

POPULAR WORLDS

ABERFELDY

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Lighting Impact Assessment  
August 2022

ABERFELDY VILLAGE MASTERPLAN

**EQUATION**

4098

ABERFELDY VILLAGE MASTERPLAN

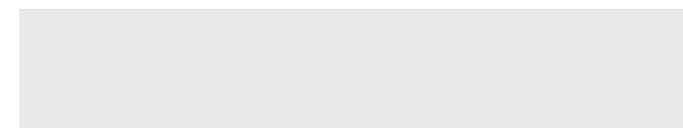
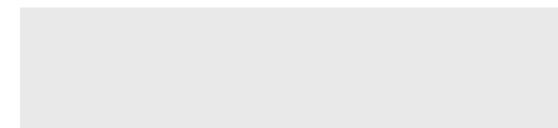
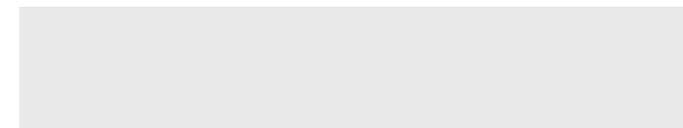
**LIGHTING IMPACT ASSESSMENT**

**19 AUGUST 2022**

REVISION P3

DOCUMENT REF: 4098

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# CONTENTS

1. NON TECHNICAL SUMMARY

2. INTRODUCTION

3. SITE CONTEXT

4. RELEVANT LEGISLATION & PLANNING  
POLICY CONTEXT

5. METHODOLOGY

6. EVALUATION, IMPACTS & MITIGATION

7. SUMMARY & CONCLUSIONS

8. GLOSSARY OF LIGHTING TERMS

9. REFERENCES

10. CURRICULUM VITAE

11. APPENDIX I  
BASELINE PHOTOGRAPHS - DAYTIME

12. APPENDIX II  
BASELINE PHOTOGRAPHS - NIGHTTIME

# 1. NON TECHNICAL SUMMARY

## Note:

**This report is an update to the previously submitted version that was submitted to the Council in support of the hybrid planning application.**

**This updated version has been prepared in response to the changes to the planning application boundary as explained in the covering letter to accompany the amendments to the Proposed Development.**

This Lighting Impact Assessment considers potential light pollution and light trespass from the proposed development and its potential to cause a statutory nuisance.

National Planning Practice Guidance states that *"Artificial light provides valuable benefits to society... extending opportunities for sport and recreation, and can be essential to a new development. Equally, artificial light is not always necessary, (and) has the potential to become what is termed 'light pollution' or 'obtrusive light'"*.

Planning guidance also states that *"...not all modern lighting is suitable in all locations."*

The scope of this report concerns Phase A of the Proposed Development, since phases B, C and D are being submitted as an outline planning application at this stage.

The Site is located in Poplar, within the administrative boundary of the London Borough of Tower Hamlets.

The proposed development is located to the north of East India Dock Road (A13), east of the Blackwall Tunnel Northern Approach Road (A12) and to the south west of Abbot Road.

The Proposed Development comprises the comprehensive redevelopment of the Site. The Proposed Development will provide new retail and workspace floorspace along with residential dwellings and the pedestrianisation of the A12 Abbott Road vehicular underpass to create a new east to west route. The Development will also provide significant, high quality public realm, including a new Town Square, a new High Street and a public park.

Surrounding building uses are predominantly residential dwellings with a small number of commercial retail and trade premises located on Aberfeldy Street. Cultural and religious buildings are also located along this street.

Braithwaite Park located to the east of the proposed development is a dark landscape. Leven Road Green further to the north along Abbott Road is also unlit.

An assessment of the baseline conditions has been carried out which has recorded existing electric lighting installations in the surrounding area and identified potential receptors which may be impacted by lighting installations within the proposed development.

There will be permanent lighting installations provided for safety and amenity during the operational phase of the proposed development, which will have the potential to impact on the local environment through light spill, light pollution and glare. These lighting installations will include light spill from the interior of the development and external amenity lighting.

All species of bat are protected by Wildlife & Countryside Act (1981) and the Conservation of Habitats

and Species Regulations (2017). Electric light can cause a disturbance to bats at roost and can also affect their feeding behaviour. Mitigation of the adverse effects of electric light should therefore be considered in the design of the development. Lighting should be designed in such a way as to avoid isolation of bat colonies.

During the demolition and construction phase, site lighting is likely to be an integral part of the on-site security and health and safety requirements. Any effects associated with construction site lighting are considered to be medium-term in duration and temporary in nature.

For the purposes of the assessment it is assumed that the exterior and interior lighting for the development will be designed in accordance with current good practice design guidance.

On the assumption that these good practice guidelines are adopted in the detailed design and installation of the lighting, the development should not materially alter existing illuminance levels outside the development or adversely affect the use and enjoyment of nearby buildings, open spaces or adversely impact other identified receptors.



## 2. INTRODUCTION

This Lighting Impact Assessment has been prepared by Equation Lighting Design and is submitted in support of a hybrid planning application for the Aberfeldy Village Masterplan.

The hybrid planning application is made in relation to the north of East India Dock Road (A13), east of the Blackwall Tunnel Northern Approach Road (A12) and to the south west of Abbot Road (the "Site") on behalf of The Aberfeldy New Village LLP ("The Applicant"). The hybrid planning application is formed of detailed development proposals in respect of Phase A for which no matters are reserved ("Detailed Proposals"), and outline development proposals for the remainder of the Site, with all matters reserved ("Outline Proposals"). The Detailed Proposals and Outline Proposals together are referred to as the "Proposed Development".

This scope of this report relates to Phase A of the Proposed Development only. Phases B,C and D are excluded.

The Proposed Development comprises the comprehensive redevelopment of the Site. The Proposed Development will provide new retail and workspace floorspace along with residential dwellings and the pedestrianisation of the A12 Abbott Road vehicular underpass to create a new east to west route. The Development will also provide significant, high quality public realm, including a new Town Square, a new High Street and a public park.

The purpose of the Lighting Impact Assessment is to assess the potential effects of obtrusive light that could arise from artificial lighting of the application site.

An assessment of the baseline conditions has been carried out which has recorded existing electric lighting installations in the local area and identified potential receptors which may be impacted by the proposed development.

There will be permanent lighting installations provided for safety and amenity during the operational phase of the proposed development, which will have the potential to impact on the local environment through light spill, light pollution and glare.

The proposed development will also introduce temporary lighting during the demolition and construction phase which may temporarily cause adverse effects which may require mitigation.

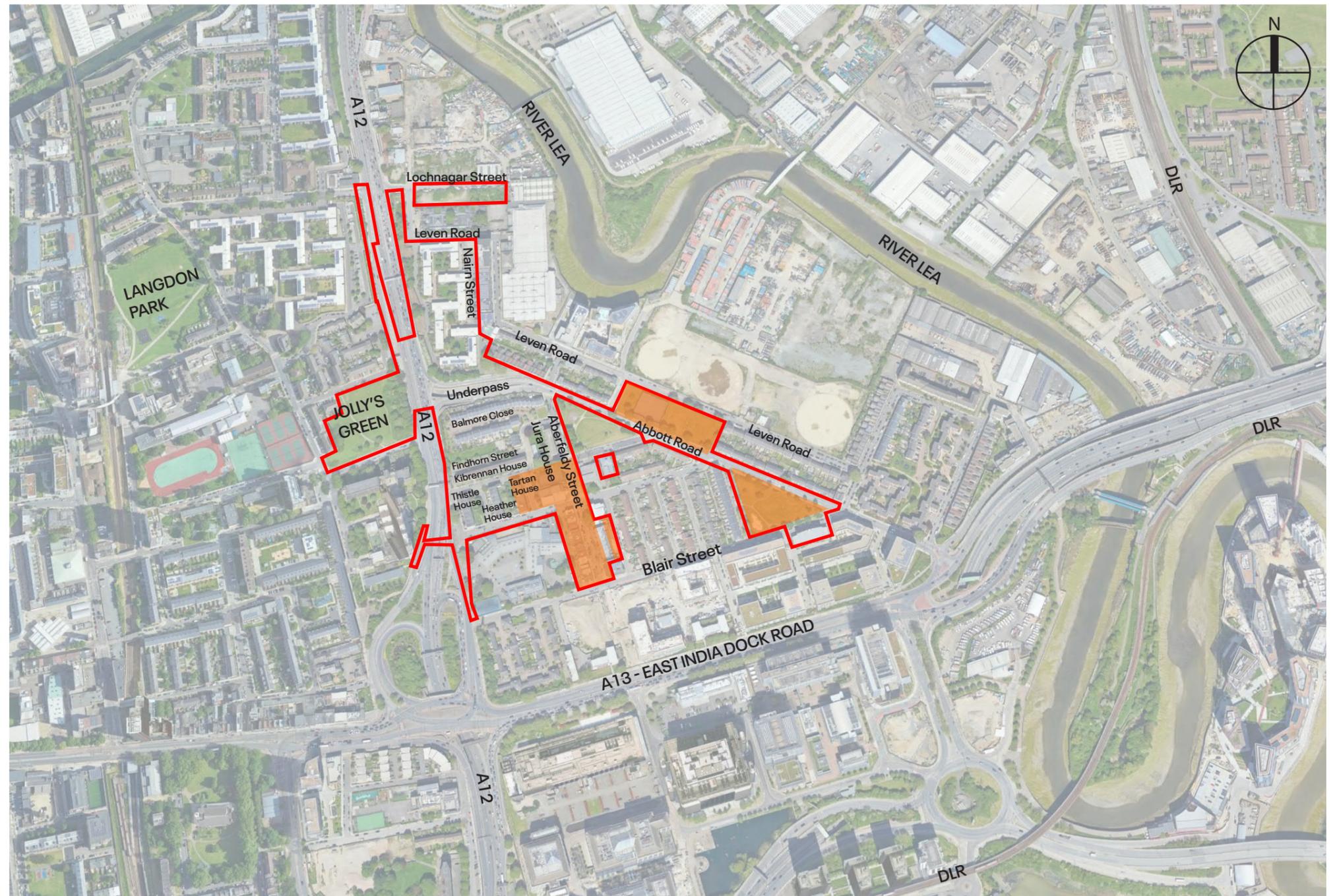
Recommendations for avoiding possible adverse effects are included in the impact assessment together with recommended lighting design strategies.

# 3. SITE CONTEXT

The Site is located in Poplar, within the administrative boundary of the London Borough of Tower Hamlets. The Site is 8.14 hectares (approx. 20 acres) in total and comprises:

