

New Century Place, East Street, Reading External Lighting Scheme Assessment Memo April 2020 Job No. 8352.2		
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1 INTRODUCTION

Background

- 1.1 The Ecology Consultancy was commissioned by VINCI Construction UK Ltd to review and evaluate the current lighting plans proposed for the post construction phase of the New Century Place, East Street, Reading development.

- 1.2 A Preliminary Ecological Appraisal carried out in 2016 (ADAS, 2016) recommended that external lighting to be installed on the new development is sympathetic to bats and any light spill outside of the site is avoided. Wildlife sensitive lighting will ensure that the nearby potential roosts as detailed below and surrounding areas will be maintained as suitable for use by roosting, commuting and foraging bats as well as other wildlife such as nesting birds.
- 1.3 The scope of this report is to evaluate the final lighting plans that have been produced in line with best practice and determine their suitability, and any associated strategies are provided accordingly (Clark Degan Consulting Engineers, 2019a & 2019b).
- 1.4 The lighting plans are required to meet planning condition 19 of planning consent 181849 (Planning application ref: 200290) in relation to wildlife, specifically bats, at the site. Planning condition 19 reads as follows:

“Condition 19. No external lighting shall be installed until a report detailing the lighting scheme and how this will not adversely impact upon wildlife has been submitted to and approved in writing by the Local Planning Authority. The report shall include the following figures and appendices:

- *A layout plan with beam orientation*
- *A schedule of equipment*
- *Measures to avoid glare*
- *An isolux contour map showing light spillage to 1 lux both vertically and horizontally and areas identified as being of importance for commuting and foraging bats.*

The approved lighting plan shall thereafter be implemented as agreed.

Reason: To ensure that wildlife is not adversely affected by the proposed development in line with Policy CS36.”

Site Context and Status

- 1.5 The development site is 0.01 hectares (ha) in size and is centred on Ordnance Survey National Grid reference SU 71872 73171. Based on results from the Phase 1 survey carried out in 2016, the site consisted of hardstanding bordered by small areas of mostly introduced shrubs and scattered trees (ADAS, 2016). The site was surrounded by a mix of commercial and residential properties, with Reading Town centre to the north.

The wider locality is urban, dominated by commercial and residential properties and limited green open spaces, the River Kennet Local Wildlife Site (LWS) is located 150m north of the site.

Development Proposals

- 1.6 The development proposals are for site clearance and the construction of a new part-4 part-5 storey building (plus basement) to provide 135 units of purpose-built student accommodation and associated facilities (Sui Generis). Landscaping proposals includes new shrub planting and climbing vegetation with known value to wildlife and new opportunities for nesting birds in the form of 15 swift nest boxes and one sparrow terrace.

Bats

- 1.7 Although the site itself was assessed as being of low value to bats due to lack of habitat, potential roost sites for bats were noted adjacent to the site during the survey in 2016 (ADAS, 2016). Two buildings outside the site boundary were considered to have low potential for roosting bats, approximately 15m west and 30m south of the site.
- 1.8 There is limited commuting or foraging habitat of importance for bats within close proximity to the site; however, vegetation 15m to the west and street trees 40m to the north of the site could provide stepping-stones to optimal habitats for bats located north of the site, such as the River Kennet LWS (150m north) and vegetated railway embankments (750m north). However,
- 1.9 Bats likely to be using the area on and around the site are considered more tolerant of artificial light such as common pipistrelle and soprano pipistrelle due to the urban location of the site; however a bat survey has not been undertaken to date, therefore it cannot be confirmed that more-light sensitive bat species, such as those of the *Plecotus* or *Myotis* genera do not use the site. The objective is to reduce lighting the surrounding areas as much as possible and ensure the potential bat roosts identified and any commuting or foraging routes are maintained. Furthermore, despite some species being more light tolerant, they do, however, have a level of sensitivity to light, albeit at a lower level.

Birds

- 1.10 All existing vegetation on site will be removed as part of the development; however, some vegetation that has potential for nesting birds is present adjacent to the west of the site which could be impacted by increased lighting and the new bird boxes to be installed on the western elevation of the new building (See Appendix 1, Figure 5) must not be directly illuminated by artificial lighting (The Ecology Consultancy, 2020).

2 EFFECTS OF LIGHTING ON WILDLIFE

- 2.1 The installation of artificial lighting within habitats can impact wildlife, particularly bats, through disturbance. Therefore, measures should be undertaken to minimise such impacts to ensure compliance with the Wildlife and Countryside Act 1981 (as amended) and the planning authority's requirement under planning condition 11. Appropriate measures for lighting strategies, designed to minimise disturbance to suitable bat roosts as well as foraging and commuting habitats and other potential protected species on site such as birds, are discussed below in Section 3.

