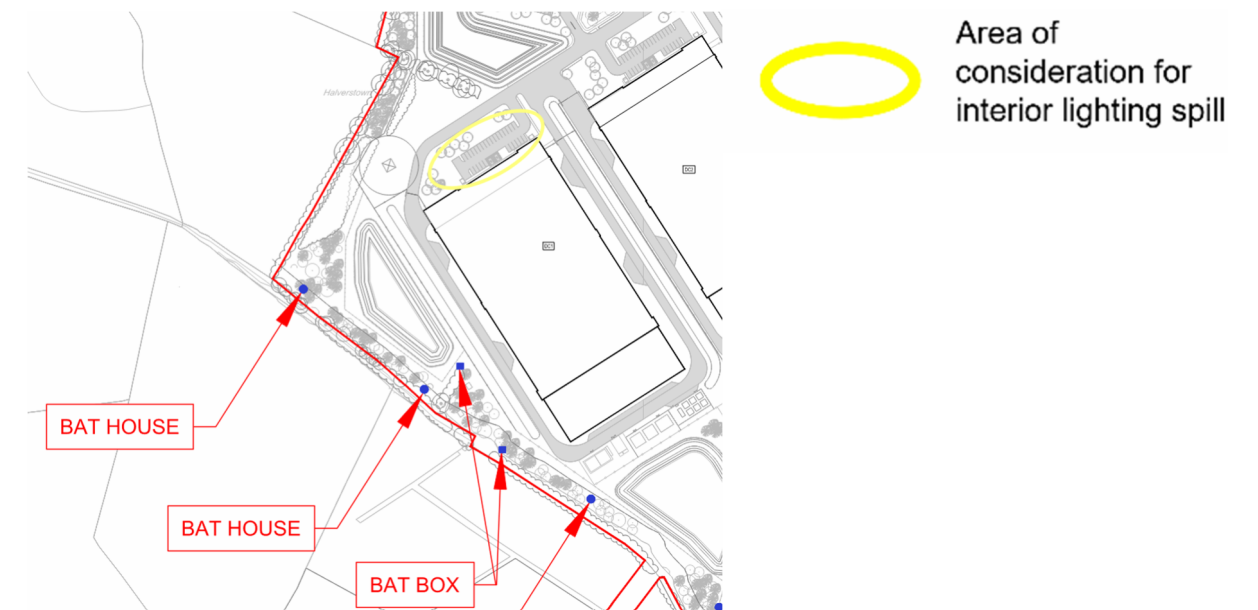


4.1.2 Office Lighting Calculations Design criteria:

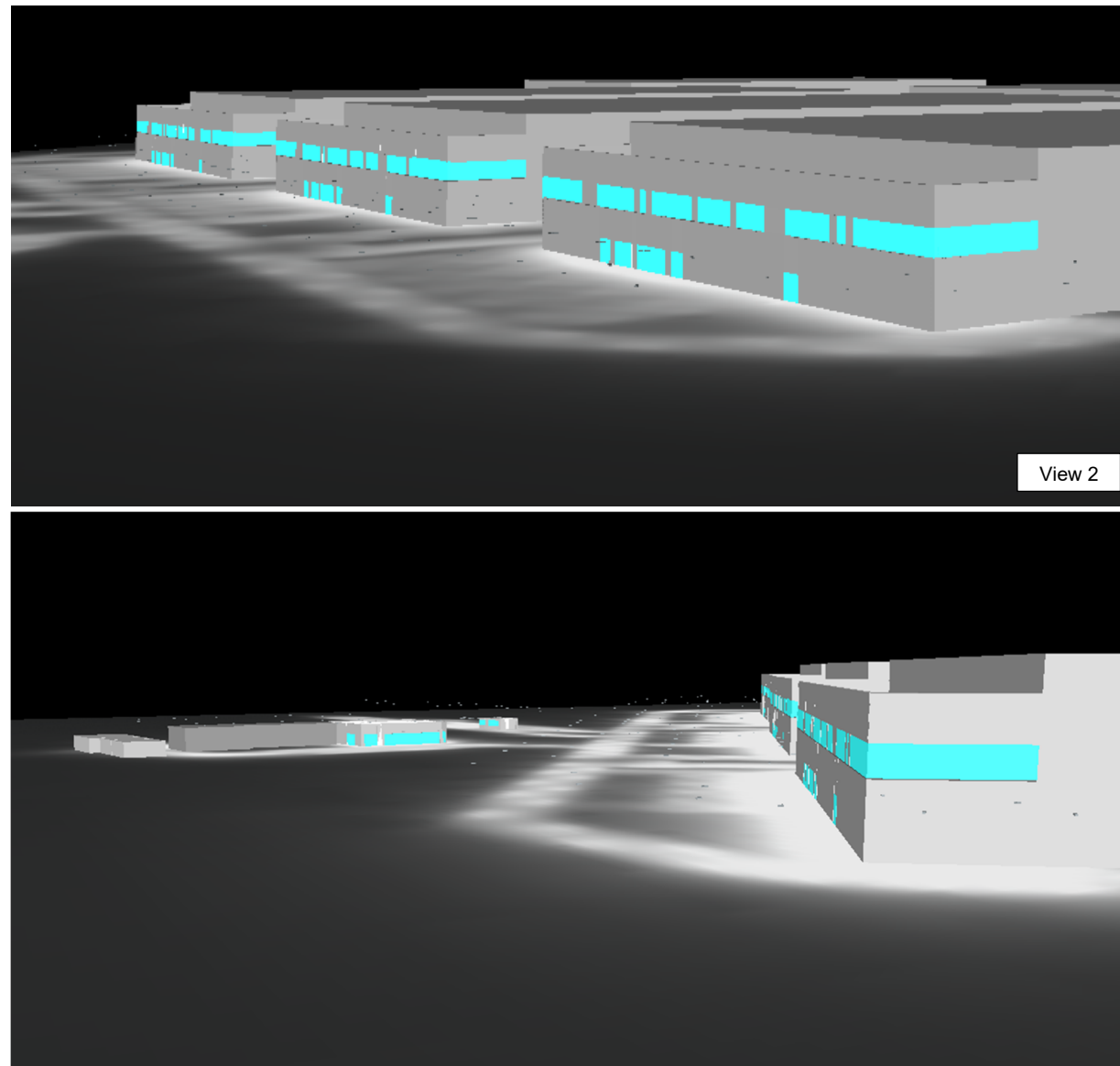
Average illumination level = 400lux

Uniformity = 0.4 – 0.8

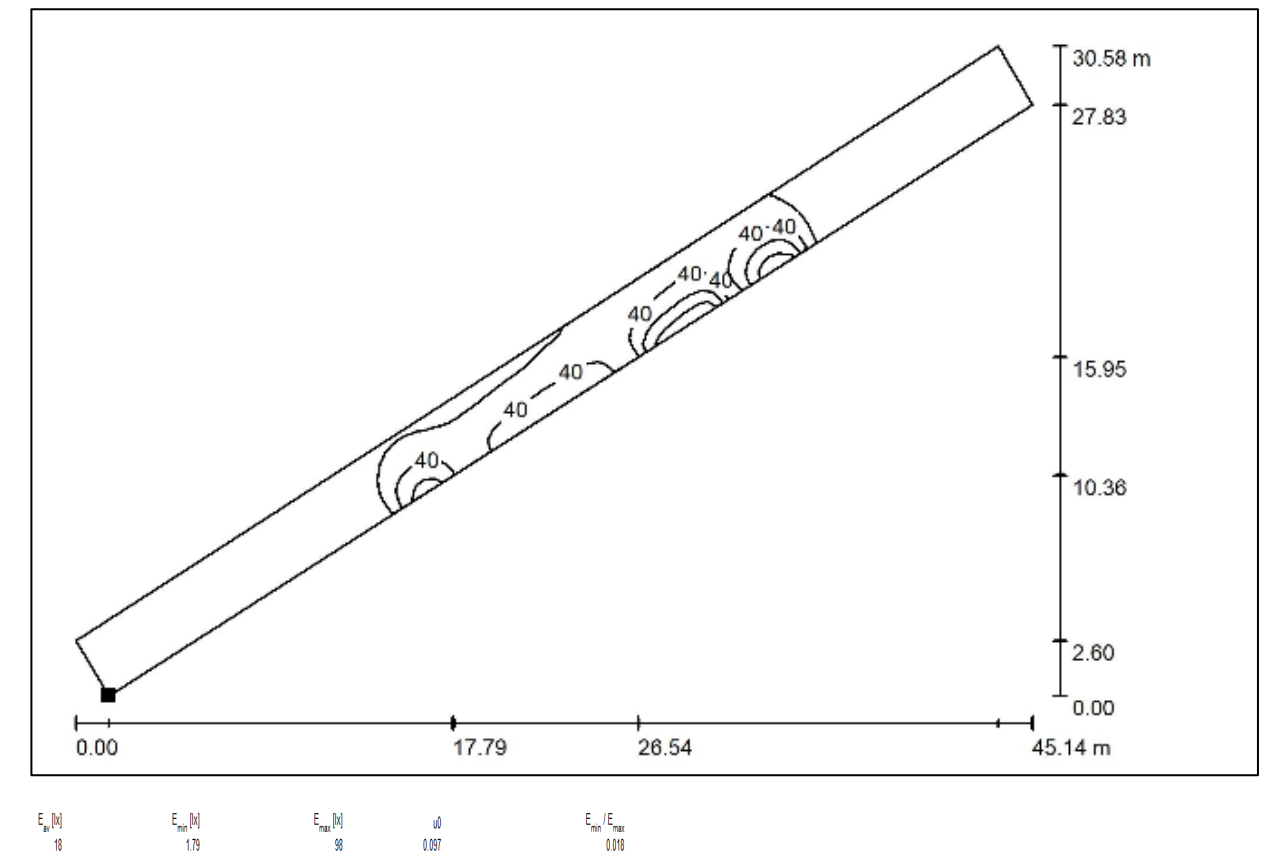
Figure 4-1. Interior lighting spill (building closest to the bat habitat)