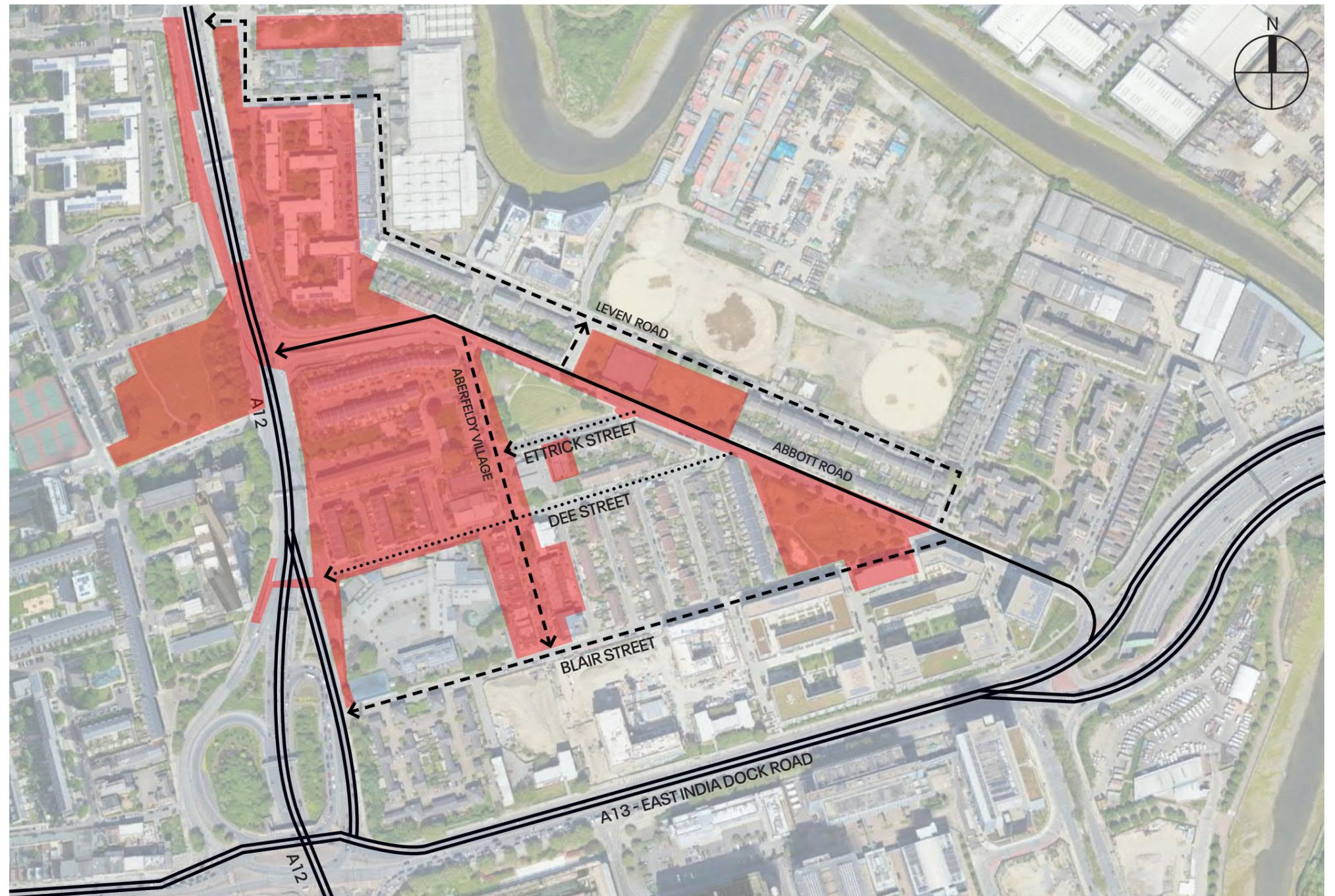
- Abbott Road;
- Aberfeldy Street;
- Balmore Close;
- Blairegowrie House;
- Heather House;
- Jura House;
- Tartan House;
- Thistle House;
- Kilbrennan House;
- Blairgowrie House;
- Nos. 33-35 Findhorn Street;
- 2a Ettrick Street;
- Lochnager Street;
- Aberfeldy Neighbourhood Centre;
- Nairn Street Estate; and
- Leven Road Open Space and Braithwaite Park are included for their enhancement.
- Jolly's Green

- KEY:
-  New Masterplan Boundary Line
  -  Phase A  
(September 2022 - December 2024)



### 3. SITE CONTEXT

The adjacent diagram illustrates the main vehicular traffic routes around and within the Site, according to hierarchy and use of the street.



KEY:  
 New Masterplan Boundary Line

# 3. SITE CONTEXT

- KEY:
- New Masterplan Boundary Line
  - 100 - 150 lux
  - 50-99 lux
  - 20-49 lux
  - 10-19 lux
  - 1-9 lux



# 3. SITE CONTEXT // BRAITHWAITE PARK

Existing Conditions // Daytime & Night time



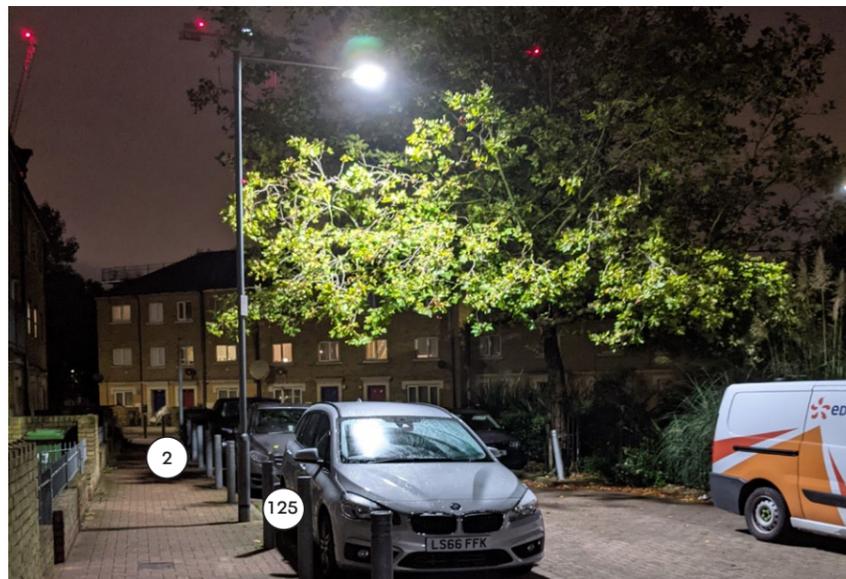
BLAIR STREET LOOKING EAST (ADJACENT TO BRAITHWAITE PARK)



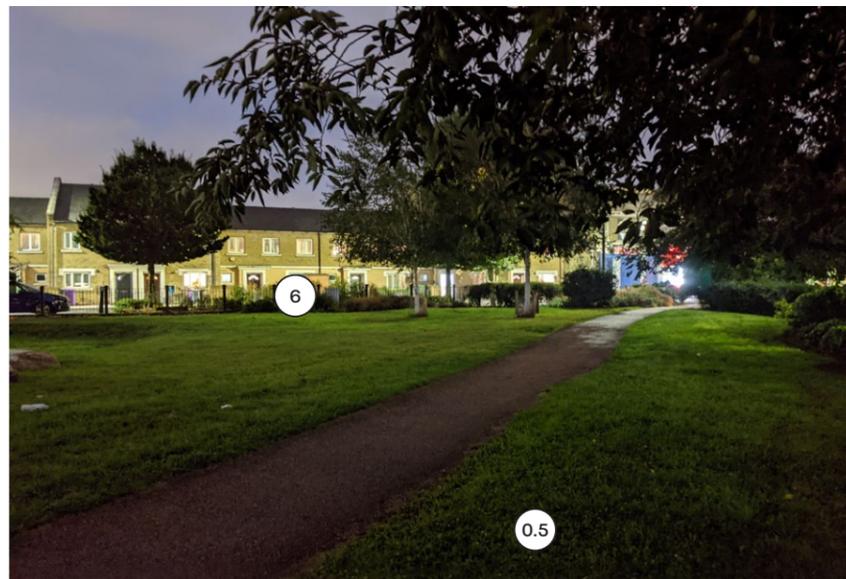
BRAITHWAITE PARK LOOKING EAST (TOWARDS BENLEDI ROAD)



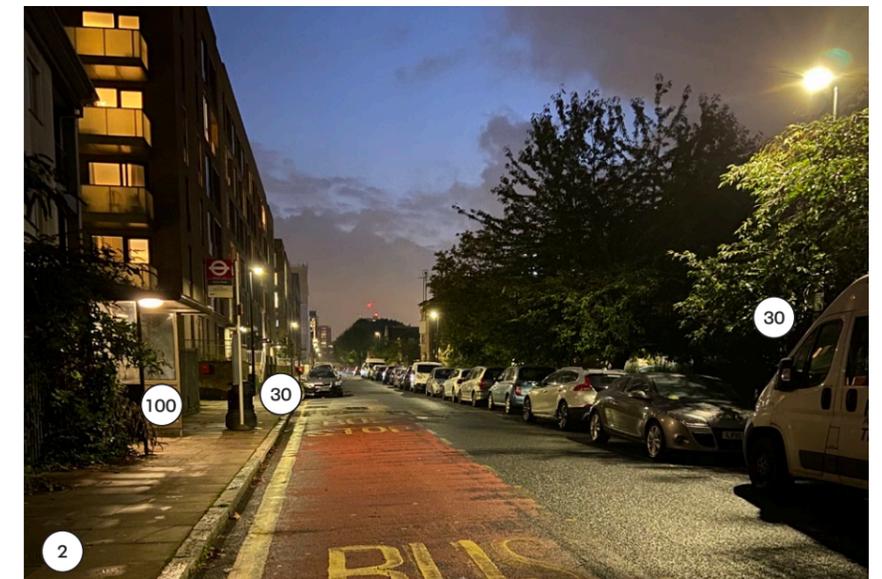
BLAIR STREET LOOKING WEST (ADJACENT TO BRAITHWAITE PARK)



BENLEDI ROAD LOOKING NORTH (ADJACENT TO BRAITHWAITE PARK)



BRAITHWAITE PARK LOOKING EAST (TOWARDS ABBOTT ROAD)



BLAIR STREET LOOKING WEST (ADJACENT TO BRAITHWAITE PARK)

# 3. SITE CONTEXT // LEVEN ROAD GREEN

Existing Conditions // Daytime & Night time



ABBOTT ROAD LOOKING NORTH WEST (ADJACENT TO LEVEN ROAD GREEN)



LEVEN ROAD GREEN LOOKING NORTH



ABBOTT ROAD LOOKING SOUTH EAST



ABBOTT ROAD LOOKING NORTH WEST (ADJACENT TO LEVEN ROAD GREEN)



LEVEN ROAD GREEN LOOKING NORTH



ABBOTT ROAD LOOKING NORTH WEST

# 3. SITE CONTEXT // LEVEN ROAD // LOCHNAGAR STREET

Existing Conditions // Daytime & Night time



LEVEN ROAD LOOKING WEST (ADJACENT BROMLEY HALL SCHOOL)



LOCHNAGAR STREET LOOKING EAST



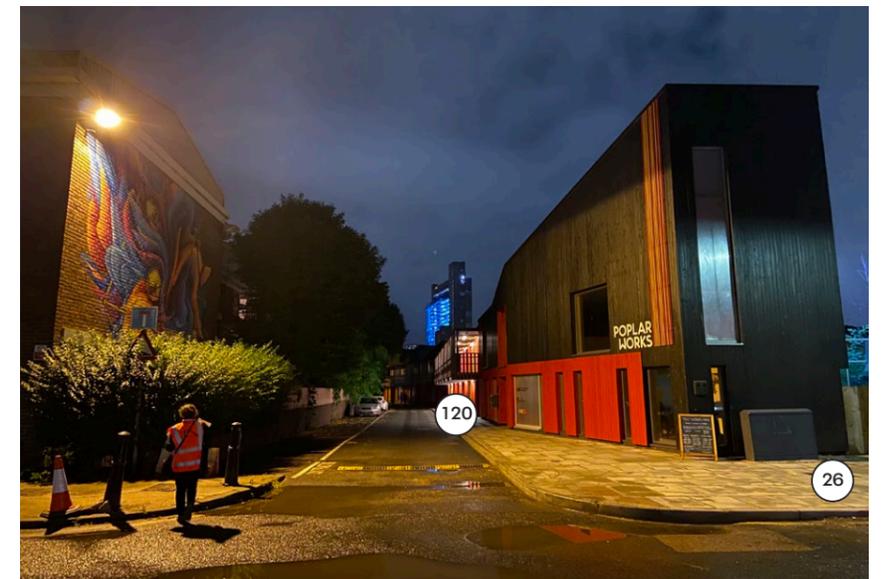
ABBOTT ROAD LOOKING SOUTH



LEVEN ROAD LOOKING WEST (ADJACENT BROMLEY HALL SCHOOL)



LOCHNAGAR STREET LOOKING EAST



LOCHNAGAR STREET LOOKING EAST

# 3. SITE CONTEXT // ABERFELDY STREET

Existing Conditions // Daytime & Night time



ABERFELDY STREET LOOKING SOUTH (ADJACENT TO ABERFELDY MILLENNIUM GREEN)



ABERFELDY STREET LOOKING SOUTH



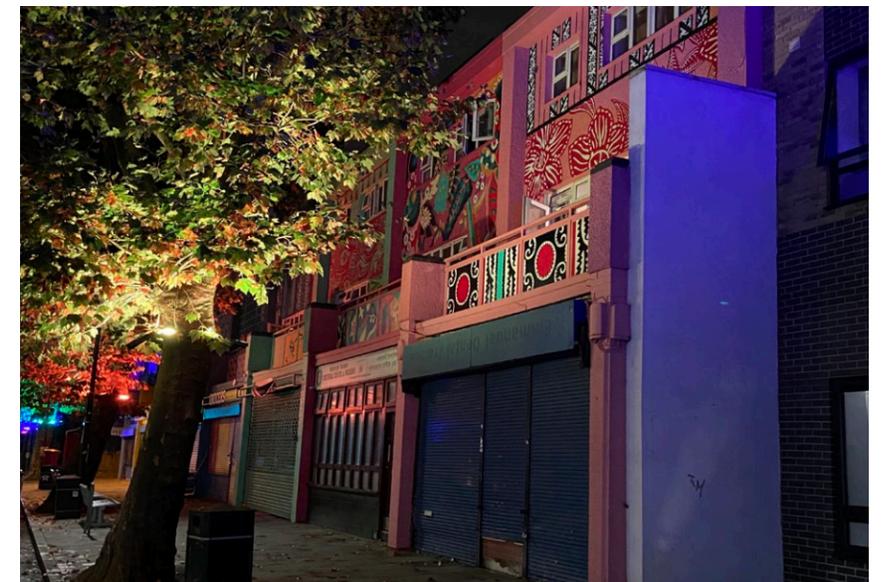
ABERFELDY STREET LOOKING NORTH



ABERFELDY STREET LOOKING SOUTH (ADJACENT TO ABERFELDY MILLENNIUM GREEN)



