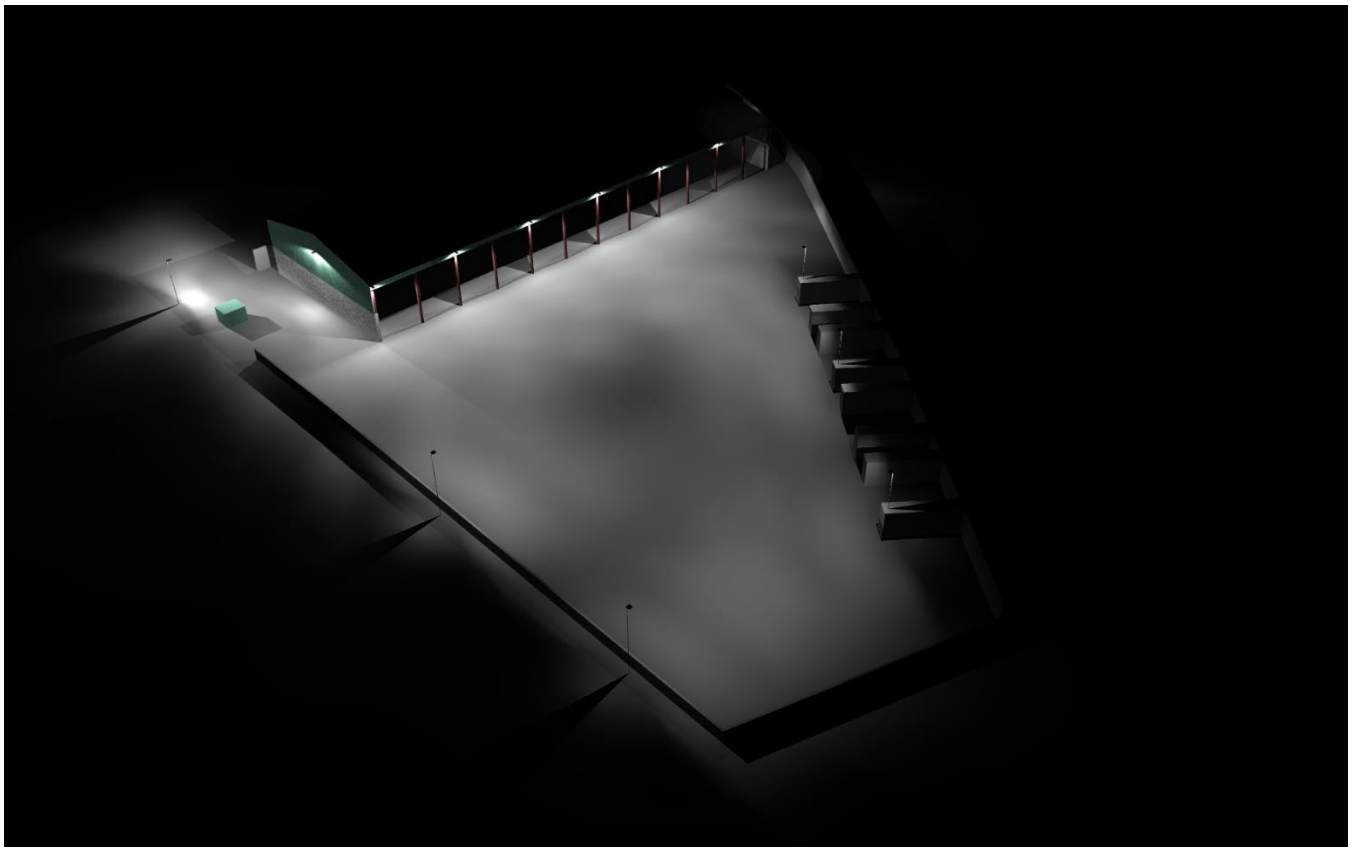
STRENGER



MRF, Falconer Road, Haverhill

Lighting Assessment

Prepared for: Widdington Recycling

Date: May 2024

TECHNICAL CONCEPTS

ILP Environmental Zone

ILP Guidance Note 01/21: The Reduction of Obtrusive Light sets out a series of environmental zones for classifying lighting assessment study areas based on their surroundings type e.g. rural, suburban etc., and the lighting environment e.g. low district brightness, medium district brightness etc. Based on the surroundings type and lighting environment, an environmental zone can be selected, from Zone E0 to Zone E4. The obtrusive light limits associated with the relevant environmental zone(s) are then adopted for assessment purposes.

Lighting curfew

A lighting curfew is an agreed time, beyond which, a lighting installation is subject to more stringent environmental control, generally as agreed with the local planning authority (LPA). Such controls may take the form of switching the lighting installation off in its entirety, switching the lighting installation off in part, dimming the lighting installation, or the implementation of smart lighting controls. Irrespective of the adopted control measures, suitable control of obtrusive light for the pre-curfew scenario and the post-curfew scenario can generally be demonstrated by adhering to ILP Guidance Note 01/21: The Reduction of Obtrusive Light. This national guidance document defines obtrusive light level limits separately for the pre-curfew scenario and the post-curfew scenario. Lighting curfews are generally best suited to facilities where a specific activity requiring artificial lighting ceases at a specific time e.g. a floodlit sports pitch, or a supermarket. However, in many cases, particularly 24-hour operations there is no clear change in activities requiring artificial lighting. In such cases, LPAs seldom impose a lighting curfew per se. However, for the sake of robustness in assessing obtrusive light, it is usual to adopt the ILP post-curfew obtrusive light criteria beyond a certain time. Where this time is not imposed by the LPA, 23:00 hours is generally adopted.

Light Spill

Light spill defines the amount of light spilling beyond an intentionally lit area. It is assessed in terms of the amount of light falling on a surface i.e. illuminance (E) and is measured in lux. Generally, light spill is measured in the horizontal plane to give the horizontal illuminance.

'Light intrusion'

This occurs as a result of light spill falling on to a receptor, generally onto a residential property window (hence the term 'light intrusion') but equally could be any light-sensitive human receptor. It is assessed in terms of the amount of light falling on a surface i.e. illuminance (E) and is measured in lux. Where the receptor is a residential window, the level of illuminance is measured in the vertical plane parallel with the window, to give the vertical illuminance (E – lux).

'Glare' (residential context)

This is the degree of discomfort, adaptation or disability associated with a light source when viewed against a darker background. In the context of residential / landscape & visual lighting assessment, the luminance of the background against which the intensity will be assessed is defined by means of the relevant ILP Environmental Zone. It is assessed in terms of the intensity of the light i.e. viewed light source intensity (I) and is measured in candelas (cd).

'Sky-glow'

This is the diffuse luminance of the night sky. Although there is a naturally occurring glow to the night sky, artificial lighting can potentially dominate the level of 'sky-glow'. This occurs due to direct upward lighting and reflected lighting off ground surfaces, buildings etc. reflecting off gaseous molecules in the atmosphere resulting in luminosity of the night sky. The level of 'sky-glow' will vary depending on prevailing atmospheric conditions, particularly metrological conditions i.e. cloud cover and precipitation. There are various potential means of quantifying 'sky-glow'; however, in the case of new exterior lighting installations, 'sky-glow' is addressed by means of limiting the upward light ratio (ULR) of the installation i.e. the ratio between useful light downwards and wasted light upwards towards the sky.