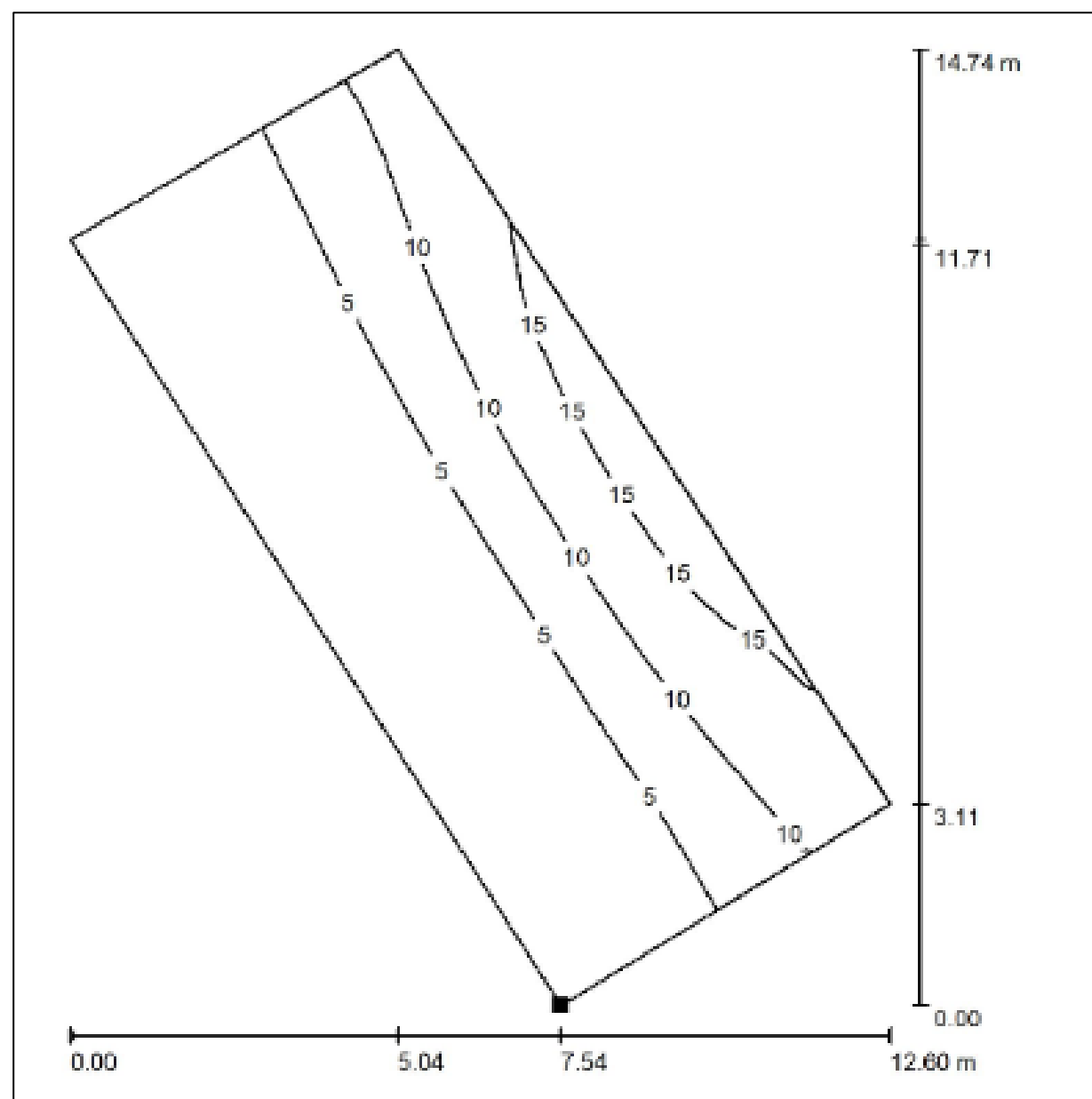


Refer to 4.3Appendix A for bat box and house location plan.



Refer to 4.3Appendix B for site view selection plan





E_{av} [lx] 6.86
 E_{min} [lx] 2.00
 E_{max} [lx] 19
 $u0$ 0.291
 E_{min}/E_{max} 0.107

Calculated lighting levels – light spilled from the interior lighting to the adjacent outdoor space (to minimise the light pollution blinds will be required)

4.2 External Lighting to Overall Site

4.2.1 External Overall Site Lighting Calculation Assumptions

Ground Reflectance: 30%

Pole mounted luminaires: 6m pole height, with arm bracket 750mm and antiglare and back shield (as per below image typical arrangement)

Luminaire used (TamLite City RLB with baffle/shield optic) typical arrangement.

View 3



4.2.2 External Lighting Calculations Design criteria:

Average illumination level = 10-20lux

Uniformity = 0.4

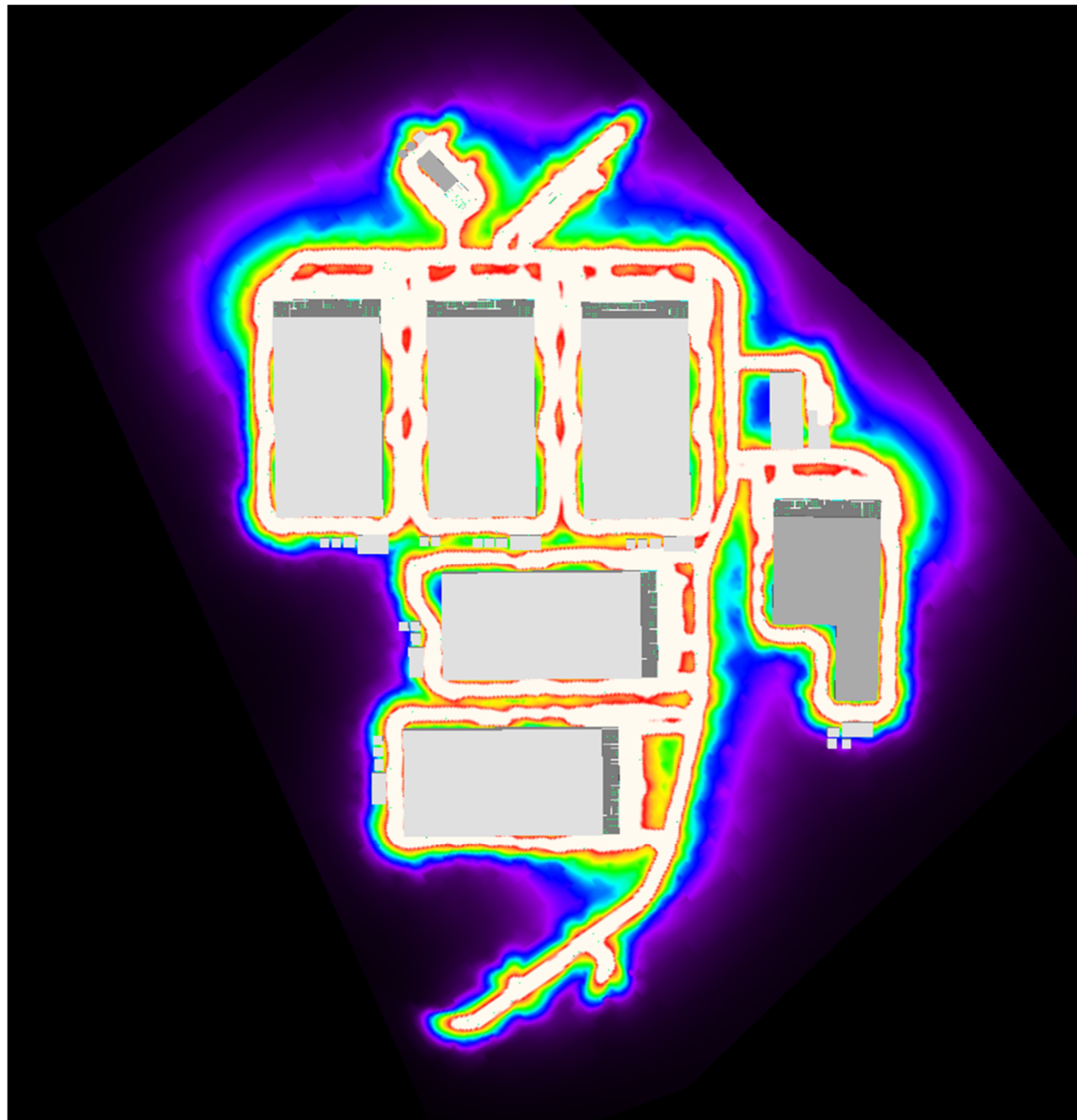
4.2.3 Overall site lighting layout

The external lighting calculations to the overall site were carried out by modelling office building blocks and access roads together with proposed external/street lighting.