ABERFELDY STREET LOOKING SOUTH



ABERFELDY STREET LOOKING NORTH

## 4. RELEVANT LEGISLATION & PLANNING POLICY CONTEXT

### Environmental Protection Act 1990

An amendment contained within the Clean Neighbourhoods and Environment Act, 2005 to Section 79 of the Environmental Protection Act 1990\* states:

*"Artificial light emitted from premises so as to be prejudicial to health and nuisance constitutes a 'Statutory Nuisance' and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate to complaint".*

### National Policy

#### National Planning Policy Framework February (NPPF)

The updated NPPF was adopted on July 2021. It states that:

*"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 . . .*

*. . . limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes*

*and nature conservation."* (Source: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>)

### 5.1 Planning Practice Guidance

Planning Practice Guidance - Light Pollution (was updated on November 2019. It states that:

*". . . Artificial light provides valuable benefits to society, including through extending opportunities for sport and recreation, and can be essential to a new development. Equally, artificial light is not always necessary, has the potential to become what is termed 'light pollution' or 'obtrusive light' and not all modern lighting is suitable in all locations. It can be source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky. For maximum benefits, the best use of artificial light is about getting the right light, in the right place and provide light at the right time."* (Paragraph: 001 Reference ID: 31-001-20191101)

*". . . Light intrusion occurs when the light 'spills' beyond the boundary of the area being lit. For example, light spill can result in safety impact related to the impairment or distraction of people (e.g. when driving vehicles), health impacts arising from impaired sleep, cause annoyance to people, compromise an existing dark landscape or adversely effects can usually be avoided with careful lamp and luminaire selection and positioning."* (Paragraph: 003 Reference ID: 31-003-20191101)

*". . . The use of lighting only when the light is required can have a number of benefits, including minimising light pollution, reducing energy consumption, reducing harm to wildlife and improving people's ability to enjoy the night sky.*

*Lighting schemes could be turned off when not needed ('part-night lighting') to reduce any potential adverse effects. Planning conditions could potentially require this where necessary.*

*Lighting could also be dimmed to minimise its visual impact at times of reduced need or increased sensitivity.*

*Impacts on sensitive ecological receptors throughout the year, or at particular times may be mitigated by the design of the lighting or by turning it off or down at sensitive times."* (Paragraph: 004 Reference ID: 31-004-20191101)

*". . . Consideration can also be given to whether the proposed lighting is purely for decorative purposes as opposed to being needed for functional reasons such as security. The character of the area and the surrounding environment may affect what will be considered an appropriate level of lighting for a development. In particular, lighting schemes for developments in protected areas of dark sky or intrinsically dark landscapes need to be carefully assessed as to their necessity and degree.*

*Glare needs to be avoided, particularly for safety reasons. Glare is the uncomfortable brightness of a light source due to the*

*excessive contrast between bright and dark areas in the field of view. Consequently, the perceived glare depends on the brightness of the background against which it is viewed. It is affected by the quantity and directional attributes of the source. Where appropriate, lighting schemes could include 'dimming' to lower the level of lighting*

*White light, with more blue content or with ultraviolet content, is generally more disruptive to wildlife than, say, yellow/orange light. Similarly, for humans, light intrusion by white/blue light is more disruptive to sleep. Use of modern white light sources that filter out blue or ultraviolet light may mitigate these effects, as well as offering superior directional control. However, whiter light aids people's vision and ability to perceive colour; it also facilitates CCTV use..."* (Paragraph: 005 Reference ID: 31-005-20191101)

*"Wildlife species differ from humans in their sensitivity to light. The positioning, duration, type of light source and level of lighting are all factors that can affect the impact of light on wildlife. Further advice is available from the DEFRA and Natural England websites on handling the impact on wildlife – including from artificial light – where Protected Sites or protected species could be affected. The specific nature of any consideration will depend on the features of any protected site or presence of any protected species."* (Paragraph: 006 Reference ID: 31-006-20191101)

## 4. RELEVANT LEGISLATION & PLANNING POLICY CONTEXT

### London Plan (2021)

#### Policy D8 Public Realm

*"... Lighting, including for advertisements, should be carefully considered and well-designed in order to minimise intrusive lighting infrastructure and reduce light pollution."*

*"The lighting of the public realm needs careful consideration to ensure it is appropriate to address safety and security issues, and make night-time activity areas and access routes welcoming and safe, while also minimising light pollution. (p. 152)*

#### Policy D9 Tall buildings

*"... buildings should be designed to minimise light pollution from internal and external lighting."*

*"Any external lighting for tall buildings should be minimal, energy efficient and designed to minimise glare, light trespass, and sky glow, and should not negatively impact on protected views, designated heritage assets and their settings, or the amenity of nearby residents."*

*"Development proposals that are adjacent to or near SINC's or green corridors should consider the potential impact of indirect effects to the site, such as noise, shading or lighting."*

(Source: <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/london-plan-2021>)

### Tower Hamlets Local Plan 2031 (2020)

*"Development should create streets and spaces with a degree of enclosure by assisting in defining the edges of the public realm, through continuous building lines and active frontages. Development should avoid creating concealment points and external lighting should be an integral component in ensuring safety and security within the public."*

*"8.90 Part 1(e) seeks to ensure that artificial lighting is well-designed and uses appropriate light levels to avoid interference with someone's use of their property and reflects the street hierarchy. Badly designed lighting schemes can be damaging to the environment and result in visual nuisance to residents."*

*"8.91 For the purposes of this policy, light pollution is defined as the adverse effect of artificial lighting and includes glare, light spillage and sky glow."*

(Source: [https://www.towerhamlets.gov.uk/Documents/Planning-and-building-control/Strategic-Planning/Local-Plan/TH\\_Local\\_Plan\\_2031\\_accessibility\\_checked.pdf](https://www.towerhamlets.gov.uk/Documents/Planning-and-building-control/Strategic-Planning/Local-Plan/TH_Local_Plan_2031_accessibility_checked.pdf))

## 5. METHODOLOGY

### Desk Study

At the outset, a briefing pack was received from the client which included the new proposed masterplan, illustrative views of each proposed character area and plans and elevations of the proposed development (Phase A).

Supplementary briefing information was provided by the planning consultant DP9 and the project ecologist Greengage Environmental Ltd.

The existing buildings consist of mainly residential dwellings, with some commercial units at ground level and cultural/religious buildings.

The site comprises also some open areas such as parks, green areas and sport courts.

Vehicular access is directly from the A13 - East India Dock Road (south side) and from the A12 (west side).

The proposed development comprises new retail and workspace floorspace along with residential dwellings and the pedestrianisation of the A12 Abbott Road vehicular underpass to create a new east to west route. The Development will also provide significant, high quality public realm, including a new Town Square, a new High Street and a public park.

Published guidance on the impact of electric light on bat populations and wildlife habitats was also studied. Details of relevant publications are included in Section 9 - References. Information on local planning policies and design guidance were obtained from the London planning portal and Tower Hamlets planning portal.

Further research was undertaken using Google maps and other web-based resources to establish an understanding of the baseline condition in advance of the site visit. Existing land uses and potential receptors were identified in advance. These were later verified during the site survey.

The Equation project team determined an appropriate scoping methodology for the site visit considering national and local planning guidance and best practice guidelines for carrying out lighting visual impact assessments such as this.

### Result of Desk Study

The desk-based study identified relevant planning policy areas and other statutory requirements to be considered during the impact assessment (see section 4 above).

Relevant lighting codes and standards & best practice lighting design guidelines were also determined (See Section 9 - References).

The potential lighting impacts during the construction and operational phases of the proposed development were considered in advance of the site visit.

### Field Survey

A visual assessment of the baseline in and around the development site was carried out during the evening of Tuesday 14th September 2021 from 6.30pm to 9.30pm. The sun set at 7.17pm, therefore the visit was carried out both during daytime and after dark. There was light cloud cover and visibility was good during the site visit.

The survey started from the east side of the site, at the intersection between Abbott Road and Blair Street.

Abbott Road is the main vehicular route to access the site, it is illuminated with approximately 10 metre tall lighting columns, retrofitted with 4000K LED light sources. An average of 30lux was measured on the pavement during the site visit. Higher light levels were recorded in correspondence to the pedestrian crossings where an average of 120 lux was measured.

Blair Street is a secondary road which runs across the site from east to west. It is illuminated with approximately 7m tall lighting columns with 4000K LED light sources, at about 20m spacing. This street is also a bus route (bus 309) and, as such, several bus stops are present along the street. An average of approximately 30 lux was recorded directly beneath the light column and 2 lux in between two columns. An average of 100 lux was recorded at the bus stop during the visit.

Braithwaite Park is a public open area delimited to the north-east by Abbott Road, to the south by Blair Street and to the west by a private road, Benledi Road. The park is characterised by a large lawn with a few paths which cut across the open area. There was no exterior lighting within Braithwaite park, illuminance levels below 1 lux were recorded in this area.

Benledi Road appeared to be brighter compared to the neighbouring streets. This road is illuminated with 7m tall columns, retrofitted with 4000K LED light sources. An average of 125 lux was measured directly beneath the light column and 5 lux in between two columns.

Similarly to Braithwaite Park, Leven Road Green did not present any exterior lighting. This area is delimited to the south by Abbott Road and to the north by Leven Road. This open space is characterised by a large lawn and two basketball courts. No lighting was present to illuminate the sports courts.

Leven Road is illuminated by approximately 7m tall columns with 3500K LED light sources. An average of 20 lux was recorded beneath the light column, and an average of 3-5 lux in between two columns.

Parallel to Abbott Road, Leven Road bends to the North, towards Bromley Hall School. In this part of the street, besides the light columns, there are a series of wall mounted luminaires, retrofitted with fluorescent and LED light sources with different colour temperature: 3000K and 4000K. An average of 20 lux was recorded on Leven Road, on the pavement adjacent to the residential building with the wall lights installation.

Light levels at the building entrances/thresholds were recorded as an average of 200lux, presenting a great contrast with the illuminance levels measured beneath the light columns: 25 lux.

At the end of Leven Road, at the intersection with Abbott Road and Bromley Hall Road, a wall mounted floodlight with high pressure sodium light source was installed at approximately 9m on a residential building. Illuminance level of 80 lux was recorded in correspondence to the floodlight, whilst 45 lux was measured beneath a 7m tall column with 4000K LED light source. This lighting typology continues on Bromley Hall Road, where an average of 40 lux was measured beneath the columns and 16 lux in between.

## 5. METHODOLOGY

At the intersection between Bromley Hall Road and Lochnagar Street, a 12 m tall column with 2no luminaires was illuminating the junction, where vehicles appeared to frequently use to make a turn, coming from the A13. Illuminance level of 50 lux was measured in this location.

Continuing on Abbott Road, along the Poplar Works linear building, a series of tubular luminaires retrofitted with 4000K LED light sources were observed in correspondence to the building entrances.

An average of 120 lux was recorded in front of these luminaires. Illuminance value of 280lux was measured at the last stretch of the building (22 Abbott Road), where the light tubes were installed at a close offset.

A series of high pressure sodium floodlights were mounted on the top facade of the residential buildings facing the Poplar Works. An average of 50 lux was measured in these locations.

From Abbott Road, the site visit continued on Aberfeldy Street, where a series of approximately 7m tall columns, retrofitted with 4000K LED light sources, were illuminating the pavement and driveway.

A series of wall mounted floodlights retrofitted with 4000K light sources were installed on the residential building at approximately 3,5m height.

An average of 33 lux was recorded beneath the light columns and 7,5 lux measured in between.

Walking south on Aberfeldy Street, on the left side of the street, a series of coloured LED floodlights was observed uplighting the mature trees with very saturated colours.

