now part of

The Old Power Station, Vastern Road

Lighting Assessment

On behalf of **Berkley Homes (Oxford and Chiltern) Ltd**

Project Ref: 47500/3003 | Rev: V2.0 | Date: December 2019

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: reading@peterbrett.com

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	Name	Position	Signature	Date
Prepared by:	Shannon Smart	Assistant Environmental Planner	SS	02/12/2019
Reviewed by:	Neil Young	Associate Environmental Scientist	NY	02/12/2019
Approved by:	Jonathan Riggall	Director Energy and Natural Resources	JR	03/12/2019
For and on behalf of Peter Brett Associates LLP				

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Contents

Figures

Tables

Appendices

1 Introduction

1.1 Overview

1.1.1 Peter Brett Associates LLP (now part of Stantec) have been commissioned by Berkley Homes (Oxford and Chiltern) Ltd ('the Applicant') to prepare a Lighting Assessment for the redevelopment of part of the former SSE site at 53-55 Vastern Road, Reading and is within the jurisdiction of Reading Borough Council (RBC).

1.1.2 The full planning application seeks permission for the demolition of existing buildings and structures and provision of residential units, a new café and a new north-south pedestrian link, connecting Christchurch Bridge to Vastern Road ('proposed development').

1.2 Aims and Objectives

1.2.1 The key aims and objectives of this lighting assessment are to:

- Identify national and local planning policy, guidance and standards as relevant to artificial lighting for the proposed development;
- Determine the existing lighting conditions within the site and wider study area;
- Establish the minimum exterior artificial lighting required to construct and operate the proposed development safely and securely;
- Assess the potential effects of the minimum exterior artificial lighting required for the proposed development on light sensitive receptors; and
- Outline potential mitigation measures for the design of lighting so obtrusive light is minimised to within guideline levels.

1.3 Report Structure

1.3.1 The structure of the lighting assessment report is set-out below:

- Section 2 – Describes the site and the proposed development;
- Section 3 – Sets out legislation, planning policy and guidance relevant to obtrusive light;
- Section 4 – Details the methodology of the Lighting Assessment;
- Section 5 – Outlines the existing baseline conditions of the site including light sensitive receptors within and surrounding the site;
- Section 6 – Outlines the minimum lighting requirements for the proposed development;
- Section 7 – Qualitatively identifies any potential effects on sensitive receptors (identified in Section 5) within the site and wider study area;
- Section 8 – Details measures to mitigate potential impacts (identified in Section 7) on light sensitive receptors (identified in Section 5); and
- Section 9 – Identifies residual effects after mitigation and provides a set of conclusions.

2 The Site and Proposed Development

2.1 Site Location and Description

2.1.1 The Old Power Station forms part of the former SSE site, 53-55 Vastern Road, Reading, RG1 8BU. It is bounded by the River Thames to the north, retained SSE electrical transformers and associated works to the east, Vastern Road to south and residential properties fronting Lynmouth Road to the west.

2.1.2 **Figure 2.1** shows the site location within Reading and highlights the surrounding existing land uses.

Figure 2.1: Site Location

2.2 The Proposed Development

2.2.1 The proposed development for which full planning permission is sought is as follows:

"*Demolition of existing structures and erection of a series of buildings ranging in height from 1 to 11 storeys including residential dwellings (C3 use class) and leisure floorspace (A3 use class), together with a new north-south pedestrian link, connecting Christchurch Bridge to Vastern Road.*"

2.2.2 A new pedestrian and cycle link will be provided as part of the proposed development. This will include a new podium level connection to the existing Christchurch Bridge, new footway/cycle through the proposed development to link the bridge to Vastern Road and a new crossing point on Vastern Road.

2.2.3 The detailed floor plans for the proposed development are provided in **Appendix A**.

3 Legislation, Policy and Guidance

3.1 Introduction

3.1.1 This section provides a review of the relevant national and local legislation, policy and guidance relevant to the assessment of obtrusive light in relation to the Proposed Development.

3.1 Legislation

Clean Neighbourhoods and Environment Act

3.1.1 The Clean Neighbourhoods and Environment Act 2005 (CNEA) amended Section 79 of the Environmental Protection Act 1990 by extending the statutory nuisance regime to include light nuisance, by stating the following:

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

"Subsection (1)(fb) does not apply to artificial light emitted from - (a) an airport; (b) harbour premises; (c) railway premises, not being relevant separate railway premises; (d) tramway premises; (e) a bus station and any associated facilities; (f) a public service vehicle operating centre; (g) a goods vehicle operating centre; (h) a lighthouse; (i) a prison."

3.1.2 Therefore, since 6th April 2006, artificial light can be considered to be a statutory nuisance unless it is from exempt premises. It should be noted that road lighting is not exempt from the CNEA, although they are unlikely to qualify as a statutory nuisance as they are not strictly located on a premises.

3.1.3 Guidance produced by the Department of Environment, Food and Rural Affairs (DEFRA) in April 2006, on Section 101 to 103 of the CNEA, extends the duty on local authorities to ensure their areas are checked periodically for existing sources of statutory nuisances.

3.1.4 If a light nuisance is considered by a local authority to exist, the local authority must serve a notice on the person responsible requiring the abatement of the nuisance, and/or restricting or prohibiting its recurrence.

3.1.5 Section 103 extends the defence of 'best practical means' to those statutory nuisances where light is emitted from industrial, trade or business premises and also from relevant outdoor sports facilities.

3.2 National Policy

National Planning Policy Framework

3.2.1 The National Planning Policy Framework (NPPF) was revised on the 24th of July 2018 and subsequently updated on 19th February 2019 and 19th June 2019. This supersedes the existing policy within the previous NPPF (March, 2012). The revised NPPF includes a number of references to the need to consider the effects of artificial lighting.

3.2.2 Paragraph 180 of the NPPF states:

"*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the*

site or the wider area to impacts that could arise from the development. In doing so they should:

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation." (Page 52)

National Planning Practice Guidance

3.2.3 The Government's Planning Practice Guidance web-based resource presents specific guidance on light pollution (obtrusive light) presented in Paragraph: 001 – 006 that have been considered throughout the assessment including:

Table 3.1: Review of Planning Practice Guidance

NPPG Guidance	How the guidance has been considered in this Lighting Assessment
Paragraph 1: When is light pollution relevant to planning?	There is potential for light from the proposed development to be obtrusive to people and wildlife or detract from the enjoyment of the night sky. Therefore, obtrusive light from the proposed development has been considered further within this report.
Paragraph 2: What factors should be considered when assessing whether a development proposal might have implications for light pollution / obtrusive light?	This report considers where, when and how the light shines as the proposed development has the potential to adversely affect the use or enjoyment of nearby buildings or open spaces.
Paragraph 3: What factors are relevant when considering where light shines?	This report considers the potential for light intrusion effecting receptors outside the site boundary which can lead to annoyance to people, compromise existing dark landscapes and affect natural systems.
Paragraph 4: What factors are relevant when considering when light shines?	This report considers the potential for lighting including when it may be required (**Section 6** sets out the anticipated Lighting Requirements).
Paragraph 5: What factors are relevant when considering how much the light shines?	This report considers the minimum requirements to construct and operate the proposed development safely and securely (**Section 6** Lighting Requirements). The Environmental Zone of the site is established to ensure there is an appropriate level of lighting for the ambient lighting conditions. A framework of mitigation has been established to ensure that the light source and its spectral attributes would be considered further during the technical design process.
Paragraph 6: What factors are relevant when considering possible ecological impact?	This report specifically considers the effects obtrusive lighting may have on ecological receptors (under ecological receptors in **Section 7**).