Bats

Roosts

- 2.2 It has been documented that lighting a roost access point will delay bats from emerging from the roost, shortening the amount of time available for them to forage. Furthermore, the main peak of nocturnal insect abundance occurs at and soon after dusk. A delay in emergence means vital time needed for feeding is missed which, in turn can prevent the continued functionality of the roost (BCT, ILE 2009).

Foraging and Commuting

- 2.3 The Bat Conservation Trust (BCT) and the Institute of Lighting Professionals (ILP) (2009; 2018) noted two effects of lighting on bat foraging and commuting routes. One, the attraction certain types of lights have to a range of insects and second, the very presence of lit conditions. Both of which, could in turn affect the conservation status of the species present.
- 2.4 Moths and a range of other insects can be attracted to light (especially those that emit an ultraviolet component). Whilst some species such as the noctule, Leisler's and pipistrelle bat species swarm around street lights, studies have shown slow flying species such as the brown long eared bat and myotis species of bat generally avoid lights and therefore

insect species and in turn, food availability may be reduced in habitats they utilise as a result (BCT, ILP, 2018).

Birds

- 2.5 Lighting is known to play a role in effecting a number of factors within a bird's lifecycle. Studies have shown day length has the ability to influence behaviour patterns such as courtship, migration, fat deposition and moulting. Rawson (1923) documented the relationship between dawn singing in thrushes and light intensity during sunrise. Lack (1965) discovered robins and blackbirds began egg laying 1-2 weeks earlier in urban gardens with artificial lighting compared to woodland, leading to problems with food supply. For nocturnal birds, catch success can be reduced and daytime birds may extend feeding times during extended lighting, thereby reducing the prey population.

3 EVALUATION OF EXTERNAL LIGHTING PROPOSAL

Post Construction Lighting

- 3.1 The post construction lighting plans including lux contour plans (horizontal and vertical) and landscaping proposed for the site have been evaluated against design strategies documented within the BCT Landscape and Urban Design for Bats and Biodiversity (Gunnell et al., 2012) and Bats and Artificial Lighting in the UK (BCT, ILP, 2018). For a full list of the BCT, ILP guidelines, see Appendix 3.

Lighting type

- 3.2 Two types of lighting are proposed within the site post construction:
1. Thorn PIAZZA II LED to be mounted along the southern, western and northern elevation of the new building at a height of 3.5m and spaced 5m apart; and
 2. ARES EMMA 110 LED to be mounted either side at a height of approximately 2m of the doorway on the north-eastern elevation of the new building.
- 3.3 A plan of the external lighting layout proposed is provided below (see Appendix 1, Figure 1 and Figure 2). Nineteen Thorn PIAZZA II LED are proposed and two ARES EMMA 110 LED.

- 3.4 All lights proposed are LED, considered more directional with a narrow beam compared to others (BCT, ILE, 2009 & 2018); they also lack UV radiation, considered less likely to attract insects and affect prey availability.
- 3.5 LED typically features no UV component and research indicates that while lower UV components attract fewer invertebrates, warmer colour temperatures with peak wavelengths greater than 550nm (~3000°K) cause less impacts on bats (Stone *et al*, 2012, 2015a, 2015b). All lighting units to be installed on site will be 4000°K, therefore this requirement is not met.
- 3.6 The BCT guidelines suggest lighting that is required for security or safety reasons should use a lamp of no greater than 2000 lumens (150 Watts) and should comprise sensor activated low pressure sodium and narrow spectrum lights with no UV content (BCT, 2008; Stone 2013). Under current plans, proposed lights (see Appendix 1) do not exceed 150 Watts and therefore meet this requirement.

Timings

- 3.7 The external lighting will be set to an agreed 'timed on' duration. Lighting should be reduced as much as possible between the hours of 8pm and 9am, particularly during peak activity periods such as dusk when bats emerge from roost sites and dawn when bats return to roost. Lighting will be in use between the hours of 07:30 to 23:00 (at latest) and therefore this requirement is only partially met. Additional measures recommended to reduce lighting impacts is the use of dimmable lights between dusk-dawn timing even a reduction to 70% capacity would reduce any impact to bats and other nocturnal wildlife

Lighting design

- 3.8 Downward pointing light has been adopted in order to minimise light spill and no upward pointing light will be used (ARES EMMA 110 LED Unidirectional will be at a 38° angle and Thorn PIAZZA II LED at a 90° angle). This will limit any light spill onto the adjacent areas including the area of vegetation to the west and north of the site as well as the new swift boxes and sparrow terrace boxes to be installed on the new building. Artificial lighting will not directly illuminate the bird boxes in order to maximise the likelihood of birds utilising these boxes and increasing levels of bird activity in the vicinity (The Ecology Consultancy, 2020).