In addition, 7m tall columns were observed, in line with the rest of the street. A combination of 4000K LED light source and high pressure sodium was observed. An average of 45 lux was measured beneath the LED light and 88lux beneath the high pressure sodium light. An average of 3 lux was recorded in between two lighting columns.

## 5. METHODOLOGY

### Results of Field Survey

#### Land Uses

- The proposed development is in a primarily residential area with a few commercial premises at ground level.
- The existing open spaces will be upgraded and re-designed to offer appealing public spaces to the users.
- Surrounding land uses consist primarily of residential dwellings and cultural/educational buildings.

#### Principal Receptors

The principal lighting receptors were identified as:

#### Residential Receptors:

- Nos. 45-99 Abbott Road
- Nos.4-18 aBBOTT road
- Nos. 200-204 LEVeN ROAD
- Nos.177&144 Leven Road
- Poplar Riverside Development
- Nos. 2-22 Benledi Road
- Nos. 50-68 Blair Street
- No. 86 Blair Street
- Nos. 17-21 New Village avenue
- Nos. 67-57 Aberfeldy Street
- No. 54 Aberfeldy Street
- No. 51 Blair Street
- Heather House

#### Commercial Receptors:

- Small retailers, Oban street
- Culloden Primary Academy, Dee Street
- Bromley Hall School
- Poplar Works
- Iron Mountain Secure Storage

#### Religious/Cultural Receptors:

- St Nicholas Church, Aberfeldy Street
- Islamic cultural centre & mosque (excluded from the assessment - future location not yet determined)

Potential transient receptors are the motorists, cyclists and pedestrians (Mixed Traffic):

- Primary roads
- Secondary roads
- Tertiary roads

Greengage Environmental Ltd., the project ecologist has also identified that there are no bat commuting/foraging routes within the site itself (Phase A). However, a common pipistrelle roost has been located on site (57 Aberfeldy Street) and bat commuting and foraging routes have been identified around this area and in proximity of Thistle House. It is therefore necessary to ensure that there is no light spill or light trespass into these areas from the proposed development during the construction and operational phases of the project.



## 6. EVALUATION, IMPACTS & MITIGATION

Evaluation of the potential impact of lighting within the proposed development has been made with reference to the following documents:

- LDA Design Access & Sustainability Statement received on 15th September 2021
- Levitt Bernstein's Design Code - Lighting Strategy received on 21st September 2021
- Greengage's Preliminary Ecological Appraisal, received on 15th September 2021

The site has been assessed as being in "Environmental Zone E3" as defined in the Institution of Lighting Professionals' *"Guidance Notes for the Reduction of Obtrusive Light(2020)"*.

The adjacent tables define the required obtrusive light limitations on illuminance and luminance based on the subjective assess of the ambient brightness in and around the proposed development.

These limitations are summarised below:

- The maximum values of vertical illuminance on properties should not exceed 10 lux "Pre-Curfew" and 2 lux "Post Curfew"
- Luminaire luminous intensity should not exceed 10,000 cd/m<sup>2</sup> "Pre-Curfew" and 1,000 cd/m<sup>2</sup> "Post-Curfew"
- Maximum permissible Upward Light Ratio (ULR) should not exceed 5% of the total luminous flux of installed luminaire.
- Maximum values of upward flux ratio of installation (of four or more luminaire) should not exceed 12%.
- Maximum permitted values of average surface luminance (cd/m<sup>2</sup>) on building facade should not exceed 10 cd/m<sup>2</sup>.

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

**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.
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.

TABLE 7.1 - ENVIRONMENTAL ZONES

# 6. EVALUATION, IMPACTS & MITIGATION

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

*Note:*  
\* If the installation is for public (road) lighting then this may be up to 1 lx.

**TABLE 7.2** - (CIE 150 TABLE 2): MAXIMUM VALUE OF VERTICAL ILLUMINANCE ON PROPERTIES

Light technical parameter	Application conditions	Luminaire group (projected area $A_p$ in $m^2$ )					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire ( $I$ in cd)	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 $A_p$		2 to 5cm	5 to 10cm	10 to 20cm	20 to 40cm	40 to 80cm	>80cm
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  
5. Upper limits for each zone shall be taken as those with column  $A_p > 0.5$

**TABLE 7.3** - (CIE TABLE 3 (AMENDED)): LIMITS FOR THE LUMINOUS INTENSITY OF BRIGHT LUMINAIRES.

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

*Note:*  
This does not take into account the effect of light reflected upwards from ground that also contributes to sky glow. This is the traditional method to limit sky glow and is suitable to compare different single luminaires.

**TABLE 7.4** (CIE 150 TABLE 5): MAXIMUM VALUES OF UPWARD RATIO (ULR) OF LUMINAIRES

Light technical parameter	Type of installation	Environmental zones				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR)/%	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	6	15

*Notes:*  
Table 7 allows the effect of both direct and reflected upward components of a whole installation to be taken into account. The factor being the upward flux ratio (UFR) and CIE 150 suggests that table 7 is used for all installations consisting of four or more luminaires.  
Clauses 6.4.2 and 6.4.3 of CIE 150:2017 describe the calculation methods for both ULP and UFR.  
Light emitted just above the horizontal in a zone between 90o and 110o is extra critical for sky glow in large open areas around observatories. An additional measure in these areas limits the luminous intensities ( $I_{90} - I_{110}$ ) as follows:  
• between 90° and 100° < 0.5 cd/1000lm;  
• between 100° and 110° 0 cd.

**TABLE 7.5** (CIE 150 TABLE 6) : MAXIMUM VALUE OF UPWARD FLUX RATIO OF INSTALLATION (OF FOUR OR MORE LUMINAIRES).

Light technical parameter	Application conditions	Environmental zones				
		E0	E1	E2	E3	E4
Building façade luminance ( $L_b$ )	Taken as the product of the design average illuminance and reflectance divided by n	< 0.1	< 0.1	5	10	25
Sign luminance ( $L_s$ )	Taken as the product of the design average illuminance and reflectance divided by n, or for self-luminous signs, its average luminance.	< 0.1	50	400	800	1.000

*Note:*  
The values apply to both pre- and post-curfew, except that in zones 0 and 1 the values shall be zero post curfew. The values for signs do not apply to signs for traffic control purposes.

**TABLE 7.6** (CIE 150 TABLE 7) : MAXIMUM PERMITTED VALUES OF AVERAGE SURFACE LUMINANCE (CD/M2)

## 6. EVALUATION, IMPACTS & MITIGATION

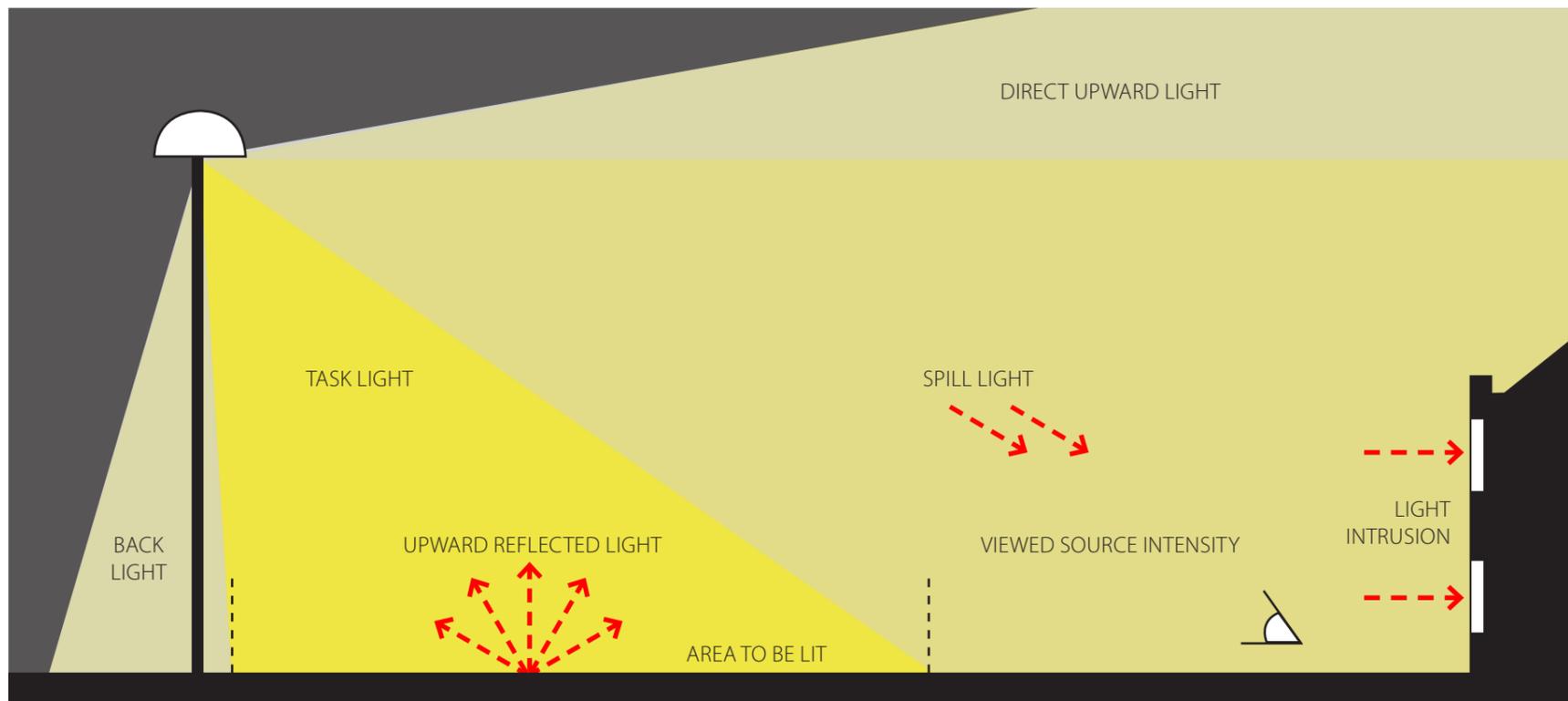
This assessment of potential lighting impacts has been made on the basis that all relevant statutory requirements will be adhered to.

In addition, it is assumed that all good practice exterior lighting guidelines published by the Institution of Lighting Professionals (ILP) regarding the reduction of light pollution and relevant design guidelines published by the Society of Light & Lighting & CIBSE will be incorporated into the detailed lighting design for Phase A of Aberfeldy Village.

As a result, the proposed development should not be over-lit and the potential adverse effects of electric lighting installations should be minimised.

Following best practice design guidelines should also ensure that appropriate lighting controls are installed, commissioned and operational. This will enable the installed lighting systems to be dimmed or completely switched off when a specific visual task is completed unless the lighting is required for safety and security.

This assessment also assumes that energy efficient luminaires and with precise optical control will be specified as part of the detailed lighting for the site. All luminaire to be aimed and focused correctly to illuminate identified visual tasks, avoid glare and minimise any light trespass into the surrounding area or into the night sky.



TYPE OF INTRUSIVE LIGHT



SKY GLOW FROM LIGHT POLLUTION



LIGHT SPILL FROM HIGH MAST LUMINAIRE

# 6. EVALUATION, IMPACTS & MITIGATION

## Assessment criteria

A number of criteria were used to determine whether the effects are 'significant'. The assessments took account of the following:

- Likelihood of occurrence
- Geographical extent
- Adherence to legislation and policy
- Adherence to local, natural and international standards
- Sensitivity of receiving environment or other receptors
- Value of resource which will be affected
- Duration of temporary effects; short, medium or long-term
- Reversible or irreversible
- Inter-relationship between effects

The analysis considered the significance of the effects (both positive and negative), the sensitivity of the receptor and the nature and magnitude of the changes as shown in the adjacent Table.

