



Havant Thicket Reservoir – Main Pipeline works

HTR-WAB-PI-ZZ-RP-W-0013_Construction Lighting Strategy

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For Construction

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Issue and Revision Record

Havant Thicket Reservoir – Main Pipeline Works

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1 Introduction

The objective of the Havant Thicket Reservoir Project is to provide a new resource to supply drinking water in the water-stressed Southeast of England while maximising the community and environmental benefits of a new raw water reservoir. Ward and Burke Construction Limited (WBCL) have been appointed by Portsmouth Water Limited (PW) to design, construct, and commission a new pipeline connecting Bedhampton Pumping Station to Havant Thicket Reservoir, including an emergency discharge structure at the Hermitage Stream, culvert upgrades and an Under Track Crossing.

1.1 Works Background

Portsmouth Water has outlined seven strategic drivers for this project to ensure continued focus on meeting the Project's objectives.

These project drivers are:

- **Quality:** Quality in procurement, design and delivery to deliver an exemplary project to serve Customers in the short, medium and long term,
- **Timeliness:** In service and operating by 2029 to support a major bulk transfer to Southern Water,
- **Innovation:** Develop best practices in the largest new reservoir project in the southeast for decades. Capture learning from companies working in partnership to deliver better value for Customers,
- **Flexibility:** Create a project that offers multiple uses and enables Portsmouth Water to be a strategic water supplier for the South over the medium and long term,
- **Responsibility:** Realise and build upon our health, safety and well-being goals,
- **Connectivity:** Positive connection for all stakeholders – Customers, the local community, regulators, staff, contractors, shareholders, commercial partners, environmental groups and individuals with a passion for the environment, and
- **Environment:** A positive contribution to local and internationally important habitats. Direct support for the Government's objective to reduce the damaging abstraction of water from rivers.

1.2 Scope of Document

This document includes the following items:

- Construction Lighting Impact Assessment

This document is required to discharge Condition 29 of permission reference HBC APP/24/00405. The requirements of Condition 29 and where within this document the requirements are addressed are set out in Table 1.1 below.

Table 1.1 – Condition 29 of APP/24/00405

Condition 29 – Details of Lighting (Permanent and Temporary including construction)	
<p>Prior to the installation of any external lighting and construction lighting, a lighting strategy shall be submitted to and approved in writing by the Local Planning Authority. The strategy shall include details of the lighting specification, design measures to minimise light pollution, and any operational restrictions proposed (such as shielding or timers), with supporting plans and isolux diagrams, as necessary.</p> <p>All external lighting associated with construction activities shall be designed, positioned, directed, and operated to minimise light spill onto adjoining land and properties and to avoid unnecessary illumination of the night sky. The Strategy must include:</p> <ul style="list-style-type: none"> i. Proposed specifications for external lighting. ii. Measures to prevent obtrusive light to residents and distraction of motorists. iii. Measures to minimise light pollution. iv. Appropriate energy efficiency technology v. Permanent lighting will comprise hooded luminaires directed away from vegetation, particularly the boundary hedgerows and treelines to avoid any light spill onto retained vegetation. vi. Lighting will follow good practice current at the time of detailed design. The lux level will be as low as possible to meet their purpose safely and effectively. The development shall be carried out in accordance with the approved Lighting Strategy and shall be retained and maintained as such thereafter. <p>The lighting shall be operated in accordance with the approved strategy for the duration of the construction works. The development shall be carried out in accordance with the approved details and retained thereafter.</p> <p>Reason: In the interests of safety, visual and residential amenity and habitats and the environment. To accord with policies DM10 & CS15 (Havant Borough Local Plan (Core Strategy) 2011), and the National Planning Policy Framework (2024).</p>	
Detail	Addressed
Proposed specifications for external lighting	App. A: Section 1
Operational restrictions	App.A : Section 3.1 App.A : Section 3.2 App.A : Section 3.5
Supporting plans and isolux diagrams	App.A: [Appendix A] App.A: [Appendix B] App.A: [Appendix C]
Measures to prevent obtrusive light to residents and distraction of motorists	App. A: Section 6 App. A: Section 3.10 App.A: [Appendix A]
Measures to minimise light pollution	App. A: Section 6.1 App. A: Section 6.2
Appropriate energy efficiency technology	App. A: Section 3.6 App. A: Section 3.7 App. A: [Appendix D]
Permanent lighting	Section 1.3
Lighting will follow good practice current at the time of detailed design. Safe and effective lux levels	App.A : Section 3.3

The relevant phase/s of the condition (detailed in Table 1.1) this document revision seeks to address are specified in Table 1.2 below. Previously discharged phases of the condition, as well as those to be discharged in future submissions, are also listed.

Table 1.2 – Phase Submission Checklist

Phase Ref	Elements Covered	Discharge in this Submission
1	Pipeline Section P0 [FUW] (Bedhampton, associated infra.)	
2a	Pipeline Section P0 [WAB] Shaft W1 works (ex. Shaft)	✓
2b	Pipeline Sections P1/P2 Shafts W2/W3	✓
3	Pipeline Sections P3/P4 Shafts W3/W4/ED	✓
4	Pipeline Sections P5/P6 Shafts ED/W5/W6	✓
5	Pipeline Sections P7/P8 Shafts W6/W7/W8	✓
6	Pipeline Section P9	✓
7	Pipeline Section P10 [FUW] (Reservoir, associated infra.)	
8	Purbrook Way Culvert	
9	Dunsbury Way Culvert	
10	Middle Park Way Culvert	
N/A	Shaft W1 (<i>subject of separate Reserved Matters Application APP/24/00204 linked to original outline planning permission APP/20/00991</i>)	✓ (Previously Discharged)

1.3 Permanent Lighting

The lighting impact assessment in Appendix A mostly concerns the operation of lighting during the construction works but permanent lighting is likely to be required at the ED site. The full details of the permanent lighting arrangement in this location are to be finalised; however, the lighting will follow good practice current at the time of detailed design. The lux level will be as low as possible to meet the required purpose safely and effectively.

Any permanent lighting will comprise hooded luminaires directed away from vegetation, particularly the boundary hedgerows and treelines, to avoid any light spill onto retained vegetation.

Appendix A: Construction Lighting Impact Assessment

Havant Reservoir Pipeline

Construction Lighting Impact Assessment

Sweco UK Limited	Reg. No. 2888385
Project Name	Havant Reservoir Pipeline - Consent Manager
Project Number	65209354-100
Client	Ward & Burke Construction Ltd
Author	Adam Bathgate
Controlled by	David Hendry
Approved by	Kevin Ramsay
Date	2025-10-14
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Document reference	65209354-SWE-ZZ-ZZ-T-E-1001-P05

Change list

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P02	29/05/25	Comments Incorporated	DH	KR
P03	27/08/25	PW&P Comments Incorporated	DH	KR
P04	02/10/25	PW&P Comments Incorporated	DH	KR
P05	14/10/25	Final Approval Issue	DH	KR

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1 Introduction

Sweco UK has been commissioned by Ward & Burke Construction Ltd (W&B) to provide technical exterior lighting relating to the planned construction of the Bedhampton Pumping Station to Havant Thicket Reservoir Pipeline, Hampshire.

Havant Thicket Reservoir is an environmentally led project from Portsmouth Water aiming to protect the River Test and River Itchen. These chalk streams are currently used by Southern Water as part of their supply network serving West Sussex and Hampshire. The reservoir will facilitate a shared bulk water supply between Southern Water and Portsmouth Water and aims to provide an alternative and sustainable water supply to reduce the draw required from these rare chalk streams.

The reservoir works comprise of two primary elements: the construction of the reservoir, and the construction of a water pipeline connecting the reservoir to Bedhampton Pumping Station. This report and the details contained herein relate to the construction of the pipeline only, as this will run in close proximity to private residential dwellings and other sensitive receptors.

1.1 Purpose of this Document

This Construction Lighting Impact Assessment (CLIA) sets out mitigation measures to be applied to the construction activities being undertaken as part of the Havant Thicket Reservoir works, to reduce the potential for significant impacts from light emissions. This document has been produced to mitigate the impacts of construction lighting to residents and ecology.

The CLIA includes external lighting of service areas, parking, walkways, open spaces and security measures.

The purpose of this CLIA is to ensure that the construction activities associated with lighting for the Havant Thicket Reservoir pipeline comply with relevant European and UK legislation, environmental commitments as set out in the Environmental Statement (ES), environmental and construction best practice and the Construction Environmental Management Plan CEMP.

This CLIA will outline measures to prevent obtrusive light to residents and measures to minimise light pollution that could affect wildlife.

The report will also confirm the construction lighting complies with the requirements outlined in the Register of Environmental Actions and Commitments (REAC) Table. By following these strategies, the CLIA aligns to the CEMP and the REAC Table efficiently.

- **Minimising Light Pollution:** The CLIA includes measures to reduce light spill and glare, ensuring minimal impact on nearby receptors.
- **Energy Efficiency:** The strategy prioritises energy-efficient lighting solutions, such as LED lights, to reduce overall energy consumption.
- **Operational Hours:** The proposed operational hours for construction lighting are restricted to minimise disruption.
- **Health and Safety:** Adequate illumination in work areas is provided to ensure worker safety and effective operation during darkness hours.

- **Monitoring and Maintenance:** Regular monitoring and maintenance of lighting equipment are incorporated to ensure ongoing compliance with environmental and safety standards.

1.2 Location.

The Havant Thicket Reservoir project is located in Havant, Hampshire. This area is currently open space land, and no lighting is present. The satellite compounds and construction areas are within urban and built-up areas.

The Campaign to Protect Rural England (CPRE) mapping of England's light pollution and dark skies (England's Light Pollution and Dark Skies, CPRE, 2019) illustrates the influence of light pollution on the night skies within the study area.