The diagrams below show lighting isolux plots identifying lighting levels and how they taper off away from the areas that are being illuminated (i.e. car parks, access roads, ect.) by using the luminaires with specific light distribution optics and back shields.

The average lighting levels calculated are in the range between 10 – 20 lux across. The uniformity in some areas is below targeted 0.4 (for the road lighting). This is due to the site limitations for location of the pole mounted lights in relation to the landscape elements, road design and locations of pylons. Reference should be made to the overall site calculation summary in Appendix C and lighting layout drawing 10360452-HDR-XX-XX-DR-E-632000 in Appendix D.

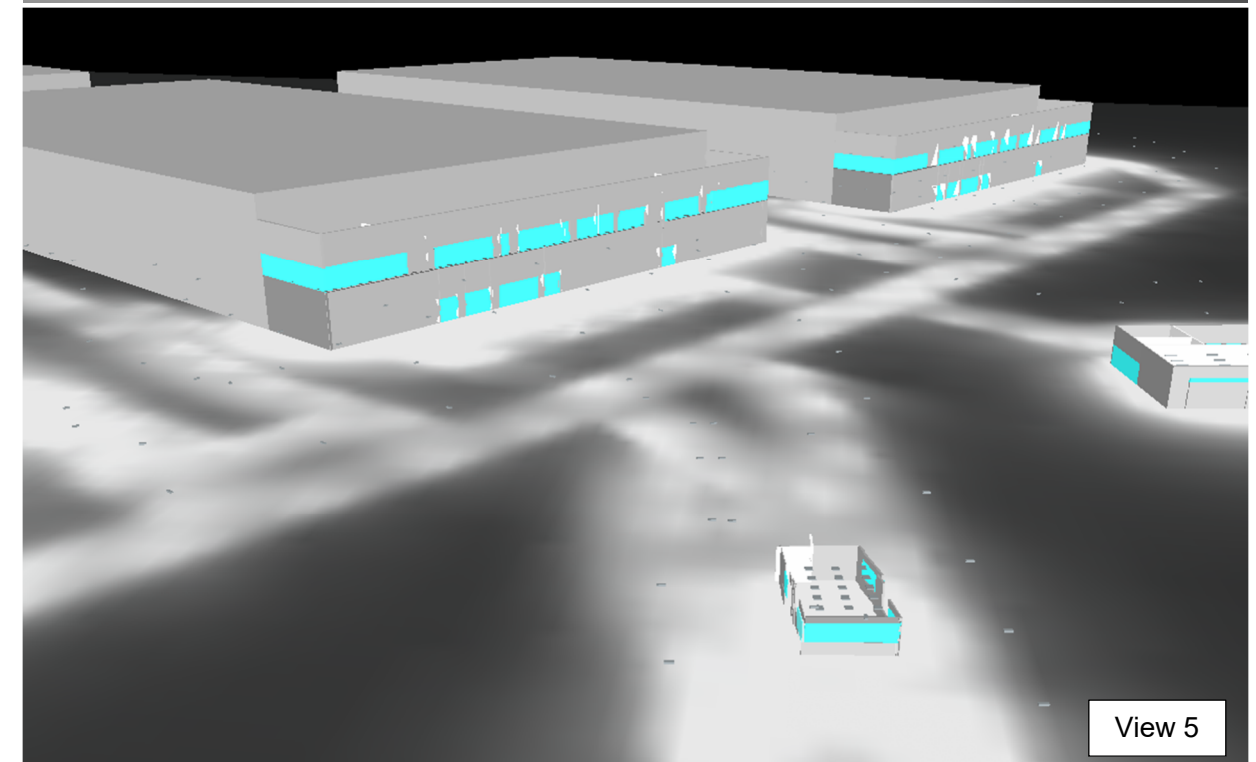
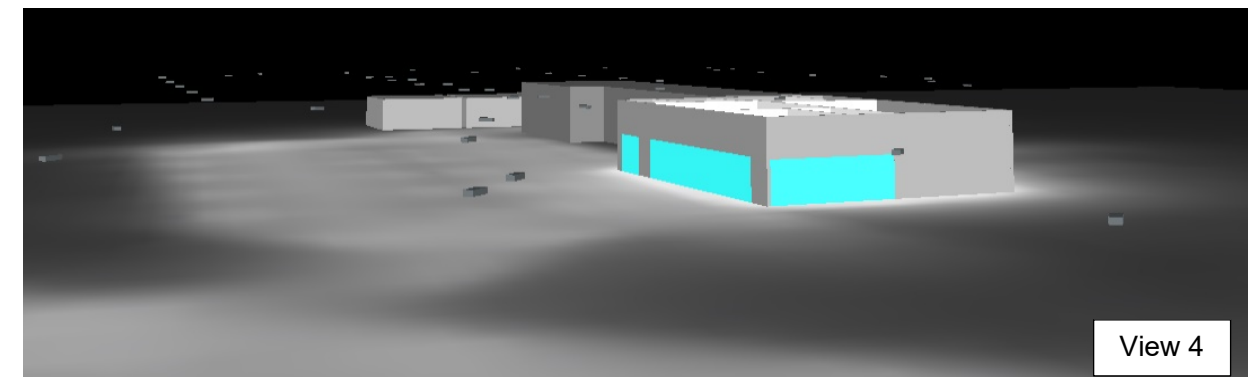
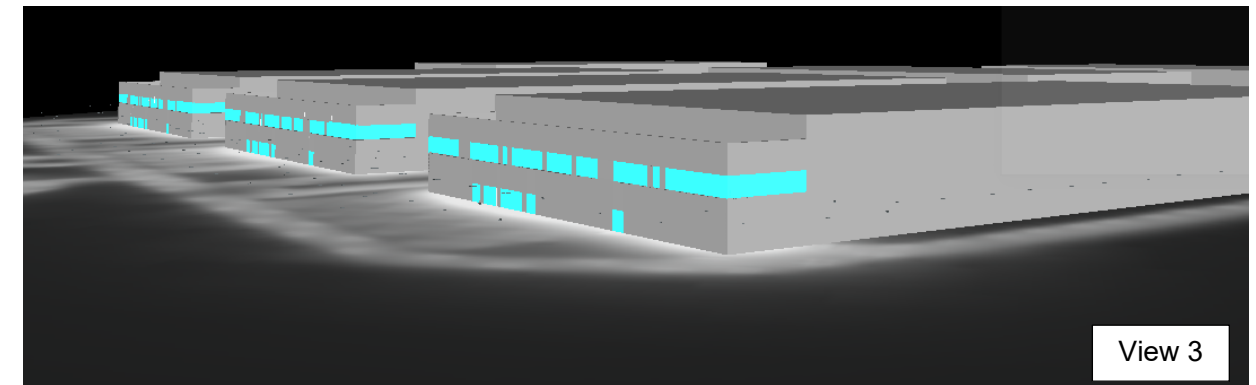
Figure 4-2. Overall site lighting calculations with legend below