3.3 Local Policy

Reading Borough Local Plan (2019)

3.3.1 The Reading Borough Local Plan was adopted in November 2019 and guides development in Reading up to 2036. The following policies are relevant to lighting associated with the proposed development:

CC8: Safeguarding Amenity

"Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:… Artificial lighting…"

EN16: Pollution and Water Resources

"Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution…

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution."

OU4: Advertisements

"All adverts shall comply with the following criteria: …Illumination should not detract from the amenity of the area or pose a safety hazard to users of the highway…"

3.4 Guidance

Obtrusive Light

3.4.1 Guidance on obtrusive light is set out within the following guidance documents, further detail is provided in **Appendix B**:

- The Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (2011); and
- ILP Professional Lighting Guide 04: Guidance on Undertaking Environmental Lighting Impact Assessments (2013).

Ecological

3.4.2 Guidance on obtrusive light in relation to bats as issued by the Bat Conservation Trust is listed below, further detail is provided in **Appendix B**:

- Landscape and Urban Design for Bats and Biodiversity (2012);
- Artificial Lighting and Wildlife Interim Guidance: Recommendations to Help Minimise the Impact of Artificial Lighting (2014);
- Bat Conservation Trust and ILP Guidance Note 08/18: Bats and Artificial Lighting in the UK (2018); and
- EUROBATS Advisory Committee. Publication Series No. 8: Guidelines for Consideration of Bats in Lighting (2018).

3.5 Standards

3.5.1 **BS EN 13201-1:2014 Road Lighting, Part 1 Guidelines on selection of lighting classes:** specifies the lighting classes set out in EN 13201-2 and gives guidelines on the selection of the most appropriate class for a given situation.

3.5.2 **BS EN 13201-2:2015 Road lighting - Performance requirements**: Defines performance requirements which are specified as lighting classes for road lighting aiming at the visual needs of road users, and it considers environmental aspects of road lighting.

3.5.3 **BS EN 5489-1:2013 Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas**: This document provides specific guidance on selecting lighting classes that will help design more energy efficient road lighting schemes. It gives the most up-to-date recommendations for general principles of road lighting including aesthetic, technical aspects, operation and maintenance.

3.5.4 **BS EN 12464-2:2014 Light and lighting - Lighting of work places Part 2: Outdoor work**: This document outlines requirements for lighting outdoor work places, focusing primarily on visual comfort and performance.

3.5.5 **CIBSE (2016) Lighting Guide LG6 – The Outdoor Environment:** presents lighting solutions to basic visual problems and individual characteristics of outdoor lighting applications.

4 Methodology

4.1 Introduction

4.1.1 This Chapter provides an outline of the methods and procedures that were followed when undertaking the Lighting Assessment including how the baseline lighting conditions were determined and the assessment process that was undertaken.

4.2 Consultation

4.2.1 RBC were contacted to agree the baseline survey and assessment methodology for the lighting assessment[1]. RBC were also contact after the baseline survey to agree the Environmental Zone classification for the site.

4.2.2 The Environmental Health Officer requested that the following information should also be provided:

"*…a layout plan with beam orientation and a schedule of equipment in the design (luminaire type; mounting height; aiming angles and luminaire profiles) and an isolux contour map to show light spill levels down to 2 lux. The plans should include neighbouring buildings so that the predicted impact on them can be assessed. The applicants should demonstrate that light levels will not exceed the relevant guidance lux levels specified in the ILP guidance. Information should also show how glare will be controlled.*"

4.2.3 At the time of issue for this Lighting Assessment a preliminary lighting design has not been received but will be prepared to supplement the conclusions of this report and will be submitted via condition for approval of RBC prior to installation of the lighting strategy

4.3 Baseline Conditions

Desk Based Information

4.3.1 A desk-based review of publicly available information was undertaken, in order to inform the existing lighting conditions, and to understand the context of the proposed development within its existing environmental setting.

4.3.2 The following sources of publicly available information were reviewed as part of the desk-based review:

- Ordnance Survey mapping and aerial photography (2019);
- Google Street View (2014-2019); and
- Defra Multi-Agency Geographic Information for the Countryside (MAGIC) Map Application (2019).

4.3.3 The desk-based review provided an initial indication of the existing lighting conditions and potential light sensitive receptors in and surrounding the site. However, in order to establish a definitive understanding of the existing lighting conditions of the site a site walkover was undertaken, the methodology of which is explained further in the following sections. The methodology for the baseline survey and lighting assessment was agreed with RBC[1].

[1] Email correspondence between Assistant Environmental Planner at PBA and Senior Environmental Health Officer at Reading Borough Council 26th – 29th November 2019.

Site Visit

4.3.4 To establish the existing lighting conditions of the site, a site walkover was undertaken. The site walkover recorded night-time views in a series of photographs and notes. The view was studied to record principle lighting features and obtrusive light.

4.3.5 The night-time walkover was undertaken on 27th and 28th November 2019 between approximately 18:00 - 20:00 and 17:00 - 17:30 respectively. The moon phase at the time of the survey was new moon. The weather was noted as dry with some cloud cover with the moon partly visible.

4.3.6 In addition to the qualitative analysis of lighting conditions, during the site visit a light meter (Cert no. 66500, calibration date 8th March 2018) was used to measure illuminance along the boundaries of the site and in the centre to understand the lighting currently experienced by sensitive ecological receptors in this area. Measurements were also recorded along the Thames Path between the boundary of the site and the River Thames.

4.3.7 Both vertical and horizontal illuminance were measured. When measuring horizontal illuminance, the light meter was held flat, approximately 1.5m off the ground, free from obstructions and facing horizontal (directly upwards). Vertical illuminance was measured at the same height to the north, east, south and west at each point.

4.4 Sensitive Receptors

4.4.1 Sensitive receptors within and immediately surrounding the site have been identified drawing on the recommendations in ILP Guide 04 (2013) and drawing on desk-based information.

4.4.2 The ILP Guide 04 (ILP, 2013) recommends consideration of any of the following sensitive areas in or near the site through the assessment:

- A World Heritage Site;
- Dark Sky Core or Buffer Zones;
- National Park Area;
- Outstanding Natural Beauty (AONB);
- Sites of Specific Scientific Interest (SSSI);
- Ramsar Sites;
- Conservation Areas; or
- Vulnerable Wildlife Habitats (e.g. insects, reptiles, bats).

4.5 ILP Environmental Zone

4.5.1 The ILP have established Environmental Zones for exterior lighting based on the existing external ambient lighting levels in the area (see **Table 4.1**). The ILP Environmental Zone classification for the site has been determined based on professional judgement.

4.5.2 The ILP Environmental Zone classification determines the obtrusive light limitations for exterior lighting installations for that area. The specification of the limits for each ILP Environmental Zone are reproduced from the ILP guide (2011) in **Appendix C**.

Table 4.1: Environmental Zone Classifications, ILP 2011

Environmental Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night- time activity

4.6 Assessment

Qualitative Assessment

4.6.1 The lighting impact assessment of the proposed development having due regard to the Institution of Lighting Professionals' (ILP's) Professional Lighting Guidance Notes for the Reduction of Obtrusive Light' and 'PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessments'.