The darkness lighting levels within this study area are relatively high owing to the urban areas of Havant at 8-16 NanoWatts/cm²/sr. This is the radiance of light shining up into the night sky. Closer to Havant town centre, near the Bedhampton train station, this radiance increases to 16-32 NanoWatts/cm²/sr. The northern part of the study area, Havant Thicket open space, is darker by comparison, Figure 1.1 identifies the lighting pollution map and Figure 1.2 below identifies the Key for the map.

Figure 1.1: CPRE Light Pollution Map

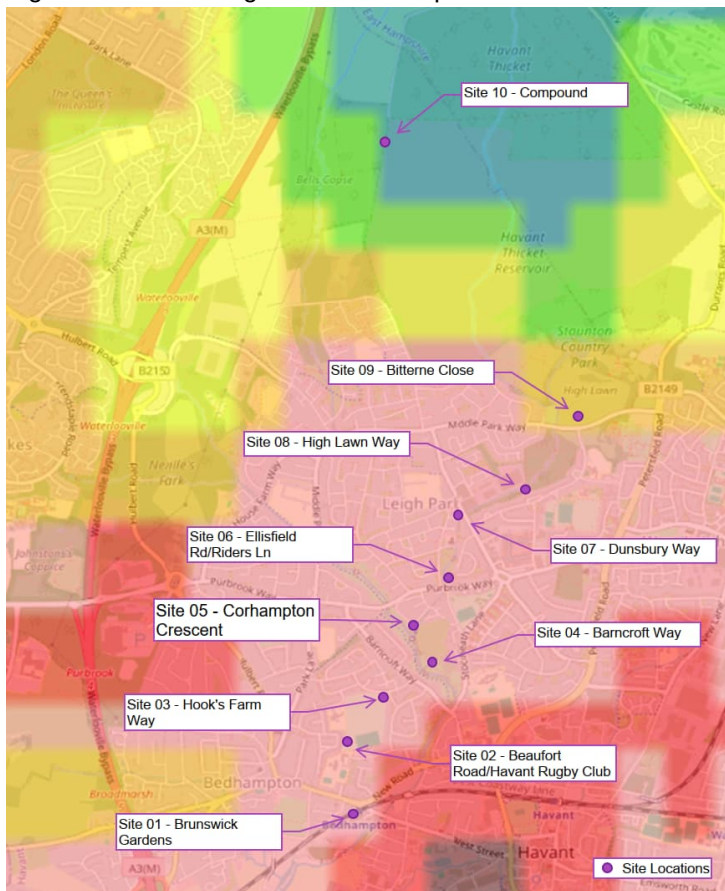
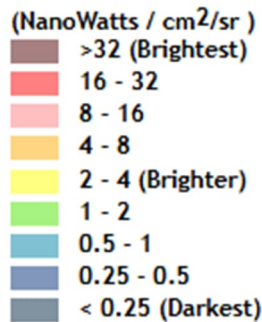


Figure 1.2: CPRE Light Pollution Map Legend



For a location overview for all construction sites and identified receptor locations please see Appendix B.

The study area does not however, include any of the darkest skies categories and the assessment of effects on night skies as an amenity resource has not been included.

The proposed drawings for the Project, and associated Isolux Contours, are presented in Appendix A.

The CLIA considers the maximum adverse scenario in relation to the artificial lighting associated with the Project to adequately assess the significance of the likely effects on the identified sensitive receptors. The maximum adverse scenario can be assumed due to the following design considerations:

- Shadowing/Fencing Screens/Tree Lines not modelled in lighting calculations
- Luminaire photometry does not include light cut-off from rear shield installations
- Contour lines produced from full output conditions (calculation maintenance factor set to 1.0)
- Assumed flat ground conditions due to lack of surface level information provided

2 Construction Areas

2.1 Construction works overview

The construction works related to the Havant Thicket Reservoir pipeline are broken down as follows:

- Launch shaft (above ground equipment)
- Reception shaft (above ground equipment)
- Shaft construction
- Tunnelling
- Open cut
- Product pipe installation
- Shaft fit-out
- Site Welfare
- Haul road/works access

For this CLIA our areas are concentrated on each site compound area and site storage areas. In total, 9 construction sites and one compound area.

3 Lighting During Construction

3.1 Hours of Construction

No construction shall take place outside the hours of 08:00-18:00 Monday to Friday or 08:00-13:00 on Saturday and no Sunday or Public Holiday working, with the following exceptions of:

- Specific works agreed in writing with the Local Planning Authority in advance, including details of the task, dates, and duration of works, and the noise and vibration control measures to be implemented, including any nighttime or 24hr working including locations and duration.
- The P1 Under Track Crossing (UTX) works beneath the railway, which are permitted to operate on a 24-hour basis as assessed within the Environmental Statement and agreed with Environmental Health.
- Such works may be undertaken only where they have been agreed in writing in advance with the Local Planning Authority (LPA).

Reason: In the interest of residential amenity, air quality and appearance and character of the area. To accord with policies DM10 & CS15 (Havant Borough Local Plan (Core Strategy) 2011), and the National Planning Policy Framework (2024).

3.2 Construction Lighting

Night-time working (taken to be 30 minutes prior to sunset to 30 minutes after sunrise) within all surface work locations should be avoided. If this is not possible, lighting will be kept to a minimum and directed away from trees and scrub which is being retained and water courses. Lighting should be the minimum required for the task.

Without careful design and mitigation, lighting has the potential to have the following impacts:

- Causing disturbance and annoyance to nearby residents, particularly regarding sleep patterns
- Disturbance to wildlife due to light spill
- Visual amenity due to the illumination of the night sky
- Distraction to passing motorists

Lighting will be discussed and agreed with the Ecological Clerk of Works (ECoW) prior to commencement of works. This will include ensuring appropriate locations, widths and light levels within buffer zones alongside sensitive habitats. Sensitive features at each site location and areas where lighting needs to be avoided will be detailed within the ecological method statements being produced for each of the works sites.

A desktop study and design has been carried out and is detailed in Section 5.

3.3 Design Standards & Guidance

Adequate and appropriate lighting is essential for safe work, facility use, movement, and to minimise eye strain. Derived from the British Standards Publication BS EN 12464-2:2024 Part 2 Outdoor Work Places. Table 3.1 below is derived from BS EN 12464-2:2024 Part 2.

Table 3.1: Light Levels

Activity	Average Lux level (lx)	Uniformity (Uo)
Walkways	5	0.20
Traffic Areas	10	0.40
Construction Areas	50	0.40

Guidance notes produced by the Institution of Lighting Professionals (ILP) are among the most commonly referenced guidance notes for good practice within the lighting design industry.

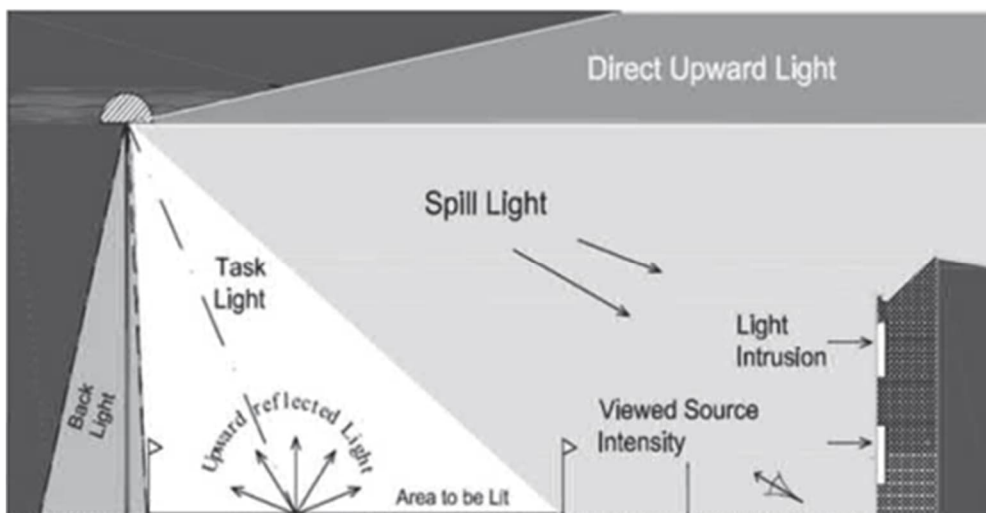
The reduction of obtrusive light (GN01/21,2021)

Obtrusive light (or sometimes referred to as light pollution) refers to any light emitted in a direction in which it is not required or wanted and as such is detrimental to other users. Consideration is given to light intrusion, direct upward light (sky glow) and glare within the context of varying environmental zones.

- **Light intrusion** refers to the spilling of light beyond the boundary of the area to be lit. This includes the intrusion of light into bedroom windows.
- **Sky glow** refers to the brightening of the sky above towns caused by direct or reflected upward light.
- **Glare** refers to the uncomfortable brightness of a light source when viewed against a dark background.

The figure 3.1 below illustrates the different types of obtrusive light.

Figure 3.1: Obtrusive light diagram (GN01:2021, Figure 1)



The ILP Guidance also quantifies the levels of obtrusive light regarded as acceptable for varying environmental zones E0 to E4. Reference Table 3.2 below for zone categories.

Table 3.2: Environmental Zones

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

Notes:

1. Where an area to be lit lies on the boundary of two zones, the obtrusive light limitation values used should be those applicable to the most rigorous zone.
2. Rural zones under protected designations should use a higher standard of policy.
3. Zone E0 must always be surrounded by an E1 Zone.
4. Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas. Agreement should be reached at planning stage.
5. SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.
6. Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.
7. Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK

In the absence of an LPA contact the Environmental zones have been assessed based on their locations and surroundings in accordance with the ILP guidance.