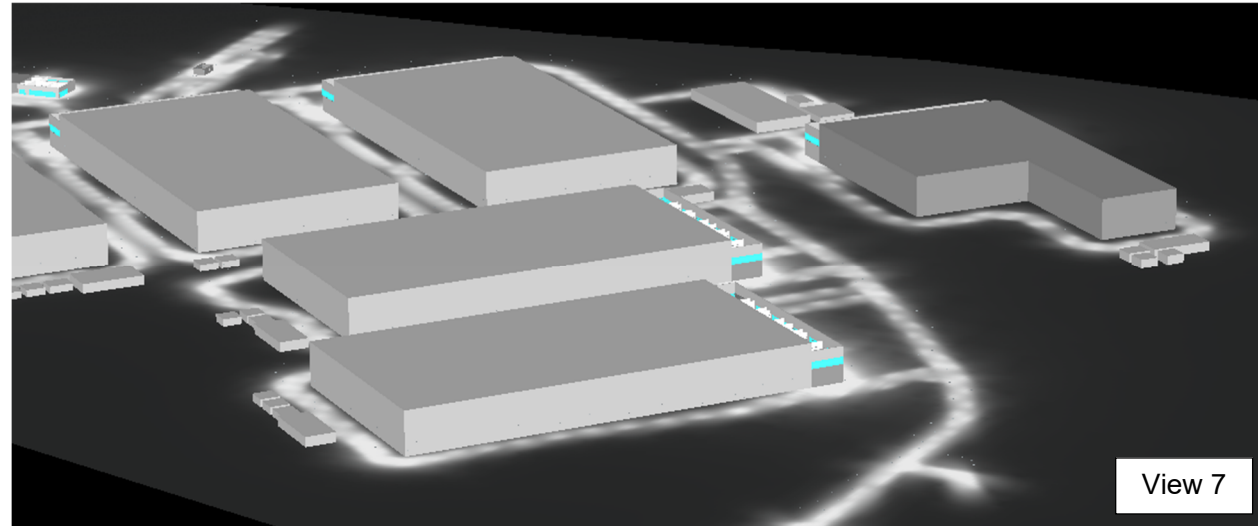
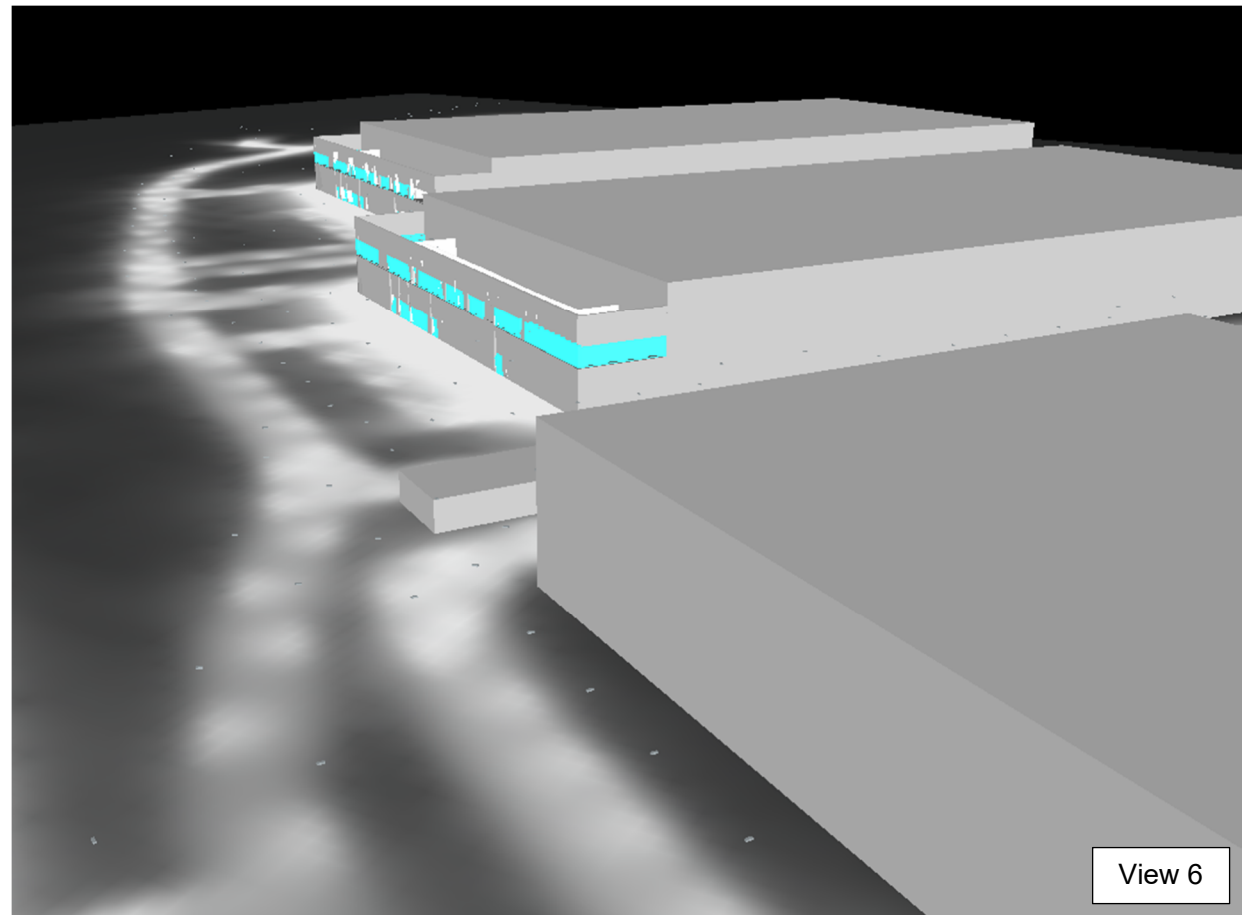


☒ Illuminances ☐ Luminance

	10.00	lx	Interpolate
	7.50	lx	
	5.00	lx	
	2.00	lx	
	1.00	lx	
	0.50	lx	
	0.20	lx	
	0.10	lx	
	0.00	lx	
Colours	Sort	Apply	

Figure 4-3. 3D Selected Site Views (DIALux modelling and lighting calculation visuals):





4.2.4 Lighting calculations overview

The average lighting levels calculated are in the range between 10 – 30 lux across with uniformity mostly in the range of 0.4. However, the uniformity in some areas is below targeted 0.4 (for the road lighting). This is due to the site limitations and environmental restrictions (such as preference for lower column lights to help with mitigation of light spill related to bat habitat) where pole mounted lights can be positioned in relation to the landscape elements, site road design and proximity of the Pylon locations.

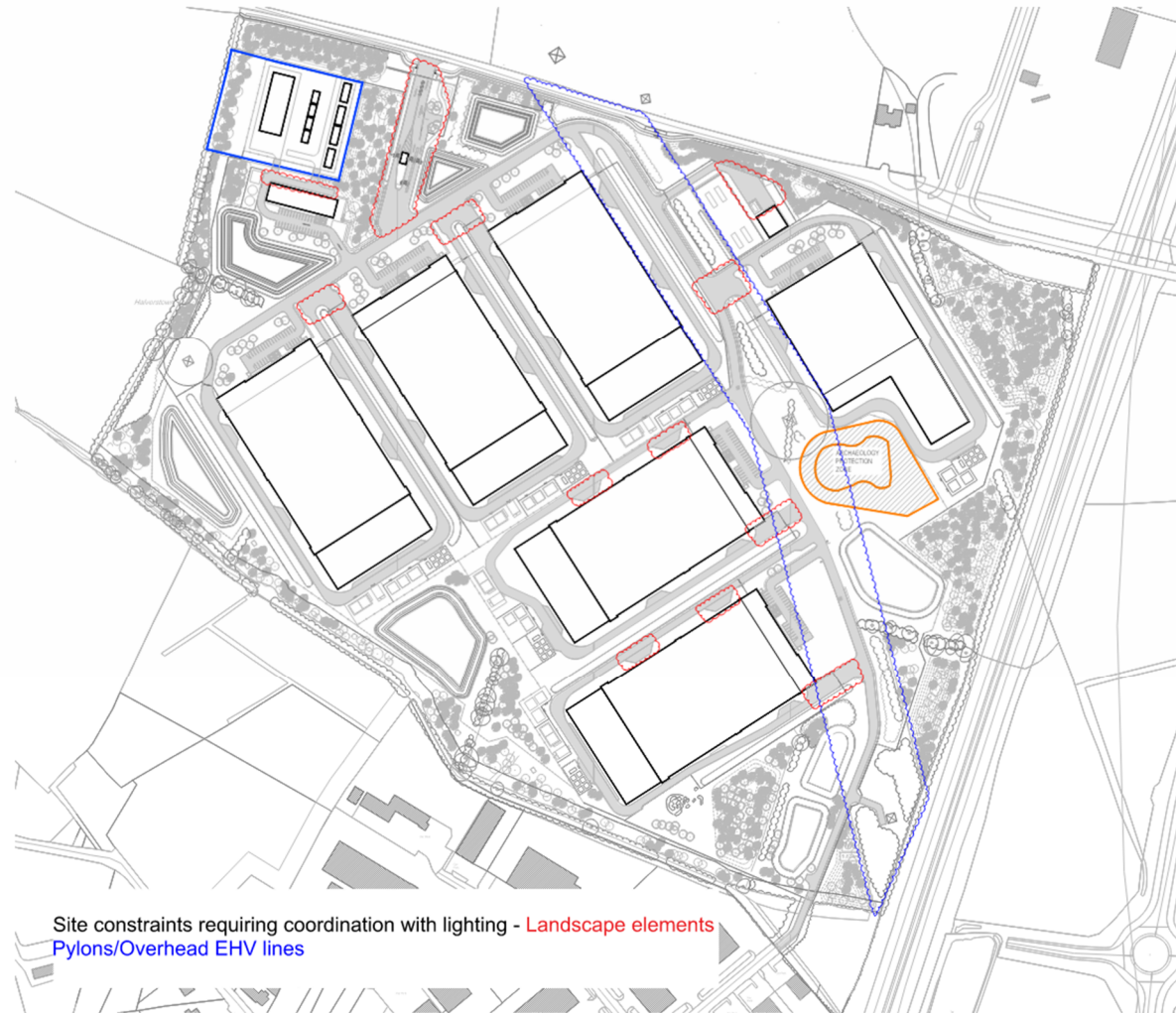
Reference should be made to the overall site calculation summary in Appendix C and lighting layout drawing 10360452-HDR-XX-XX-DR-E-632000 in Appendix D. The lighting calculation summary highlights areas where uniformity is below 0.4.