4.6.2 This report presents a qualitative assessment of the effects of construction and operational lighting from the proposed development on sensitive receptors against the existing baseline lighting conditions. The assessment accounts for in-built mitigation designed into the layout of the application such as soft landscaping.

4.6.3 The qualitative assessment considers the effects of obtrusive light on sensitive receptors.

4.6.4 A quantitative assessment has not been undertaken as a detailed lighting design was not available at the time of writing. A detailed lighting design will be prepared and submitted to RBC for approval.

4.6.5 This qualitative assessment includes the consideration of potential adverse effects of the following three components of obtrusive light (as expressed in **Figure 4.1**):

- Sky glow – the brightening of the night sky above areas with large amounts of artificial light which may be reflected from illuminated surfaces or come from direct upward lighting installations;
- Glare – the brightness of a light source which is uncomfortable when viewed against a dark background. This is mostly experienced when light sources are not covered by a shield or directed by a suitable lens / reflector set up; and
- Light intrusion – when light affects areas beyond the boundary of the area which is to be lit. This is also known as 'spill' or 'trespass' and may cause nuisance or disturbance to sensitive receptors.

4.6.6 The ILP PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessment (2013) provides guidance on undertaking lighting assessment. It should be noted that this guidance has been used to inform the lighting assessment undertaken in this report, however it does not comprise part an Environmental Impact Assessment.

4.6.7 The impacts of lighting effects during construction and operation are assessed against the criteria outlined in **Table 4.2** which is taken from the ILP PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessment (2013). Level of effect has been determined using this criteria based on professional judgement and giving consideration to both positive and negative lighting effects associated with the proposed development.

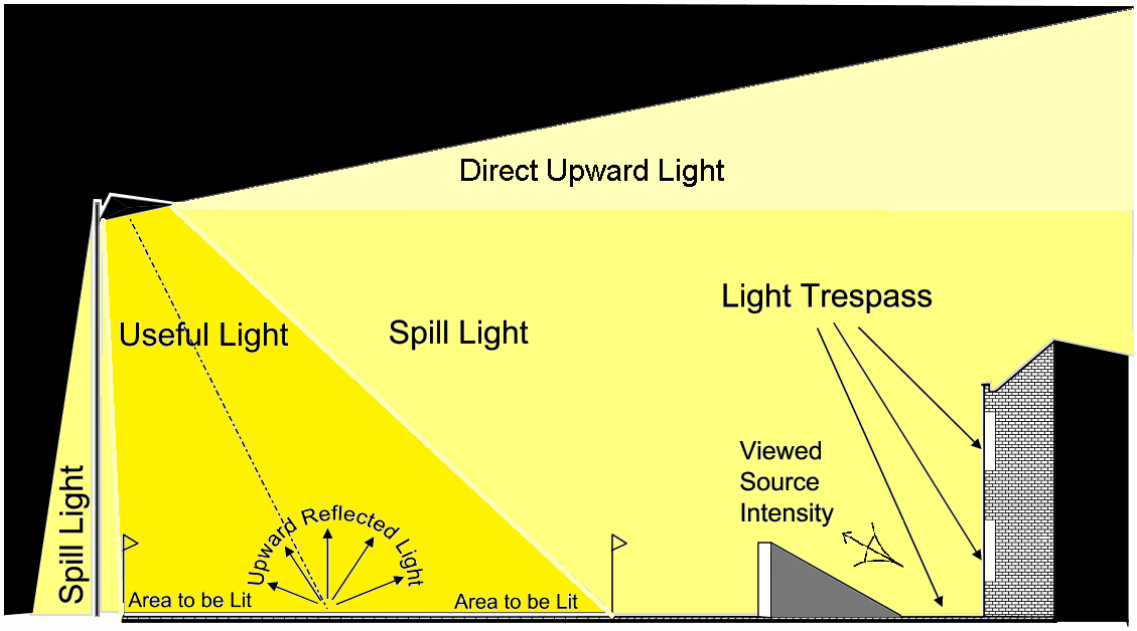

Figure 4.1: Diagrammatic Representation of Types of Obtrusive Light (ILP, 2011)

Table 4.2: Lighting Assessment Criteria (adapted from ILP PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessment (2013))

Nature	Level	Description
Positive	Major/ substantial beneficial effects	Significant improvement in night environment and/or reductions in glare, light intrusion and sky glow etc
	Moderate beneficial effects	Noticeable improvement in night environment and/or reductions in glare, light intrusion and sky glow etc
	Minor beneficial effects	Slight improvement in night environment and/or reductions in glare, light intrusion and sky glow
Neutral	None/ negligible	No significant effect or overall effects balancing out
Negative	Minor adverse effects	Slight increase in visibility of site, glare, light intrusion and sky glow etc
	Moderate adverse effects	Noticeable increase in visibility of site, glare, light intrusion and sky glow etc
	Major adverse effects	Significant problems with increase in visibility of site, glare, light intrusion and sky glow etc

4.7 Limitation

4.7.1 In the absence of statutory guidance, the ILP 'Guidance Notes for the Reduction of Obtrusive Light' and 'PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessments' have been used as criteria against which to assess the effects of artificial lighting, in accordance with best practice.

4.7.2 Some lighting that had been installed on site was not operational at the time of the survey (e.g. column mounted lighting within the car park). Therefore, the illumination readings and identified lighting noted on site may not reflect the full extent of lighting which was once operational. It is considered that this presents a robust baseline on which to make the assessment.

5 Existing Lighting Conditions

5.1 Introduction

5.1.1 This section of the report establishes the existing external lighting conditions of the site and the wider study area that form the 'baseline conditions'. Further details, including the panoramic site photos taken are provided in **Appendix D**. Existing baseline conditions of the site were determined through the site visit and conditions of the surrounding area through a desk based assessment.

5.2 Existing Lighting

5.2.1 The site is primarily comprised of existing SSE office buildings and a car park. There are a range of artificial lighting sources present on site including wall mounted amenity lighting and flood lighting for amenity and security which include Metal Halide (MH), High Pressure Sodium (HPS) and fluorescent lamps.

5.2.2 The flood lighting provided on site help illuminate the wider car park area whilst the localised amenity lighting helps illuminate the external building areas. The duration of which lighting is switched on within the site is controlled through a mix of sensors or left on permanently. Internal lighting from within the building was also visible from locations across the site. There are also lighting column present within the car park area which were not switched on at the time of the survey.

5.2.3 To the north, Light Emitting Diode (LED) column mounted lighting is present along the Thames Path and backs onto the northern site boundary which causes some minor light intrusion into this section of the site. Coloured architectural lighting and rail mounted lighting is also present on the Christchurch Bridge which is visible from the majority of the site. Residential amenity lighting is visible on the residential property on Fry's Island, as is decorative Christmas lighting.

5.2.4 To the east, bright white (anticipated to be LED or MH), spherical column mounted lighting is present within the car park of the neighbouring development which causes some lighting intrusion into the site. Internal lighting is also visible from within the buildings of the adjacent office. Beyond this, column mounted Low Pressure Sodium (LPS) lighting is visible along the B3345.