EXECUTIVE SUMMARY

Outline Scope

Strenger Ltd was appointed by Widdington Recycling to undertake a lighting assessment for an exterior lighting installation associated with a proposed Materials Recovery Facility at land off Falconer Road, Haverhill (hereon in, the 'Proposed Development').

The assessment is required in order to quantify the impact of artificial light associated with the Proposed Development on its surroundings.

Emergency and CCTV lighting is beyond the scope of this assessment. This report shall be read in conjunction with the following accompanying drawings produced by Strenger:

- SK-01 Residential Receptor Location Plan
- SK-02 Assessed Scheme of Lighting
- SK-03 Light Spill

Assessment

In order to assess the potential light impacts associated with the Proposed Development, the following has been undertaken:

- review of pertinent legislation, policy and guidance;
- review of the site and surrounding area using aerial photography and OS mapping;
- production of a scheme of lighting (Assessed Scheme of Lighting) suitable for environmental assessment;
- detailed 3D computational modelling of the Assessed Scheme of Lighting;
- specification of high-level mitigation measures;
- calculation of 'light intrusion' (vertical illuminance) at residential receptors;
- calculation of 'glare' (viewed source intensity) at residential receptors;
- calculation of 'sky-glow' (upward light ratio);
- comparison of the obtrusive light levels with national guideline limits;
- production of isolux contours of light spill;
- production of ray-traced rendered light model imagery; and
- production of CAD drawings.

Conclusions

Based on the Assessed Scheme of Lighting, it has been demonstrated that the Proposed Development will be compliant with the residential receptor criteria as set out in ILP Guidance Note 01/21: The Reduction of Obtrusive Light. Specifically, the Assessed Scheme of Lighting associated with the Proposed Development is compliant with the ILP post-curfew obtrusive light criteria for Environmental Zone E3. The adopted criteria are as follows:

- 'Light intrusion' limit of 2 lux (E - vertical illuminance)
- 'Glare' limit of 2.5d to 1,000 cd (I - source intensity)
- 'Sky-glow' limit of 5 % (upward light ratio)

Compliance has been achieved with the adoption of an environmentally sympathetic scheme of lighting having the following integral mitigation measures:

- the use of luminaires with minimal to zero direct contribution to upward light;
- minimising luminaire uplift angles;
- careful aiming and positioning of luminaires;
- careful selection of luminaires;
- the use of optimal light distributions for their specific location and orientation;
- optimisation of mounting heights;
- the adoption of the lowest intensity LED modules practicable; and
- minimising the task illuminance level.

1. LEGISLATION, POLICY & GUIDANCE

Legislation

Clean Neighbourhoods and Environment Act (CNEA), 2005

1.1 Light pollution was introduced within the Clean Neighbourhoods and Environment Act 2005 *('CNEA* 2005 ')as a form of statutory nuisance under the Environmental Protection Act 1990 (the 'EPA 1990') which was amended in 2006 to include the following nuisance definition:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance;"

1.2 Although light was described as having the potential to cause statutory nuisance in the CNEA 2005, no prescriptive limits or rules were set for impact assessment purposes. The Guidance Notes for the Reduction of Obtrusive Light produced by the ILP has, therefore, been referred to for the purposes of this assessment.

1.3 Guidance produced by DEFRA, Statutory Nuisance from Insects & Artificial Light (2006) on s101 to s103 of the CNEA has also been referred to which places a duty on local authorities to ensure that their areas are checked periodically for existing and potential sources of statutory nuisances - including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice (in accordance with s80(2) of the EPA 1990), requiring that the nuisance cease or be abated within a set timescale.

National Planning Policy

National Planning Policy Framework (NPPF), 2023

1.4 The National Planning Policy Framework (NPPF) states that the purpose of the planning system is to contribute to the achievement of sustainable development and constitute the Government's view on what sustainable development in England means in practice for the planning system. A principal concept contained within the NPPF is the presumption in favour of sustainable development and with regard to artificial lighting, the NPPF states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

… (c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

International Guidance

Comission Internationale De L'Eclairage 150: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2017 (CIE-150)

1.5 The purpose of CIE-150: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2017 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. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. This Guide refers to the potentially adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers.

Comission Internationale De L'Eclairage 126: Guidelines for Minimising Sky Glow, 1997 (CIE-126)

1.6 CIE-126: Guidelines for Minimising Sky Glow, 1997 gives general guidance for lighting designers and policy makers on the reduction of sky glow. The report gives recommendations about maximum permissible values for exterior lighting installations. These values are regarded as limiting values. Lighting designers should strive to meet the lowest criteria for the design. Practical implementation of the general guidance is left to national regulations.

National Guidance

Institute of Lighting Professionals (ILP) Guidance Note 01/21: The Reduction of Obtrusive Light, 2021

1.7 The ILP has proposed obtrusive lighting guidance and criteria for local authorities with a recommendation that these are incorporated at the local plan level. ILP Guidance Note 01/21 defines various forms of light pollution and describes a series of environmental zones. ILP Guidance Note 01/21 provides suitable criteria against which the effects of artificial lighting can be assessed.

Institute of Lighting Professionals (ILP) PLG 04 - Guidance on Undertaking Environmental Lighting Impact Assessments, 2013 *(update pending)*

1.8 The aim of the Guidance on Undertaking Environmental Lighting Impact Assessments (ILP PLG04:2013) is to outline good practice in lighting design and provide practical guidance on production and assessment of lighting impacts within new developments. The document was produced following the publication of the NPPF in April 2012 and the importance of lighting design being part of a planning application, this document aims to:

- provide an explanation of, and guidance on, the process for producing a lighting assessment;
- prompt the lighting designer on important aspects of specific projects which should be used to remove or minimise potential environmental problems; and
- look at the overall processes and evaluation procedures regarding lighting which are considered to be relevant.

2. CRITERIA

Exterior Lighting

2.1 In the absence of statutory guidance, ILP Guidance Note 01/21: The Reduction of Obtrusive Light has been used as criteria against which to assess the effects of artificial lighting associated with the Proposed Development on residential, receptors; this is considered best practice.

ILP Environmental Zone Classification

2.2 The ILP has developed an Environmental Zone classification system for the categorisation of areas with regard to suitable obtrusive lighting limits. The Environmental Zone classifications are reproduced in Table 2.1.

Table 2.1: ILP Environmental Zone Classification

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

ILP Environmental Zone Criteria

2.3 For each Environmental Zone, obtrusive light limits for exterior lighting installations have been determined. These are summarised in Table. 2.2 to Table 2.4 below and are intended to support decision makers in establishing whether artificial lighting is detrimental to local amenity or a potential statutory nuisance.