In order to improve lighting uniformity across the site (as per areas highlighted below) further coordination between light fixtures location and landscape elements, road design together with Pylon/overhead EHV lines will need to be carried out. It will also be required to dim particular lights to the pre-set level using the lighting control system.

Image below highlights areas where landscape elements and lighting are to be coordinated in Red colour, and lighting to be coordinated with Pylons/Overhead EHV lines in Blue colour.

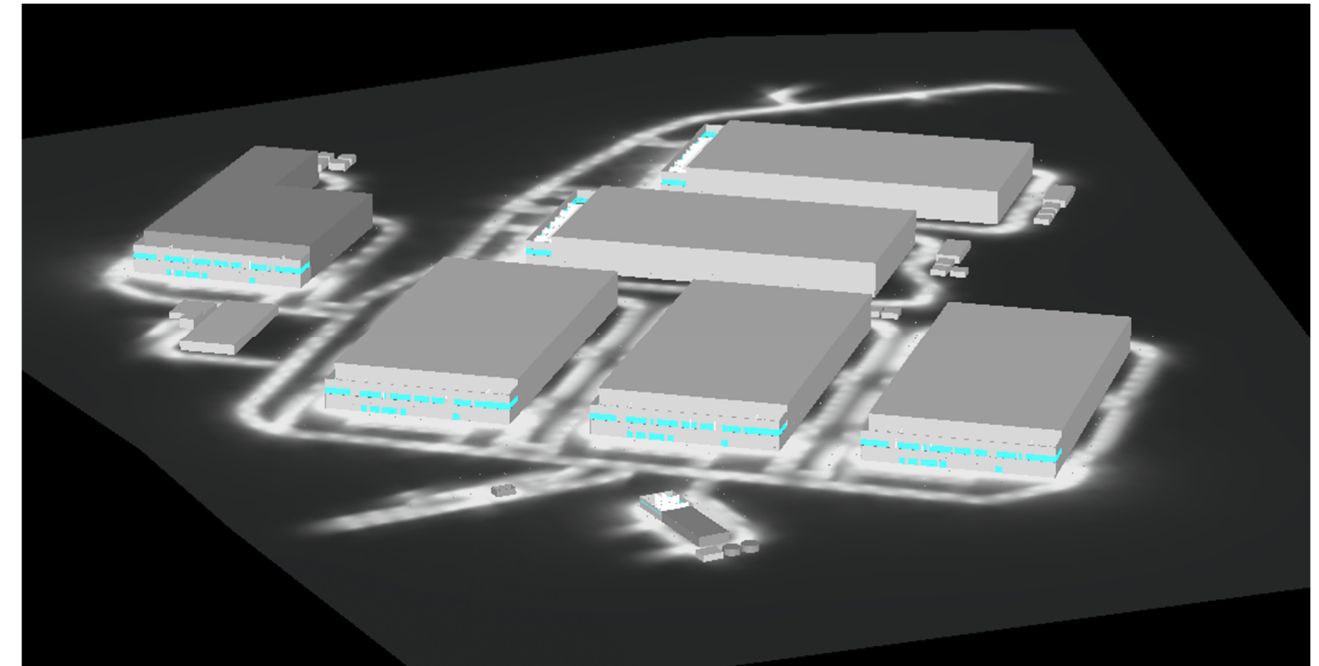
Landscape elements such as pond/water features, road design and areas immediately adjacent to roads will need coordination with lighting to allow for the positioning of lights to ensure safe movement.



4.3 Conclusion/Recommendations

It is proposed that external lighting to Herbata Data Centre Campus development is to provide functional lighting and to ensure safe movement and security inside the site boundary while minimising the light pollution and its impact on the surrounding rural areas containing bat colonies. The lighting level criteria for safe movement is much higher depending on the activity (pedestrian use/car parking/traffic/security etc.) when compared to the low levels recommended by ILE Note for Environmental Zone E2 (pre-curfew 5lux and post curfew 1lux). The calculations demonstrate the small light spill outside the site boundary at the site entry points which is due to the light fixture side optics and road orientation (perpendicular to each other). This can be mitigated by the use of the additional side shields added to those luminaires (two lights at each entry point).

Therefore, it is essential that lighting is controlled from dusk to dawn by ensuring that all external lighting is normally turned off and all internal lighting (from the admin/office block) is prevented to spill externally using solid materials or screens or blinds at night.

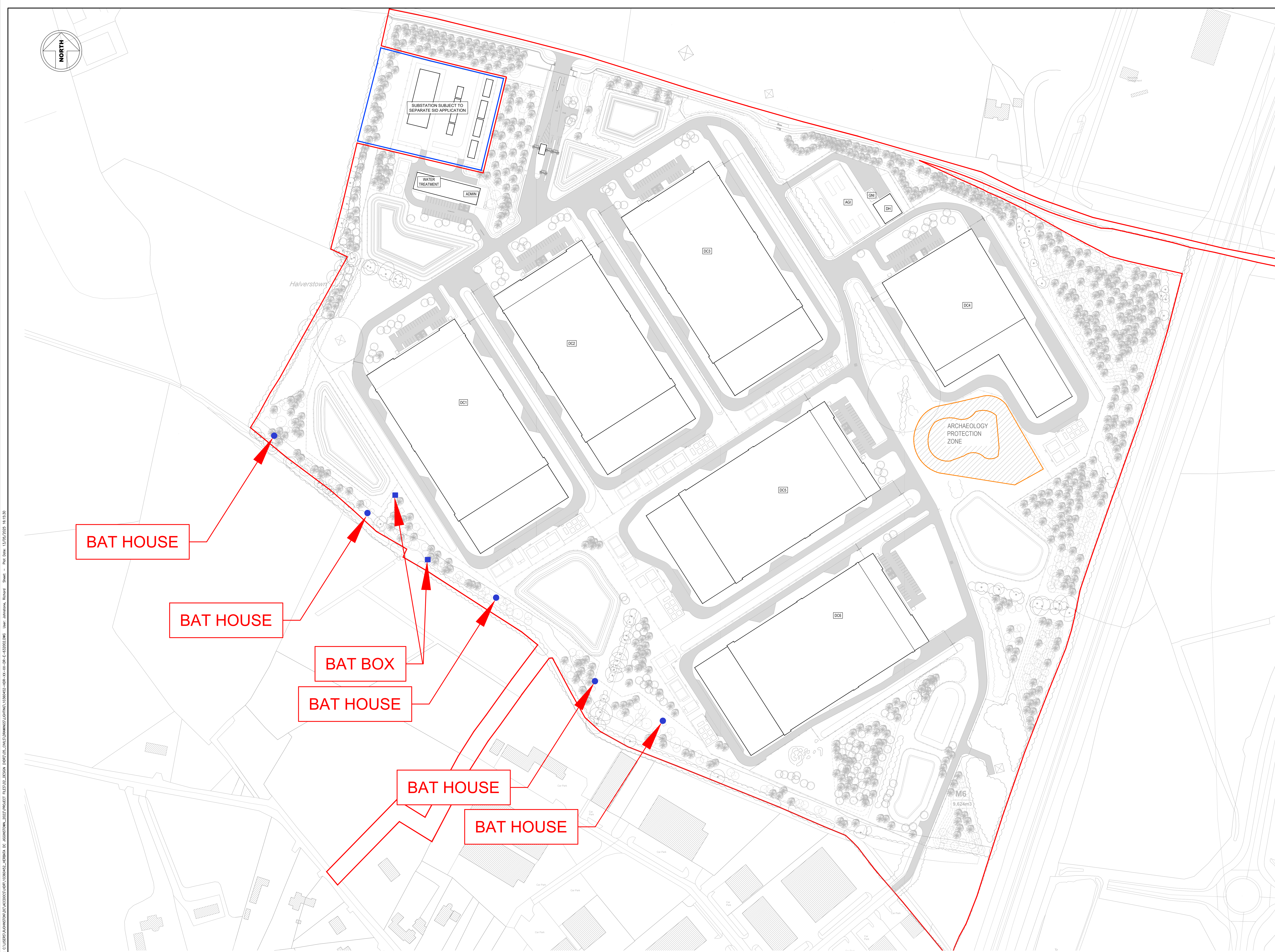


The following strategies are recommended (in addition to elements listed in section 2.3 General Approach and Design criteria) to minimise light pollution at night:

- Only provide lighting for circulation areas and avoid any lighting to surrounding areas, such as protected areas on site.
- Control all external lighting by switching, use only when required and switched off or blanked out 2 hours after sunset.
- Control internal lighting using PIR/automatic switching/dimming facility and use of blinds at windows and glass doors to prevent light spill externally.
- Keep lighting levels as low as possible in accordance with European Standards.
- Use of dimmable lighting system across the site will provide flexible external lighting solution to provide a good and balanced lit environment (i.e., reducing the intensity of the light where in close proximity to the site boarder with possible light spill where shield is not enough, and light spill is by surface reflection). In order to mitigate light pollution and balance lighting across the site all lights will be dimmed to pre-set levels post installation and at commissioning stage.