The Proposed Scheme is located within an area of low to medium level of district brightness, given the generally urban local environment. Therefore, the Environmental Zone is categorised as **E3** (Environmental Zone 3) except for Site 10 Compound. The compound site is situated in an area of low-level district brightness, given the slightly more rural environment the Environmental Zone is categorised as E2 in accordance with the ILP Guidance Notes and Table 3.2.

In the absence of suitable statutory guidance, the ILP “Guidance Notes for the Reduction of Obtrusive Light” GN01:2021 is typically used, in order to provide suitable assessment criteria against which to assess the likely effects of artificial lighting.

The relevant criteria of upward light, light intrusion and direct source intensity are discussed below, Table 3.3 provides the criterion for source intensity or glare, whilst Table 3.4 sets limits for the criteria of upward light and light intrusion.

Table 3.3: Limits for the luminous intensity of bright luminaires

Light Technical Application Parameter	Application Conditions	Luminaire group (projected area A, in m ²)					
		0<A ^p ≤0.002	0.002<A ^p ≤0.01	0.01<A ^p ≤0.03	0.03<A ^p ≤0.13	0.13<A ^p ≤0.50	A ^p > 0.5
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0						
	Pre-Curfew	0	0	0	0	0	0
	Post-Curfew	0	0	0	0	0	0
	E1						
	Pre-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
	Post-Curfew	0	0	0	0	0	0
	E2						
	Pre-Curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
	E3						
	Pre-Curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000
	E4						
	Pre-Curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000
	Post-Curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
Aid to gauging A ^p Luminaire diameter		2 to 5 cm	5 to 10 cm	10 to 20 cm	30 to 40 cm	40 to 80 cm	>80 cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding A ^p representative area (m ²)		0.0008	0.004	0.016	0.063	0.251	>0.5

Notes

1. 'd' is the distance between the observer and the glare source in metres
2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions
3. 'A^p' is the apparent surface of the light source seen from the observer position
4. For further information refer to Annex C of CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition
5. Upper limits for each zone shall be taken as those with column A^p>0.5

Table 3.4: Maximum values of vertical illuminance on premises

Lighting 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

Notes

1. If the installation is for public (road) lighting, then this may be up to 1 lx

By selecting low output road lighting LED luminaires which control the direction of light with sharp cut-off and installing them at a 0 degree to a maximum 5 degree angle, we ensure that the luminous intensity remains negligible with a maximum mounting height of 6m. The proposed locations will only require temporary site lighting with minimal security lighting. Additionally, the planned working hours will restrict activities during dark hours, ensuring that neither site will be fully operational during periods of darkness. For further operational details refer to Section 3 above and for design methodology refer to Section 5 below.

Bats and Artificial Lighting in the UK (GN08/23,2023),

The ILP and Bat Conservation Trust (BCT) prepared this document. It provides guidance for artificial exterior lighting in close proximity to light sensitive ecology. The following is stated within the document:

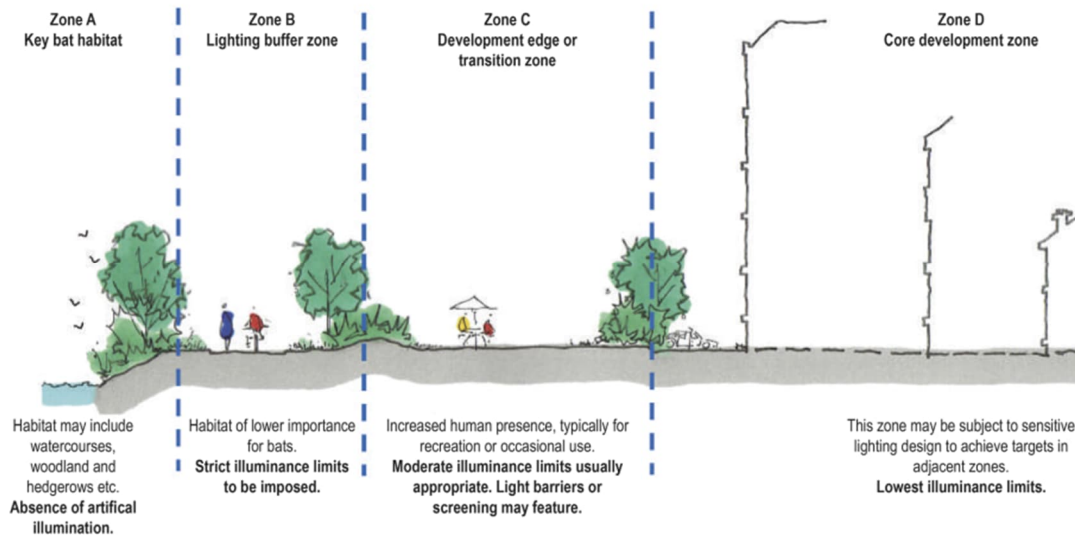
Illuminating a bat roost can cause disturbance and this may result in the bats deserting the roost, or even becoming entombed within it.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats. Many night-flying species of insect that bats hunt are attracted to light.

A buffer zone subdivided into smaller zones of increasing illuminance limit further away from the supporting habitat would ensure light levels (illuminance measure in lux) do not exceed certain defined limits. This has the effect of a gradual decrease in lighting from the developed zone, rather than a distinct cut-off, which may provide useable area for the projection which also limits lighting impacts on less sensitive species, or less well-used habitat. The ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits according to the value of that habitat to bats. Figure 4 gives an example of a multi-zoned approach which includes Key Habitat (Zone A) which would receive no ALAN and Supporting Habitat (Zones B and C) which would act as a 'light attenuation zone', but remain within the public realm, and so receive reduced light levels".

The ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits according to the value of that habitat to bats. Figure 4 gives an example of a multi-zoned approach which includes Key Habitat (Zone A) which would receive no Artificial Light at Night (ALAN), and Supporting Habitat (Zones B and C) which would act as a 'light attenuation zone', but remain within the public realm, and so receive reduced light levels.

Figure 3.2: GN08/23 Guidelines for illumination Buffer zones (GN08:2023, Figure 4)



It is therefore important that the use of an area by bats is thoroughly assessed before artificial lighting is changed or added in the vicinity of a roost or where bats may commute or forage.

Highways England, 2020. Design Manual for Roads and Bridges LA 104 Environmental assessment and monitoring

Design Manual for Roads and Bridges (DMRB) LA 104 details requirements and procedures to be followed when assessing, reporting and monitoring the environmental effects of projects in line with the requirements of the EIA Directive 2014/52/EU.

DMRB LA 104 section 3 sets out criteria for determining the sensitivity of receptors, magnitude of impacts, significance categories of effects, and a matrix for determining the significance of impact upon the environment. These tables have been adapted within this section for the purposes of the lighting assessment.

The significance of an effect from artificial lighting has been based upon the sensitivity of the receptor and the magnitude of change at that receptor due to the revised conditions of the Proposed Scheme. The sensitivity of the receptor has been classified as **Very High, High, Medium, Low** or **Negligible** according to the descriptions provided in Table 3.5.

The magnitude of impact is determined as **being Very High, High, Minor** or **Negligible** and descriptions for each are provided in Table 3.6 with effects identified as either beneficial or adverse.

The scale of effect is derived through a matrix (Table 3.8), matching the sensitivity of the receptor, with the magnitude of the impact.

Table 3.5 Criteria for receptor sensitivity (Adapted from DMRB LA 104 Table 3.2N)

Value (sensitivity) of Receptor	Typical Description
Very High	<p>Very High importance and rarity, international scale and very limited potential for substitution.</p> <p>In the context of lighting receptors are typically split into Human (Amenity), Human (Safety) and Ecological, with the following criteria relevant to Very High receptor value:</p> <ul style="list-style-type: none"> Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be greatly affected (i.e. lighting is designated a statutory nuisance). Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting dramatically affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.
High	<p>High importance and rarity, national scale, and limited potential for substitution.</p> <p>In the context of lighting, the following criteria are relevant to a High receptor value:</p> <ul style="list-style-type: none"> Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance). Human (Safety) - receptors where a change in the lighting has the potential to either significantly improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.
Medium	<p>Medium or high importance and rarity, regional scale, limited potential for substitution.</p> <p>In the context of lighting, the following criteria are relevant to a Medium receptor value:</p> <ul style="list-style-type: none"> Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected. Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers or workers). Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt

Value (sensitivity) of Receptor	Typical Description
Low	<p>Low or medium importance and rarity, local scale.</p> <p>In the context of lighting, the following criteria are relevant to a Low receptor value:</p> <ul style="list-style-type: none"> Human (Amenity) – receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance) Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers or workers). Ecological – area with limited wildlife.
Negligible	Very low importance and rarity, local scale.

Table 3.6: Criteria for magnitude of impact (Adapted from DMRB LA 104 Table 3.4N)

Value (sensitivity) of Receptor	Magnitude of impact	Typical Description
Very High	Adverse	<p>Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.</p> <p>For example, levels of obtrusive light in the form of sky glow, light intrusion or glare towards a receptor which exceeds the limits set within the ILP guidance for a higher environmental zone might classify as a major magnitude of change</p>
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
High	Adverse	<p>Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.</p> <p>In terms of the limits set in the ILP guidance this might equate to exceeding the limit but within the limits set for the next Environmental Zone.</p>
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	<p>Very minor loss or detrimental alteration to one or more characteristics, features or elements.</p> <p>In the context of lighting, this will constitute a change which, when compared to background levels, is only just noticeable.</p>
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No Change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 3.7: Likely effects description (Adapted from DMRB LA 104 Table 3.7)

Value (sensitivity) of Receptor	Typical Description
Very large	Effects at this level are material in the decision-making process.