Table 2.2: ILP 'Light Intrusion' (vertical illuminance) Limits E - lux

Application Conditions	Environmental Zone				
	E0	E1	E2	E3	E4
Pre-curfew	n/a	2	5	10	25
Post-curfew	n/a	< 0.1 *	1	2	5

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

Table 2.3: ILP 'Glare' (source intensity) Limits I - cd						
Application Conditions	**Luminaire group (projected area A_p in m^2)**					
	0 < Ap ≤ 0.002	**0.002 < Ap ≤ 0.01**	**0.01 < Ap ≤ 0.03**	**0.03 < Ap ≤ 0.13**	**0.13 < Ap ≤ 0.50**	**Ap > 0.50**
E0 Pre-curfew E0 Post-curfew	0 0	0 0	0 0	0 0	0 0	0 0
E1 Pre-curfew E1 Post-curfew	0.29 d 0	0.63 d 0	1.3 d 0	2.5 d 0	5.1 d 0	2,500 0
E2 Pre-curfew E2 Post-curfew	0.57 d 0.29 d	1.3 d 0.63 d	2.5 d 1.3 d	5.0 d 2.5 d	10 d 5.1 d	7,500 500
E3 Pre-curfew E3 Post-curfew	0.86 d 0.29 d	1.9 d 0.63 d	3.8 d 1.3 d	7.5 d 2.5 d	15 d 5.1 d	10,000 1,000
E4 Pre-curfew E4 Post-curfew	1.4 d 0.29 d	3.1 d 0.63 d	6.3 d 1.3 d	13 d 2.5 d	26 d 5.1 d	25,000 2,500

1) d is the distance between the observer and the 'glare' source in metres

2) Upper limits for each zone shall be taken as those with column $A_p > 0.5$

Table 2.4: ILP 'Sky-glow' (upward light ratio) Limits ULR - %				
Environmental Zone				
E0	**E1**	**E2**	**E3**	**E4**
0	0	2.5	5	15

Determination of ILP Environmental Zone

2.4 The Proposed Development site lies within an industrial area on the outskirts of Haverhill, with residential use to the wider study area. Based on the Proposed Development surroundings, it is considered that the most appropriate classification for the purposes of this obtrusive light assessment is ILP Environmental Zone E3.

2.5 Such a classification will ensure that the nightscape within the immediate and wider study area is suitably protected.

ILP Environmental Zone Criteria

2.6 Based on ILP Environmental Zone E3, the obtrusive light limits for the Proposed Development affecting residential receptors are as follows:

- Pre-curfew 'light intrusion' limit of 10 lux (E - vertical illuminance)
- Post-curfew 'light intrusion' limit of 2 lux (E - vertical illuminance)
- Pre-curfew 'glare' limit of 7.5d to 10,000 cd (I - source intensity)
- Post-curfew 'glare' limit of 2.5d to 1,000 cd (I - source intensity)
- 'Sky-glow' limit of 5% (upward light ratio)

Adopted ILP Criteria

2.7 In order to demonstrate that it would be possible to operate all lighting for operational, health & safety and security purposes throughout the entire night-time period, only the post-curfew ILP criteria have been adopted for the purposes of this assessment. As such, the adopted criteria are as follows:

- 'Light intrusion' limit of 2 lux (E - vertical illuminance)
- 'Glare' limit of 2.5d to 1,000 cd (I - source intensity)
- 'Sky-glow' limit of 5 % (upward light ratio)

3. RECEPTORS

Residential

3.1 Within the context of this assessment, residential receptors are taken as those with the potential to be affected by obtrusive light associated with the Proposed Development. Key existing residential receptors which have the potential to be impacted by obtrusive light from the Proposed Development have been identified and adopted as receptor locations within this assessment.

3.2 Residential receptors are positioned at local ground level +2.0 m (i.e. ground floor level window height). At such a height, the angle subtended with the light sources will be less than that if assessed at first floor level windows. The assessed receptor height therefore represents a reasonable worst-case scenario, as the level of 'glare' (viewed source intensity) will be at its maximum.

3.3 The assessed residential receptors are set out in Strenger drawing ref: SK-01 Residential Receptor Location Plan.

4. EXTERIOR LIGHTING

Overview

4.1 Artificial lighting will be required for operational, health & safety and security requirements during periods of darkness. The associated potential obtrusive light effects towards surrounding light-sensitive receptors would be minimised through the controlled application of lighting in accordance with current best practice.

Assessed Scheme of Lighting

4.2 An indicative outline scheme of lighting (Assessed Scheme of Lighting) has been produced for the Proposed Development. The Assessed Scheme of Lighting does not consider CCTV or emergency lighting. The Assessed Scheme of Lighting adopts LED luminaires; such technology offers significant energy savings and provide a high degree of optical control, thus minimising obtrusive light. With regard to this assessment, the luminaires - whilst specific, can be considered to be relatively generic; provided that sensible selection of another manufacturer's luminaires is made by a competent Lighting Engineer. The final selection of luminaires and their positioning shall be determined by the Responsible Lighting Engineer in order to meet the Proposed Development site final risk assessed lighting requirements; but bearing in mind any obtrusive lighting impact that the selection may have.

4.3 The details of the luminaires used in the Assessed Scheme of Lighting are set out in Table 4.1 below. The Assessed Scheme of Lighting is set out in Strenger drawing ref: SK-02 Assessed Scheme of Lighting. The drawing details the position, height and type of all assessed lighting. The associated levels of light spill are set out in Strenger drawing ref: SK-03 Light Spill. DSEAR, Passive safety measures, isolation measures, physical protection measures, set-back distances, mounting method/design, CCTV, Rainwater goods clash detection etc. shall all be considered as part of the final lighting design.

Table 4.1: Assessed Scheme of Lighting Details

Reference	No. of	Manufacturer	Luminaire	Module (driving current)	Distribution
LUM-A	1	DW Windsor	Sabre	3000K 16 LED (750mA)	C2
LUM-B	2	DW Windsor	Sabre	3000K 64 LED (1000mA)	A1
LUM-C	5	DW Windsor	Sabre	3000K 64 LED (1000mA)	C2
LUM-D	11	Luceco	Semita Arc	3000K 7.5W	Path
LUM-E	2	Philips	ClearFlood	830 LED160	DX51
LUM-F	2	Philips	ClearFlood	830 LED220	DX51
LUM-G	1	Philips	ClearFlood	830 LED360	DX51

Figure 4.1: DW Windsor Sabre

Figure 4.2: Luceco Semita Arc

Figure 4.3: Philips ClearFlood

5. MODELLING

5.1 Light modelling was undertaken using DIALux software, an independent lighting modelling software tool which can calculate artificial lighting scenes in exterior scenarios. The software incorporates recognised calculation methodologies and is commonly used for lighting assessment throughout Europe. An indicative scheme of lighting for the Proposed Development has been produced for the purposes of this assessment and has been inputted into the lighting model.

