

Blossom Street

**11 Daylight, Sunlight,
Overshadowing, Solar Glare & Light Pollution**

Replacement Environmental Statement

Volume I

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Preface – Update 2015

- This replacement November 2015 Environmental Statement (hereafter referred as the 'November 2015 Replacement ES' or 'this Replacement ES') takes into account the design changes to the Blossom Street project (refer *Chapter 4: Proposed Development*) that have occurred since the submission of the application in December 2014 ES and concludes if any changes to the likely significant effects occur as a result of those changes. This Replacement ES consolidates the environmental assessment of the design changes into a single ES, presenting commentary (under the heading 'Update 2015') for the design changes in the March 2015 ES Addendum (the 'March 2015 Addendum') by blue text, and the design changes arising from the current design changes by red text. Where relevant, text removed will be denoted by strike-through, e.g. effect), and updated tables and figures will be denoted by the suffix 'A' (e.g. Table 2.10A).
- This Replacement ES adopts the following terminology to describe the development descriptions and design changes:
 - Proposed Development: description of the development presented in the December 2014 ES;
 - Revised Scheme: description of the scheme incorporating the design changes to the Proposed Development in March 2015 (the design changes referred as the 'March 2015 amendments'), assessed within the March 2015 ES Addendum;
 - Amended Proposed Development: description of the development incorporating the current design changes to the Revised Scheme (the design changes referred as the 'November 2015 amendments'), to be assessed within the November 2015 Replacement ES.
- Further details in regard to the approach taken in this November 2015 Replacement ES are outlined in *Chapter 2: EIA Methodology*.

Introduction

- 11.1 This chapter of the Environmental Statement (ES) assesses the potential significant effects of the Proposed Development on daylight, sunlight, overshadowing, solar glare and light pollution within neighbouring residential receptors and amenity areas. The technical analysis has been undertaken in accordance with the Building Research Establishment (BRE) 2011 criteria (Ref. 11-1).
- 11.2 The chapter outlines the relevant policy context, describes the methodologies applied and the existing baseline conditions in and around the Site, and identifies the potential effects associated with the Proposed Development. Mitigation is set out as necessary and the resulting likely residual effects are identified.
- 11.3 This chapter has been prepared by Gordon Ingram Associates and is supplemented by daylight and sunlight assessments; an overshadowing assessment; a light pollution assessment; solar glare assessments; and an internal daylight, sunlight and overshadowing report, which are presented within *ES Volume III: Appendix F*.

Legislation and Planning Framework

National Legislation

Environmental Protection Act (1990)

- 11.4 Section 79 of the Environmental Protection Act, 1990 (Ref 11-2), as amended by the Clean Neighbourhoods and Environment Act, 2005, states the following with regards to light pollution:
- "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 the complaint".*

National Policy and Guidance

National Planning Policy Framework (2012)

- 11.5 The National Planning Policy Framework (Ref 11-3), adopted on the 27th March 2012, replaces the Planning Policy Statements and Planning Policy Guidance and stipulates that:

"...planning policies and decisions should always seek to secure a good standard of amenity for existing and future occupants of land and buildings."

- 11.6 In addition, the NPPF stipulates:

"By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity..."

Planning Practice Guidance 2014

- 11.7 The Planning Practice Guidance (PPG) was launched in 2014 (Ref 11-4), creating an online resource for planning practitioners. The guidance does not provide any further detail in terms of amenity beyond that stated in the NPPF.

Regional Policy and Guidance

The London Plan (2011)

- 11.8 The key policies from the London Plan (Ref. 11-5) of relevance to this assessment are detailed below:
- Policy 7.6 states: *"...buildings and structures should...not cause unacceptable harm to the amenity of surrounding land and buildings, particularly residential buildings, in relation to privacy, overshadowing, wind and micro-climate."*; and
 - Policy 7.7 notes that large buildings should not adversely affect their surroundings in terms of overshadowing and solar reflected glare: *"Location and design of tall buildings should not affect their surroundings adversely in terms of microclimate, wind turbulence, overshadowing, noise, reflected glare, aviation, navigation and telecommunication interference."*

Revised Early Minor Alterations to the London Plan (2013)

- 11.9 The Revised Early Minor Alterations (Ref 11-6) do not alter policies 7.6 and 7.7 and no new policy has been introduced with relevance to daylight, sunlight and overshadowing.