- 3.9 By reducing height and increasing spacing as much as possible, it will minimise light spill and reduce overall illumination (BCT, ILP, 2018). It will also reduce the likelihood of the development presenting a barrier to bats, reducing the extent of their movement throughout the landscape. The height of lighting columns will be limited to 3.5m reducing the amount of light spill onto the surrounding areas and any potential bat roosts within the vicinity and commuting routes.

Lux contour plans

- 3.10 A summary of the lux levels using the lighting units provided above on the site is provided in Appendix 1, Figures 3 and 4. Predicted contour lux plans at both horizontal and 25m vertical heights were provided by the lighting consultant using a maintenance factor of 0.8. In line with best practice guidance (ILP, BCT, 2018), lux levels to reduce impacts on bats are recommended to be below 1 lux in key bat habitats.
- 3.11 The lighting is an average of 2.4 lux level at ground level and 0.3 lux at 25m above fixed floor level (AFFL). Light spill level will be approximately 1 lux at 15m distance from the new building. Therefore, the potential bat roosts located to the west and south of the site and the vegetation 15m to the west will not be directly illuminated and will only be subject to minimal light spill, likely to be of no or little increase from levels already in surrounding areas. Street trees located 40m north of the site will not be subject to any light spill as a result of the development.

4 CONCLUSION

- 4.1 Buildings within proximity to the site (approx. 15m west and 30m south of the site) have the potential to support a bat roost. Due to the urban location of the site and lack of optimal bat habitat within 150m of the site it is considered that species considered more tolerant of artificial light such as common pipistrelle and soprano pipistrelle bats are likely to use the bat features identified. The objective has been to ensure external lighting proposals do not impact the potential bat roosts and any commuting and foraging routes as well as the bird boxes to be installed on site.
- 4.2 Whilst not all requirements have been met, overall, by implementing the measures in Section 3, it is considered sufficient to minimise any impacts from artificial lighting on both bats and birds to an acceptable level whilst enabling the developers to meet health and safety and other lighting requirements on the site.