5.2 In order to represent a reasonable worst-case scenario for environmental assessment, the maintenance factor within the lighting model was set to 1.0, such that the scheme was assessed based on the full design lumen output, rather than the maintained minimum design lumen output.

5.3 The lighting model does not take account of vegetation and off-site buildings. As such screening has not been accounted for, this can be considered to be a reasonably conservative assessment of obtrusive light.

5.4 Such as to provide an illustrative overview of the lighting model used for the assessment, ray-traced imagery of the rendered lighting model is appended to this report in Appendix A.

5.5 As stated above, the lighting model does not take into account intervening vegetation and off-site buildings. Accordingly, such entities do not feature within the appended imagery.

6. MITIGATION

6.1 The following mitigation measures are integral to good lighting design, and have therefore been included in the Assessed Scheme of Lighting as a matter of course:

- the use of luminaires with minimal to zero direct contribution to upward light;
- minimising luminaire uplift angles;
- careful aiming and positioning of luminaires;
- careful selection of luminaires;
- the use of optimal light distributions for their specific location and orientation;
- optimisation of mounting heights;
- the adoption of the lowest intensity LED modules practicable; and
- minimising the task illuminance level.

7. ASSESSMENT

Residential

'Light Intrusion' (vertical illuminance)

7.1 The levels of 'light intrusion' from the Assessed Scheme of Lighting associated with the Proposed Development have been predicted at residential receptors. The resultant levels of 'light intrusion' are set out in Table 7.1 against the ILP post-curfew 'light intrusion' criterion of 2 lux for Environmental Zone E3. Each receptor has been assigned a PASS / FAIL outcome accordingly.

Table 7.1: 'Light Intrusion' Assessment

Receptor	'Light Intrusion' Criterion - E (lux)	Predicted 'Light Intrusion' - E (lux)	Outcome
RES-01	2	0.01	**PASS**
RES-02	2	0.01	**PASS**
RES-03	2	0.01	**PASS**
RES-04	2	0.01	**PASS**
RES-05	2	0.04	**PASS**
RES-06	2	0.03	**PASS**
RES-07	2	0.02	**PASS**
RES-08	2	0.01	**PASS**
RES-09	2	0.01	**PASS**
RES-10	2	0.01	**PASS**
RES-11	2	0.01	**PASS**
RES-12	2	0.01	**PASS**
RES-13	2	0.01	**PASS**
RES-14	2	0.01	**PASS**
RES-15	2	0.04	**PASS**

7.2 As can be seen from Table 7.1 above, the predicted levels of 'light intrusion' at residential receptors from the Assessed Scheme of Lighting associated with the Proposed Development are compliant with the ILP post-curfew 'light intrusion' criterion of 2 lux for Environmental Zone E3.

'Glare' (viewed source intensity)

7.3 The maximum levels of 'glare' from the Assessed Scheme of Lighting associated with the Proposed Development have been predicted at residential receptors. The resultant maximum levels of 'glare' are set out in Table 7.2 against the adopted ILP post-curfew 'glare' criteria for Environmental Zone E3. Each receptor has been assigned a PASS / FAIL outcome accordingly.

Table 7.2: 'Glare' Assessment

Receptor	Adopted 'Glare' Criteria - I (cd)	Predicted Maximum 'Glare' - I (cd)	Outcome
RES-01	738	64	**PASS**
RES-02	635	79	**PASS**
RES-03	603	60	**PASS**
RES-04	538	17	**PASS**
RES-05	330	23	**PASS**
RES-06	345	6	**PASS**
RES-07	418	3	**PASS**
RES-08	633	19	**PASS**
RES-09	585	24	**PASS**
RES-10	558	27	**PASS**
RES-11	638	10	**PASS**
RES-12	633	33	**PASS**
RES-13	635	43	**PASS**
RES-14	553	65	**PASS**
RES-15	403	131	**PASS**

7.4 As can be seen from Table 7.2 above, the predicted maximum levels of 'glare' at residential receptors from the Assessed Scheme of Lighting associated with the Proposed Development are compliant with the ILP post-curfew adopted 'glare' criteria for Environmental Zone E3.

'Sky-glow' (upward light ratio)

7.5 The level of 'sky-glow' from the Assessed Scheme of Lighting associated with the Proposed Development has been predicted for residential receptors. The resultant level of 'sky-glow' is set out in Table 7.3 against the ILP 'sky-glow' criterion of 5 % for Environmental Zone E3. Each receptor has been assigned a PASS / FAIL outcome accordingly.

Table 7.3: 'Sky-glow' Assessment

Receptor	'Sky-glow' Criterion - ULR (%)	Predicted 'Sky-glow' - ULR (%)	Outcome
Residential	5	0.0	**PASS**

7.6 As can be seen from Table 7.3 above, the predicted level of 'sky-glow' from the Assessed Scheme of Lighting associated with the Proposed Development is compliant with the ILP 'sky-glow' criterion of 5 % for Environmental Zone E3.