5.2.5 To the south, column mounted LED street lighting is present along Vastern Road which illuminates the pavement and front of the buildings along the southern site boundary. On the opposite side of the road is retail development and a car park. Signage lighting, advertisement lighting, internal lighting from the store and spherical HPS column mounted lighting is present within this development. Beyond this, internal lighting from the Thames Tower is visible.

5.2.6 To the west, column mounted LED street lighting is present along Lynmouth Road however this is only partly visible from within the site as it is screened along part of the western site boundary by neighbouring residential properties which back onto the site. Internal lighting from these residential properties is visible from within the site. External security lighting is also installed on some of these properties but was not in use at the time of the survey.

5.2.7 There is also clear sky glow above the site and surrounding area from Reading.

5.2.8 During the baseline survey illuminance was measured across the site, including along the boundaries and in the centre of the site. Reading were also taken along the Thames Path where it abuts the norther site boundary and the River Thames. Readings were taken at regular intervals (~ 10–20m) and where a clear change in lighting conditions were noted. The results of the lighting survey are presented in **Table 5.1** and the locations are shown on a plan

provided in **Appendix E**. Only the maximum value for vertical illuminance and the direction that this was recorded as noted in **Table 5.1**. All vertical readings are provided in **Appendix F** for completeness. **Table 5.2** below presented examples of illuminance levels associated with different lighting conditions.

Table 5.1: Illuminance Measurements

Location Number	Horizontal Illuminance (lux)	Maximum Vertical Illuminance (lux)
1	3.4	5.3 (E)
2	1.3	2.6 (N)
3	10.0	28.6 (E)
4	0.5	1.4 (N) and (E)
5	0.5	21.6 (E)
6	0.5	1.6 (S)
7	0.5	1.2 (E) and (S)
8	4.7	5.4 (N)
9	5.3	20.5 (S)
10	1.0	2.5 (S)
11	8.9	7.7 (W)
12	1.3	4.0 (S)
13	0.7	2.1 (S)
14	24.8	28.5 (W)
15	2.6	4.7 (E)
16	3.5	8.0 (E) and (S)
17	0.9	2.9 (S)
18	11.2	22.6 (S)
19	1.0	2.7 (S)
20	0.7	17.1 (W)
21	3.3	5.8 (N)
22	1.3	2.1 (S)
23	4.2	7.6 (S)
24	3.4	8.5 (S)
25	25.2	19.4 (E)

Location Number	Horizontal Illuminance (lux)	Maximum Vertical Illuminance (lux)
26	16.1	12.2 (E)
27	28.3	15.3 (W)
28	45.3	4.8 (W)

Table 5.2: Example illuminance levels (lux)

Lighting Condition	Illuminance (Lux)
British summer sunshine	50,000
Overcast sky	5,000
Well-lit office	500
Minimum for easy reading	300
Passageway or outside working area	50
Good main road lighting	5-20
Sunset	10
Typical side road lighting	5
Minimum security lighting	2
Twilight	1
Clear full moon	0.25 to <1
Typical moonlight/cloudy sky	0.1
Typical starlight	0.001
Poor starlight	0.0001

Source: Reproduced from the Bat Conservation Trust and ILP Guidance Note 08/18: Bats and Artificial Lighting in the UK (2018).

5.3 Sensitive Receptors

5.3.1 The site is not situated with a statutory or non-statutory designated area. In line with guidance outlined in **Section 4**, receptors have been identified within the surrounding area which could be potentially impacted by the proposed development.

5.3.2 Ecologically designated areas may include habitats used by light sensitive species. Such areas are primarily impacted by light intrusion onto protected habitats and are not sensitive to glare and sky glow. On this basis receptors located over 2 km from the site are unlikely to be impacted by light intrusion from the proposed development.

5.3.3 No statutory designated ecological sites have been identified within this radius. The nearest statutory designated ecology site is Clayfield Copse Local Nature Reserve which is located approximately 2.7 km north of the site on the opposite site of the River Thames.

5.3.4 Existing sensitive receptors that have been identified within the site and surrounding area are detailed in **Table 5.3**.

5.3.5 Future sensitive receptors have also been included below in **Table 5.4**.

Table 5.3 Existing Sensitive Receptors

Receptor	Description
Existing local residents	There are existing local residents located adjacent to the site boundaries that have the potential to be impacted (intrusion, glare and sky glow) by the proposed development, these are: ▪ Lynmouth Road ▪ Lynmouth Court ▪ Norman Place
Motorist, cyclists & pedestrians	Users of roads adjacent to the site that have the potential to be impacted (glare) by the proposed development: ▪ Lynmouth Road ▪ Vastern Road
Heritage	Designated heritage features have the potential to be impacted (intrusion, glare and sky glow) by the proposed development. The nearest heritage assets to the site are as follows: ▪ Main Building of Reading General Station Grade II Listed (~260m south) ▪ Kings Meadow Swimming Pool Grade II Listed (~430m east) ▪ Market Place/London Street Conservation Area (~300m south east) Given the distance, location of the site and intervening built up area, it is not anticipated that the proposed development will have a material effect on lighting conditions experienced at these receptors and therefore they are not considered further within this assessment.
Ecology	The River Thames is located to the north of the site and is anticipated to be a foraging and commuting corridor for bats (see ecological report (Ecoconsult Ltd, 2019) submitted as part of the application for further details

Table 5.4 Future Sensitive Receptors

Receptor	Description
Local Residents	Residents of the Proposed Development.
Motorist, Cyclists & Pedestrians	New internal roads and footpaths within the proposed development.

5.4 ILP Environmental Zone

5.4.1 Given the existing sources of lighting present on site and the extensive existing light sources within the surrounding area, the site has been identified through the site walkover as E3 Suburban (medium district brightness), on the edge of E4 Urban (High district brightness) as set out in ILP Guidance Notes for the Reduction of Obtrusive Light GN01:2011 (see **Appendix C**). This classification has been agreed with RBC[1].

6 Lighting Requirements

6.1.1 This Chapter outlines the minimum lighting requirements to safely and securely construct and operate the proposed development.

6.1.2 All external lighting will be designed in accordance with the following lighting standards and guidance, as a minimum.

- BS EN 12464-2:2014; Light and lighting – Lighting of work places Part 2: Outdoor work;
- BS EN 5489-1:2013; Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas;
- BS EN 13201-1:2015 Road Lighting, Part 1 Guidelines on selection of lighting classes;
- BS EN 13201-2:2015 Road Lighting, Part 2 Performance Requirements; and
- CIBSE (2016) Lighting Guide LG6 – The Outdoor Environment.

6.2 Construction Lighting

6.2.1 There will be no night-time working outside of the agreed standard working hours unless otherwise agreed with RBC for the proposed development. It is assumed that standard working hours for audible works are:

- Monday to Friday: 8am to 6pm;
- Saturday: 8am to 1pm; and
- Sunday and bank holidays: no working.

6.2.2 Work during darkness is therefore more likely during the winter months when the days are short (sunrise ~08:00 and sunset ~16:00) and lighting is required.

6.2.3 The general lighting requirement is predictable for fixed elements of the construction works such as site offices, compounds, welfare facilities, parking areas, fuel storage areas and plant storage areas.

6.2.4 Task specific lighting to maintain safety around excavation areas, concrete pour sites and other specific activities will vary according to weather conditions, programme and the particular tasks being undertaken.

6.2.5 Lighting may also be present from construction vehicles and plant which often deploy flashing lights and strobes when operating which can cause additional adverse effects to nearby receptors.