Value (sensitivity) of Receptor	Typical Description
	In the context of lighting this will represent a major change in the levels of obtrusive light at sensitive receptor positions, and dramatically affect ecological habitats. If the effects are considered adverse, this will represent a major increase in obtrusive light at sensitive receptors and /or to users of the Proposed Scheme such as an increase in glare, light intrusion to properties, increase in sky glow or effects on flora and fauna, and requires extensive remedial works
Large	Effects at this level are likely to be material in the decision-making process. In the context of lighting this may represent a major change in the levels of obtrusive light at sensitive receptor positions and may significantly affect ecological habitats. If the effects are considered adverse, this may represent a significant increase in obtrusive light at sensitive receptors and / or to users of the Proposed Scheme such as an increase in glare, light intrusion to properties, increase in sky glow or effects on flora and fauna, and may require extensive remedial works
Moderate	Effects at this level can be considered to be material decision-making factors. In the context of lighting this will constitute a moderate reduction or increase in obtrusive light at sensitive receptors and/or to users of the Proposed Scheme. If the effects are considered adverse, this may cause effects such as an increase in glare, light intrusion to properties, increase in sky glow or effects on flora and fauna, and requires monitoring and local remedial work.
Slight	Effects at this level are not material in the decision-making process. In the context of lighting this represents a minor increase or reduction in obtrusive light at sensitive receptors and/or to users of the Proposed Scheme. Effects are considered reversible or temporary.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

The significance of any effect is determined through the application of Table 3.8. Significant effects are considered where the likely effect is of moderate or greater.

Table 3.8: Significance matrix (Adapted from DMRB LA 104 Table 3.8.1)

Magnitude of impact (degree of change)						
Environmental value (sensitivity)		No Change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or Large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

3.4 Design Limitations

The provided contour drawings and designs are in accordance with relevant design standards and guidance as Section 3.1. The design takes account of the worst-case scenario lighting from day one and the design is based on a flat ground and does not take

account of changing ground levels or obstructions which may block or obscure the passage of light.

3.5 Hours of Lighting

The need for artificial lighting will be dependent on seasonality, where natural light is not sufficient to carry out specific works, and to ensure safe working conditions. The artificial lighting can be switched on 30 minutes prior to sunset (which will change through the winter) to the end of the shift. It can also be switched on at the start of the shift to up to 30 minutes after sunrise. Out with these hours operational lighting will not be required.

Security Lighting is required and will be dormant until motion is detected and then energise to 50% with a 1-minute timer. This lighting will be in the vicinity of access gates and walkways near offices.

3.6 Types and Positioning Requirements

The need for agile and energy saving lighting is becoming more important in construction sites, as new technology is developing and emerging into the marketplace more options are available. The use of solar mobile lighting is becoming more common and is the proposed option to replace tower lighting and remove cable trails through sites as a potential hazard.

Where walkways are in the vicinity of compound offices bulk heads can be utilised.

Figure 3.3 below is a typical image of a solar LED luminaire and Figure 3.4 is a typical LED bulkhead.

Figure 3.3: Solar LED luminaire with additional panel

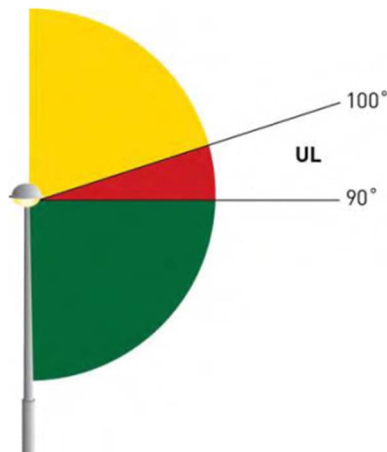


Figure 3.4: LED Bulkhead



The modern LED luminaires and bulkheads are design to limit upward light as the Figure 3.3 below indicates the suitable angle of light output before this can contribute to sky glow or upward light spill.

Figure 3.5: Crucial luminaire angle for minimising sky glow



The choice of luminaire with the right optical distribution at the right mounting height is critical to minimising light spill and obtrusive light effects yet providing the right lighting performance on the task area. Sky glow is the general diffusion that is visible in the direction of large cities, airports, and industrial complexes. It occurs from both natural and artificial light sources and does not depend exclusively on the lighting design. It also depends on the atmospheric conditions (humidity, aerosols, clouds, haze, atmospheric pollution, etc.). Light propagating into the atmosphere either directly from upward directed or incompletely shielded sources, or after reflection from the ground or other surfaces, is partially scattered back towards observers on the ground.

3.7 Benefits of Solar

Using solar-powered external lighting offers several benefits over conventional cable-powered lighting systems:

- **Environmentally Friendly:** Solar lights are powered by the sun, which means they do not require electricity from the grid, reducing their carbon footprint.
- **Cost-Effective:** Once installed, solar lights have no ongoing electricity costs, which can lead to significant savings over time.
- **Minimal Maintenance:** Solar lighting systems require very little maintenance as they operate independently of external power sources. This eliminates the complexity of wiring and reduces the risk of electrical faults.
- **Increased Reliability:** Solar-powered outdoor lighting systems are reliable and long-lasting, especially in remote or off-grid areas where power outages may occur frequently.
- **Ease of Installation:** Solar lights are generally easier to install than wired systems because they do not require electrical connections, making them ideal for locations without existing infrastructure.
- **Flexibility in Placement:** Without the need for wiring, solar lights allow for greater lighting design flexibility.

3.8 Negatives of Solar

- **No Guarantee of Supply:** With no connection to the national grid, a steady power supply relies on enough sunlight year-round to charge the battery which can be difficult in the UK, especially around December and January.
- **Material Cost:** Material cost of Solar PV LED Luminaires with PiR sensors can appear comparatively higher than a standard LED Luminaire employing a typical control method.
- **Solar Glare:** In locations where a large number of solar panels, typically solar farms, are installed Solar Glare can become an issue causing disability glare and light nuisance to nearby resident and/or road users.

3.9 Solar Report

The solar option has been provided for the contractor so generators and cabled connections are not required, reducing trip hazards and allowing for flexibility in lighting unit positions. Found in Appendix D, the Solar Report sets out the evidence behind the solar power designs and using December as the worst month for penetrating sunlight, suggests the type and size of PV panels most suitable for each proposed LED luminaire. The solar design also recommends a minimum surplus PV generation value of 25% which accounts for additional power requirements during periods of lower solar irradiance. The estimated PV generation for each installation is then calculated to ensure the minimum value is met.

3.10 Solar Glare

The proposed solar panels are black so primarily will absorb light rather than reflect, but they do have a sheen so there will be some reflectance. However, the important part to consider is the viewing angle of the panel (residents and road-users) and the angle the sunlight meets the panels. The panel of the Sierra is horizontal so light hitting the panel from any angle will reflect upwards.

The additional Torino panel is vertical, sunlight will only reflect off this to any distance at all when the sun is very low in the sky, when, of course, it's furthest away from the viewer and therefore at its weakest.

As an example, when the sun is at 10° above the horizon, with the top of the Torino panel at nominally 5m above the ground and with a person 1.5m to eye level, they would need to be 5.3m from the lighting column to see any reflection.

With the sun at 20° above the horizon. They would need to be 1.6m from the column.

When solar farms go through planning, glare is a consideration, but remember that in this case, the panels are angled to optimise solar irradiance gain and here the angle of reflectance is much higher (above ground level), and there are generally hundreds of panels.

Solar lighting products, by comparison, have very small panels and are essentially free from reflection.

4 Receptors

Identified in the Future Water MJJV Ltd Construction lighting strategy (copy provided in Appendix F) sensitive visual receptors for light from the reservoir construction works include occupiers of residential properties and people working or enjoying the adjacent countryside. A review to identify potentially sensitive receptors that could be affected by external artificial lighting considered all buildings within 250m of the site. A similar exercise has been carried out for the closest visual and Ecological receptors to the Main compound and the 9 satellite construction sites. These receptors are identified in Table 4-1 below.

Table 4.1: Sensitive Light Receptors Locations

Site Id	Light Receptors	Ecological Features	Nearest Compound	Nearest Works	Receptor Type	Receptor Co-ordinates (Latitude, Longitude)
Site 10	Havant Thicket Access Track	Havant Thicket ancient woodland	Main (52m)	Site 10 - 52m	Ecological	50.8864285, -0.9946464
Site 9	Bitterne Close	High Lawn Site of Importance for Nature Conservation (SINC) and Thicket Lawn SINC	Satellite (2m)	Site 9 - 2m	Ecological	50.8736309, -0.9812877
Site 8	High Lawn Way	High Lawn Way and woodland to the north	Satellite (10m)	Site 8 - 10m	Ecological/Human Amenity	50.8696359, -0.9834126
Site 7	Dunsbury Way	River corridor near Dunsbury Way	Satellite (2m)	Site 7 - 2m	Ecological	50.8684745, -0.988588
Site 6	Ellisfield Road / Riders Lane	River corridor and mature trees near Ellisfield Road / Riders Lane	Satellite (17m)	Site 6 - 17m	Human Amenity / Ecological	50.8653577, -0.9891992 / 50.8654051, -0.9902828
Site 5	Corhampton Crescent	River corridor with trees and scrub near Corhampton Crescent	Satellite (16m)	Site 5 - 16m	Human Amenity / Ecological	50.863517, -0.9922757 / 50.8630861, -0.9924943
Site 4	Barncroft Way	River corridor with trees and scrub near Barncroft Way	Satellite (16m)	Site 4 - 16m	Ecological	50.8609446, -0.9912685
Site 3	Hooks Farm Way	Hooks Farm Way and mature trees within parkland	Satellite (20m)	Site 3 - 20m	Human Amenity/ Ecological	50.8594958, -0.9940988
Site 2	Beaufort Road /	Beaufort Road / Havant Rugby Club	Satellite (30m) /	Site 2 - 30m / 1m	Human Amenity / Ecological	50.8573743, -0.9975079 /

	Havant Rugby Club	and mature trees within parkland	Satellite (1m)			50.8574099, -0.9965503
Site 1	Brunswick Gardens	Brunswick Gardens	Satellite (25m)	Site 1 - 25m	Human Amenity	50.853728, -0.9975462

The locations above have been reviewed by the project Ecologist and they are content that they provide a good coverage of the sites.