5 REFERENCES

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Appendix 1: Plans

Figure 1 : External Lighting Layout

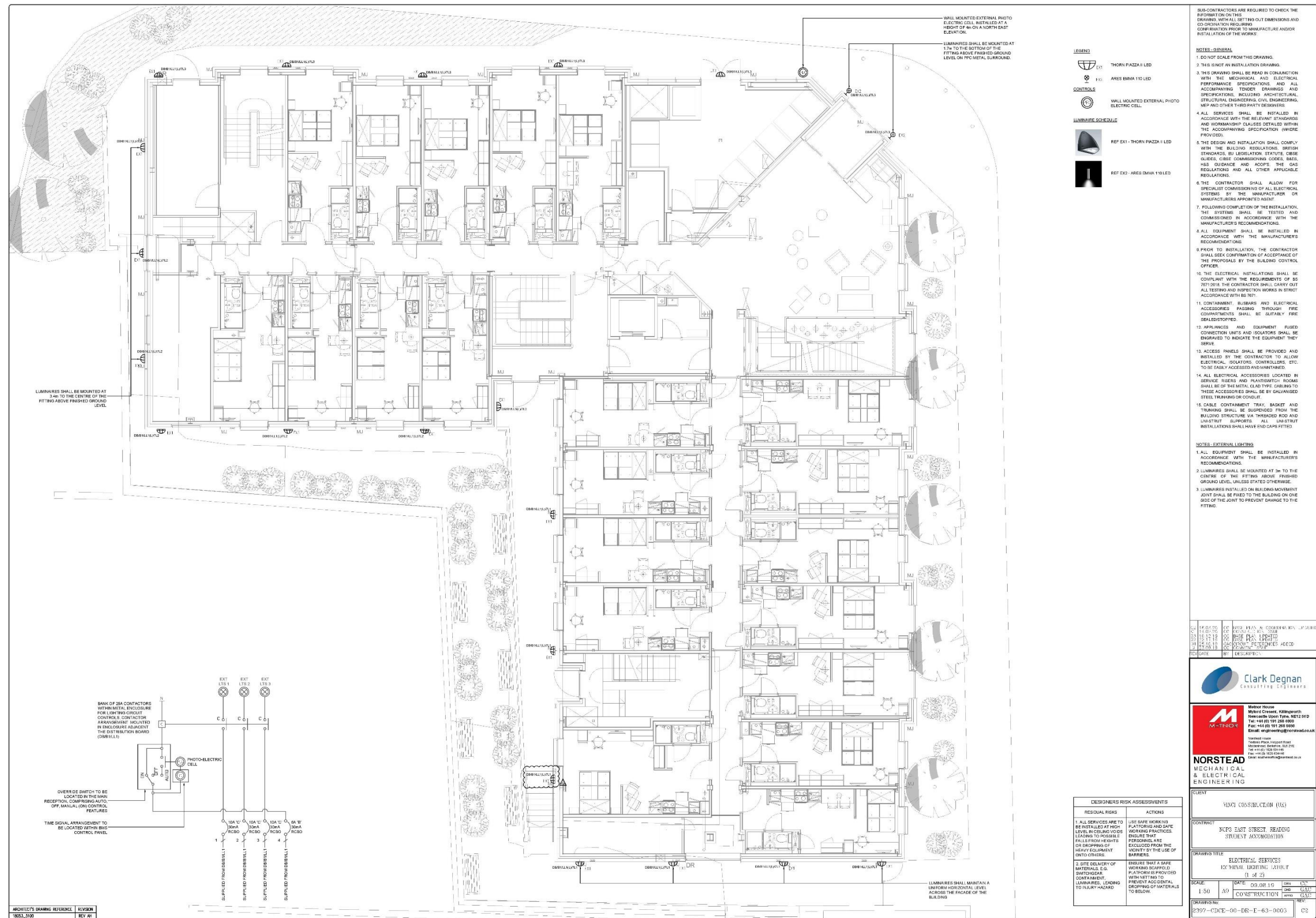


Figure 2: External Lighting Layout