6.3 Operational Lighting

6.3.1 Operational lighting is required throughout the proposed development to provide adequate illuminate to safely navigate and move through the site and reduce the potential for crime.

6.3.2 **Sections 3.4 - 3.5** outline the relevant guidance and standards which has been used to inform lighting requirements for the proposed development and will be used to inform the subsequent lighting design.

Residential Built Development

6.3.3 Residential built development may be equipped with external security lighting to illuminate particular areas around the building. This may for example be at external doors, external amenity, car parking and footpaths leading to buildings.

6.3.4 Any residential development provided may be equipped with amenity lighting (e.g. bollards) and external security lighting to illuminate communal areas, footpaths, signage, storage areas and parking areas.

6.3.5 The external lighting design for road, footpaths and public amenity areas in areas of residential built development will be in accordance with BS 5489-1:2013, which provides standards for roads and public amenity areas.

6.3.6 Lighting designed to the standards set by BS 5489-1:2013 is also recommended in ILP guidance to act as a measure to reduce crime within developments.

Leisure Uses

6.3.7 The proposed development will provide a café on site. Operators of the facilities may develop their own standards in relation to lighting to standardise lighting installations to preserve brand identity, therefore lighting design may be influenced by occupant requirements.

6.3.8 Statutory measures for illuminance of advertisements is set out within ILP Professional Lighting Guide 05 – The Brightness of Illuminated Advertisements (2015) guidance document. The maximum permitted luminance levels outlined in this document are presented in **Table 6.1** which will be adhered to and used to inform the detailed lighting design.

Table 6.1: Luminance Limits in England

Illuminated Area	Zone E1 (candelas/m²)	Zone E2 (candelas/m²)	Zone E3 (candelas/m²)	Zone E4 (candelas/m²)
> 10 m^2	N/A	200	300	300
≤10 m^2	100	400	600	600

6.3.9 External lighting is most likely to be required during standard trading and operational hours. A lighting curfew could function that would reduce the level of external lighting post-curfew, either through dimming or part night time lighting.

Landscaping and Public Open Space

6.3.10 Landscaping and public open space will be provided as part of the proposal including a new pedestrian and cycle route through the proposed development to link Vastern Road with the Christchurch Bridge.

6.3.11 Some lighting may be required across these spaces in order to maintain safety and prevent crime, this may include column mounted lights for footpaths and walkways; or low-level lighting for signage.

6.3.12 As a general principle lighting in these areas should be kept low key and will only be installed where necessary in order to reduce the fear of crime and to maintain safety. Lighting within these areas will be designed in accordance with BS 5489-1:2013 which provides standards for the lighting of roads and public amenity areas.

6.3.13 Lighting provided along the podium that will link the pedestrian/ cycle way to Christchurch Bridge will be designed to provide a continuation and blend in with that already provided on the bridge.

Access, Roads and Junction

6.3.14 The existing access to the site off via Lynmouth Road will be retained and widened as part of the proposal and a new internal road created to enable safe access to the existing highway and effective operation of the Proposed Development.

6.3.15 Plans including the locations of the proposed lighting columns have not yet been developed but the street lighting design will be designed in accordance with the BS5489-1:2013 requirements.

7 Potential Impacts

7.1 Introduction

7.1.1 This section identifies any potential effects from the exterior lighting design on the current and/or future sensitive receptors within and surrounding the site in absence of mitigation measures.

7.1.2 Lighting during the construction phase of the proposed development may have different effects on sensitive receptors than lighting required for the operation of the proposed development and therefore have been considered separately in this section.

7.1.3 For the purposes of this assessment the effects of obtrusive light have been assessed against the baseline conditions, as set out in **Section 5**.

7.2 Environmental Zone

7.2.1 As set out in **Section 5** the desk-based review and lighting survey have indicated that the site is best characterised as ILP Environmental Zone E3 (Suburban) - medium district brightness given the extent of existing lighting present on site and is on the edge of Reading urban centre (Environmental Zone E4 (Urban) - high district brightness).

7.2.2 At this time a detailed lighting design is not available, however given the scale and nature of the proposed development and lighting requirements, it is anticipated that the site will remain as E3 (medium district brightness).

7.2.3 Therefore, effects are considered to be **Neutral** where lighting will not exceed the current Environmental Zone of the site.

7.3 Construction

7.3.1 Generally, construction lighting tends to lead to more obtrusive lighting than operational lighting because of its temporary nature, and the type of lighting equipment used. For ease of deployment and use, construction lighting tends to be mobile, and focus on providing the widest coverage of light from the fewest possible units; in order to minimise time spent maintaining and installing the equipment. This, along with the fact that it is often poorly directed or installed, can result in temporary effects of glare, light intrusion and sky glow if good practice measures are not employed.

Residents

7.3.2 There are residential receptors located to the east and west of the site on Norman Place, Lynmouth Road and Lynmouth Close. Without mitigation there is potential for receptors to be impacted temporarily by light intrusion and glare. It is unlikely residential receptors will notice a change in sky glow given their location within the centre of Reading and the existing levels of sky glow. Therefore there is potential for a temporary **Moderate Adverse** effect (without mitigation) on nearby residential receptors.

Motorist, Cyclists & Pedestrians

7.3.3 Misdirected lighting orientated onto nearby roads can cause glare and has the potential to dazzle drivers on Lynmouth Road and Vastern Road where construction lighting is poorly orientated. Without mitigation there is therefore potential for there to be a **Minor** - **Moderate Adverse** effect.

Ecology

7.3.4 The River Thames is located to the north of the site and used by bats as a foraging and commuting corridor. Lighting intrusion onto this corridor during the construction phase (e.g. from temporary flood lighting) has the potential to increase the illumination along this area and deter bats from using this route. Therefore, without the implementation of mitigation measures there is potential for there to be a **Major Adverse** effect to ecological receptors.

7.4 Operation

Residents

7.4.1 Nearby residents adjacent to the western and eastern site boundaries on Lynmouth Road, Lynmouth Court and Norman Place have the potential to be negatively affected by light intrusion and glare associated with the operation of the proposed development. Given the location of the site within central Reading and the level of existing sky glow already present it is not anticipated that residential receptors will be adversely affected by changes to the level of sky glow created by the proposed development.

7.4.2 Some landscaping will be provided along the eastern boundary which will act as a buffer, reducing the amount of potential for light intrusion from new internal street lighting and external lighting on new residential buildings. Along the eastern and western site boundaries there is also some low-level screening provided in the form of walls, fencing and vegetation (trees) which will help limit light intrusion and filter night-time views at the ground floor level.

7.4.3 In the absence of mitigation, there is still however potential for there to be **Moderate Adverse** effects to existing residential receptors associated with light intrusion and glare should lighting be poorly located and orientated.

7.4.4 Future residents have the potential to be impacted by existing obtrusive lighting in proximity to the site boundary. During the site visit no lighting visible glare from surrounding light source was visible and therefore it is not anticipated this will have an adverse effect to future residential receptors.

7.4.5 There is however existing light intrusion into the site from external lighting in proximity to the site boundaries including HPS flood lighting on an SSE building which abuts the eastern site boundary, LED street lighting along Vastern Road and LED lighting along the Thames Path. Maximum horizontal lux values along the northern, eastern, southern site boundaries were 8.9, 24.8 and 5.4 lux respectively. Limited external lighting was present along the western site boundary and illumination levels recorded along this boundary are more reflective of lighting presented on site as opposed to surrounding sources.