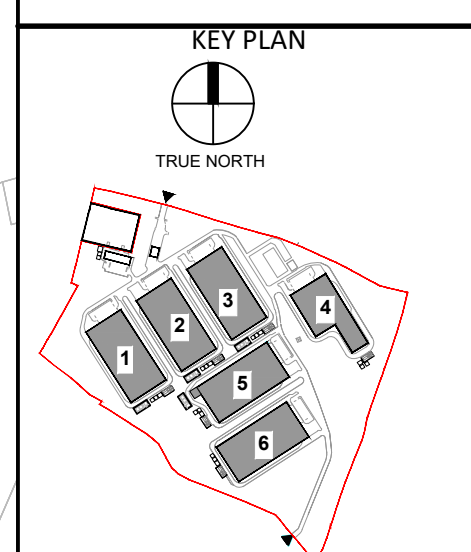
In summary, the light pollution is minimised by implanting: luminaires with good optical distribution, use of glare shields, selecting suitable luminaire height, dimmable light source, good lighting control and by switching the light off for a period (post curfew).

Appendix A. Bat House and Bat Box Locations



- Notes:**
1. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNLESS EXPRESSLY STATED.
 2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL DISCIPLINE DRAWINGS, REPORTS AND SPECIFICATIONS.
 3. THE DRAWING IS FOR STAGE 2 PURPOSES ONLY. SERVICES SHOWN HAVE BEEN CO-ORDINATED AS FAR AS PRACTICABLE IN 2D. A FULL COORDINATION EXERCISE IS TO BE UNDERTAKEN AT STAGE 3.

— SITE BOUNDARY
— OTHER LANDS UNDER CONTROL OF THE APPLICANT

[illegible]

P04	14/05/25	ISSUE FOR PLANNING
P03	02/05/25	ISSUE FOR PLANNING
P02	14/02/25	ISSUE FOR PLANNING
P01	31/01/25	ISSUE FOR PLANNING
Rev.	Date	Description

STATUS	PLANNING
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PROJECT	HERBATA NAAS
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PROJECT ADDRESS	NAAS, CO. KILDARE
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DWG TITLE	BAT HOUSE AND BOXES
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LOCATIONS

DWG NO.

10360452-HDR-XX-XX-DR-E-632002			
REV.	SUITABILITY	PROJECT NO.	1036045

P04	S3	SCALE	AS SHOWN
DATE 4.10.05	DRN DJ	CHK	LIC

DKD

RKD

59 Northumberland Rd
Ballsbridge, Dublin 4
D04 W9D9, Ireland

+353 1 908 1055
mail@rkl.ie
rkl.ie

155 BOM

FOR BSM

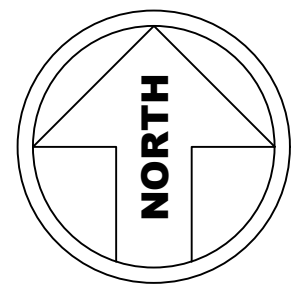
Knollys House
17 Addiscombe Road,
Croydon,
CR9 1QR, United Kingdom

D: +44 (0)20 8763 5900	1968
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DONNACHADH O'BRIEN

& ASSOCIATES CONSULTING ENGINEERS

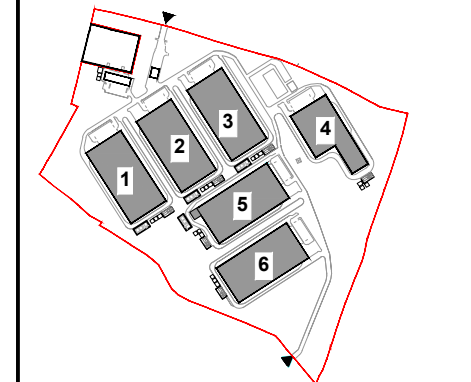
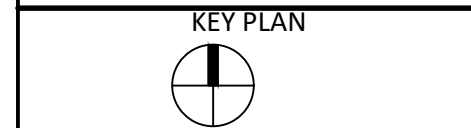
Appendix B. Site Plan with Selected Views



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- NOTES**
1. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNLESS EXPRESSLY STATED.
 2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL DISCS, THE DRAWINGS, REPORTS AND SPECIFICATIONS.
 3. THE DRAWING IS FOR STAGE 3 PURPOSES ONLY. SERVICES SHOWN HAVE BEEN CONCENTRATED AS FAR AS PRACTICABLE. STAGE 3 PLANNING COORDINATION EXERCISE IS TO BE UNDERTAKEN AT STAGE 2.

— SITE BOUNDARY
— OTHER LANDS UNDER CONTROL OF THE APPLICANT



Rev	Date	Description
001	14/05/25	ISSUE FOR PLANNING
002	02/05/25	ISSUE FOR PLANNING
003	14/05/25	ISSUE FOR PLANNING
004	14/05/25	ISSUE FOR PLANNING
005	14/05/25	ISSUE FOR PLANNING

Rev	Date	Description
001	14/05/25	ISSUE FOR PLANNING
002	02/05/25	ISSUE FOR PLANNING
003	14/05/25	ISSUE FOR PLANNING
004	14/05/25	ISSUE FOR PLANNING
005	14/05/25	ISSUE FOR PLANNING

STATUS: **PLANNING**

PROJECT: **HERBATA NAAS**

PROJECT ADDRESS: **NAAS, CO. KILDARE**

DWG TITLE: **SITE VIEWS**

DWG NO: **10360452-HDR-XX-XX-DR-E-632001**

REV: **S3** SCALE: **AS SHOWN**

DATE: **14/05/25** DWG: **RJ** DRW: **UG**

RKD

17 Kildare Street, Dublin 4
01 454 4000
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BSM

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& ASSOCIATES CONSULTING ENGINEERS

Est. 1968

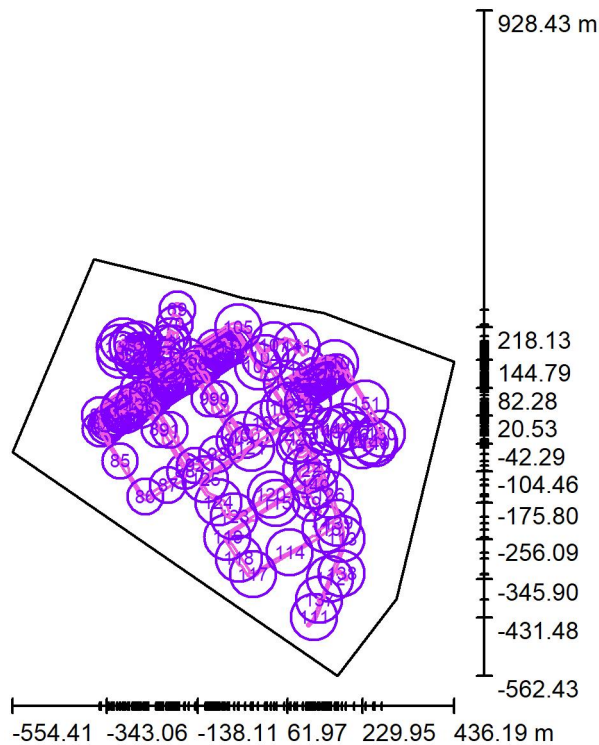


Appendix C. External Lighting Analyses Calculations (Overall Site)

In order to improve lighting uniformity across the site (as per areas highlighted in calculation results over the following pages) further coordination between light fixtures location and landscape elements, road design together with Pylon/overhead EHV lines will need to be carried out.