For a Map location overview for all the construction sites and identified receptor locations please see Appendix B.

5 Methodology

5.1 Desktop Study

The assessment has been carried out in accordance with published ILP guidance documents that quantify the levels of direct upward light, light intrusion, viewed source intensity and glare regarded as acceptable for varying environmental zones.

The Proposed Scheme includes the compound areas, construction areas, walkways and car parks at the main compound and all satellite construction compounds. In total 10 sites have been included in the assessment. Table 5.1 below identifies the drawing numbers for each site assessed. These drawings are included in Appendix A

Table 5.1: Site drawing numbering

Site Id	Drawing Id (Full Power)	Drawing Id (Security 50% Power)
Site 10	65209354-SWE-ZZ-ZZ-D-E-1001	65209354-SWE-ZZ-ZZ-D-E-2001
Site 09	65209354-SWE-ZZ-ZZ-D-E-1002	65209354-SWE-ZZ-ZZ-D-E-2002
Site 08	65209354-SWE-ZZ-ZZ-D-E-1003	65209354-SWE-ZZ-ZZ-D-E-2003
Site 07	65209354-SWE-ZZ-ZZ-D-E-1004	65209354-SWE-ZZ-ZZ-D-E-2004
Site 06	65209354-SWE-ZZ-ZZ-D-E-1005	65209354-SWE-ZZ-ZZ-D-E-2005
Site 05	65209354-SWE-ZZ-ZZ-D-E-1006	65209354-SWE-ZZ-ZZ-D-E-2006
Site 04	65209354-SWE-ZZ-ZZ-D-E-1007	65209354-SWE-ZZ-ZZ-D-E-2007
Site 03	65209354-SWE-ZZ-ZZ-D-E-1008	65209354-SWE-ZZ-ZZ-D-E-2008
Site 02	65209354-SWE-ZZ-ZZ-D-E-1009	65209354-SWE-ZZ-ZZ-D-E-2009
Site 01	65209354-SWE-ZZ-ZZ-D-E-1010	65209354-SWE-ZZ-ZZ-D-E-2010

Light spill modelling

As the Proposed Scheme is located in a broadly urban area, light spill modelling has been undertaken as part of the desktop study to inform the lighting assessment and to determine the potential levels of spill light from the Proposed Scheme onto nearby potentially sensitive receptors. The light spill modelling results are shown at Appendix A.

The following information has been provided for the lighting modelling:

- Software Utilised – Lighting Reality Outdoor Area
- Reference Drawings – Construction site layout drawing provided by W&B (HTR-WAB-PI-W1-DR-W-0014 – SITE LAYOUT)
- Photometric Data – DW Windsor Sierra Solar IES photometry files / ASD Stealth Elite LDT photometry files
- Calculation Assumptions – MF calculated as per the BS5489-1:2020 using maintenance factor tables calculated through environmental zones/cleaning frequencies/mounting heights and the manufacturer datasheets luminaire maintenance factor value (only to confirm levels for contour drawings used MF 1.0)
- Calculation Grids and Points – Typically 1.5m x and y spacings
- Light Level Contours are calculated at ground level

Environmental Zone

As previously determined in Section 3.3 the Environmental Zone is categorised as **E3** (Environmental Zone 3) with the exception of Site 10 Compound. The compound site is situated in an area of low-level district brightness, given the slightly more rural environment the Environmental Zone is categorised as E2 in accordance with the ILP Guidance Notes and Table 3.2.

Operation

It is assumed that the approved scheme shall thereafter be installed, maintained and operated in accordance with the approved details of this report and agreement with the ECoW.

6 Mitigation Measures

6.1 General

The Compound areas necessitate illuminated construction areas, walkways and car parks at the Main Compound and all satellite construction compounds. General mitigation measures below:

- Luminaires with Warm White 3000K LEDs are proposed with low blue light content.
- Column heights will be no greater than 6m height to minimise light spill.
- Only luminaires with a full cut-off (no light above the 90-degree angle) and optical control will be used.
- No upward tilts on luminaires in areas with sensitive receptors
- External security lighting will be set on motion-sensors with short (1 minute) timers when activated to 50% of light output.
- Working Hours 08:00-18:00 Monday to Friday or 08:00-13:00 on Saturday and no Sunday or Public Holiday working refer to Section 3 for more details.

6.2 Additional Ecology Mitigation

In addition to the general mitigation measures above, additional measures are to be implemented for Ecology receptors.

Bats will benefit from minimising light spill away from areas of woodland, river corridors, scrub and mature trees.

The location of sensitive features at each site including areas where lighting needs to be avoided will be detailed within the ecological method statements being produced for each of the works sites.

Mitigation measures to further minimise light spill include:

- A ten-metre buffer zone, 'dark corridor' will be implemented between the accommodation units and any surrounding treeline.
- Column mounted luminaires should be located so that the rear shields are adjacent to habitats, or narrow optics selected that direct light into the task area where needed.
- Light spill can be successfully screened through landscaping and the installation of fences. To ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Windbreak mesh / dust-type netting to the inside of the compound boundary fence will help to further reduce light spill.
- On-site lighting controlled by dimming or switching according to human activity (PIR).
- Lighting should be set to a low output state by default, to turn up to a predetermined output in response to a trigger and be combined with a timeclock or photocell to further add an element of seasonal or diurnal control.
- No Night-time working (taken to be 30 minutes prior to sunset to 30 minutes after sunrise), if not possible refer to Section 3.2 for details.
- Lighting to be used outside these hours to be discussed with the ECoW to ensure they can advise on placement and how to minimise disturbance to sensitive features. This will include ensuring appropriate locations, widths and light levels within buffer zones alongside sensitive habitats. If lighting is required near trees with features suitable for roosting bats further surveys (and mitigation if required) will be undertaken if effects cannot be avoided in these locations through changes to lighting location, design or appropriate screening methods.

With the implementation of Mitigation measures the Light Spill / Nuisance can be assessed based on the light contour drawings provided in Appendix A. The impact on the receptors can be categorised by Low, Medium and High, table 6.1 below identifies the risk level associated with mitigation.

Table 6.1: Proposed Scheme likely residual effects

Receptor Viewpoint	Receptor Type	Sensitivity of receptor	Impact magnitude	Nature of impact (permanent / temporary)	Residual effects
Havant Thicket Access Track	Ecological	Medium	Negligible	Temporary	Neutral
Bitterne Close	Ecological	Medium	Negligible	Temporary	Neutral
High Lawn Way	Human Amenity	Medium	Negligible	Temporary	Neutral
Dunsbury Way	Ecological	Medium	Negligible	Temporary	Neutral
Ellisfield Road / Riders Lane	Human Amenity / Ecological	Medium	Negligible	Temporary	Neutral
Corhampton Crescent	Human Amenity	Medium	Negligible	Temporary	Neutral
Barncroft Way	Ecological	Medium	Negligible	Temporary	Neutral
Hooks Farm Way	Human Amenity	Medium	Negligible	Temporary	Neutral
Beaufort Road / Havant Rugby Club	Human Amenity / Ecological	Medium	Negligible	Temporary	Neutral
Brunswick Gardens	Human Amenity	Medium	Negligible	Temporary	Neutral

Due to the mitigation measures outlined in Section 6, the residual effects are assessed to be Neutral. This is due to the low potential for obtrusive light to affect human and ecological receptors through the implementation of the lighting layout.

Potential human sensitive receptors located outside the red line boundary are unlikely to be subjected to obtrusive light from the Proposed Scheme, due to the design of the proposed lighting for the Proposed Scheme.

7 Summary and Conclusion

This assessment considers the effects resulting from artificial lighting associated with the Proposed Scheme and its surroundings. It assesses the potential effects from obtrusive light associated with the temporary site lighting. The principal objective is to assess the significance of likely effects.

The Proposed Scheme is within an urban environment which is assessed to be an E2 and E3 environmental zone due to the built-up area around the satellite sites.

The requirement for artificial lighting to support the construction activities means that there could be potential effects caused including light spill, direct source luminance or glare (onto receptor views) and sky glow or upward light.

Without mitigation, the potential effects are likely to be **Moderate Adverse**, as poor-quality light sources could be installed with lighting levels that are non-compliant with British

Standards and/or not in line with guidance. To avoid this, mitigation measures will be implemented.

The mitigation measures deployed through the lighting layout presented in Appendix A along with the mitigation measures outlined in Section 6 would ensure that artificial lighting is not obtrusive during construction.

Providing mitigation measures outlined in Section 6 are applied, the residual effects of the construction phase are assessed to be **Neutral**. This is due to the low potential for obtrusive light to affect human and ecological receptors, through the implementation of the lighting layout.

Potential human sensitive receptors located outside the red line boundary of the Proposed Scheme are unlikely to be subjected to obtrusive light from the Proposed Scheme, due to the standards of design of lighting anticipated for the Proposed Scheme.

In combination, the design implementation seeks to ensure that light is only focused where it is needed, and the layout of the site will provide shielding to sensitive receptors from the effects of obtrusive light. This will help reduce the potential for the levels of glare and light spill to be greater than those permitted within Table 3.3.

Lighting levels following the application of the mitigation measures outlined in Section 6, and the implementation of the lighting layout presented in Appendix A are expected to comply with necessary guidance presented in ILP GN01:2020, PLG04, and GN08-21; meeting the tests identified for this installation.

In conclusion, lighting levels and operation associated with the Proposed Scheme would be sympathetic to the surroundings and consist of the lowest possible lighting levels whilst meeting relevant British Standards. As such, it is unlikely that there would be significant effects from artificial lighting installed as part of the Proposed Scheme.