7.4.6 Residential buildings are set back from the existing sources of lighting and intervening landscaping that provides partial screening is provided in places, limiting the potential for light intrusion into bedrooms. It is therefore anticipated that effects to these receptors will be **Neutral**.

Motorist, Cyclists & Pedestrians

7.4.7 Effects of obtrusive light to road users are primarily related to glare. Disability glare reduces the contrast between objects and their background such that their visibility is decreased. Glare can also impact pedestrians, cyclists and pedestrians although this is not as critical as for motorists, because speed of movement is much lower, giving a greater reaction time[2].

[2] BS EN 5489-1:2013 Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas.

7.4.8 The existing site access will be widened and a new internal street and car parking will be provided as part of the proposed development which will be lit. Lighting provided in these areas will be designed in accordance with BS 5489-1:2013 and to achieve the relevant class of lighting, in accordance with BS EN 13201-2:2003. Intensity limits should be used to control direct glare from luminaires. As such it is not anticipated that lighting will result in disability glare to surrounding road users.

7.4.9 Lighting will also be provided along the new podium which will link to Christchurch Bridge to enable safe access and wayfinding for pedestrians and cyclists.

7.4.10 It is therefore not anticipated that operational lighting will have an adverse effect on existing or proposed road users and effects are anticipated to be **Neutral**.

Ecology

7.4.11 Residential development and internal streets are set back approximately 5-10 m from the northern site boundary which will reduce the potential for light intrusion in this part of the site. Landscaping is provided within this set back area, including tree planting, which will help also help filter and screen light to the north.

7.4.12 There may however be some light intrusion from the proposed development onto the banks of the River Thames where lighting is orientated outwards, towards the river. Where lighting is provided on the podium ramp which links to the Christchurch Bridge there is also potential for light intrusion into the River Thames.

7.4.13 It should be noted that there is already existing lighting provided along the Thames Path. Horizontal lux levels along the path where it abuts the northern site boundary vary from 16.1 – 45.3 lux and vertical lux levels from the south, towards the river vary from 0.5 – 3.1 lux.

7.4.14 In the absence of mitigation measures, effects to ecological receptors on the River Thames are anticipated to be **Moderate Adverse**.

8 Mitigation Measures

8.1 Introduction

8.1.1 This section sets out measures to mitigate potential impacts (identified in **Section 7**) on sensitive receptors (identified in **Section 5**).

8.2 Construction

8.2.1 Potential effects resulting from artificial lighting during construction can be mitigated through a range of design and control measures, including the use of shields and hoods on luminaires, appropriate timing of working hours and operation of security lighting, as well as consideration of the orientation of luminaires, and the avoidance of 'over-lighting'.

8.2.2 General principles to mitigate the adverse effects of lighting associated with construction of the proposed development are listed below:

- Construction lighting should be directed so it does not create light intrusion outside of the immediate working area;
- Sufficient lighting units used to avoid the need for tall, wide beam lighting units to illuminate large areas;
- Vehicle lights should be properly directed and lenses must be intact to prevent un-necessary glare and breakout of obtrusive light (this is also an MOT requirement);
- Lighting should be reduced when not required for safety purposes. Security lighting should be kept at the minimum level needed for visual and security protection;
- If appropriate, to reduce the need for fixed visible lighting outside working hours, the use of infrared flood lighting and CCTV systems should be considered for security;
- All lighting related to the works will be designed and fitted to minimise light intrusion onto any sensitive habitat such the River Thames;
- The use of visual screening, such as hoardings between more sensitive visual receptors and construction light sources in proximity to the site; and
- Dark corridors along the River Thames should be maintained during the evening, overnight or early morning (i.e. outside approximately one hour before dusk and one hour after dawn) by avoiding light intrusion on this area. This will avoid the fragmentation of this bat corridor.

8.3 Operation

8.3.1 Potential effects on sensitive receptors during operation of the completed scheme can be avoided through appropriate lighting design. Measures to mitigate potential effects such as sky glow, glare or light intrusion include the type of luminaire, as well as the design and positioning of lights (e.g. power, orientation, and height of the luminaire), the use of shields and dimming or part night lighting. The following principles should be considered during the detailed lighting design:

- Lighting should be directed away (or controlled) from the sensitive receptors identified in **Section 5.3** to prevent obtrusive light adversely affecting them;

- Minimising light break-out above the horizontal using 'full cut-off' lighting systems. This is achieved through placing lighting units correctly and also by fitting them at a height such that they can be directed downwards rather than horizontally;

- Lighting should be designed to avoid reflectance from buildings and plant – so external lighting should be mounted onto buildings or on lighting stands and directed to the area where it is needed rather than facing building facades. Surfaces should be dark in colour and uniformed, i.e. no bright concrete with preferences towards tarmac and dark paving;

- Reducing external lighting levels outside working hours (post-curfew) to levels suitable for maintaining safety and security; and

- Use of automated devices to switch lights (particularly security lighting) on and off according to activity/ambient light levels.

8.3.2 The central principle of mitigation for operational lighting of the Proposed Development is that the detailed lighting designs are kept within the limitations set for obtrusive light (see **Appendix E**) for the appropriate ILP Environmental Zone. As noted in **Section 7.2**, it is anticipated that this is achievable given the scales and nature of the proposed development.

8.3.3 Ecological design objectives to minimise the adverse effects of lighting on local wildlife using River Thames as foraging and commuting corridors are listed below and will be taken into consideration during preparation of the detailed lighting design:

- The lighting design should be bat sensitive and allow 'dark corridors' along the River Thames to be maintained. This can be facilitated by fitting lamps with hoods, cowls, louvers or shields. This will help avoid the fragmentation of the habitat used by protected species such as bats, that use these features at night-time for refuge;

- The use of a Central Monitoring System (CMS) to control lighting could be used to help reduce disturbance of bat commuting and foraging corridors by enabling lighting to be dimmed or switched off in these areas during bat commuting or emergence times. This implementation of a CMS wil be considered at the detailed lighting design stage; and

- Where lighting is required in proximity to the River Thames, consideration should be given to the use of luminaries which have a lesser impact on bats, including those which have a: low or no Ultra Violet (UV) element; warm white spectrum to reduce blue light content; and/or feature peak wavelengths higher than 550 nm (see Bat Conservation Trust and ILP – Bats and Artificial Lighting in the UK (2018) for further details).

8.3.4 A lighting plan providing contours of illuminance from proposed external lighting within the site will be prepared and used to inform the preliminary lighting design to enable target illuminance levels to be achieved for sensitive receptors.

9 Residual Effects and Conclusion

9.1 Introduction

9.1.1 This section identifies the residual obtrusive light effects from the proposed development and any mitigation that will be considered during preparation of a preliminary lighting design at the detailed design stage.

9.2 Residual Effects

9.2.1 With the implementation of the proposed mitigation measures during preparation of the preliminary lighting design, it is anticipated that potential obtrusive lighting effects will be reduced so they are within guideline levels. The residual effects anticipated to sensitive receptors are outlined in **Table 9.1** below.