8. CONCLUSIONS

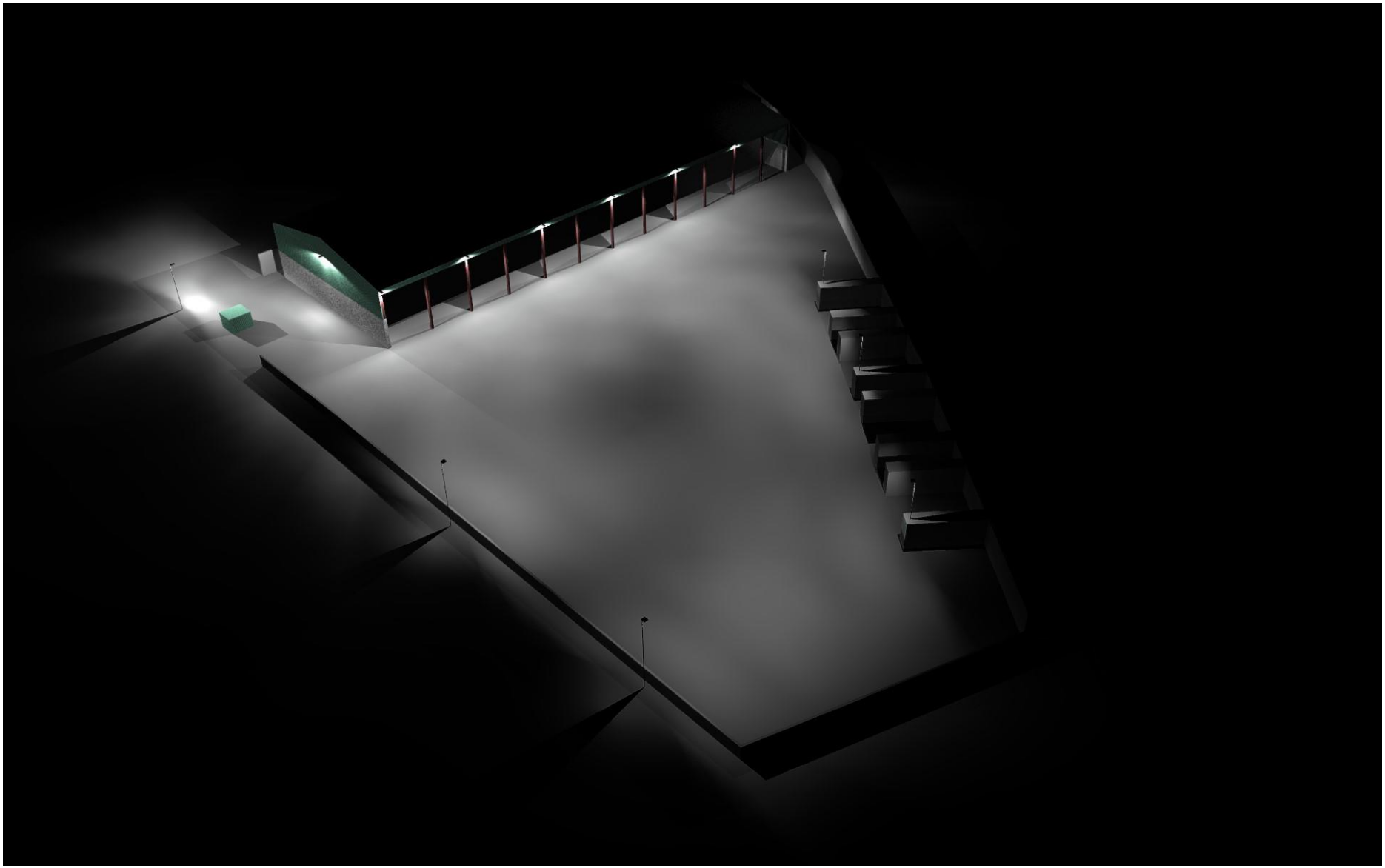
8.1 Based on the Assessed Scheme of Lighting, it has been demonstrated that the Proposed Development will be compliant with the residential receptor criteria as set out in ILP Guidance Note 01/21: The Reduction of Obtrusive Light. Specifically, the Assessed Scheme of Lighting associated with the Proposed Development is compliant with the ILP post-curfew obtrusive light criteria for Environmental Zone E3. The adopted criteria are as follows:

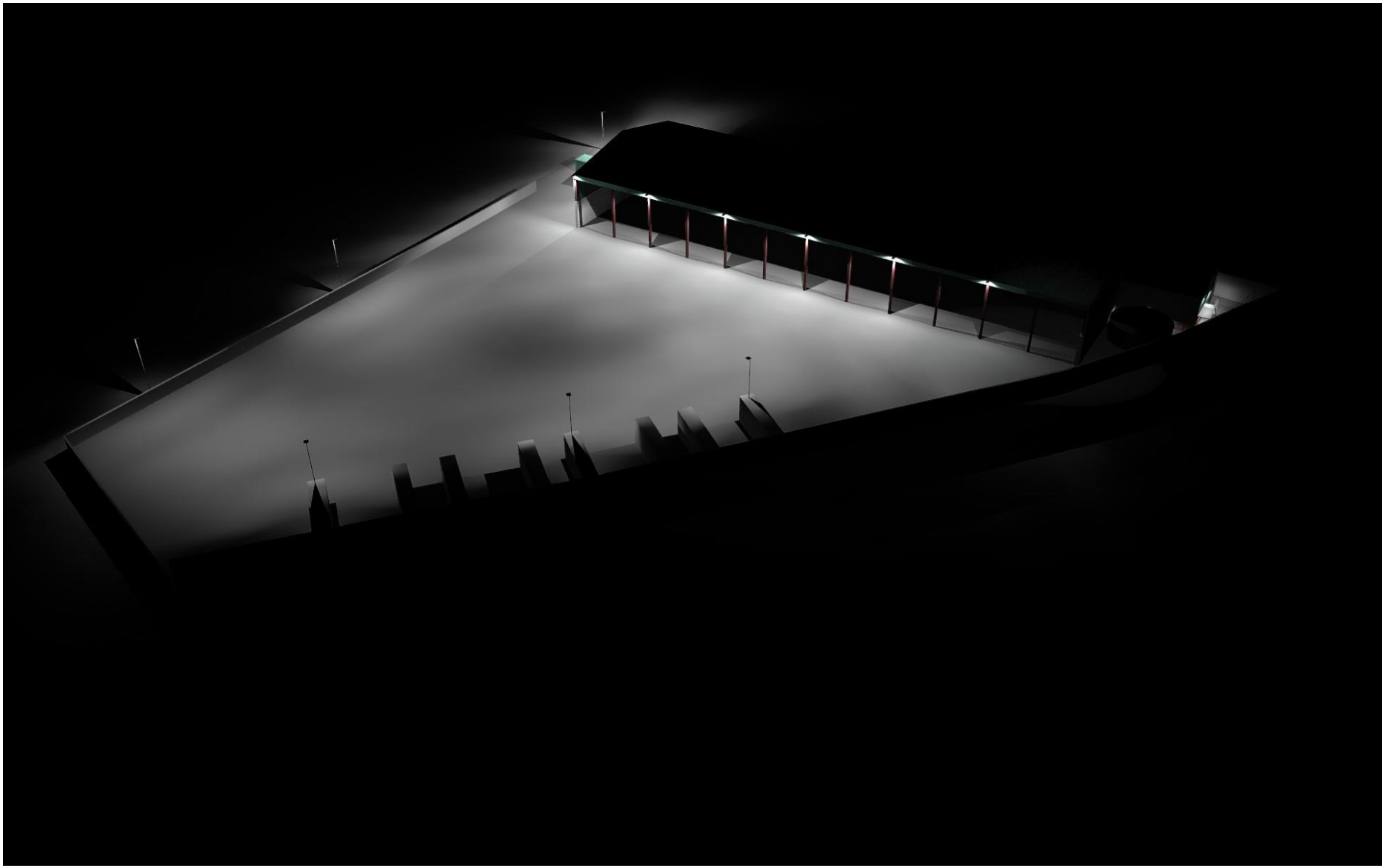
- 'Light intrusion' limit of 2 lux (E - vertical illuminance)
- 'Glare' limit of 2.5d to 1,000 cd (I - source intensity)
- 'Sky-glow' limit of 5 % (upward light ratio)