Table: Assessment criteria

		SENSITIVITY OF RECEPTOR / RECEIVING ENVIRONMENT			
		HIGH	MEDIUM	LOW	NEGLIGIBLE
MAGNITUDE OF CHANGE	HIGH	MAJOR	MAJOR	MODERATE	NEGLIGIBLE
	MEDIUM	MAJOR	MODERATE	MINOR TO MODERATE	NEGLIGIBLE
	LOW	MODERATE	MINOR TO MODERATE	MINOR	NEGLIGIBLE
	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

# 6. EVALUATION, IMPACTS & MITIGATION



## KEYS

LOCATION OF PROPOSED DEVELOPMENT

### RESIDENTIAL DWELLINGS:

- 1 NOS. 45-99 ABBOTT ROAD
- 2 NOS. 4-18 ABBOTT ROAD
- 3 NOS. 200-204 LEVEN ROAD
- 4 NOS. 177&144 LEVEN ROAD
- 5 POPLAR RIVERSIDE DEVELOPMENT
- 6 NOS. 2-22 BENLEDI ROAD
- 7 NOS. 50-68 BLAIR STREET
- 8 NO. 86 BLAIR STREET
- 9 NOS. 17-21 NEW VILLAGE AVENUE
- 10 NOS. 67-57 ABERFELDY STREET
- 11 NO. 54 ABERFELDY STREET
- 12 NO. 51 BLAIR STREET
- 13 HEATHER HOUSE

### COMMERCIAL/SERVICE RECEPTORS:

- 14 SMALL RETAILERS, OBAN STREET
- 15 CULLODEN PRIMARY ACADEMY, DEE STREET
- 16 BROMLEY HALL SCHOOL
- 17 POPLAR WORKS
- 18 IRON MOUNTAIN SECURE STORAGE

### RELIGIOUS/CULTURAL RECEPTORS:

- 19 ST NICHOLAS CHURCH, ABERFELDY STREET
- 20 ISLAMIC CULTURAL CENTRE & MOSQUE

# 6. EVALUATION, IMPACTS & MITIGATION



### KEYS

 LOCATION OF PROPOSED DEVELOPMENT

### PRINCIPLE ROUTES:

 PRIMARY ROADS

 SECONDARY ROADS

 TERTIARY ROADS

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
Nos. 45-99 Abbott Road (considered as a group)	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Braithwaite Park and on Plot I building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Braithwaite Park: Luminaires with precise optical control and a shielded downward light distribution should be installed within the park to avoid glare and light trespass. Plot I: The proposed building is replacing an existing residential block. The exterior lighting should be limited to the communal entrances / thresholds from Blair Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Nos. 4-18 Abbott Road (considered as group)	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Leven Road Open Space during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Luminaires with precise optical control and a shielded downward light distribution should be installed within the open space to avoid glare and light trespass. Accent landscape lighting, such as uplights to trees should be equipped with glare control accessories. Amenity lighting to the open spaces should be focused to the task areas, avoiding light spill beyond the boundary of the site. Sport courts: if it is decided that it is beneficial to install lighting to illuminate the sports courts, care should be taken to avoid light trespass beyond the sport pitches. Barrier planting should be provided at the perimeter of the park to avoid light spilling glare to residential blocks.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
Poplar Riverside Development	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Leven Road Open Space during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Luminaires with precise optical control and a shielded downward light distribution should be installed within the open space to avoid glare and light trespass. Accent landscape lighting, such as uplights to trees should be equipped with glare control accessories. Amenity lighting to the open spaces should be focused to the task areas, avoiding light spill beyond the boundary of the site.</p> <p>Sport courts: if it is decided that it is beneficial to install lighting to illuminate the sports courts, care should be taken to avoid light trespass beyond the sport pitches. Barrier planting should be provided at the perimeter of the park to avoid light spilling glare to residential blocks.</p>
Nos. 200-208 Leven Road (considered as a group)	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Leven Road Open Space during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Luminaires with precise optical control and a shielded downward light distribution should be installed within the open space to avoid glare and light trespass. Accent landscape lighting, such as uplights to trees should be equipped with glare control accessories. Amenity lighting to the open spaces should be focused to the task areas, avoiding light spill beyond the boundary of the site.</p> <p>Sport courts: if it is decided that it is beneficial to install lighting to illuminate the sports courts, care should be taken to avoid light trespass beyond the sport pitches. Barrier planting should be provided at the perimeter of the park to avoid light spilling glare to residential blocks.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
No. 177 & No. 144 Leven Road	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Leven Road Open Space during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Luminaires with precise optical control and a shielded downward light distribution should be installed within the open space to avoid glare and light trespass. Accent landscape lighting, such as uplights to trees should be equipped with glare control accessories. Amenity lighting to the open spaces should be focused to the task areas, avoiding light spill beyond the boundary of the site.</p> <p>Sport courts: if it is decided that it is beneficial to install lighting to illuminate the sports courts, care should be taken to avoid light trespass beyond the sport pitches. Barrier planting should be provided at the perimeter of the park to avoid light spilling glare to residential blocks.</p>
Nos. 2-22 Benledi Road	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Braithwaite Park and on Plot I building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Braithwaite Park: Luminaires with precise optical control and a shielded downward light distribution should be installed within the park to avoid glare and light trespass. Plot I: The proposed building is replacing an existing residential block. The exterior lighting should be limited to the communal entrances / thresholds from Blair Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Nos. 50-68 BLAIR STREET	Low	Medium	Minor to Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Braithwaite Park and on Plot I west building facade - on Blairgowrie Court - during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Braithwaite Park: Luminaires with precise optical control and a shielded downward light distribution should be installed within the park to avoid glare and light trespass.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
No. 86 Blair Street (Artisan House)	Low	High	Minor to Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting within Braithwaite Park and on Plot I east building facade - adjacent to Artisan House - during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Braithwaite Park: Luminaires with precise optical control and a shielded downward light distribution should be installed within the park to avoid glare and light trespass.</p>
Nos. 17-21 New Village avenue (Traders House)	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting on Plot I south building facade - adjacent to Artisan House - during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot I: The proposed building is replacing an existing residential block. The exterior lighting should be limited to the communal entrances / thresholds from Blair Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Nos. 67-57 Aberfeldy Street	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting on Plot F1 north building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot F1: The proposed building is replacing a open playground, sports court with floodlights and low rise community centre. The exterior lighting should be limited to the communal entrances / thresholds from Aberfeldy Street (High Street) proposed Culloden Green. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
No. 54 Aberfeldy Street	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting on Plot F1, H1, H2 and H3 building facades during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: The proposed H1, H2 and H3 buildings are replacing independent retail units and the the Aberfeldy Islamic cultural centre &amp; mosque. The existing street is an active commercial area with coloured floodlighting to the mature trees on the eastern side. The proposed development will also contain street and amenity lighting, appropriate to the various uses of the space. There are retail units with active frontages on both sides of the street, which is similar to the existing baseline. Care should be taken to limit excessive light spill from the shop fronts and street lights into the residential units at high level.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
No. 51 Blair Street	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting on Plot F1, H1, H2 and H3 building facades during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: The proposed H1, H2 and H3 buildings are replacing independent retail units and the the Aberfeldy Islamic cultural centre &amp; mosque. The existing street is an active commercial area with coloured floodlighting to the mature trees on the eastern side. The proposed development will also contain street and amenity lighting, appropriate to the various uses of the space. There are retail units with active frontages on both sides of the street, which is similar to the existing baseline. Care should be taken to limit excessive light spill from the shop fronts and street lights into the residential units at high level.</p>
Heather House	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these dwellings from temporary site lighting on Plot F1 north building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot F1: The proposed building is replacing a open playground, sports court with floodlights and low rise community centre. The exterior lighting should be limited to the communal entrances / thresholds from Aberfeldy Street (High Street) proposed Culloden Green. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Small retailers, oban street	Low	High	Moderate	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these retail units from temporary site lighting within Braithwaite Park and on Plot I building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Braithwaite Park: Luminaires with precise optical control and a shielded downward light distribution should be installed within the park to avoid glare and light trespass. Plot I: The proposed building is replacing an existing residential block. The exterior lighting should be limited to the communal entrances / thresholds from Blair Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
Culloden Primary Academy, Dee Street	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into the school premises from temporary site lighting on Plot F1, H1 and H2 building facades during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot F1: The proposed building is replacing a open playground, sports court with floodlights and low rise community centre. The exterior lighting should be limited to the communal entrances / thresholds from Aberfeldy Street (High Street) proposed Culloden Green. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies. Plot H1 &amp; H2: The proposed buildings are replacing independent retail units with increased building height. The exterior lighting should be limited to the communal entrances / thresholds from Kirckmichael Road. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Bromley Hall School	High	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into the school premises from temporary site lighting on Plot J1 building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot J1: The proposed building is replacing an open area adjacent to Bromley Hall school, which appears not to be in use. The architectural character of the proposed building appears to be sympathetic with the neighbouring school. The exterior lighting should be limited to the communal entrances / thresholds from Lochnagar Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private gardens and balconies.</p>
Poplar Works	Low	Low	Minor	<p>Construction Phase: Care should be taken to avoid glare, light trespass into these retail units from temporary site lighting on Plot J1 building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot J1: The proposed building is replacing an open area adjacent to Bromley Hall school, which appears not to be in use. The architectural character of the proposed building appears to be sympathetic with the neighbouring school. The exterior lighting should be limited to the communal entrances / thresholds from Lochnagar Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private gardens and balconies.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

Table 2: Evaluation of impacts by identified Receptor Prior to Mitigation

IDENTIFIED RECEPTORS				
RECEPTOR	MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR	IMPACT	PROPOSED MITIGATION
Iron Mountain Secure Storage	High	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into the storage premises from temporary site lighting on Plot J1 building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot J1: The proposed building is replacing an open area adjacent to Bromley Hall school, which appears not to be in use. The architectural character of the proposed building appears to be sympathetic with the neighbouring school. The exterior lighting should be limited to the communal entrances / thresholds from Lochnagar Street. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private gardens and balconies.</p>
St. Nicholas Church, Aberfeldy Street	Medium	High	Major	<p>Construction Phase: Care should be taken to avoid glare, light trespass into the church premises from temporary site lighting on Plot F1 north building facade during construction. It is therefore recommended that all site lighting is shielded to avoid light trespass and glare, and the lighting should be switched off after an agreed curfew time.</p> <p>Operational Phase: Plot F1: The proposed building is replacing a open playground, sports court with floodlights and low rise community centre. The exterior lighting should be limited to the communal entrances / thresholds from Aberfeldy Street (High Street) proposed Culloden Green. Care should be taken to avoid glare and obtrusive light from the amenity lighting on private balconies.</p>
Primary Roads	Negligible	Low	Negligible	<p>Construction Phase: No adverse lighting impacts envisaged.</p> <p>Operational Phase: No adverse lighting impacts envisaged.</p>
Secondary Roads	Low	Low	Minor	<p>Construction Phase: No adverse lighting impacts envisaged.</p> <p>Operational Phase: No adverse lighting impacts envisaged.</p>
Tertiary Roads	Low	Low	Minor	<p>Construction Phase: No adverse lighting impacts envisaged.</p> <p>Operational Phase: No adverse lighting impacts envisaged.</p>

## 6. EVALUATION, IMPACTS & MITIGATION

### Mitigation Measures

Where a potential lighting impact on a receptor has been identified, the main mitigation measures have been considered in 3 categories, Primary, Secondary and Construction. The aim of the mitigation is to modify either the magnitude of the lighting installation, in terms of quantity of light, scale, duration of operation etc. to reduce or eliminate potential adverse impacts on the identified receptors.

#### Primary:

As noted above, primary mitigation measures include the implementation of good lighting design and best practice guidelines. Site specific issues include the correct location of luminaires, appropriate light distribution and light intensity and the specification of appropriate light sources.

#### Secondary:

Measures that address any remaining adverse impacts, include architectural design, landscape design and site planning, for example the use of screening and/or barrier planting.

#### Construction:

In addition to the incorporation of the initial Design and Primary and Secondary Mitigation measures already noted, temporary site lighting should be addressed as a specific issue in the project Construction Method Statement. This will provide guidance with regards to the careful installation, aiming and use of lighting for construction sites.

A number of different lighting typologies have been identified in order to assess the potential impact of electric light from the proposed development as taken from concept layout:

- Road, Footpath
- Landscape & Open space
- Facade mounted lighting

### Other considerations:

- Potential Bat Foraging Routes (outside the site)
- External Lighting within the dwellings
- Construction Phase Lighting Impacts

### Recommended Mitigation Measures

The proposed development is in an area with a high district brightness. The site is largely characterised by residential buildings with sporadic commercial units and some cultural/religious buildings.

The proposed development consists in residential buildings with retail units at ground floor, new community amenity space and play areas.

It is anticipated that any exterior and interior lighting within the proposed development will be a significant improvement on the existing baseline in terms of the perceived quality of the lit environment. Following current good practice lighting guidelines will ensure that all lighting is focused onto the identified task areas with minimal light spill and light pollution.

- Primary Mitigation (Operational Phase)

Wherever column mounted luminaires are specified, high efficiency flat glass full cut-off lanterns with a shielded downward light distribution should be specified. The scale of the street lighting columns should be appropriate to the area in which they are installed.

Where catenary lighting is proposed, a shielded downward light distribution should be specified. The scale and mounting height of the luminaires should be appropriate to each location.