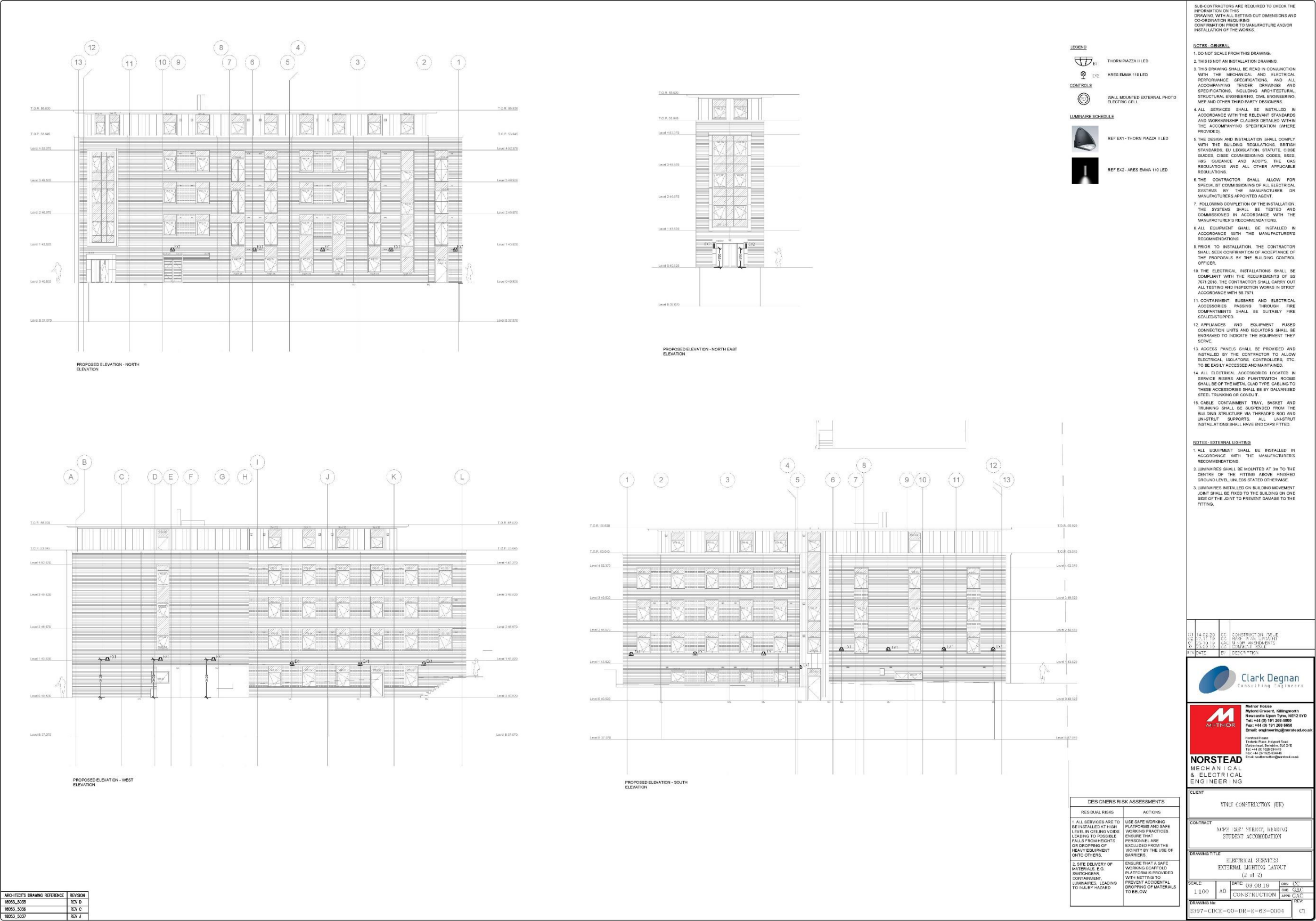


Figure 3: External Layout Lux Plan

2.2 Summary, Exterior 1

2.2.4 Result overview, Ground

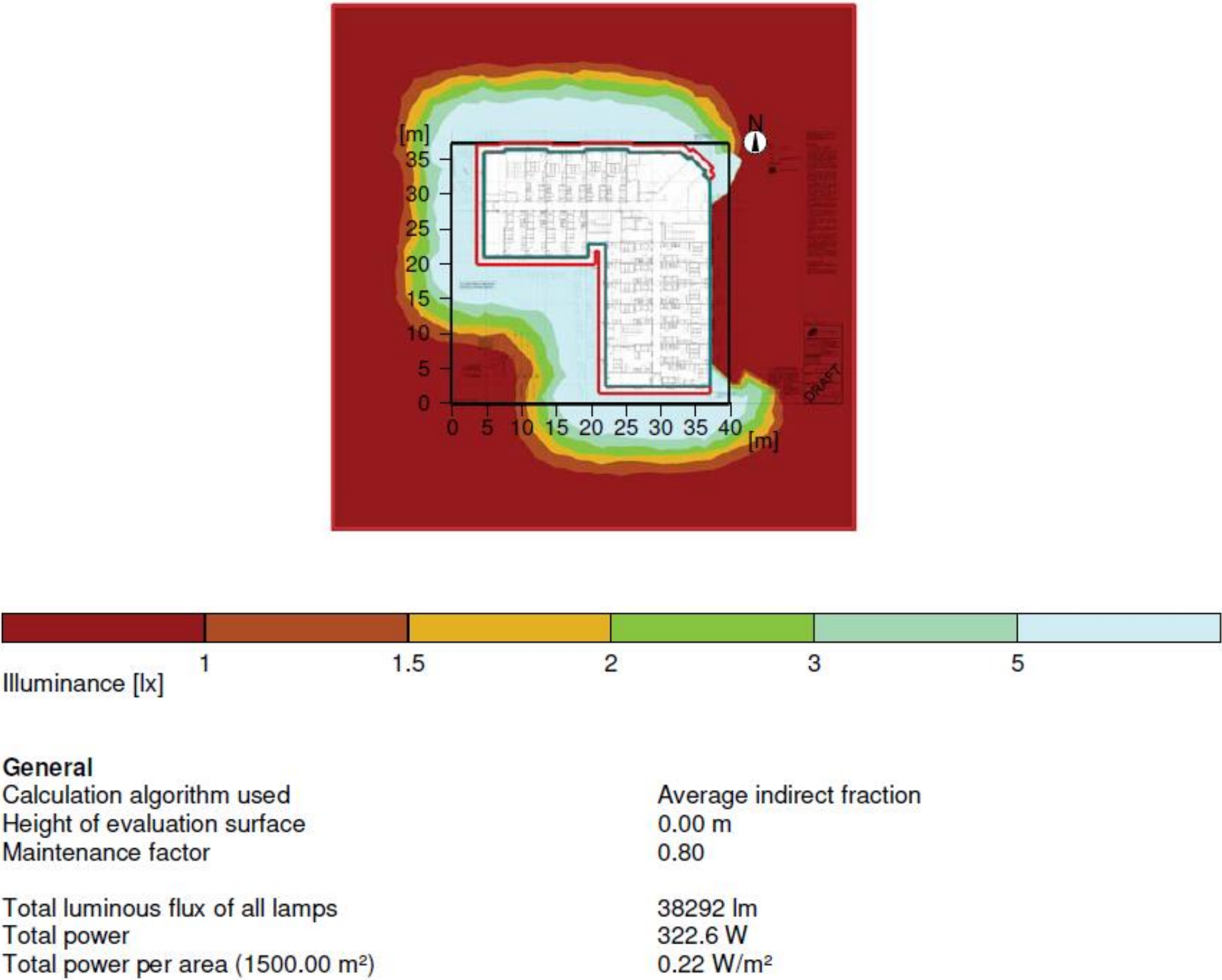