8 Abbreviations and glossary

8.1 Acronyms

Table 8.1: Acronym list

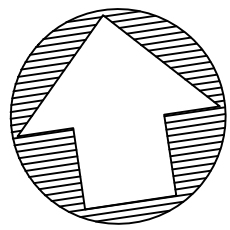
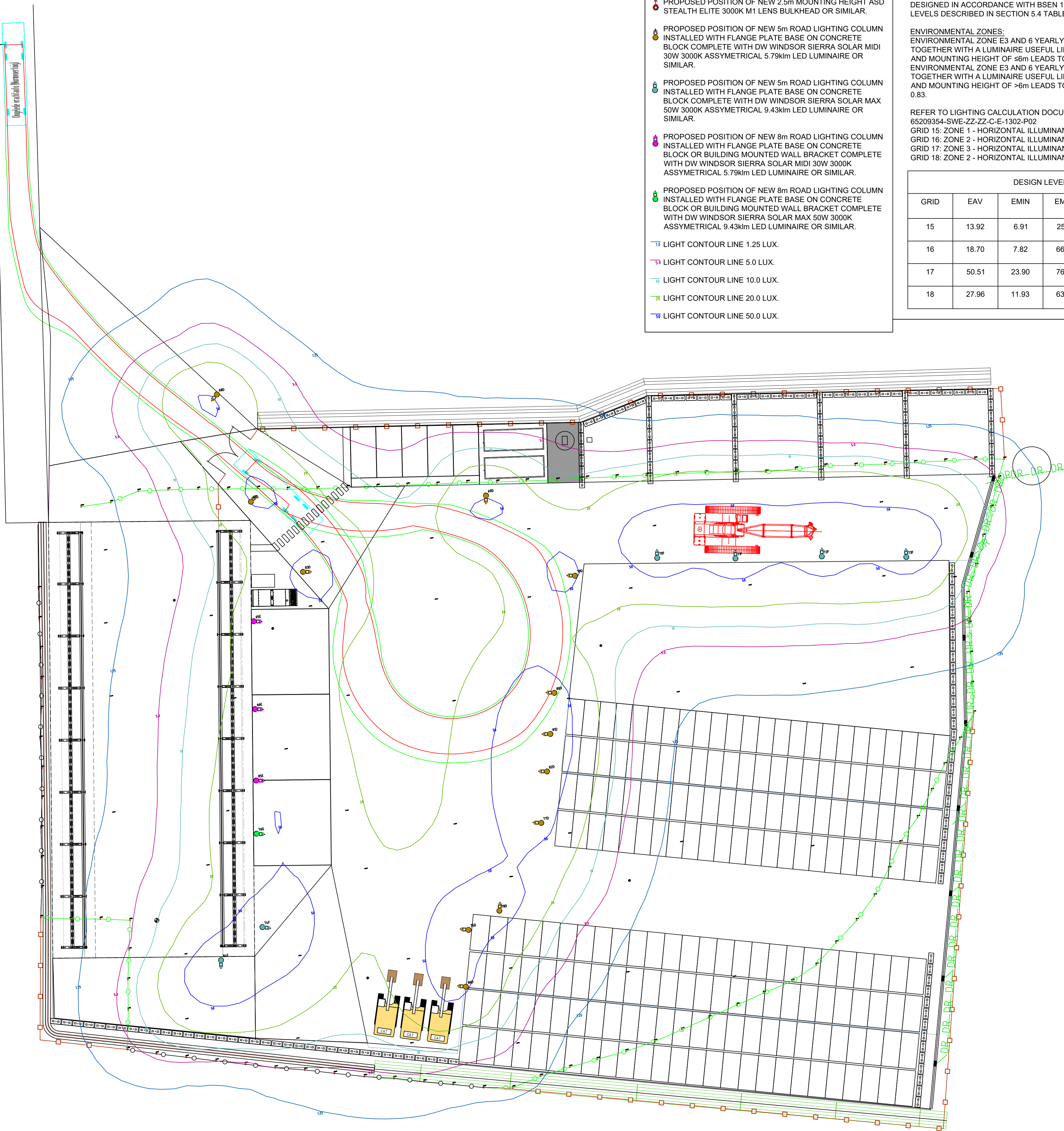
Acronym	Meaning
ILP	Institution of Lighting Professionals
LED	Light emitting diode
ALAN	Artificial Light At Night
CLIA	Construction Lighting Impact Assessment
m	metre
DMRB	Design Manual for Roads and Bridges
ECow	Ecological Clerk of Works

8.2 Glossary

Table 8.2: Glossary

Term	Definition
Artificial Light Source	Man-made lighting such as floodlights, illuminated bollards and street lighting.
Candela	International System of Units (SI) for Luminous Intensity, a common candle emits light with a luminous intensity of approximately 1 candela.
Illuminance	Measurement of Luminous Flux at a point on a surface.
Light Intrusion	Light that falls beyond the boundary of the area being lit.
Light Spill	See Light Intrusion.
Luminaire	Complete light fitting housing the lamp, control gear and optical distribution control.
Luminaire Intensity	Measured in Candelas, this is a measure of the amount of light that a source radiates in a given direction. This can be considered as the power of light in 1 specific angle (or given direction) often to an observer
Luminance	Luminance is an indicator of how bright a surface will appear.
Lux	SI unit for Illuminance, 1 lumen per square metre.
Obtrusive Light	Light that falls, or can be viewed beyond the boundary of the area being lit which causes annoyance, discomfort or distraction
Sky Glow	The illumination of the sky at night by artificial light sources including light emitted directly upward from the light source and also reflected from the ground or a surface
Proposed Scheme	The concept or design proposed i.e. the building and infrastructure layout and associated earthworks, drainage, building structures, lighting, etc

Appendix A – Light Contour Plans



- KEY:**
- ▲ PROPOSED POSITION OF NEW 2.5m MOUNTING HEIGHT ASD STEALTH ELITE 3000K M1 LENS BULKHEAD OR SIMILAR.
 - PROPOSED POSITION OF NEW 5m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK COMPLETE WITH DW WINDSOR SIERRA SOLAR MIDI 30W 3000K ASSYMETRICAL 5.79klm LED LUMINAIRE OR SIMILAR.
 - PROPOSED POSITION OF NEW 5m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK COMPLETE WITH DW WINDSOR SIERRA SOLAR MAX 50W 3000K ASSYMETRICAL 9.43klm LED LUMINAIRE OR SIMILAR.
 - PROPOSED POSITION OF NEW 8m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK OR BUILDING MOUNTED WALL BRACKET COMPLETE WITH DW WINDSOR SIERRA SOLAR MIDI 30W 3000K ASSYMETRICAL 5.79klm LED LUMINAIRE OR SIMILAR.
 - PROPOSED POSITION OF NEW 8m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK OR BUILDING MOUNTED WALL BRACKET COMPLETE WITH DW WINDSOR SIERRA SOLAR MAX 50W 3000K ASSYMETRICAL 9.43klm LED LUMINAIRE OR SIMILAR.
- LIGHT CONTOUR LINE 1.25 LUX.
- LIGHT CONTOUR LINE 5.0 LUX.
- LIGHT CONTOUR LINE 10.0 LUX.
- LIGHT CONTOUR LINE 20.0 LUX.
- LIGHT CONTOUR LINE 50.0 LUX.

DESIGN LEVELS:

DESIGNED IN ACCORDANCE WITH BSEN 12464-2 TO LIGHTING LEVELS DESCRIBED IN SECTION 5.4 TABLES 5.1 AND 5.3.

ENVIRONMENTAL ZONES:

ENVIRONMENTAL ZONE E3 AND 6 YEARLY CLEANING REGIME TOGETHER WITH A LUMINAIRE USEFUL LIFE FACTOR OF L90 AND MOUNTING HEIGHT OF ≤6m LEADS TO A MF VALUE OF 0.75.

ENVIRONMENTAL ZONE E3 AND 6 YEARLY CLEANING REGIME TOGETHER WITH A LUMINAIRE USEFUL LIFE FACTOR OF L90 AND MOUNTING HEIGHT OF >6m LEADS TO A MF VALUE OF 0.83.

REFER TO LIGHTING CALCULATION DOCUMENT REFERENCE:

65209354-SWE-ZZ-ZZ-C-E-1302-P02

GRID 15: ZONE 1 - HORIZONTAL ILLUMINANCE (LUX)

GRID 16: ZONE 2 - HORIZONTAL ILLUMINANCE (LUX)