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Exterior Scene 1 / Calculation surfaces (results overview)



Scale 1 : 16967

Calculation Surface List

No.	Designation	Type	Grid	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
1	Admin Building Lobby	perpendicular	9 x 5	312	181	373	0.581	0.485
2	Admin Building Kitchenette	perpendicular	9 x 7	342	181	431	0.528	0.419
3	Admin Building Open Plan Office	perpendicular	11 x 9	452	241	614	0.534	0.393
4	Admin Building Conference Room	perpendicular	7 x 9	449	171	663	0.380	0.258
5	Admin Building Managers Office	perpendicular	15 x 7	489	298	578	0.610	0.516
6	Admin Building Workshop	perpendicular	7 x 13	323	164	427	0.509	0.385
7	Admin Building Storage	perpendicular	15 x 7	174	117	220	0.673	0.531
8	Security House Office	perpendicular	9 x 7	624	481	736	0.770	0.653
9	DC01 GND Asset Management	perpendicular	7 x 9	300	225	372	0.748	0.604



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Exterior Scene 1 / Calculation surfaces (results overview)

Calculation Surface List

No.	Designation	Type	Grid	E _{av} [lx]	E _{min} [lx]	E _{max} [lx]	u0	E _{min} / E _{max}
10	DC01 GND Meeting Room	perpendicular	9 x 7	508	374	596	0.736	0.628
11	DC01 GND Lobby	perpendicular	11 x 7	392	317	499	0.809	0.636
12	DC01 GND Security	perpendicular	9 x 9	591	415	717	0.701	0.578
13	DC01 GND Manager Office	perpendicular	9 x 7	535	436	622	0.815	0.702
14	DC01 L1.01 Office	perpendicular	11 x 11	370	185	471	0.499	0.392
15	DC01 L1 Printer & Phone Booth	perpendicular	5 x 9	301	191	375	0.636	0.510
16	DC01 L1 Canteen	perpendicular	11 x 7	257	191	310	0.742	0.615
17	DC01 L1 Stairs 2	perpendicular	5 x 9	268	190	341	0.708	0.556
18	DC01 L1 Gym	perpendicular	11 x 7	328	227	391	0.691	0.579
19	DC01 L1 Meeting Room 1	perpendicular	9 x 9	463	249	614	0.538	0.406
20	DC01 L1 Meeting Room 2	perpendicular	11 x 9	529	262	719	0.496	0.365
21	DC01 L1 Welfare Room	perpendicular	9 x 5	351	221	418	0.630	0.529
22	DC01 L1 Facilities	perpendicular	7 x 11	473	213	711	0.451	0.300
23	DC01 L1 Office 2	perpendicular	13 x 11	443	247	535	0.558	0.461
24	DC02 GND Asset Management	perpendicular	7 x 9	301	225	372	0.749	0.605
25	DC02 GND Meeting Room	perpendicular	9 x 7	508	374	596	0.737	0.628
26	DC02 GND Lobby	perpendicular	11 x 7	393	318	499	0.809	0.636
27	DC02 GND Security	perpendicular	9 x 9	591	415	717	0.701	0.578
28	DC02 GND Manager Office	perpendicular	9 x 7	536	437	622	0.815	0.702
29	DC02 L1.01 Office	perpendicular	11 x 11	371	185	475	0.499	0.390
30	DC02 L1 Printer & Phone Booth	perpendicular	5 x 9	301	191	374	0.635	0.511
31	DC01 L1 Canteen	perpendicular	11 x 7	257	191	306	0.743	0.623
32	DC02 L1 Stairs 2	perpendicular	5 x 9	270	190	341	0.702	0.556
33	DC02 L1 Gym	perpendicular	11 x 7	328	227	392	0.692	0.578
34	DC02 L1 Meeting Room 1	perpendicular	9 x 9	463	249	614	0.538	0.406
35	DC02 L1 Meeting Room 2	perpendicular	11 x 9	529	262	719	0.496	0.365
36	DC02 L1 Welfare Room	perpendicular	9 x 5	351	221	418	0.630	0.529
37	DC02 L1 Facilities	perpendicular	7 x 11	473	213	711	0.451	0.300
38	DC02 L1 Office 2	perpendicular	13 x 11	443	247	535	0.557	0.461
39	DC03 GND Asset Management	perpendicular	7 x 9	301	226	373	0.749	0.605

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Exterior Scene 1 / Calculation surfaces (results overview)

Calculation Surface List

No.	Designation	Type	Grid	E _{av} [lx]	E _{min} [lx]	E _{max} [lx]	u0	E _{min} / E _{max}
40	DC03 GND Meeting Room	perpendicular	9 x 7	510	374	608	0.733	0.616
41	DC03 GND Lobby	perpendicular	11 x 7	393	318	500	0.808	0.635
42	DC03 GND Security	perpendicular	9 x 9	595	416	721	0.700	0.578
43	DC03 GND Manager Office	perpendicular	9 x 7	541	443	627	0.818	0.706
44	DC03 L1.01 Office	perpendicular	11 x 11	371	185	471	0.499	0.392
45	DC03 L1 Printer & Phone Booth	perpendicular	5 x 9	301	191	374	0.635	0.511
46	DC03 L1 Canteen	perpendicular	11 x 7	257	191	310	0.742	0.615
47	DC03 L1 Stairs 2	perpendicular	5 x 9	270	190	341	0.702	0.556
48	DC03 L1 Gym	perpendicular	11 x 7	332	215	394	0.648	0.547
49	DC03 L1 Meeting Room 1	perpendicular	9 x 9	463	249	614	0.538	0.406
50	DC03 L1 Meeting Room 2	perpendicular	11 x 9	529	262	719	0.496	0.365
51	DC03 L1 Welfare Room	perpendicular	9 x 5	351	221	418	0.630	0.529
52	DC03 L1 Facilities	perpendicular	7 x 11	473	213	711	0.451	0.300
53	DC03 L1 Office 2	perpendicular	13 x 11	443	247	535	0.557	0.461
54	DC04 GND Asset Management	perpendicular	7 x 9	149	131	165	0.874	0.792
55	DC04 GND Meeting Room	perpendicular	9 x 7	400	204	529	0.511	0.386
56	DC04 GND Lobby	perpendicular	11 x 7	325	232	455	0.714	0.510
57	DC04 GND Security	perpendicular	9 x 9	347	208	596	0.601	0.349
58	DC04 GND Manager Office	perpendicular	9 x 7	363	297	507	0.820	0.587
59	DC04 L1.01 Office	perpendicular	11 x 11	371	168	479	0.452	0.350
60	DC04 L1 Printer & Phone Booth	perpendicular	5 x 9	300	181	371	0.603	0.487
61	DC04 L1 Canteen	perpendicular	11 x 7	315	192	462	0.611	0.417
62	DC04 L1 Stairs 2	perpendicular	5 x 9	326	239	369	0.733	0.648
63	DC04 L1 Gym	perpendicular	11 x 7	342	251	432	0.733	0.581
64	DC04 L1 Meeting Room 1	perpendicular	9 x 9	340	104	539	0.307	0.194
65	DC04 L1 Meeting Room 2	perpendicular	11 x 9	632	195	1019	0.309	0.192
66	DC04 L1 Welfare Room	perpendicular	9 x 5	344	235	409	0.683	0.575
67	DC04 L1 Facilities	perpendicular	7 x 11	462	233	755	0.505	0.309
68	DC04 L1 Office 2	perpendicular	13 x 11	434	233	548	0.536	0.425
69	Road 1	perpendicular	25 x 11	27	17	35	0.623	0.479

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Exterior Scene 1 / Calculation surfaces (results overview)

Calculation Surface List

No.	Designation	Type	Grid	E _{av} [lx]	E _{min} [lx]	E _{max} [lx]	u0	E _{min} / E _{max}
70	Road 2	perpendicular	11 x 15	38	15	68	0.392	0.216
71	Road 3	perpendicular	27 x 9	40	21	161	0.514	0.128
72	Road 4	perpendicular	3 x 17	46	21	253	0.455	0.083
73	Road 5	perpendicular	15 x 11	22	3.65	50	0.163	0.074
74	DC02 Parking	perpendicular	29 x 15	67	19	168	0.289	0.115
75	DC01 Parking	perpendicular	31 x 13	51	15	144	0.302	0.107
76	DC03 Parking	perpendicular	29 x 15	61	19	167	0.312	0.114
77	DC04 Parking	perpendicular	31 x 15	71	24	186	0.338	0.129
78	DC05 Parking	perpendicular	31 x 15	51	14	119	0.267	0.115
79	DC06 Parking	perpendicular	29 x 15	60	20	166	0.337	0.122
80	Admin Building Parking	perpendicular	19 x 11	38	11	91	0.278	0.116
81	Road 13	perpendicular	21 x 11	27	16	42	0.581	0.373
82	Road 14	perpendicular	325 x 11	31	12	55	0.382	0.213
83	Road 15	perpendicular	45 x 11	35	15	67	0.415	0.219
84	Road 16	perpendicular	25 x 11	72	34	123	0.482	0.279
85	Road 17	perpendicular	157 x 7	31	16	49	0.499	0.316
86	Road 18	perpendicular	25 x 11	37	20	47	0.544	0.430
87	Road 19	perpendicular	51 x 7	25	12	36	0.458	0.319
88	Road 20	perpendicular	15 x 9	38	22	50	0.582	0.443
89	Road 21	perpendicular	128 x 8	35	11	62	0.310	0.174
90	Road 22	perpendicular	27 x 9	55	20	129	0.370	0.157
91	Road 23	perpendicular	157 x 7	33	14	47	0.431	0.299
92	Road 24	perpendicular	25 x 11	46	29	56	0.620	0.512
93	Road 25	perpendicular	51 x 7	29	13	45	0.442	0.284
94	Road 26	perpendicular	15 x 7	32	20	44	0.639	0.459
95	Road 27	perpendicular	128 x 8	30	10	47	0.343	0.214
96	Road 28	perpendicular	25 x 9	25	11	47	0.445	0.241
97	Road 29	perpendicular	25 x 9	30	9.76	46	0.324	0.213
98	Road 30	perpendicular	27 x 9	58	28	122	0.479	0.230
99	Road 31	perpendicular	128 x 16	34	15	50	0.440	0.299