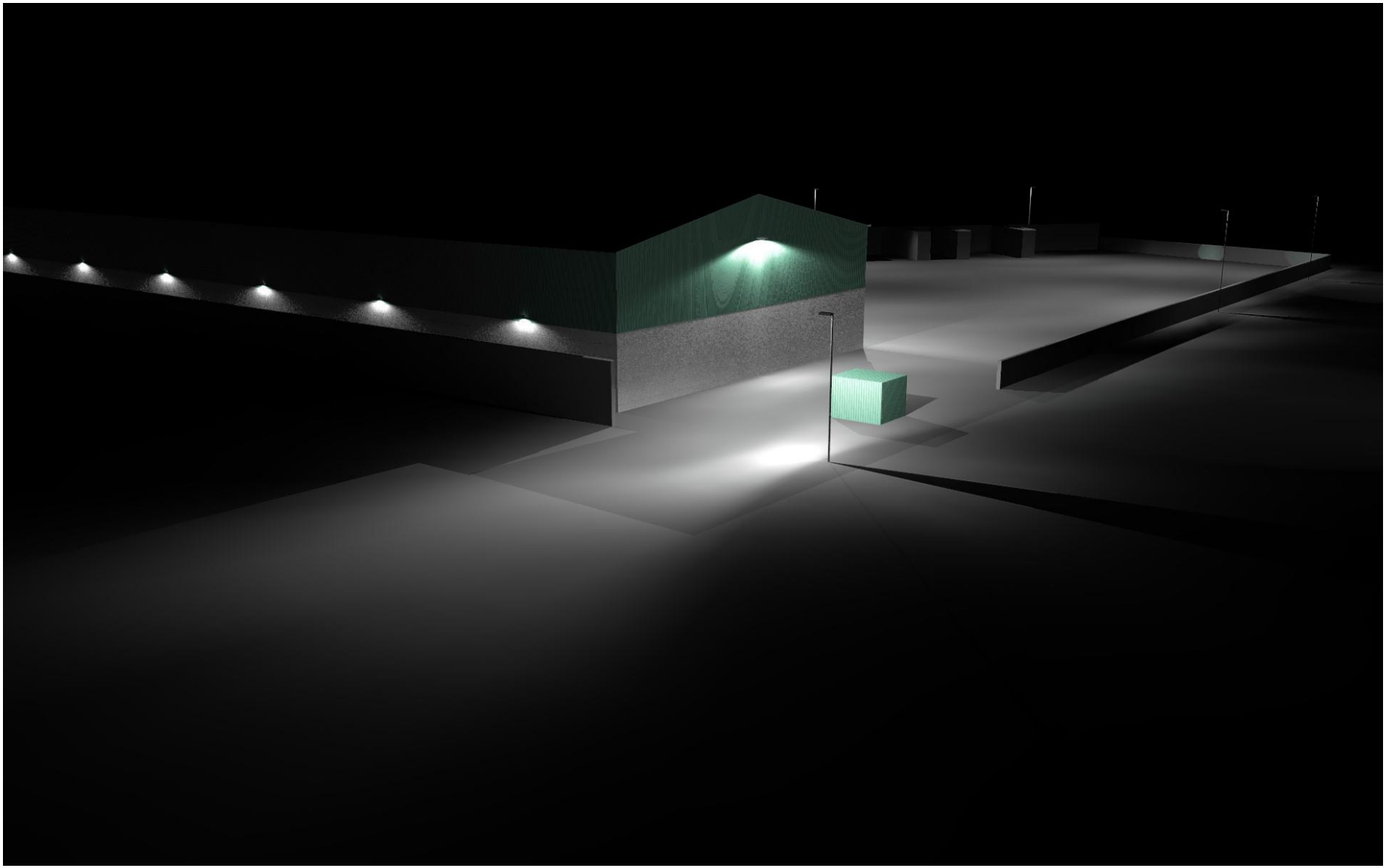
8.2 Compliance has been achieved with the adoption of an environmentally sympathetic scheme of lighting having the following integral mitigation measures:

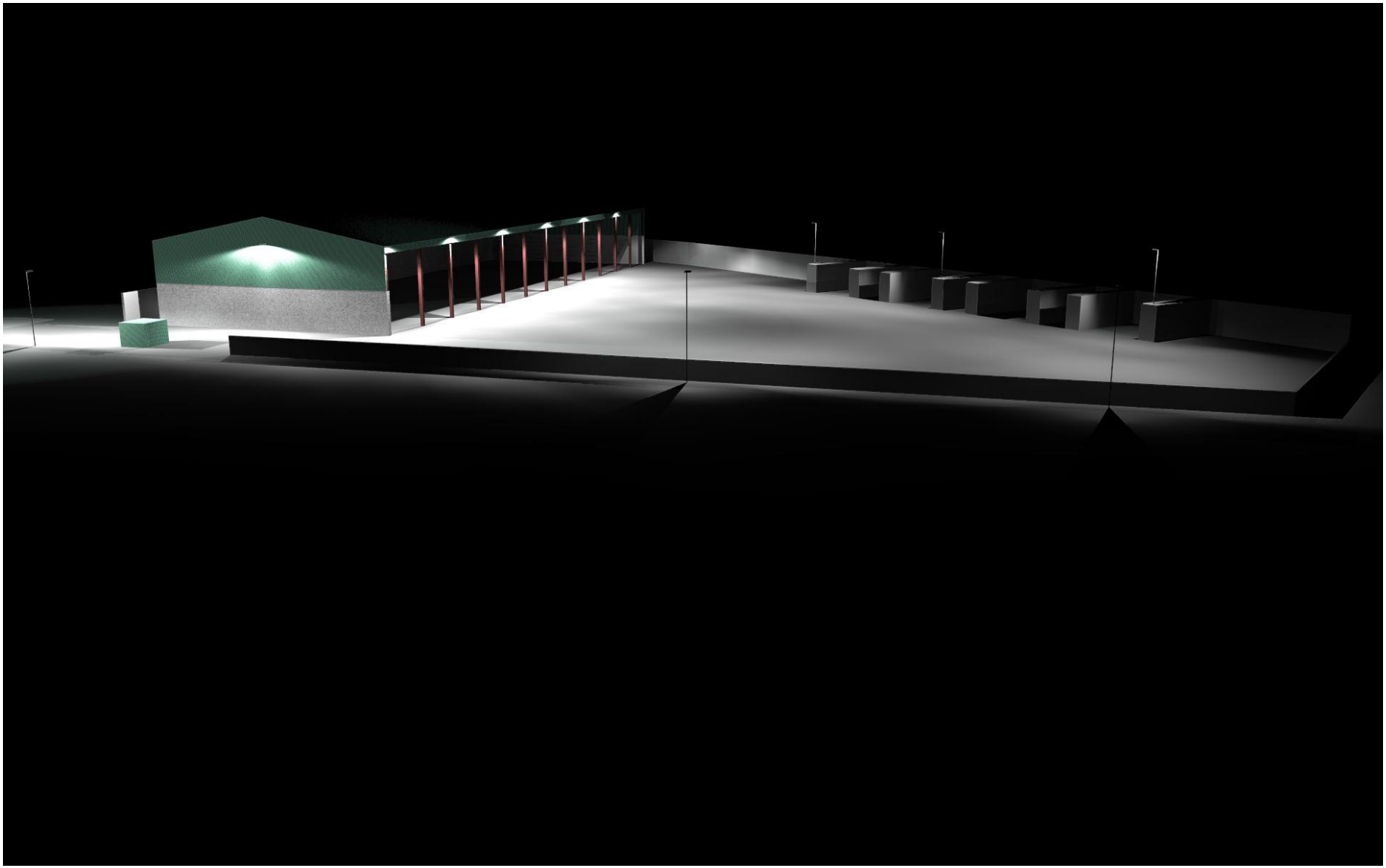
- the use of luminaires with minimal to zero direct contribution to upward light;
- minimising luminaire uplift angles;
- careful aiming and positioning of luminaires;
- careful selection of luminaires;
- the use of optimal light distributions for their specific location and orientation;
- optimisation of mounting heights;
- the adoption of the lowest intensity LED modules practicable; and
- minimising the task illuminance level.