Draft Further Alterations to the London Plan (2014)

- 11.10 Draft Further Alterations to the London Plan (Ref. 11-7) do not affect the policies already noted in the London Plan 2011.

Supplementary Planning Advice on High Buildings and Strategic Views in London (1999)

- 11.11 This sets out the planning policies for high buildings and strategic views in London (Ref. 11-8). Its principal purpose is to advise local planning authorities during the preparation and review of their development plans; in the exercise of their development control decisions; and in the formulation of their own policies in relation to high buildings and views.
- 11.12 In terms of microclimate, it recommends that local planning authorities should consider a development's effect on, *inter alia*, sunlight, overshadowing, and light reflection.

Local Policy and Guidance

LBTH Core Strategy (2010)

- 11.13 The Site is located within the London Borough of Tower Hamlets (LBTH) and this assessment has therefore been undertaken with regard to the LBTH adopted Core Strategy (Ref. 11-9). In particular, Policy SP10.4 seeks to:

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“...4. Ensure that buildings and neighbourhoods promote good design principles to create buildings, spaces and places that are high-quality, sustainable, accessible, attractive, durable and well-integrated with their surrounds. This will be achieved through ensuring development:

...Protects amenity, and promotes well-being (including preventing loss of privacy and access to daylight and sunlight)...”

LBTH Managing Development Document (2013)

11.14 The LBTH Managing Development Document (MDD) (Ref 11-10) was adopted in April 2013 and sets out the detailed policies to guide development in the Borough.

11.15 Policy DM25 Amenity outlines the Council's aim to minimise the daylight, sunlight and overshadowing impacts caused by new developments. The Council's aim is “to ensure the design of new development optimises the levels of daylight and sunlight”.

11.16 Policy DM25 Amenity states that:

“Development should seek to protect, and where possible improve, the amenity of surrounding existing and future residents and building occupants, as well as the amenity of the surrounding public realm by:

(c) ensuring adequate levels of daylight and sunlight for new residential developments; and

(d) not resulting in an unacceptable material deterioration of the sunlighting and daylighting conditions of surrounding development including habitable rooms of residential dwellings, schools, community uses and offices and not result in an unacceptable level of overshadowing to surrounding open space...”

Other Relevant Policy and Guidance

Commission for Architecture and the Built Environment Guidance on Tall Buildings (2007)

11.17 Paragraph 4.6(vi) of the Commission for Architecture and the Built Environment (CABE) guidance (Ref 11-11) recommends that consideration be given to “the effect on the local environment, including microclimate, overshadowing, night time appearance, vehicle movements and the environment and those in the vicinity of the building.”

Building Research Establishment (BRE) Guidelines: Site Layout Planning for Daylight and Sunlight 2011, A Guide to Good Practice, Second Edition

11.18 The Building Research Establishment (BRE) Guidelines ‘Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice 2011’ (Ref 11-1) provides advice on site layout, planning to achieve good sunlighting and daylighting within buildings, and in the open spaces between them. It is intended for building designers, developers, consultants and Local Planning Authorities (LPAs). The advice it gives is not mandatory and should not be used as an instrument of planning policy. Of particular relevance, it states:

“This guide is a comprehensive revision of the 1991 edition of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice. It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location.”

11.19 It also states:

“The advice is given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. In special circumstances the developer or planning authority may wish to use different target values... in an area with modern high rise buildings, a higher degree of obstruction maybe unavoidable if new developments are to match the height and proportions of existing building” (para. 1.6).

11.20 In addition, the BRE Guidelines state (para. 1.3) that “it is intended to be read in conjunction with the interior daylighting recommendations in the British Standard 8206-2 Code of practice for daylighting, and in the CIBSE publication Lighting guide: daylighting and window design”.