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Exterior Scene 1 / Calculation surfaces (results overview)

Calculation Surface List

No.	Designation	Type	Grid	E _{av} [lx]	E _{min} [lx]	E _{max} [lx]	u0	E _{min} / E _{max}
100	Road 32	perpendicular	23 x 11	34	15	44	0.450	0.345
101	Road 33	perpendicular	51 x 7	30	11	44	0.375	0.257
102	Road 34	perpendicular	23 x 11	39	22	49	0.566	0.443
103	Road 35	perpendicular	128 x 8	29	10	58	0.352	0.180
104	Road 36	perpendicular	161 x 9	34	11	50	0.328	0.225
105	Road 37	perpendicular	27 x 9	45	23	64	0.524	0.363
106	Road 38 DC4	perpendicular	128 x 8	24	5.91	58	0.247	0.102
107	Road 39	perpendicular	64 x 8	31	16	51	0.536	0.322
108	Road 40	perpendicular	15 x 13	23	6.94	44	0.301	0.156
109	Road 42	perpendicular	64 x 8	36	25	46	0.712	0.556
110	Road 44 DC4	perpendicular	31 x 11	52	23	158	0.433	0.144
111	Road 48	perpendicular	7 x 13	32	20	38	0.627	0.521
112	Road 49	perpendicular	165 x 11	43	26	67	0.609	0.389
113	Road 50	perpendicular	47 x 11	33	16	45	0.482	0.356
114	Road 51	perpendicular	155 x 7	25	9.58	54	0.389	0.178
115	Road 52	perpendicular	173 x 9	24	7.97	44	0.331	0.181
116	Road 53	perpendicular	45 x 11	43	6.53	142	0.150	0.046
117	Road 54	perpendicular	23 x 11	48	25	61	0.530	0.415
118	Road 55	perpendicular	51 x 7	35	11	58	0.323	0.196
119	Road 56	perpendicular	23 x 13	41	22	51	0.549	0.437
120	Road 57	perpendicular	155 x 7	29	16	55	0.541	0.281
121	Road 58	perpendicular	173 x 9	27	5.49	50	0.206	0.110
122	Road 59	perpendicular	45 x 11	44	9.11	155	0.207	0.059
123	Road 60	perpendicular	23 x 11	41	25	52	0.593	0.471
124	Road 61	perpendicular	51 x 7	33	16	57	0.470	0.273
125	Road 62	perpendicular	23 x 13	41	22	58	0.531	0.371
126	Road 63	perpendicular	35 x 11	30	13	47	0.433	0.272
127	Road 64	perpendicular	15 x 7	29	15	40	0.512	0.368
128	Road 65	perpendicular	89 x 11	29	12	44	0.436	0.285
129	Road 66	perpendicular	47 x 7	20	8.61	33	0.431	0.262



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Exterior Scene 1 / Calculation surfaces (results overview)

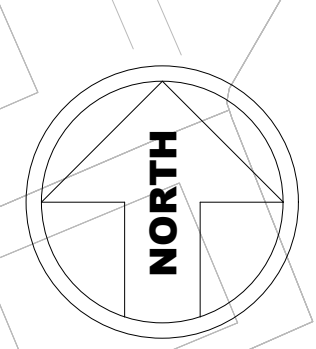
Calculation Surface List

No.	Designation	Type	Grid	E _{av} [lx]	E _{min} [lx]	E _{max} [lx]	u0	E _{min} / E _{max}
130	Road 68	perpendicular	9 x 11	45	28	57	0.615	0.485
131	Road 69	perpendicular	19 x 7	33	22	50	0.656	0.434
132	Road 70	perpendicular	73 x 7	52	32	99	0.620	0.321
133	Road 71	perpendicular	9 x 9	51	41	60	0.796	0.687
134	Road 72	perpendicular	9 x 9	52	36	67	0.695	0.541
135	DC01 Building Light Spill (Front)	perpendicular	128 x 8	188	122	371	0.647	0.328
136	DC01 Building Light Spill (Side)	perpendicular	8 x 4	91	57	135	0.628	0.421
137	Road 73	perpendicular	11 x 7	54	39	64	0.724	0.614
138	Road 74	perpendicular	25 x 9	50	26	68	0.522	0.383
139	Road 75	perpendicular	15 x 11	32	14	51	0.427	0.269
140	Road 76	perpendicular	43 x 9	21	11	37	0.522	0.300
141	Road 77	perpendicular	29 x 11	39	10	62	0.266	0.166
142	Parking DC4	perpendicular	128 x 8	24	14	37	0.576	0.369
143	Road 41 DC4	perpendicular	128 x 8	19	8.25	32	0.423	0.260
144	Road 43 DC4	perpendicular	128 x 8	26	12	36	0.454	0.333
145	Road 45 DC4	perpendicular	128 x 8	28	15	37	0.534	0.407
146	Road 46 DC4	perpendicular	128 x 8	23	9.14	41	0.401	0.223
147	Road 47 DC4	perpendicular	128 x 8	33	18	44	0.533	0.406
148	Road 78 DC4	perpendicular	128 x 8	31	13	48	0.426	0.274
149	Parking DC4	perpendicular	128 x 8	26	12	44	0.466	0.273
150	Road 79 DC4	perpendicular	128 x 8	31	17	40	0.539	0.424
151	Road 80 DC4	perpendicular	128 x 8	26	10	43	0.403	0.237

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u0	E _{min} / E _{max}
perpendicular	151	65	3.65	1019	0.06	0.00

Appendix D. Site Plan External Lighting Analyses



ESB SUB STATION SUBJECT OF SEPARATE SID APPLICATION

Halverstown

M6
9,624m³

LUMINAIRE SCHEDULE:

- 1 92" Tamiko Lighting ADV2000W0005 ADVANCE (1987 lm; 17.0 W; 1xLED)
- 2 310" Tamiko Lighting ADV3000W0005 ADVANCE (2986 lm; 25.0 W; 1xLED)
- 3 617" Tamiko Lighting ADV4000W0005 ADVANCE (3884 lm; 34.0 W; 1xLED)
- 4 14" Tamiko Lighting CTR820073WWG CITY RLB (2953 lm; 23.0 W; 1xUser defined)
- 5 698" Tamiko Lighting CTR836073WWG CITY RLB (3606 lm; 40.0 W; 1xUser defined)
- 6 12" Tamiko Lighting CTR836073WWG CITY RLB (3606 lm; 61.0 W; 1xUser defined)
- 7 14" Tamiko Lighting CTC4880W0005V8 CYCLOONE G (6884 lm; 45.0 W; 1xLED)

All dimensions to be checked on site. Figure dimensions take preference over actual dimensions. Any errors or discrepancies to be reported to HDR. This drawing may not be altered or modified by the recipient.

HERBATA
GREEN ENERGY DATA

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- THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNLESS EXPRESSLY STATED.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL DISCUSS FOR PLANNING, REPORTS AND SPECIFICATIONS.

LEGEND:

- PLANNING BOUNDARY
- OTHER LANDS UNDER CONTROL OF THE APPLICANT

ISOLES:

- 0.1 LUX
- 2.0 LUX
- 5.0 LUX
- 7.5 LUX
- 10.0 LUX

KEY PLAN

TRUE NORTH

Rev.	Date	Description
P08	14/05/25	ISSUE FOR PLANNING
P07	02/05/25	ISSUE FOR PLANNING
P06	14/05/25	ISSUE FOR PLANNING
P05	31/01/25	ISSUE FOR PLANNING
P04	07/05/24	ISSUE FOR PLANNING
P03	07/09/23	ISSUE FOR PLANNING
P02	17/05/23	ISSUE FOR PLANNING
P01	28/04/23	STAGE 2 ISSUE

STATUS: PLANNING

PROJECT: HERBATA NAAS

PROJECT ADDRESS: NAAS, CO. KILDARE

DWG TITLE: ELECTRICAL SERVICES - EXTERNAL LIGHTING LAYOUT

DWG NO: 10360452-HDR-XX-XX-DR-E-632000

REV. SUTABILITY PROJECT NO: 10360452

P08 SCALE: 1:1000

DATE: 14/05/25 DRN: RJJ CR: UG

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