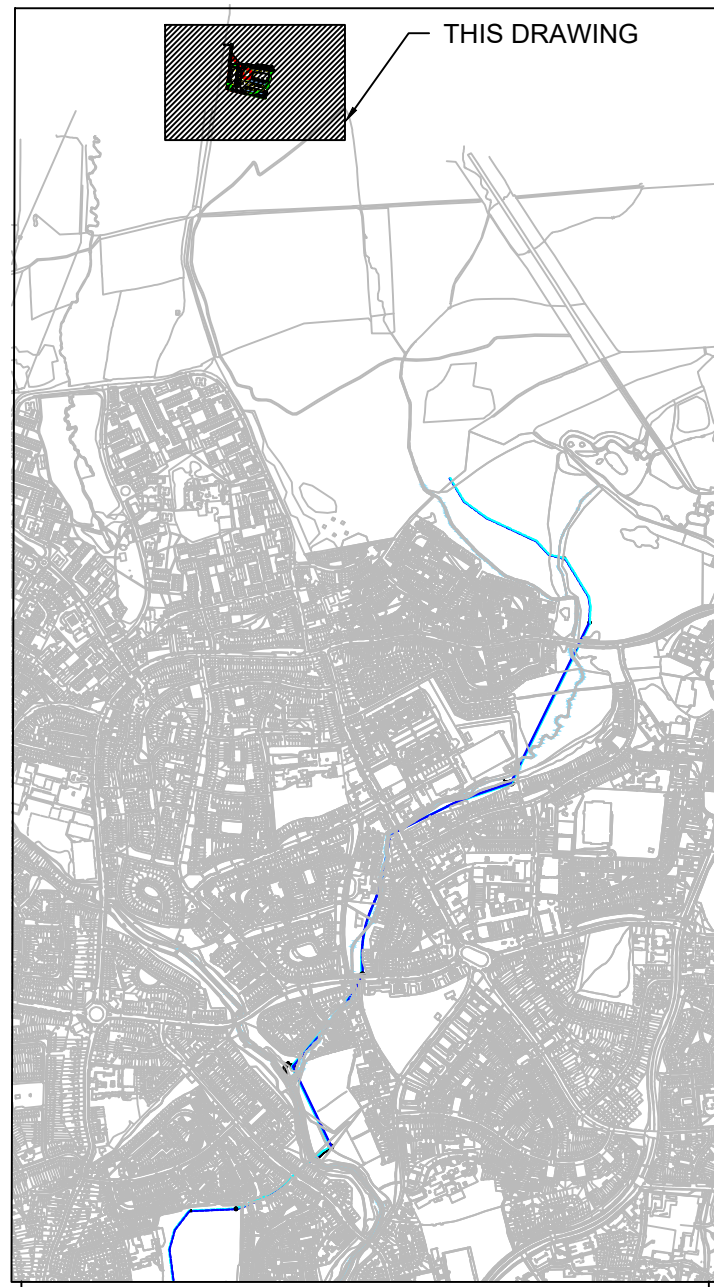
GRID 17: ZONE 3 - HORIZONTAL ILLUMINANCE (LUX)

GRID 18: ZONE 2 - HORIZONTAL ILLUMINANCE (LUX)

DESIGN LEVELS					
GRID	EAV	EMIN	EMAX	EMIN/EMAX	EMAX/EAV
15	13.92	6.91	25.31	0.27	0.50
16	18.70	7.82	66.43	0.12	0.42
17	50.51	23.90	76.53	0.31	0.47
18	27.96	11.93	63.77	0.19	0.43

NOTES

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KEY PLAN

P02	30.09.2025	PLANNING COMMENTS INCORPORATED	AB	DH	KR
P01	04.04.2025	FIRST ISSUE	AB	DH	KR
Rev	Date	Amendment Details	Dr'n	Chk'	App'

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SWECO

WARD & BURKE

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

**PROPOSED SITE LIGHTING
NORTH COMPOUND
SHEET 1 OF 1**

Purpose Of Issue			
PRELIMINARY			
Status	S3 FOR REVIEW AND COMMENT		
Drawn	Designed	Checked	Approved
AM	AB	DH	KR
Sheet Size	Scale	Sweco Ref	Revision
A1	1:250	65209354	P02

Drawing Number

65209354-SWE-ZZ-ZZ-D-E-1001

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- KEY:**
- ▲ PROPOSED POSITION OF NEW 2.5m MOUNTING HEIGHT ASD STEALTH ELITE 3000K M1 LENS BULKHEAD OR SIMILAR.
 - PROPOSED POSITION OF NEW 5m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK COMPLETE WITH DW WINDSOR SIERRA SOLAR MIDI 30W 3000K ASSYMETRICAL 5.79klm LED LUMINAIRE OR SIMILAR.
 - PROPOSED POSITION OF NEW 5m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK COMPLETE WITH DW WINDSOR SIERRA SOLAR MAX 50W 3000K ASSYMETRICAL 9.43klm LED LUMINAIRE OR SIMILAR.
 - LIGHT CONTOUR LINE 1.25 LUX.
 - LIGHT CONTOUR LINE 5.0 LUX.
 - LIGHT CONTOUR LINE 10.0 LUX.
 - LIGHT CONTOUR LINE 20.0 LUX.
 - LIGHT CONTOUR LINE 50.0 LUX.

DESIGN LEVELS:

DESIGNED IN ACCORDANCE WITH BSEN 12464-2 TO LIGHTING LEVELS DESCRIBED IN SECTION 5.4 TABLES 5.1 AND 5.3.

ENVIRONMENTAL ZONE E3 AND 6 YEARLY CLEANING REGIME TOGETHER WITH A LUMINAIRE USEFUL LIFE FACTOR OF L90 AND MOUNTING HEIGHT OF ≤ 6m LEADS TO A MF VALUE OF 0.75.

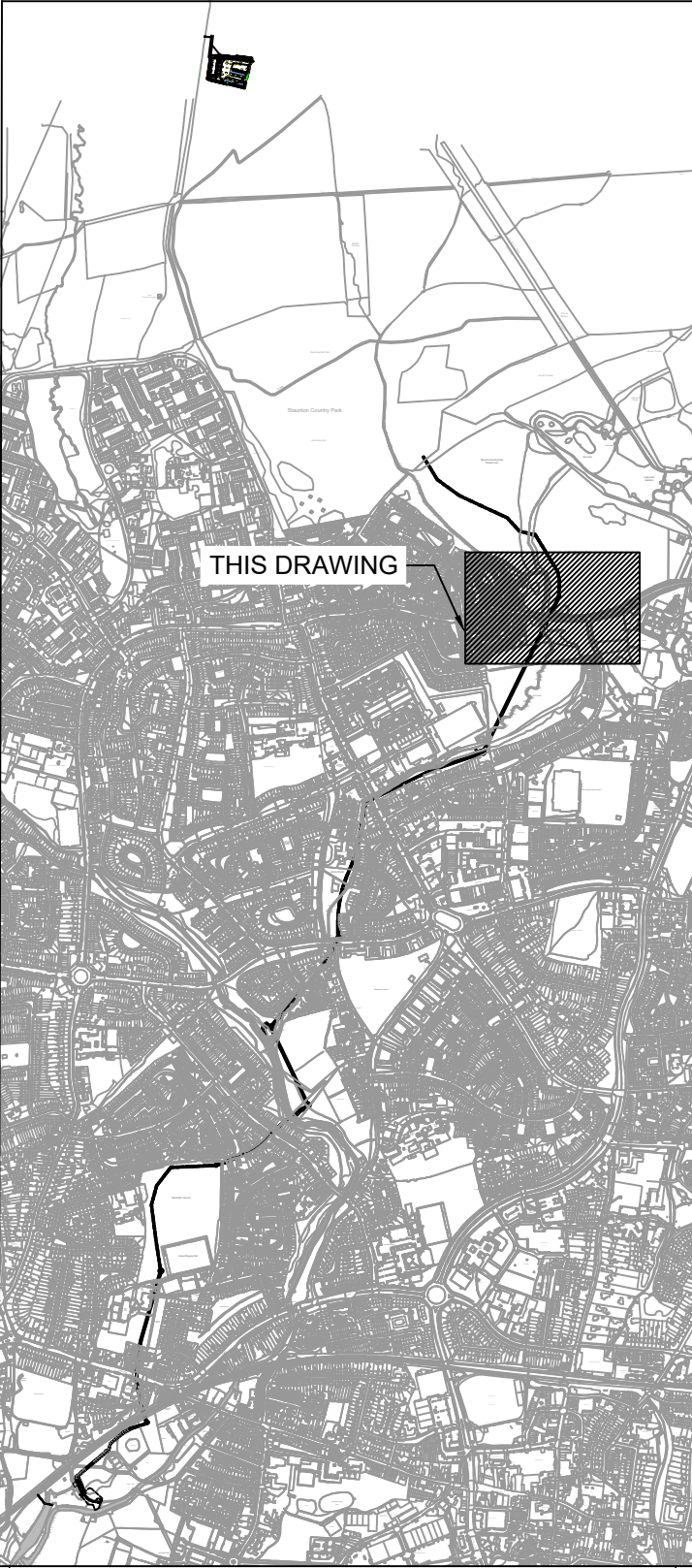
REFER TO LIGHTING CALCULATION DOCUMENT REFERENCE: 65209354-SWE-ZZ-ZZ-C-E-1302-P02

GRID 11: ZONE 1 - HORIZONTAL ILLUMINANCE (LUX)
GRID 12: ZONE 2 - HORIZONTAL ILLUMINANCE (LUX)
GRID 13: ZONE 3 - HORIZONTAL ILLUMINANCE (LUX)
GRID 14: ZONE 2 - HORIZONTAL ILLUMINANCE (LUX)

DESIGN LEVELS					
GRID	EAV	EMIN	EMAX	EMIN/EMAX	EMAX/EAV
11	24.91	8.86	57.66	0.15	0.36
12	23.45	11.53	41.67	0.28	0.49
13	62.74	30.48	92.47	0.33	0.49
14	22.53	9.49	72.50	0.13	0.42

NOTES

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KEY PLAN

P03	30.09.2025	PLANNING COMMENTS INCORPORATED	AB	DH	KR
P02	26.08.2025	PLANNING COMMENTS INCORPORATED	AB	DH	KR
P01	04.04.2025	FIRST ISSUE	AB	DH	KR
Rev	Date	Amendment Details	Dr'n	Chk'	App'