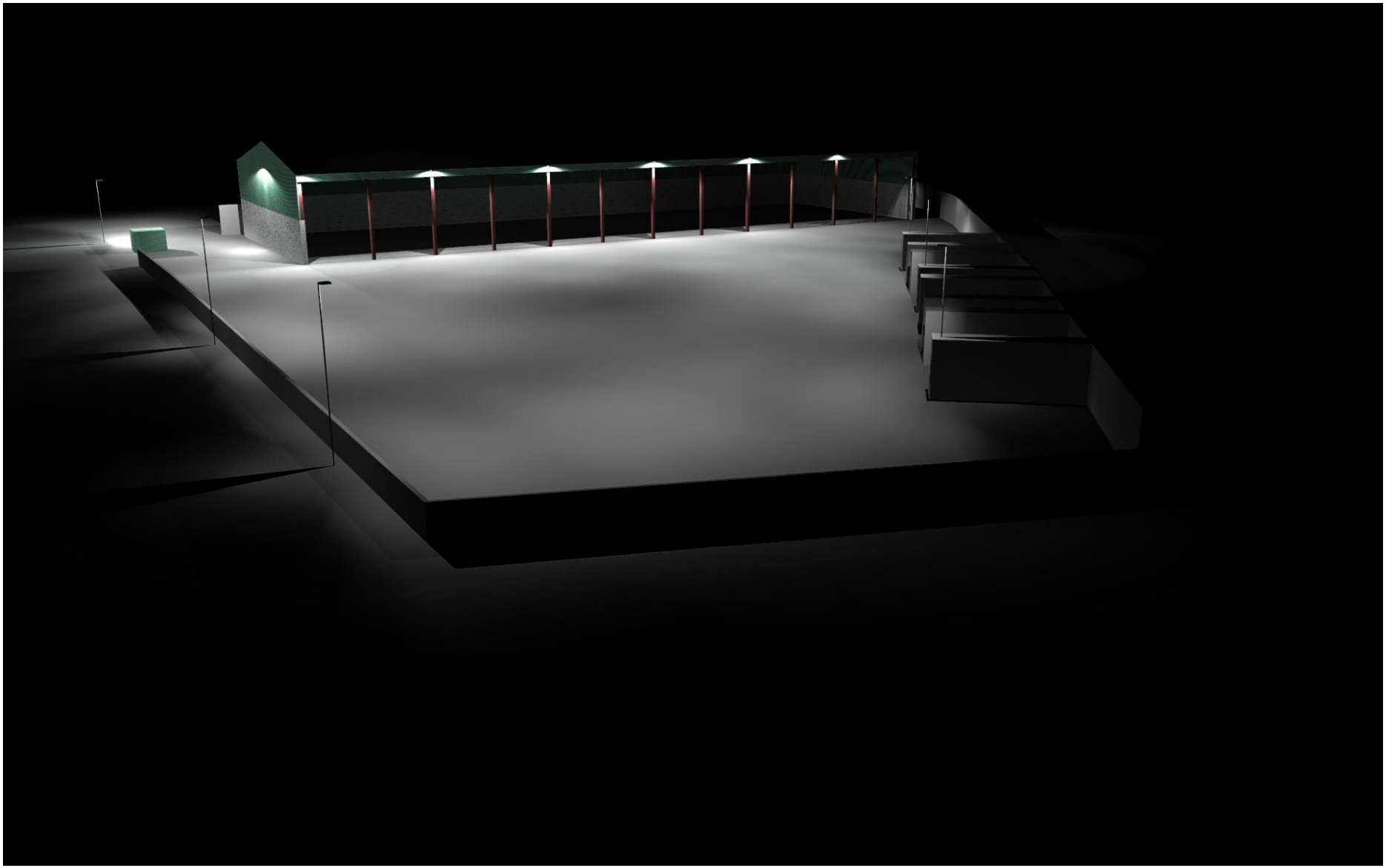
Appendix A - Lighting Model Ray-traced Imagery