Figure 4: External Layout Lux Plan

2.2 Summary, Exterior 1

2.2.2 Result overview, Light Spill (25m AFFL, 20m border)

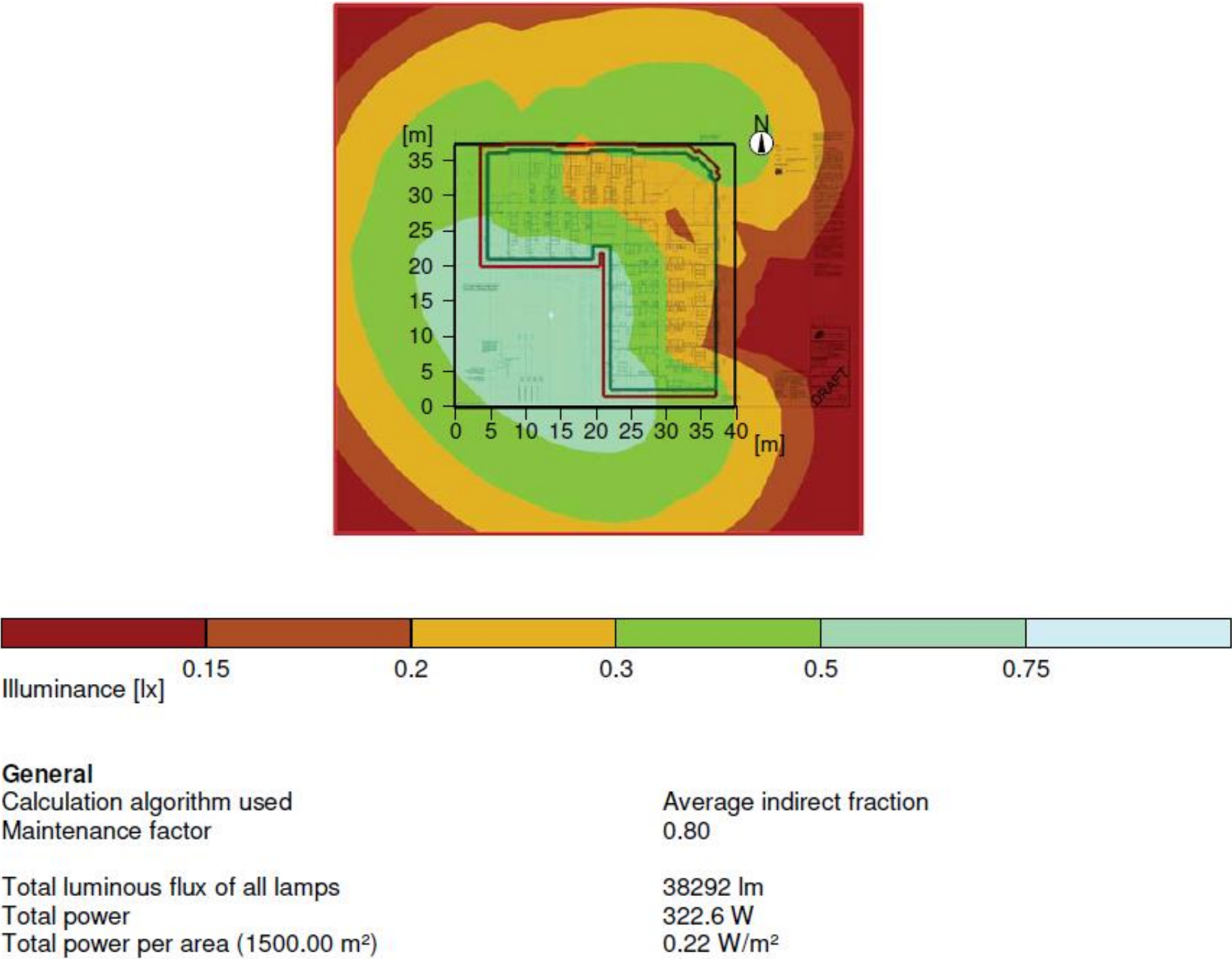
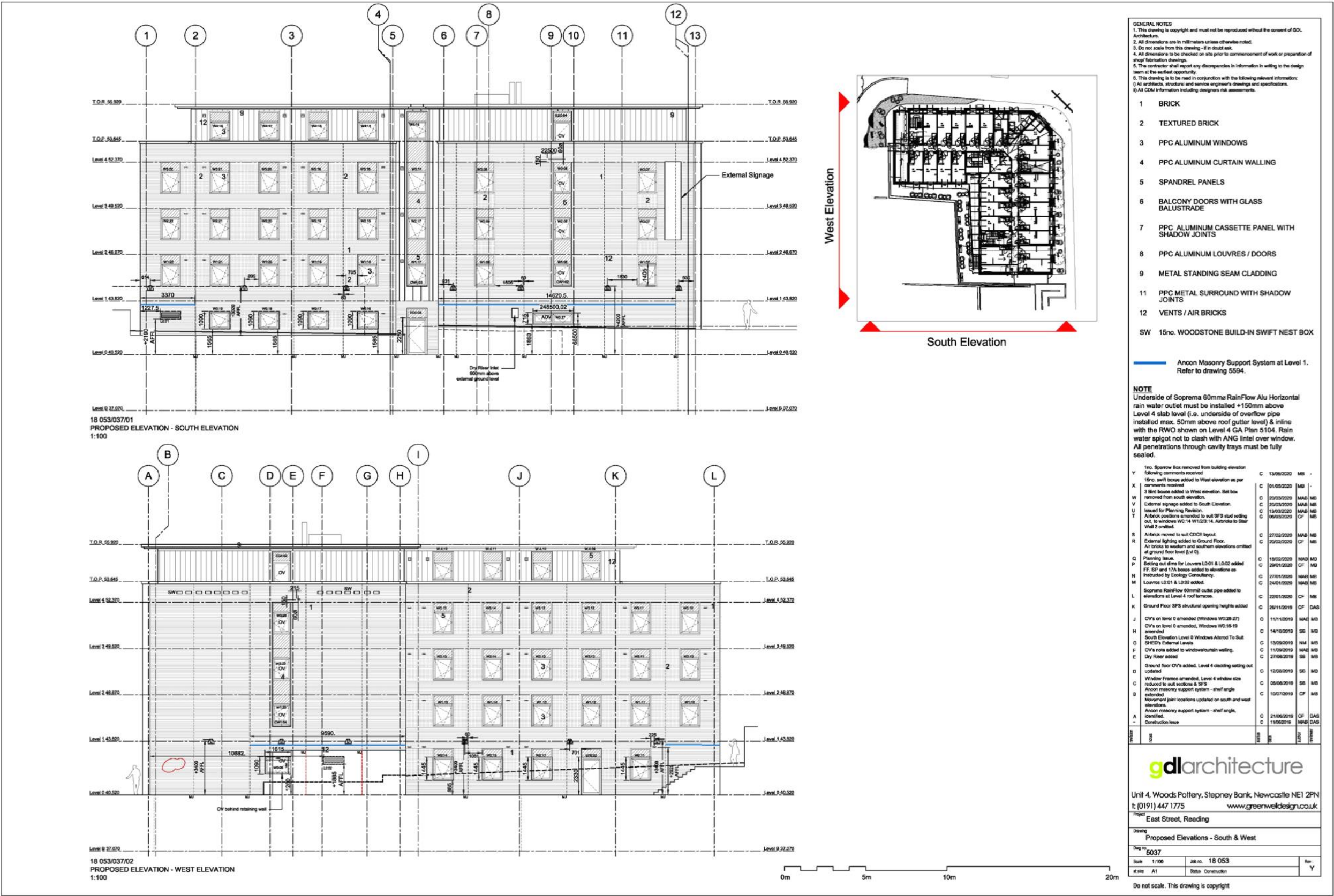