Where installed, landscape accent lighting should be focused onto the plants and other key elements of the design. Luminaires with precise photomet-

ric performance should be specified to minimise upward light spill and light pollution.

Louvres, cowls and other anti-glare accessories should be specified to control the light distribution of the luminaires and avoid potential discomfort glare.

- Secondary Mitigation (Operational Phase)

Physical screening can be used to mitigate potential adverse effects, if required.

Architectural elements, hard and soft landscaping and planting may be used to limit the receptors view of a lighting installation. For example, louvred fencing installed adjacent to a traffic route can appear solid when viewed at specific angles. Evergreen trees, planting and architectural screens can be used to shield or limit a receptor's view of the lighting installation.

The high reflectance of illuminated surfaces can have a negative impact on the perceived brightness of an external environment. A reduction in surface reflectance of materials and finishes can reduce potentially adverse impacts such as light spill and sky glow.

- Bat Foraging & Roosting Sites

The Ecological Impact Assessment has determined that there are no bat commuting/foraging routes within the site itself (Phase A). However, a common pipistrelle roost has been located on site (57 Aberfeldy Street) and the surrounding areas are likely to form bat commuting and foraging routes/areas. It is therefore necessary to ensure that there is no light spill or light trespass from lighting within the proposed development.

Published guidance from the ILP and the Bat Conservation Trust recommends avoiding lighting on key habitats and features altogether.

Where bat habitats and features are considered of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Given the potential indirect disturbance from light pollution is a probable negative effect and that a sensitive lighting scheme can mitigate the adverse effects, it is reasonable to assume that adverse effects can be mitigated by adopting good design practice.

The following aspects should be incorporated when specifying luminaires:

The spectral power distribution should have no UV component.

A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.

Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).

Only luminaires with an upward light ratio of 0% and good optical control should be used.

Luminaires should always be mounted on the horizontal, i.e. no upward tilt.

Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

## 6. EVALUATION, IMPACTS & MITIGATION

- **Construction Stage Mitigation**

During the construction of each phase, it is expected that there will be temporary site lighting in operation to illuminate working areas and provide lighting for site safety and security.

The HSE Guide to the Construction (Design & Management) Regulations 2015 states the following regarding site lighting installations:

**“Each construction site and approach and traffic route to that site must be provided with suitable and sufficient lighting, which must be, so far as is reasonably practicable, by natural light. The colour of any artificial lighting provided must not adversely affect or change the perception of any sign or signal provided for the purposes of health or safety. Suitable and sufficient secondary lighting must be provided in any place where there would be a risk to the health or safety of a person in the event of the failure of primary artificial lighting.”**

In terms of mitigating the adverse effects of temporary site lighting installations, consideration to light trespass and glare to neighbouring properties should be considered and temporary lighting should be switched off when not needed to carry out a specific task. Mitigation measures may therefore require temporary hoardings to be put in place to avoid light spill and light trespass into neighbouring properties.

### **Visual Amenity**

Consideration of visual amenity is usually embedded in the lighting design before construction commences. The baseline lighting assessment methodology has assumed that perceived overall brightness of the development during the construction and operational phases should not be significantly greater than the existing baseline conditions.

However, subjective and objective improvements to the lit environment in terms of aesthetic enhancement and visual amenity as a result of applied mitigation may result in improvements to the lit environment, when compared to the baseline conditions and significantly benefit many of the identified receptors.

### **Health & Safety**

None of the potential mitigation measures suggested in this report should be implemented if the health and safety of users of the development or the identified receptors is compromised in any way.

## 7. SUMMARY & CONCLUSIONS

The proposed development will have lighting installations provided for safety and amenity during the construction and operational phases, which have the potential to impact on the local environment through light spill, light pollution and glare.

An assessment of the magnitude of change from the existing baseline condition with careful consideration to the sensitivity of the identified receptors has concluded that in most instances the potential negative impacts will be moderate during the construction and operational phases of the proposed development.

During the demolition and construction phase, the use of temporary site lighting is likely to be an integral part of the on-site security and health and safety requirements of the main contractor. Any adverse effects associated with construction site lighting are considered to be medium-term in duration and temporary in nature.

For the purposes of this assessment it is assumed that all exterior and interior lighting for the proposed development will be designed in accordance with current good practice Society of Light & Lighting & CIBSE recommendations and in accordance with the Institution of Lighting Professional's Guidance Notes for the Reduction of Obtrusive Light.

On the assumption that these good practice guidelines are adopted in the detailed design and installation of the lighting, the development should not materially alter existing illuminance levels outside the proposed development or adversely affect the use and enjoyment of nearby dwellings, other buildings and open spaces.

The Plot F1 with its new community public square is likely to have a positive beneficial effect on the surrounding environment, since the quality of the nocturnal environment in and around the development will be enhanced (assuming that current good

practice guidelines are adopted in the final design and installation).

There are not considered to be any additive or synergistic cumulative effects resulting from light pollution from the proposed development, during the construction and operational phases.

In addition, there are not considered to be any residual significant effects during either the demolition and construction, or operational phases of the development as long as the suggested design and mitigation measures are incorporated in the final design and implemented correctly on site.

## 8. GLOSSARY OF LIGHTING TERMS

The following definitions for lighting terms are taken from the SLL “Code for Lighting” 2012, which additions included to explain lighting technical terms included in the lighting impact Assessment.

### Annual operating time

Number of hours per annum for which the lamps are operating (unit:h)

### Astronomical time clock

See “Solar time clock” below.

### Atmospheric luminance (Latm)

Light veil as a result of the scatter in the atmosphere expressed as a luminance (unit: cd.m<sup>2</sup>).

### Average illuminance (Ē)

Illuminance averaged over the specified surface (unit: lux).

### Average luminance (L)

Luminance averaged over the specified surface or solid angle (unit: cd· cd·m<sup>2</sup>).

### Brightness

Attribute of a visual sensation according to which an area appears to emit more or less light (Note: obsolete term - luminosity).

### Brightness contrast

Subjective assessment of the difference in brightness between two or more surfaces seen simultaneously or successively.

### Carriageway

Part of the road normally used by vehicular traffic.

### Chromaticity

Property of a colour stimulus defined by its chromaticity coordinates, or by its dominant or complementary wavelength and purity taken together.

### CIE 974 general colour rendering index (R<sub>a</sub>)

Value intended to specify the degree to which objects illuminated by a light source have an expected colour relative to their colour under a reference light source.

Note: R<sub>a</sub> is derived from the colour rendering indices for a specified set of 8 test colour samples. R<sub>a</sub> has a maximum of 100, which generally occurs when the spectral distributions of the light source and the reference light source are substantially identical

### Circuit luminous efficacy of a source (c)

Quotient of the luminous flux emitted by the power absorbed by the source and associated circuits (unit: lm·W)

### Colour contrast

Subjective assessment of the difference in colour between two or more surfaces seen simultaneously or successively.

### Colour rendering

Effect of an illuminance on the colour appearance of object by conscious or subconscious comparison with their colour appearance under a reference illuminance.

For design purposes, colour rendering requirements shall be specified using the colour rendering index and shall take one of the following value of R<sub>a</sub> 20; 40; 60; 80;90.

### Colour rendering index

See CIE 1974 general colour rendering index (above)

### Colour stimulus

Visible radiation entering the eye and producing a sensation of colour, either chromatic or achromatic.

### Colour temperature (T<sub>c</sub>)

Temperature of a Planckian radiator whose radiation has the same chromaticity as that of a given stimulus (unit: K)

Note: The reciprocal colour temperature is also used, unit: K-1

### Contrast

- In the perceptual sense: assessment of the difference in appearance of two or more parts of a field seen simultaneously or successively (hence: brightness contrast, lightness contrast, colour contrast, simultaneous contrast, successive contrast, etc.)
- In the physical sense: quantity intended to correlate with the perceived brightness contrast, usually defined by one of a number of formulae which involve the luminances of the stimuli considered, for example:  $\Delta L/L$  near the luminance threshold, or  $L1/L2$  for much higher luminances

### Control gear

Components required to control the electrical operation of the lamp(s)

Note: Control gear may also include means for transforming the supply voltage, correcting the power factor and, either alone or in combination with a starting device, provide the necessary conditions for starting the lamp(s)

### Correlated colour temperature (T<sub>cp</sub>)

Temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions (unit: K)

Note 1: The recommended method of calculating the correlated colour temperature of a stimulus is to

determine on a chromaticity diagram the temperature corresponding to the point on the Planckian locus that is intersected by the agreed isothermperature line containing the point representing the stimulus.

### Curfew

Time period during which stricter requirements (for the control of obtrusive light) will apply.

Note: It is often a condition of use of lighting applied by a government controlling authority, usually the local government.

### Cut-off

Technique used for concealing lamps and surfaces of high luminance from direct view in order to reduce glare Note: In public lighting, distinction is made between full-cut-off luminaires, semi-cut-off luminaires and non-cut-off luminaires.

### Cut-off angle (of a luminaire)

Angle, measured up from nadir, between the vertical axis and the first line of sight at which the lamps and the surfaces of high luminance are not visible (unit: degree).

### Daylight

Visible part of global solar radiation.

### Diffused lighting

Lighting in which the light on the working plane or on an object is not incident predominantly from a particular direction.

### Direct lighting

Lighting by means of luminaires having a distribution of luminous intensity such that the fraction of the emitted luminous flux directly reaching the working plane, assumed to be unbounded, is 90 to 100 per cent.

## 8. GLOSSARY OF LIGHTING TERMS

### **Directional lighting**

Lighting in which the light on the working plane or on an object is incident predominantly from a particular direction.

### **Disability glare**

Glare that impairs the vision of objects without necessarily causing discomfort. Disability glare can be produced directly or by reflection.

### **Discharge Lamp**

Discharge lamps are a family of electric light sources that generate light by sending an electrical discharge through an ionized gas, a plasma. The character of the gas discharge depends on the pressure of the gas as well as the frequency of the current. Typically, such lamps use a noble gas (argon, neon, krypton and xenon) or a mixture of these gases. Most lamps are filled with additional materials, like mercury, sodium, and metal halides.

### **Discomfort glare**

Glare that causes discomfort without necessarily impairing the vision of objects. Discomfort glare can be produced directly or by reflection.

### **Downward light output ratio (of a luminaire) (RDLO)**

Ratio of the downward flux of the luminaire, measured under specified practical conditions with its own lamps and equipment, to the sum of the individual luminous fluxes of the same lamps when operated outside the luminaire with the same equipment, under specified conditions.

### **Efficacy**

See luminous efficacy of a source.

### **Flicker**

Impression of unsteadiness of visual sensation

induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

### **Floodlighting**

Lighting of a scene or object, usually by projectors, in order to increase considerably its illuminance relative to its surroundings.

### **Flux**

See luminous flux, rated lamp luminous flux.

### **General colour rendering index**

See CIE 1974 general colour rendering index.

### **General lighting**

Substantially uniform lighting of an area without provision for special local requirements.

### **Glare**

Condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or extreme contrasts See also disability glare and discomfort glare.

### **High Pressure Sodium Lamp**

A gas-discharge lamp that uses sodium in an excited state to produce light, commonly used in street lighting installations in the UK.

### **Illuminance**

illuminance is the total luminous flux incident on a surface, per unit area, measured in lux (lx) or lumens per square metre.

### **Illuminance meter**

Instrument for measuring illuminance.

### **Intensity**

See luminous intensity.

### **Intensity distribution**

See luminous intensity distribution.

### **Lamp**

Source made in order to produce an optical radiation, usually visible

Note: This term is also sometimes used for certain types of luminaires.

### **Lamp luminous flux**

See rated luminous flux.

### **LED Lamp (Lighting Emitting Diode)**

An LED lamp is a light-emitting diode (LED) product that is assembled into a lamp, an array or a point source designed for installation in a specific luminaire or lighting product. For exterior architectural lighting applications, good colour rendering white LED products are used. These systems typically use a blue (or violet) LED light source in conjunction with a phosphor to create white light.

### **Life of lighting installation**

Period after which the installation cannot be restored to satisfy the required performance because of non-recoverable deteriorations.

### **Light output ratio (of a luminaire) (RLO)**

Ratio of the total flux of the luminaire, measured under specified practical conditions with its own lamps and equipment, to the sum of the individual luminous fluxes of the same lamps when operated outside the luminaire with the same equipment, under specified conditions.

### **Light Pollution**

Brightening of the night sky caused by street lights and other man-made sources, which has a disruptive effect on natural cycles and inhibits the observation of stars and planets.