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Client

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

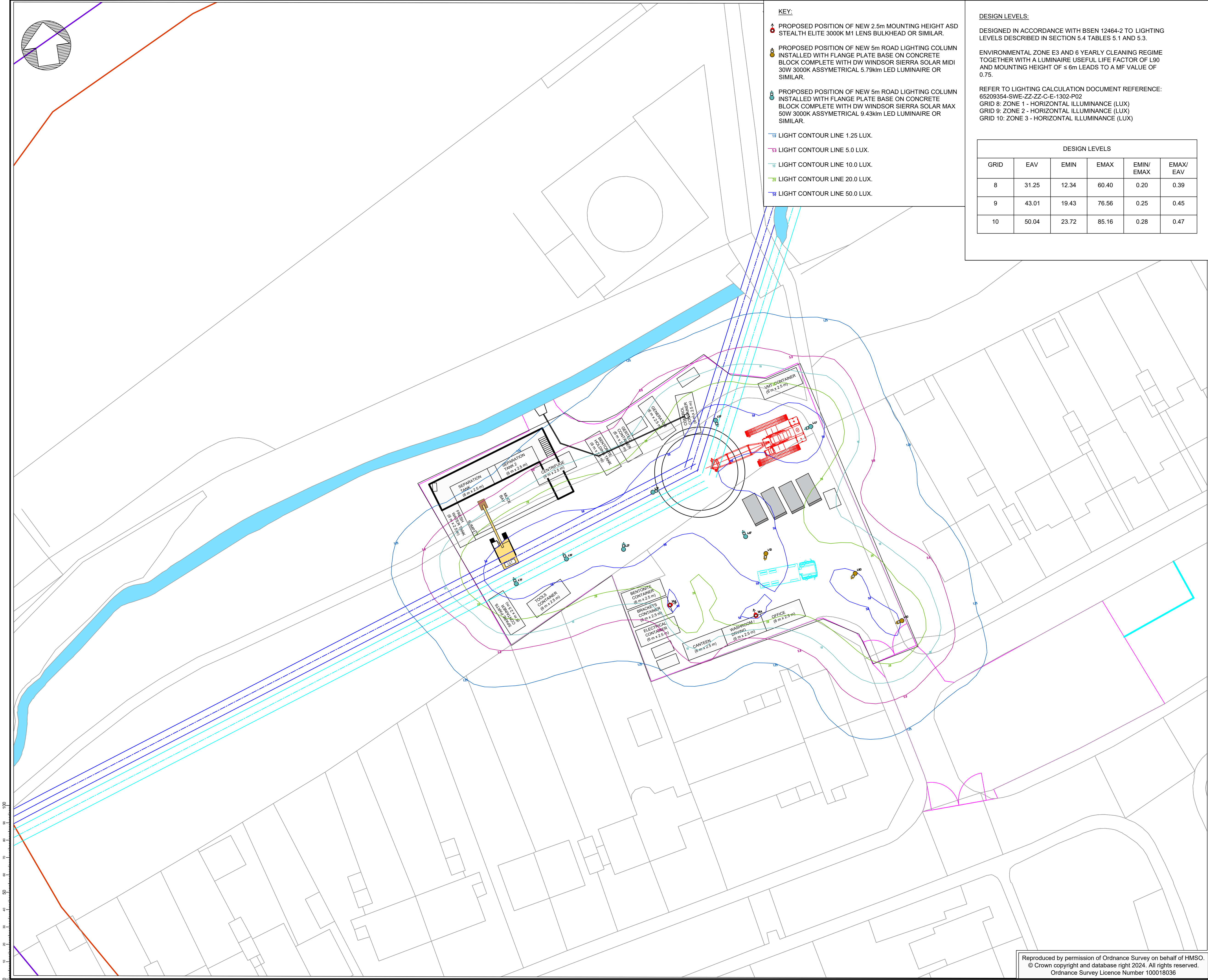
PROPOSED SITE LIGHTING
WORK SITE 9
SHEET 2 OF 10

Purpose Of Issue			
PRELIMINARY			
Status	Status Description		
S3	FOR REVIEW AND COMMENT		
Drawn	Designed	Checked	Approved
AM	AB	DH	KR
Sheet Size	Scale	Sweco Ref	Revision
A1	1:250	65209354	P03

Drawing Number

65209354-SWE-ZZ-ZZ-D-E-1002

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KEY:

- ▲ PROPOSED POSITION OF NEW 2.5m MOUNTING HEIGHT ASD STEALTH ELITE 3000K M1 LENS BULKHEAD OR SIMILAR.
- PROPOSED POSITION OF NEW 5m ROAD LIGHTING COLUMN INSTALLED WITH FLANGE PLATE BASE ON CONCRETE BLOCK COMPLETE WITH DW WINDSOR SIERRA SOLAR MIDI 30W 3000K ASSYMETRICAL 5.79klm LED LUMINAIRE OR SIMILAR.
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- LIGHT CONTOUR LINE 5.0 LUX.
- LIGHT CONTOUR LINE 10.0 LUX.
- LIGHT CONTOUR LINE 20.0 LUX.
- LIGHT CONTOUR LINE 50.0 LUX.

DESIGN LEVELS:

DESIGNED IN ACCORDANCE WITH BSEN 12464-2 TO LIGHTING LEVELS DESCRIBED IN SECTION 5.4 TABLES 5.1 AND 5.3.

ENVIRONMENTAL ZONE E3 AND 6 YEARLY CLEANING REGIME TOGETHER WITH A LUMINAIRE USEFUL LIFE FACTOR OF L90 AND MOUNTING HEIGHT OF ≤ 6m LEADS TO A MF VALUE OF 0.75.

REFER TO LIGHTING CALCULATION DOCUMENT REFERENCE: 65209354-SWE-ZZ-ZZ-C-E-1302-P02

GRID 8: ZONE 1 - HORIZONTAL ILLUMINANCE (LUX)

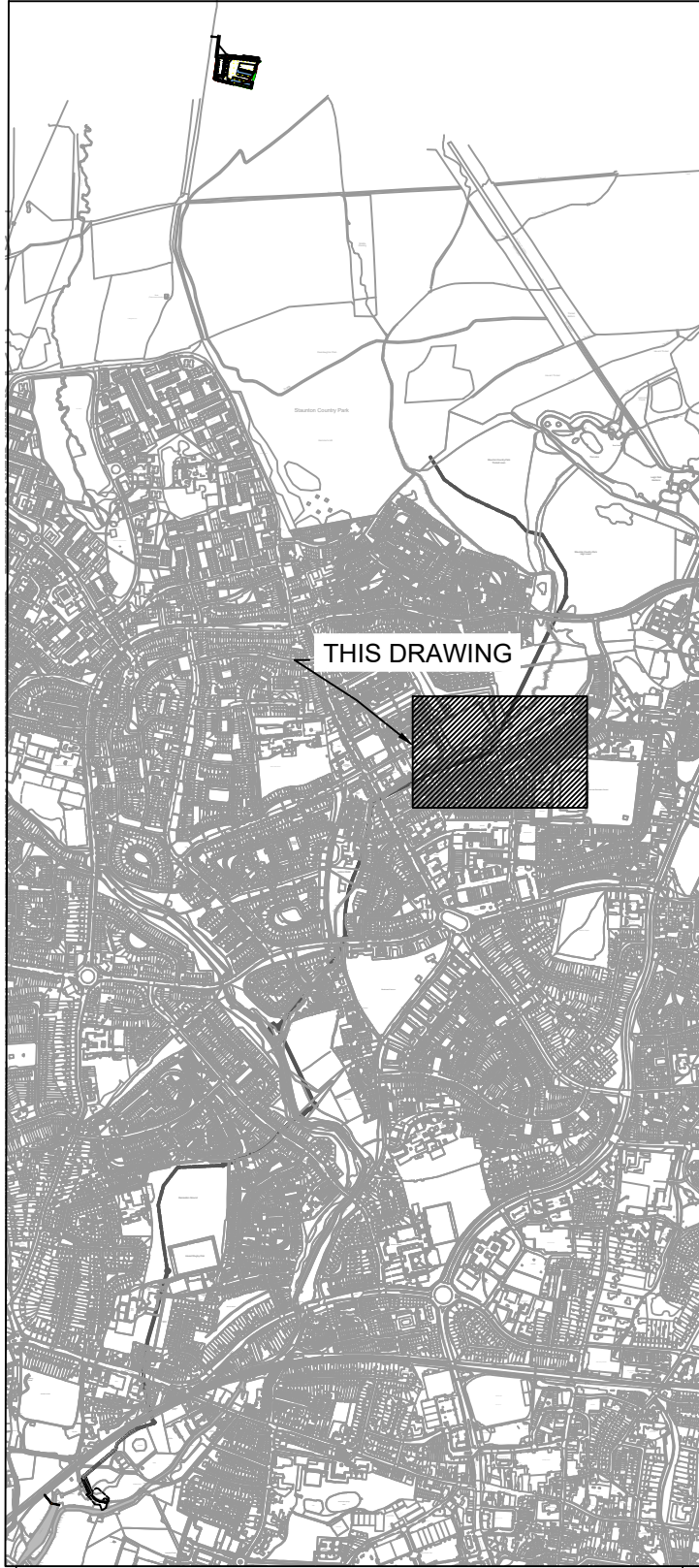
GRID 9: ZONE 2 - HORIZONTAL ILLUMINANCE (LUX)

GRID 10: ZONE 3 - HORIZONTAL ILLUMINANCE (LUX)

DESIGN LEVELS					
GRID	EAV	EMIN	EMAX	EMIN/EMAX	EMAX/EAV
8	31.25	12.34	60.40	0.20	0.39
9	43.01	19.43	76.56	0.25	0.45
10	50.04	23.72	85.16	0.28	0.47

NOTES

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KEY PLAN

P03	30.09.2025	PLANNING COMMENTS INCORPORATED	AB	DH	KR
P02	26.08.2025	PLANNING COMMENTS INCORPORATED	AB	DH	KR
P01	04.04.2025	FIRST ISSUE	AB	DH	KR
Rev	Date	Amendment Details	Dr'n	Chk'	App'

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Client

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

PROPOSED SITE LIGHTING
WORK SITE 8
SHEET 3 OF 10

Purpose Of Issue			
Status	S3 FOR REVIEW AND COMMENT		
Drawn	Designed	Checked	Approved
AM	AB	DH	KR
Sheet Size	Scale	Sweco Ref	Revision
A1	1:250	65209354	P03

Drawing Number

65209354-SWE-ZZ-ZZ-D-E-1003

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