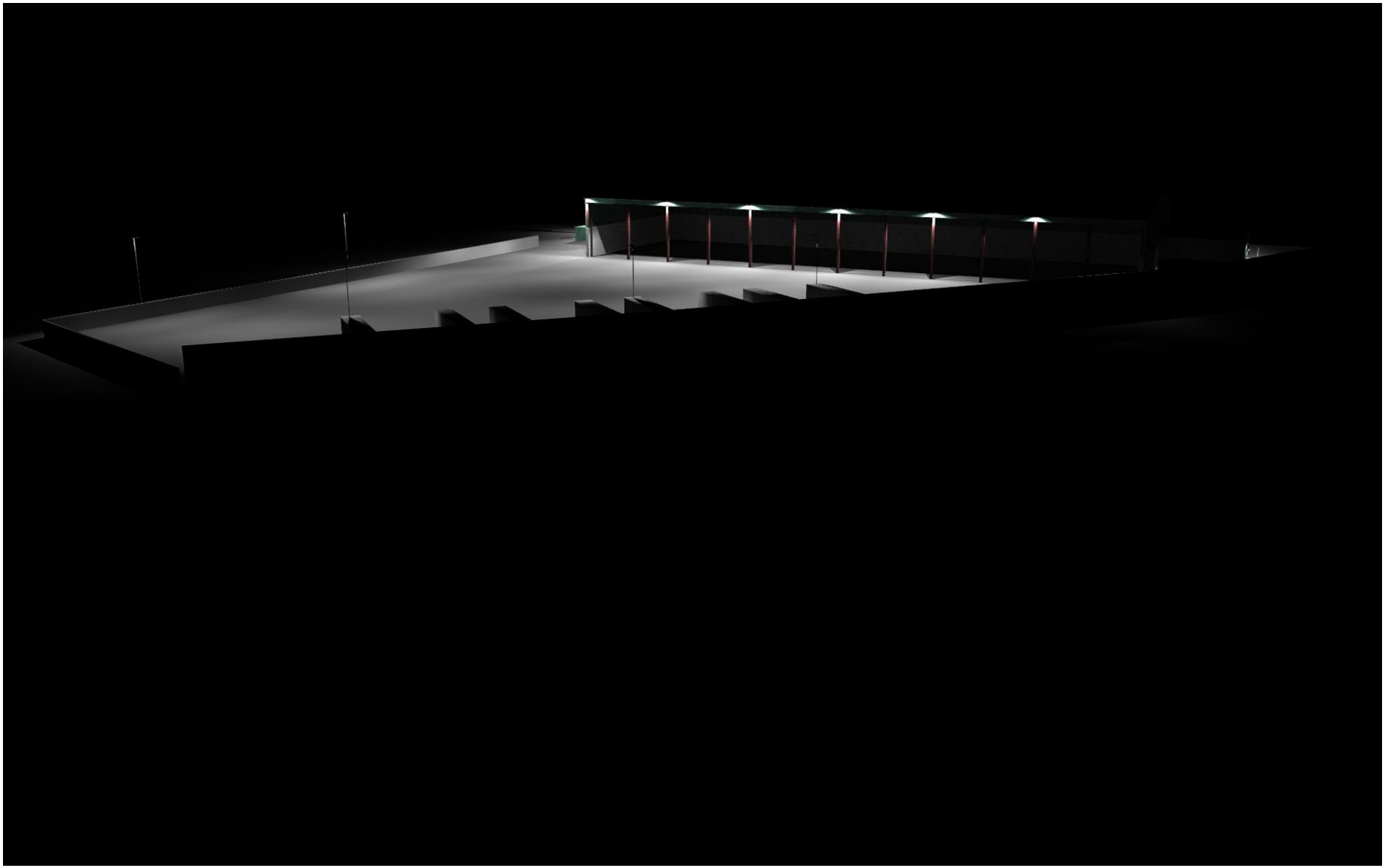


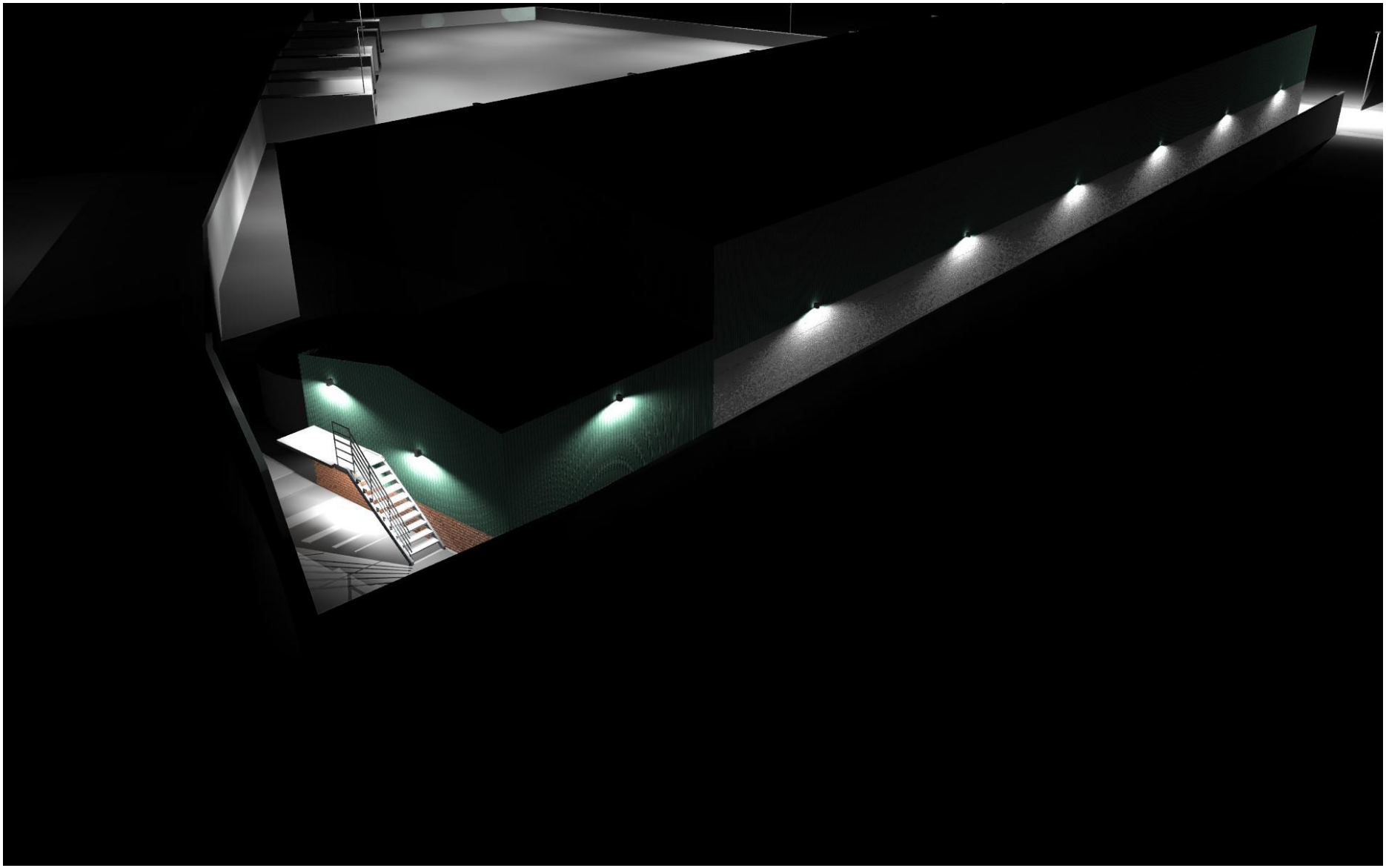












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3. Official issues of this drawing are in paper or pdf format only. Dwg files are for reference only.
4. This drawing is for environmental planning purposes only and shall not be used for any other purpose.

LUMINAIRE SCHEDULE

- DW Windsor Sabre 16 LED 3k C2 750mA
- DW Windsor Sabre 64 LED 3k A1 1000mA
- DW Windsor Sabre 64 LED 3k C2 1000mA
- Luceco Semita Arc 7.5W Path
- Philips ClearFlood LED160 830 DX51
- Philips ClearFlood LED220 830 DX51
- Philips ClearFlood LED360 830 DX51

Rev	Date	Details	Drawn

Project	Haverhill MRF

Assessed Scheme of Lighting

Strenger Ltd

Date	Scale	Drawn
MAY 24	NTS	DC

Drawing No.	SK–02
Status	FOR ENV' PLANNING

Checked	Print
OC	A3

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Isolines

- 0.1 lx
- 0.2 lx
- 0.5 lx
- 1.0 lx

Rev	Date	Details	Drawn

Project	Haverhill MRF

Light Spill

Strenger Ltd

Date	Scale	Drawn
MAY 24	NTS	DC

Drawing No.	SK–03
Status	FOR ENV' PLANNING

Checked	Print
OC	A3

Notes:

1. This drawing is confidential and may not be reproduced, manufactured or exploited in whole or part without written consent.
2. Dimensions are not to be scaled from this drawing.
3. Official issues of this drawing are in paper or pdf format only. Dwg files are for reference only.
4. This drawing is for environmental planning purposes only and shall not be used for any other purpose.

Rev	Date	Details	Drawn

Project	Haverhill MRF

Residential Receptor Location Plan

Strenger Ltd

Date	Scale	Drawn
MAY 24	NTS	DC

Drawing No.	SK–01
Status	FOR ENV' PLANNING

Checked	Print
OC	A3