### **Light source**

See "Source"

### **Local lighting**

Lighting for a specific visual task, additional to and controlled separately from the general lighting.

### **Luminaire**

Apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all of the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply.

### **Luminance (in a given direction, at a given point of a real or imaginary surface) (L)**

A photometric measure of the luminous intensity per unit area of light travelling in a given direction. It describes the amount of light that passes through or is emitted from a particular area, and falls within a given solid angle. The SI unit for luminance is candela per square metre (cd/m<sup>2</sup>).

### **Luminosity**

See "Brightness"

### **Luminous efficacy of a source (g)**

Quotient of the luminous flux emitted by the power absorbed by the source (unit: lm·W<sup>-1</sup>)

### **Luminous environment**

Lighting considered in relation to its physiological and psychological effects.

### **Luminous flux (W)**

Quantity derived from radiant flux  $W_e$  by evaluating the radiation according to its action upon the CIE standard photometric observer (unit: lm).

## 8. GLOSSARY OF LIGHTING TERMS

Quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye (as defined by the CIE standard photometric observer). It is the light power emitted by a source or received by a surface (unit: lumen, lm). **Luminous intensity (of a source, in a given direction) (I)**

Luminous intensity of a source (lamp or luminaire) as a function of direction in space

### **Maintained illuminance ( $\bar{E}_m$ )**

Minimum average illuminance (unit: lx)

### **Maintained luminance (L<sub>m</sub>)**

Minimum average luminance (unit: cd/m<sup>2</sup>)

Note 1: Value below which the average luminance on the specified area should not fall

Note 2: It is the average luminance at the time maintenance should be carried out.

### **Maintenance cycle**

Repetition of lamp replacement, lamp/luminaire cleaning and room surface cleaning intervals.

### **Maintenance factor**

Ratio of the average illuminance on the working plane after a certain period of use of a lighting installation to the initial average illuminance obtained under the same conditions for the installation.

### **Maximum illuminance (E<sub>max</sub>)**

Highest illuminance at any relevant point on the specified surface (unit: lx).

### **Maximum luminance (L<sub>max</sub>)**

Highest luminance of any relevant point on the specified surface (unit: cd·m<sup>-2</sup>).

### **Measurement field (of a photometer)**

Area including all points in object space, radiating towards the acceptance area of the detector

### **Metal Halide Lamp**

An electric lamp that produces light by an electric arc through a gaseous mixture of vaporised mercury and metal halides (compounds of metals with bromine or iodine). Metal halide lamps are similar to mercury vapour lamps, but contain additional metal halide compounds which improve the efficacy and colour rendering properties of the lamp. Ceramic metal halide lamps use ceramic arc tubes, similar to those used in high pressure sodium lamps, which improve the colour consistency of the light source.

### **Minimum illuminance (E<sub>min</sub>)**

Lowest illuminance at any relevant point on the specified surface (unit: lx).

### **Minimum luminance (L<sub>min</sub>)**

Lowest luminance at any relevant point on the specified surface (unit: cd·m<sup>-2</sup>).

### **Mixed traffic**

Traffic that consists of motor vehicles, cyclists, pedestrians, etc.

### **Motor traffic (motorised traffic)**

Traffic that consists of motorised vehicles only.

### **Obtrusive light**

Spill light which because of quantitative, directional or spectral attributes in a given context gives rise to annoyance, discomfort, distraction or reduction in the ability to see essential information

Note 1: In the case of outdoor sports lighting installations, obtrusive light is considered around the installation and not for spectators, referees or play-

ers within the sports area.

Note 2: In the case of large tertiary buildings with predominantly glazed facades, interior lighting may be considered as obtrusive light if it gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information due to light spilling outside of the building structure.

### **Operating time (t)**

Time period for the energy consumption (unit: h)  
See also annual operating time.

### **Principal area (A<sub>Principal</sub>)**

Actual playing area needed for the performance of a certain sport.

Note: Usually this means the actual marked out 'field' area for that sport (for instance football), but in some cases, this area comprises an extra playing area around the marked area (e.g. tennis, volleyball, table tennis). The dimensions of the particular area should be checked at the time when a lighting installation is being installed.

### **Performance**

See visual performance

### **Photometer**

Instrument for measuring photometric quantities.

### **Photometry**

The science of the measurement of light, in terms of its perceived brightness to the human eye.

### **PIR Detector (Passive Infra-Red Detector)**

An electronic sensor that measures infrared (IR) light radiating from objects in its field of view. Used to identify motion within its field of view.

### **Reflections**

See veiling reflections below.

### **Reflectance**

The ratio of light reflected from a surface to that incident upon it.

### **Shielding angle**

The angle between the horizontal plane and the first line of sight at which the luminous parts of the lamps in the luminaire are directly visible (unit: degrees).

Note: The complementary angle to the shielding angle is named cut-off angle.

### **Solar Time Clock**

An electronic time-keeping device which measures the passage of time based on the Sun's position in the sky. The device calculates latitude and longitude coordinates and the current time/day of the year, automatically calculating the sunrise and sunset times.

### **Source (light source)**

Object that produces light or other radiant flux  
Note: The term light source indicates the source is essentially intended for illuminating and signalling purposes.

### **Spacing (in an installation)**

Distance between the light centres of adjacent luminaires of the installation.

### **Spacing to height ratio**

Ratio of spacing to the height of the geometric centres of the luminaires above the reference plane  
Note: For exterior lighting, the reference plane is usually the ground.

### **Spill light (stray light)**

Light emitted by a lighting installation which falls outside the boundaries of the property for which the lighting installation is designed.

## 8. GLOSSARY OF LIGHTING TERMS

### **Spotlighting**

Lighting designed to increase considerably the illuminance of a limited area or of an object relative to the surroundings, with minimum diffused lighting.

### **Surrounding area (immediate surrounding area)**

Band surrounding the task area within the field of vision.

### **Task area**

Area within which the visual task is carried out.

### **Traffic lane**

Strip of carriageway intended to accommodate a single line of moving vehicles

### **Unified glare rating limit (RUGL)**

Upper limit of glare by the CIE Unified Glare Rating system

### **Uniformity (luminance, illuminance) (Uo)**

Ratio of minimum illuminance (luminance) to average illuminance (luminance) on (of) a surface.

### **Upward light output ratio (of a luminaire) (RULO)**

Ratio of the upward flux of the luminaire, measured under specified practical conditions with its own lamps and equipment, to the sum of the individual luminous fluxes of the same lamps when operated outside the luminaire with the same equipment, under specified conditions

Note 1: Upward light output ratio is sometimes signified by the abbreviation ULOR

Note 2: The luminaire attitude should be declared so that appropriate corrections to the ULOR can be made if, in application, the installed attitude is different.

### **Veiling luminance**

See equivalent veiling luminance

### **Veiling reflections**

Specular reflections that appear on the object viewed and that partially or wholly obscure the details by reducing contrast

### **Visual acuity**

1. Qualitatively: capacity for seeing distinctly fine details that have very small angular separation
2. Quantitatively: any of a number of measures of spatial discrimination such as the reciprocal of the value of the angular separation in minutes of arc of two neighbouring objects (points or lines or other specified stimuli) which the observer can just perceive to be separate.

### **Visual comfort**

Subjective condition of visual well-being induced by the visual environment.

### **Visual field**

Area or extent of physical space visible to an eye at a given position and direction of view.

Note: It should be stated whether the visual field is monocular or binocular.

### **Visual performance**

Performance of the visual system as measured for instance by the speed and accuracy with which a visual task is performed.

### **Visual task**

Visual elements of the activity being undertaken.

Note: The main visual elements are the size of the structure, its luminance, its contrast against the background and its duration.

### **Window**

Daylight opening on a vertical or nearly vertical area of a room envelope.

## 9. REFERENCES

### Relevant Legislation

- Environmental Protection Act 1990.

### Relevant Policies

- National Planning Policy Framework July 2021 (NPPF)
- Planning Practice Guidance
- London “The London Plan 2021” (adopted March 2021)”
- Tower Hamlets Local Authority “Tower Hamlets Local Plan 2031” (adopted January 2020)

### Relevant Standards

- British Standards Institution,
- BS5489-1:2013 “Code of practice for the design of road lighting. Lighting of roads and public amenity areas.”

### Relevant Best Practice Guidelines

- Society of Light & Lighting (formerly CIBSE) Lighting Guides:
- LG6 The Exterior Environment, 2016
- LG9: Lighting for Communal Residential Buildings, 2013
- Guide to Limiting Obtrusive Light, 2012  
Institution of Lighting Professionals
- “Guidance Notes for the Reduction of Obtrusive Light” GN01:2020
- “Guidance on Undertaking Environmental Lighting Impact Assessments” PLG04 2013  
Department for Communities and Local Government
- “Code for Sustainable Homes: Technical Guidance” - November 2010

### Guidance for Lighting Effects on Bats

The Bat Conservation Trust

- “Landscape & Urban Design for Bats & Biodiversity” August 2012.

Institution of Lighting Professionals/Bat Conservation Trust

- “Bats and Artificial Lighting in the UK” August 2018.

### Other Relevant Publications

International Commission on Illumination (CIE):

- Guide for lighting exterior work areas, CIE 129-1998
- Recommendations for the Lighting of Roads for Motor and Pedestrian Traffic (No 115) 1995;
- CIE Technical Report, Guidelines for minimizing sky glow, (CIE 126-1997), 1997;
- CIE Technical Report, Guide on the limitation of the effects of obtrusive light from outdoor lighting installations, 2nd Edition (CIE 150:2017), 2017

### Health & Safety Executive

- Construction (Design and Management) Regulations 2015
- Health & Safety in Construction - Third Edition 2006 (ISBN 978 0 7176 6182 2)

## 10. CURRICULUM VITAE

### **Project Lead – Keith Miller BA(Hons) MSL ACIBSE, Ass. IALD**

Keith has over 35 years' experience as a lighting consultant. He is a member of the Society of Light & Lighting's Technical & Publications Committee. He was part of the task group responsible for SLL Lighting Guide LG11: "Surface Colour & Reflectance" 2001, task group chairman and principal author of SLL Lighting Guide LG14: "Transport Buildings" published in August 2017 and a principal contributor to the SLL "Lighting Handbook" published in November 2018.

Keith has been responsible for a number of lighting impact assessments, including the Crossrail Line Wide Impacts Assessment and Lighting Impact Assessments for residential developments in Woodstock West Oxfordshire, Fareham Hampshire, Pinhoe & Chudleigh in Devon, and for the Grosvenor Estate in London.

### **Lighting Impacts Assessor – Beatrice Bertolini BSc (Hons), MSc Lighting Design, Jr IALD**

Beatrice has both a Bachelor's and a Master's degrees in Architecture and a Master's degree in Light and Lighting from the KTH, Stockholm. She has 5 years experience as a lighting consultant.

She has been involved in the development of lighting design for regeneration development in Wembley Park, public realm lighting and the exterior and landscape lighting for Embassy Gardens. Beatrice is currently working on a number of high profile commercial developments in London.