Table 9.1: Residual Effects

Receptor	Effect (before mitigation)	Residual Effect (with the implementation of mitigation)	Comments
Construction			
Existing local residents	Moderate Adverse	Minor Adverse	During demolition and construction, temporary fixed lighting from the proposed development (e.g. from site offices and compounds) and task specific lighting (e.g. around excavation areas) as identified in Section 6 may be visible to nearby receptors and impact ecological receptors, especially during the winter months when it becomes dark during standard working hours. Effects such as glare and intrusion onto these receptors can be reduced through the implementation of the mitigation measures set out in Section 8.2.
Motorist, cyclists & pedestrians	Minor - Moderate Adverse	Neutral	
Ecology	Major Adverse	Neutral	
Operation			
Residents	Existing Residents: Moderate Adverse Future Residents: Neutral	Existing Residents: Neutral Future Residents: Neutral	During the operational phase, it is anticipated that functional lighting associated with the proposed development will be designed to within the limitation of Environmental Zone for the site (E3 – Suburban). A number of other mitigation measures have also been identified such that potential
Motorist, cyclists & pedestrians	Neutral	Neutral	

Receptor	Effect (before mitigation)	Residual Effect (with the implementation of mitigation)	Comments
			adverse effects to nearby residential receptors are limited.
Ecology	Moderate Adverse	Neutral	Mitigation measures have been identified to limit light intrusion onto the River Thames to reduce potential for disturbance to light sensitive species using this corridor. There may be a local increase in lux levels around the new podium where this joins with the existing Christchurch Bridge (and is in close proximity to the River Thames) however this will be in keeping with existing lighting provided.

9.3 Conclusions

9.3.1 The site currently contains a number of artificial light sources associated with the existing SSE development including wall mounted amenity lighting and flood lighting for amenity and security which include Metal Halide (MH), High Pressure Sodium (HPS) and fluorescent lamps. There are a variety of light sources in proximity to the site, including from surrounding roads, paths and car parks (e.g. LED lighting on Vastern Road, Lynmouth Road and the Thames Path) and coloured architectural lighting on the Christchurch Bridge. To the south of Vastern Road signage and advertisement lighting is provided at the nearby retail outlet and internal lighting from office buildings such as Thames Tower is visible. The Environmental Zone for the site has therefore been identified as E3 (Suburban) in proximity to the E4 (Urban) centre of Reading as agreed with RBC.

9.3.2 The proposed development will introduce new sources of artificial lighting to this area associated with roads, car parking, new bridge, residential and leisure development. To mitigate against this, lighting limitations of Zone E3 (Suburban) will be targeted during the detailed lighting design. Mitigation measures identified in the Bat Conservation Trust and ILP – Bats and Artificial Lighting in the UK (2018) will also be used to help inform the lighting design of elements in close proximity to the River Thames (e.g. the new podium) to reduce potential adverse impacts to bats using this corridor.

9.3.3 A number of additional mitigation measures and general design considerations have been identified in **Section 8** which will reduce impacts associated with glare, light intrusion and sky glow to these receptors during construction and operation to reduce potential impacts to an acceptable level.

9.3.4 A preliminary lighting design will be submitted for the approval of RBC which will be informed by an illuminance contour plan of external lighting for the proposed development to demonstrate that obtrusive light limitations for sensitive receptors can be achieved.

9.3.5 The preliminary lighting designs will aim to provide suitable lighting for the proposed land uses to allow them to function safely and effectively, in accordance with the relevant guidance and standards and recommendations presented with this lighting assessment.

Appendix A Floor Plans

Drawing Numbers 448.SK.100 - 448.PL.H.200

00 - Ground Floor

project
Vastern Road
Reading

drawing
Proposed Floor Plans
00 - Ground Floor

date	scale @ a3	drawn
August 2019	1:500	DMT

drawing number	revision
448.SK.100	/

revision	date	prepared	description

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F: 01753 646855
www.berkeleygroup.co.uk

01 - First / Upper Ground Floor

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01 - First / Upper Ground Floor

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Farnham Royal
SL2 3RQ

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F: 01753 646855
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02 - Second Floor

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Proposed Floor Plans
02 - Second Floor

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03 - Third Floor

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03 - Third Floor

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05 - Fifth Floor

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07 - Seventh Floor

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07 - Seventh Floor

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08 - Eighth Floor

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08 - Eighth Floor

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09 - Ninth Floor

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09 - Ninth Floor

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10 - Tenth Floor

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10 - Tenth Floor

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key plan

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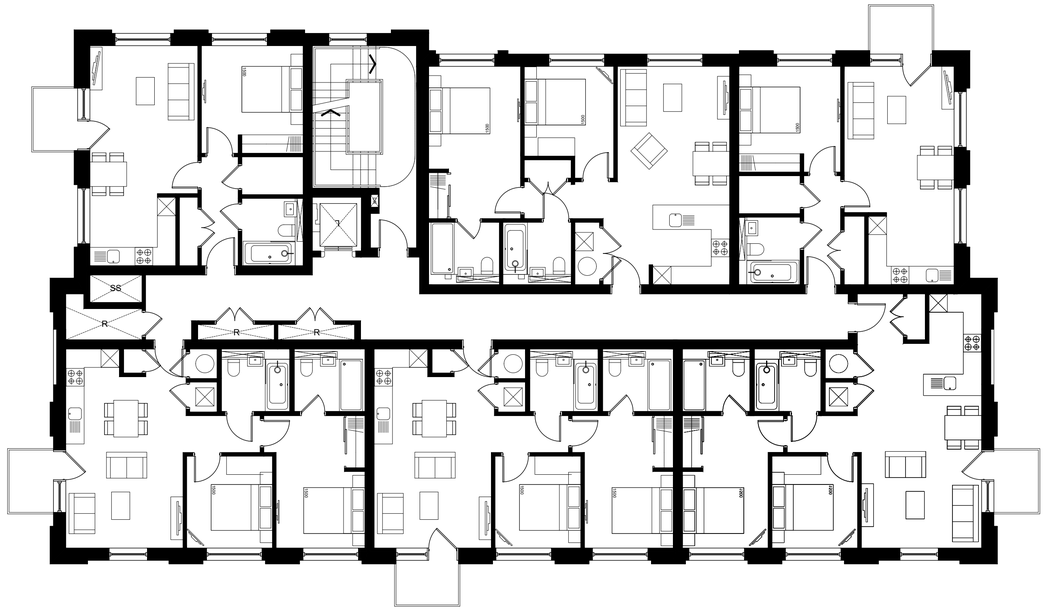
Ground Floor