Figure 5: Bird box elevation plan



Appendix 2: Legislation

BATS

All species of bat are fully protected under The Conservation of Habitats and Species Regulations 2017 (as amended) through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species (e.g. all bats)
- Deliberate disturbance of bat species as:
 - a) to impair their ability:
 - (i) to survive, breed, or reproduce, or to rear or nurture young;
 - (ii) to hibernate or migrate
 - b) to affect significantly the local distribution or abundance of the species
- Damage or destruction of a breeding site or resting place (strict liability)

Bats are also currently protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5. This is subject to the defence: incidental result of an otherwise lawful operation. Under this Act, they are additionally protected from:

- Intentional or reckless disturbance of an animal or obstruction of access to any place of shelter or protection,

The NERC Act 2006 states that ‘every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity’, otherwise known as the Biodiversity Duty. Under Section 41 of the Act, the Secretary of State must publish a list of the living organisms and types of habitat which in the Secretary of State’s opinion are ‘Species of Principal Importance for the purpose of conserving Biodiversity’ (SPIBs). This list is based on priority species recognised by the UK Biodiversity Action Plan (BAP), and in addition to Annex II species listed under The Conservation of Habitats and Species Regulations 2017 (as amended). The S41 SPIBs list replaces the list published under Section 74 of the Countryside and Rights of Way (CROW) Act 2000 as those species of material consideration to the planning process.

How is the legislation pertaining to bats liable to affect development works?

A European Protected Species Mitigation (EPSM) licence issued by the relevant competent authority (e.g. Natural England) will be required for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young and hibernate). The licence is to allow derogation from the relevant legislation but also to enable appropriate mitigation measures to be put in place and their efficacy

to be monitored. Alternatively, where no more than three low conservation significance roosts are present and are used by low numbers of bats of no more than three of the (qualifying) species that EPSM licences are most commonly applied for, it may be possible to register the site under the Bat Mitigation Class Licence (BMCL) scheme. No like for like bat compensation is required for the majority of the species covered by BMCL.

The legislation may also be interpreted such that, in certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded *de facto* protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost.