# 11. APPENDIX I - BASELINE PHOTOGRAPHS - DAYTIME



BLAIR STREET LOOKING SOUTH-WEST



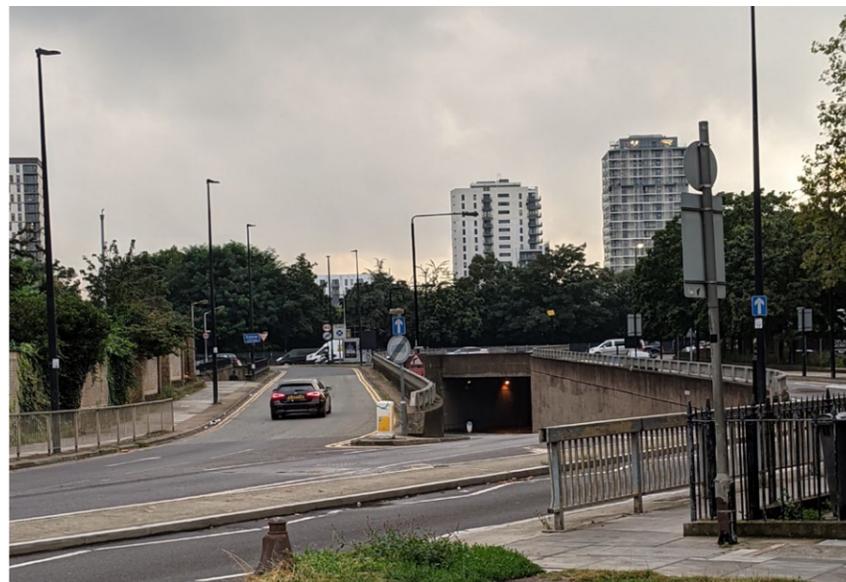
BRAITHWAITE PARK LOOKING WEST



ABBOTT ROAD LOOKING NORTH



LEVEN ROAD



ABBOTT ROAD UNDERPASS



BROMLEY HALL ROAD LOOKING NORTH

# 11. APPENDIX I - BASELINE PHOTOGRAPHS - DAYTIME



LEVEN ROAD // BROMLEY HALL SCHOOL



POPLAR WORKS



ABBOTT ROAD // POPLAR WORKS



ABBOTT ROAD LOOKING SOUTH



ABERFELDY NEIGHBOURHOOD CENTRE



ABERFELDY STREET LOOKING SOUTH

# 11. APPENDIX I - BASELINE PHOTOGRAPHS - DAYTIME



ABERFELDY STREET LOOKING WEST



ABERFELDY STREET LOOKING WEST



ABERFELDY STREET LOOKING NORTH



NEW VILLAGE AVENUE PUBLIC REALM



ABBOTT ROAD LOOKING NORTH



JUNCTION ABBOTT ROAD - A13 E INDIA DOCK ROAD

## 12. APPENDIX II - BASELINE PHOTOGRAPHS - NIGHT TIME



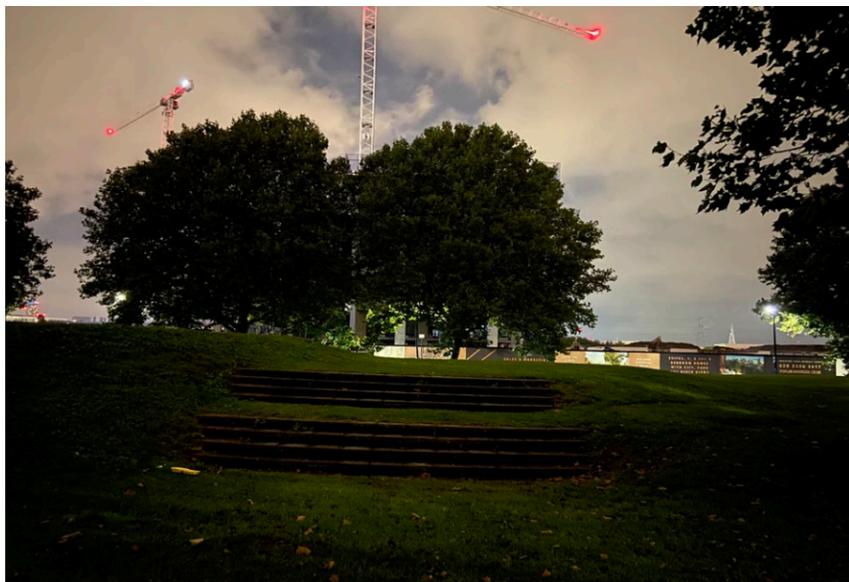
BLAIR STREET LOOKING WEST



BRAITHWAITE PARK LOOKING NORTH



BENLEDI ROAD



LEVEN ROAD GREEN LOOKING NORTH

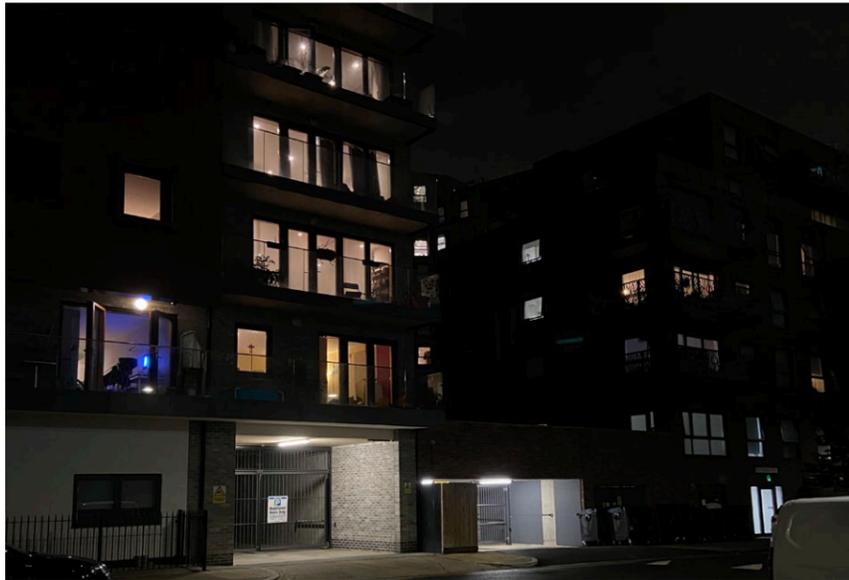


LEVEN ROAD GREEN // SPORT COURTS



ABBOTT ROAD UNDERPASS

## 12. APPENDIX II - BASELINE PHOTOGRAPHS - NIGHT TIME



LEVEN ROAD LOOKING NORTH-EAST



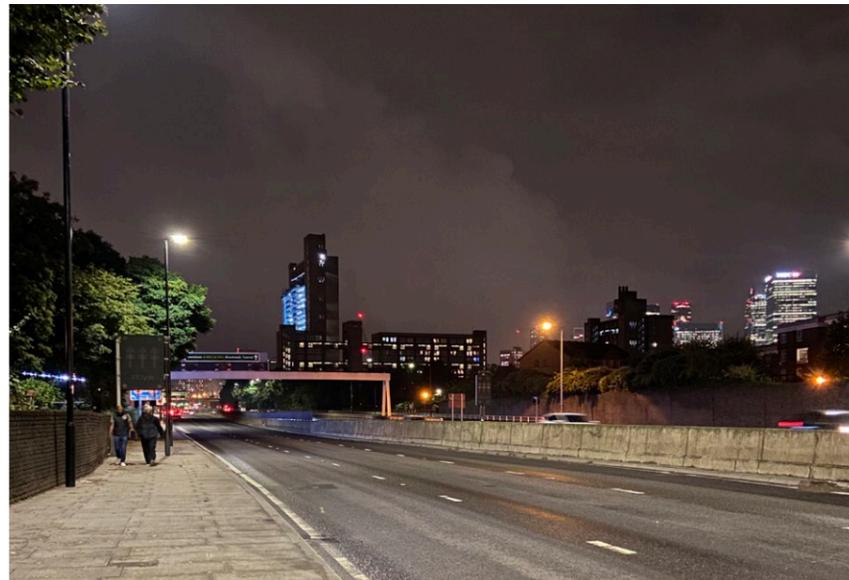
LEVEN ROAD LOOKING NORTH



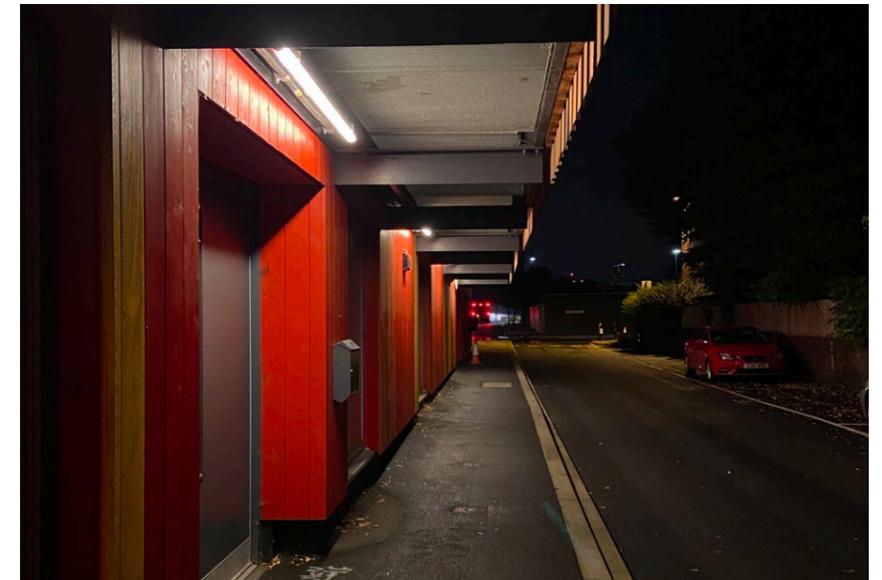
LEVEN ROAD LOOKING WEST



BROMLEY HALL SCHOOL



A12 - BLACKWALL TUNNEL NORTHERN APPROACH



ABBOTT ROAD // POPLAR WORKS

## 12. APPENDIX II - BASELINE PHOTOGRAPHS - NIGHT TIME



ABBOTT ROAD LOOKING EAST



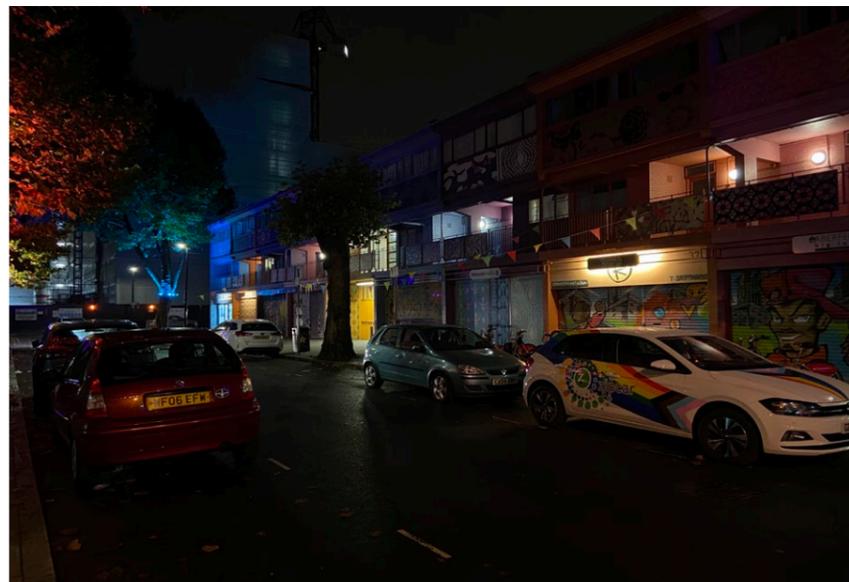
ABBOTT ROAD LOOKING SOUTH



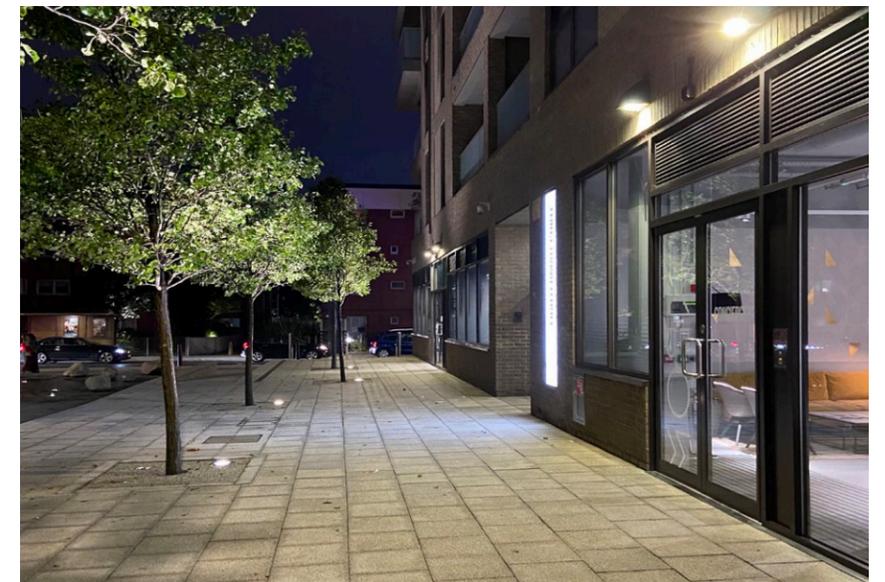
ABERFELDY STREET LOOKING SOUTH-WEST



ABERFELDY STREET LOOKING SOUTH



ABERFELDY STREET LOOKING SOUTH -EST



NEW VILLAGE AVENUE PUBLIC REALM

# EQUATION

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## QA SYSTEM

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REVISION DATE:	19.08.2022
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CLIENT NAME:	EcoWorld International
PREPARED BY:	BB
VERIFICATION BY:	KM
PROJECT COORDINATOR:	KM





ABERFELDY VILLAGE MASTERPLAN