British Standard (BS) 8206 Part 2: (2008)

11.21 The British Standard 8206 Part 2 (Ref 11-12) provides recommendations regarding the design for daylight in buildings and sets out various methods for assessing daylight. The document states:

“Daylighting gives to a building a unique variety and interest. An interior which looks gloomy, or which does not have a view to the outside when this could reasonably be expected, will be considered unsatisfactory by its users.”

Applications Manual Window Design of the Chartered Institute of Building Services Engineers (CIBSE)

11.22 This guide (Ref 11-13) replaces the CIBSE Applications Manual Window Design (1987) and provides a daylight design guide. It states:

“When daylighting decisions are made, however, they will have implications for other, interrelated aspects of window performance such as solar heat gain, winter heat loss, provision of view, acoustic performance, privacy, security and protection from fire.”

Legislation and Planning Framework - Update 2015

March 2015 ES Addendum

11.23 Since the submission of the December 2014 ES, no changes to daylight, sunlight, overshadowing and light pollution legislation or planning policy have been made that affect the assessment in the December 2014 ES.

November 2015 Amendments

The London Plan (2015)

11.24 The adoption of the FALP in March 2015 resulted in the consolidation of changes to the London Plan (2011) to become the ‘London Plan (2015)’ (Ref. 11-18). The London Plan (2015) also incorporates the REMA, which were published in October 2013.

11.25 No significant changes were made to the policy affecting the assessment as part of the adoption of the London Plan 2015 and does not alter the overarching content of the policy review undertaken as part of the December 2014 ES.

Minor Alterations to the London Plan (2015)

11.26 On 11th May 2015 the Mayor of London published for six weeks public consultation (11th May to 22nd June) two sets of Minor Alterations to the London Plan – on Housing Standards and on Parking Standards (Ref. 11-19). Both sets of minor alterations were to be considered at a public examination, commencing on 21st October 2015.

11.27 These minor alterations have been prepared to bring the London Plan in line with new national housing standards and car parking policy. These alterations do not propose any significant changes to the policy relevant for the assessment.

Assessment Methodology and Significance Criteria

Consultation

11.28 LBTH has been consulted throughout the evolution of the Proposed Development. The scope of the daylight, sunlight, overshadowing, solar glare and light pollution assessment for the EIA was set out in the EIA Scoping Report submitted to LBTH in July 2014. The EIA Scoping Opinion identified a list of information to be accounted for within the assessment. These have been addressed within this chapter (refer below) or where topics have not been addressed, reasons are provided.

11.29 Matters addressed include:

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Table 11.1 Matters raised within Scoping Opinion

Topic	Reference in Chapter / Application Documentation
London Borough of Tower Hamlets	
Both internal and external receptors will need to be assessed in the EIA.	Refer 'Potential Effects and Mitigation Measures' section
The internal daylight and sunlight assessment can be appended to the main ES, but the conclusions of the internal daylight and sunlight assessment will need to be incorporated in to the main chapter	Refer 'Potential Effects and Mitigation Measures- Internal Daylight, Sunlight and Overshadowing within the Proposed Development' section Refer ES Volume III: Appendix F
It is useful for the actual assessment criteria for Vertical Sky Component (VSC) and No Sky Limit (NSL) to be agreed at the EIA Scoping stage. The appropriate bands that should be used for VSC and NSL are: - 0% to 20% - Negligible significance; - 20.1% to 30% reduction – Minor significance; - 30.1 to 40% reduction – Moderate significance; and - Above 40% reduction – Major significance.	Refer 'Evaluating Effects and Significance – Daylight, Sunlight, Overshadowing and Solar Glare' section
A 'pass/ fail' column must to be included for the daylight and sunlight tables.	Refer ES Volume III: Appendix F
Where low levels of daylight in the outline elements of the development are apparent from the VSC calculations, it would be helpful to provide Average Daylight Factor (ADF) values for notional window and room sizes for the worst affected areas so as to establish that it is possible to avoid the creation of rooms in residential properties that are so dark as to be effectively uninhabitable	Refer ES Volume III: Appendix F
For sunlight, the Annual Probability of Sunlight Hours (APSH) in summer and winter should be assessed for windows that face within 90 degrees of due south.	Refer 'Methodology for Determining Operational Effects' section Refer ES Volume III: Appendix F
Data should be provided in the chapter as a table, showing the existing, proposed and cumulative situations. All data should be submitted in a form which can be independently verified and should include digital copies of any drawings, 3D models, calculation sheets, etc.	Refer ES Volume III: Appendix F