BIRDS

All wild birds, their nests and eggs are protected under Sections 1-8 of the Wildlife and Countryside Act 1981 (as amended). Among other things, this makes it an offence to:

- Intentionally kill, injure or take any wild bird
- Intentionally take, damage or destroy the nest of any wild bird while it is in use or being built
- Intentionally take or destroy an egg of any wild bird

Certain species of bird, for example the barn owl, black redstart, hobby, bittern and kingfisher receive additional special protection under Schedule 1 of the Act and Annex 1 of the European Community Directive on the Conservation of Wild Birds (2009/147/EC). This affords them protection against:

- Intentional or reckless disturbance while it is building a nest or is in, on or near a nest containing eggs or young
- Intentional or reckless disturbance of dependent young of such a bird

To avoid contravention of the Wildlife and Countryside Act 1981 (as amended), works should be planned to avoid the possibility of killing or injuring any wild bird or damaging or destroying their nests. The most effective way to reduce the likelihood of nest destruction in particular is to undertake work outside the main bird nesting season which typically runs from March to August. Where this is not feasible, it will be necessary to have any areas of suitable habitat thoroughly checked for nests prior to vegetation clearance.

Those species of bird listed on Schedule 1 are additionally protected against disturbance during the nesting season. Thus, it will be necessary to ensure that no potentially disturbing works are undertaken in the vicinity of the nest. The most effective way to avoid disturbance is to postpone

works until the young have fledged. If this is not feasible, it may be possible to maintain an appropriate buffer zone or standoff around the nest.

Appendix 3: Best Practice Lighting Recommendations for Bats

Lighting

The following mitigation strategies have been taken from Bat Conservation Trust Landscape and Urban Design for Bats and Biodiversity (Gunnell *et al.*, 2012), ILP, BCT Built Environment Series, Guidance Note 8 Bats and artificial lighting and other referenced sources:

- Minimise light spill by eliminating any bare bulbs and upward pointing light fixtures. The spread of light should be kept near to or below the horizontal plane, by using as steep a downward angle as possible and/or shield hood. Flat, cut-off lanterns are best;
- All luminaires should lack UV elements when manufactured. Metal halide fluorescent sources should not be used.
- Luminaries should avoid the white and blue wavelengths of the light spectrum, so as to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging (Langevelde *et al.*, 2001); to achieve this, a warm white spectrum (ideally <2700Kelvin) should be adopted. Luminaires should also feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Limiting the height of lighting columns to eight metres and increase the spacing of lighting columns (Fure, 2006) can reduce the spill of light into unwanted areas;
- Use embedded road lights to illuminate the roadway and light only high-risk stretches of roads (crossings and junctions);
- Internal luminaires should be recessed where installed in proximity to windows reduce glare and light spill;
- The design of balconies can be amended to reduce refraction of light e.g rather than using clear glass a rail and tailored infill could be used;
- Avoid using reflective surfaces under lights or light reflecting off windows (e.g. onto bat flight lines);
- Only luminaires with an upward light ratio of 0% and with good optical control should be used. Luminaires should be mounted on the horizon with no upward tilt;
- Only the minimum amount of light needed for safety and access should be used and or turned off when the site is not in use;
- Artificial lighting proposals should not directly illuminate tree lines, which may be of value to foraging or commuting bats and birds (e.g. the trees along the northern and western boundaries of the site);

- Artificial lighting should not directly illuminate any bat roosting features that are installed within the proposed development;
- Lux levels should be below 1 lux and the lights should be controlled via a passive infrared (PIR) sensor, only operating when activated by motion within proximity of the light;
- Lighting that is required for security reasons should use a lamp of no greater than 2000 lumens (150 Watts) and be PIR sensor activated using short timers (1min), to ensure that the lights are not on only when required (Jones, 2000; BCT, 2018)
- Uplighters should be avoided, particularly at the base of trees and within the aforementioned habitats;
- Street lights can be located so that the rear shields are adjacent to habitats or optics selected that stop back light thereby directing light into the taskarea where needed (ILP, BCT, 2018);
- If possible 'dark zones' could be created by limiting or removing lighting within a 5 - 10m buffer between lit areas and the dark, vegetated boundary habitat. Scattered 'dark zones' and dark corridors bisecting the site should also be provided to further enhance commuting/foraging behaviour for bats.
- Light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding. However, fencing should be supported on concrete or metal posts for longevity; until established newly planted vegetation (trees, shrubs and scrub) are unlikely to adequately contribute to light attenuation on key habitats for a number of years, temporary fencing or other barrier is likely to be required to create a suitable screen/light barrier;
- As a last resort, accessories such as cowls, baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed (ILP, BCT, 2018)



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The Ecology Consultancy is part of the Temple Group.

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