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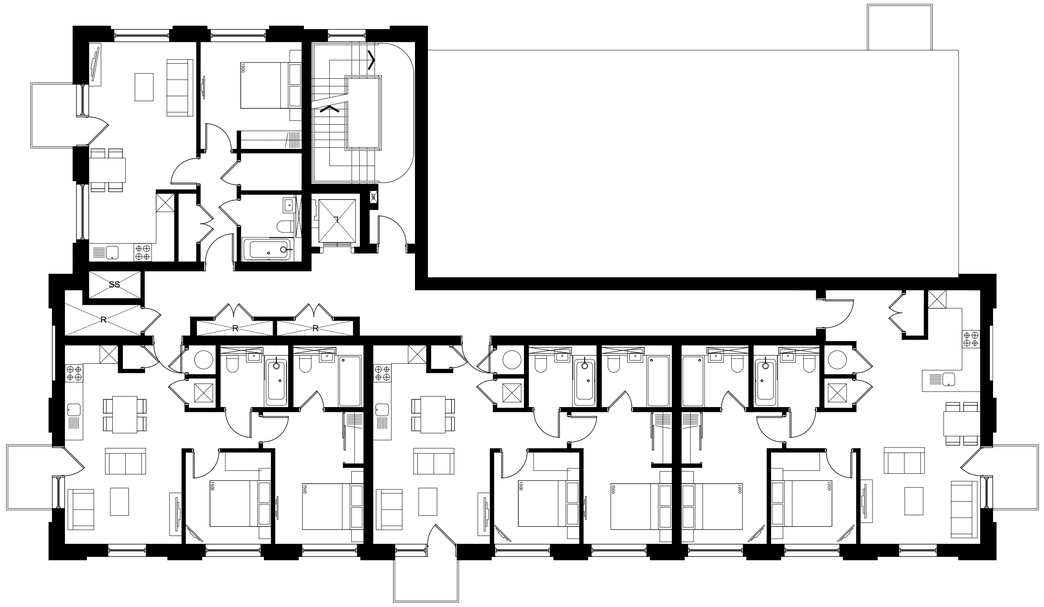
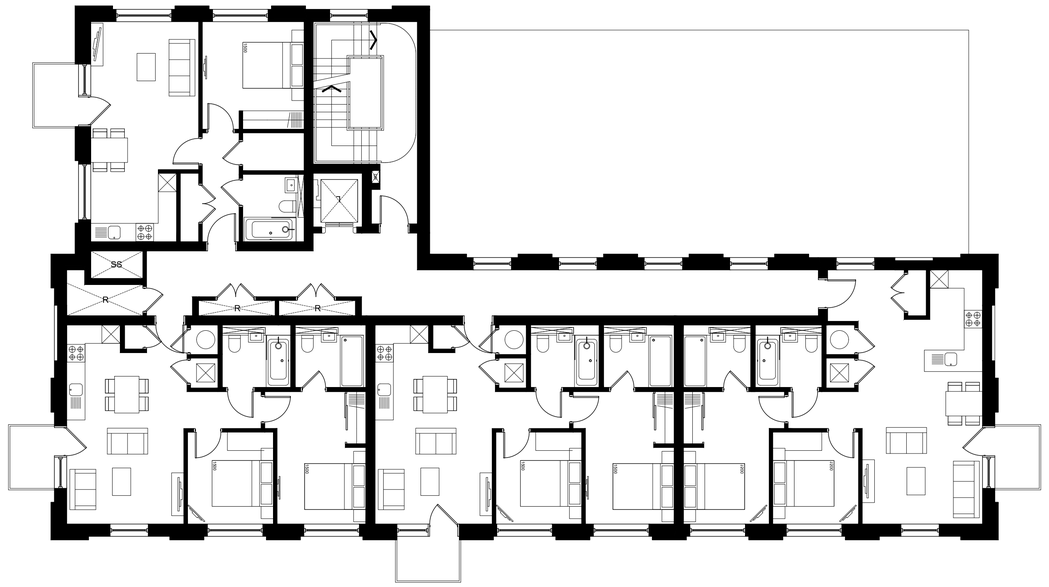


Second Floor



Third Floor

0 1 5 10m

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Ground - Third Floor

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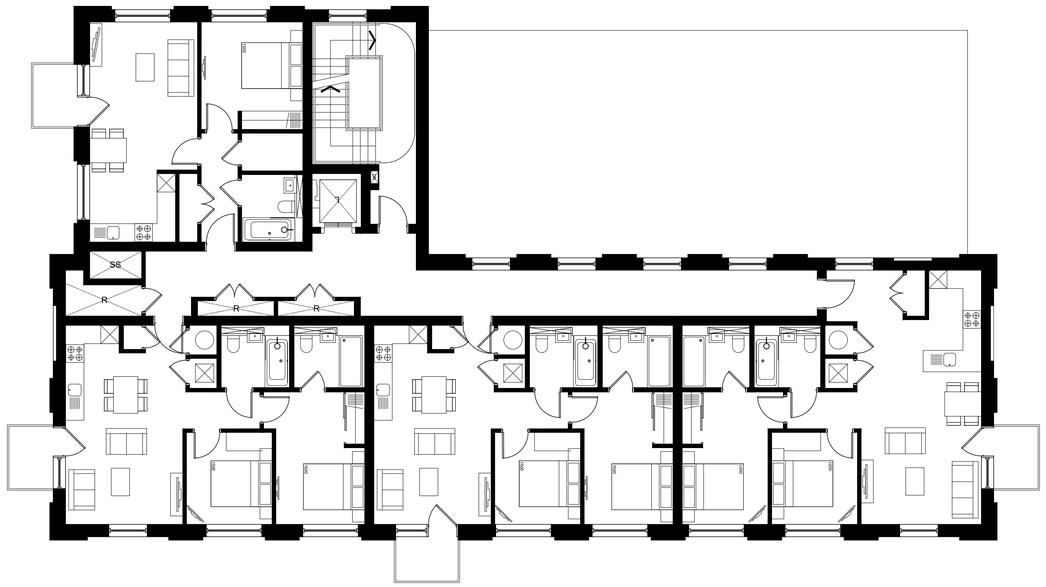
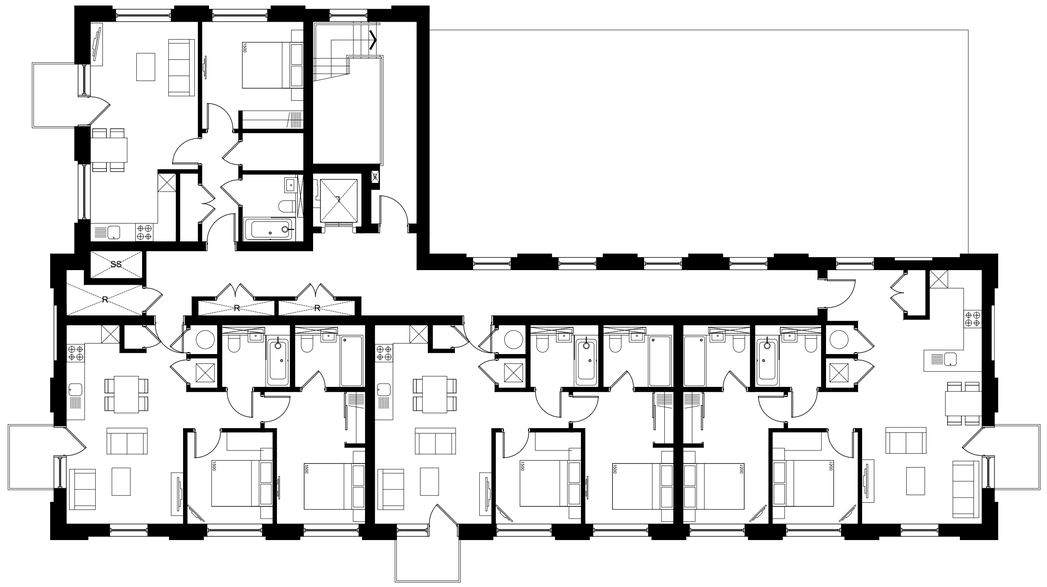
key plan

notes



Fourth Floor



Fifth Floor

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