Terminology

11.30 For the purposes of this chapter, the following terminology and abbreviations have been used when describing the assessment methodology:

- Building Research Establishment (“BRE”);
- Vertical Sky Component (VSC);
- No-Sky Line (NSL);
- Average Daylight Factor (ADF);
- Annual Probable Sunlight Hours (APSH); and
- Upward Light Ratio (ULR).

Assessment Methodology

Methodology for Determining Baseline Conditions and Sensitive Receptors

Residential Properties

11.31 The BRE Guidelines suggest that residential properties have the highest requirement for daylight and sunlight and states that

“the guidelines are intended for use for rooms in adjoining dwellings where light is required, including living rooms, kitchens and bedrooms”.

11.32 Therefore, this chapter focuses on those residential buildings surrounding the Site which would have the potential to be affected by the Proposed Development. Residential occupation of adjoining properties was established using external observation (site visit November 2013) and Valuation Office Agency (VOA) checks.

Amenity Areas

11.33 Due to the southerly rotation of the sun we have only considered the amenity areas located to the north of the Site.

Scenarios Assessed

11.34 The following scenarios have been assessed and are reported within this Chapter of the ES:

- Baseline;
- Proposed Development; and
- Cumulative.

Baseline

11.35 The Baseline Scenario consists of the Site in its existing cleared condition, along with the surrounding existing buildings. This scenario is depicted on drawing no. 3005/58 to 60 (**ES Volume III: Appendix F**).

Proposed Development

11.36 The Proposed Development scenario consists of the Proposed Development in the context of the surrounding existing environment. This scenario assesses the potential daylight, sunlight, overshadowing, solar glare and light pollution impacts of the Proposed Development on the surrounding residential receptors and amenity spaces.

11.37 The Proposed Development scenario is illustrated on drawing no. 3005/137-139 in (**ES Volume III: Appendix F**).

Cumulative Scenario

11.38 The cumulative scenario considers the Proposed Development and the surrounding cumulative schemes and compares this against the baseline. Details of the cumulative schemes considered in the assessment are presented in **Chapter 2: Methodology**.

11.39 Professional judgement has been applied to identify the list of cumulative schemes for consideration, so as to ensure that only the cumulative developments with the potential to generate impacts relating to daylight, sunlight, overshadowing, solar glare and light pollution, in conjunction with the Proposed Development, are included within the cumulative effects assessment.

11.40 This scenario is depicted on drawing no. 3005/140-142 (**ES Volume III: Appendix F**).

11.41 The cumulative schemes that are considered within this scenario are as follows:

- Principal Place;
- The Stage Shoreditch;
- Silwex House, Quaker Street; and
- Bishopsgate Goodyard.

Technical Assessment Methodology

Methodology for Determining Construction Effects

11.42 Owing to the evolving and changing nature of demolition and construction activities, the assessment of potential impacts during demolition and construction of the Proposed Development on daylight and sunlight to surrounding properties has not been modelled. Instead, a qualitative assessment has been undertaken using professional judgement and experience.

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11.43 Since the potential impacts relating to demolition and construction works will vary throughout the construction programme and gradually increase to the potential impacts identified for the completed Proposed Development, the interim construction impacts are not assessed quantitatively as it is considered that the completed Proposed Development represents the worst case assessment in terms of likely daylight, sunlight, overshadowing, solar glare and light pollution impacts.

Methodology for Determining Operational Effects

11.44 The following approaches are undertaken to assess the impact on residential receptors of surrounding properties when the Proposed Development is completed and operational:

- Daylight
 - VSC
 - NSL
 - ADF
- Sunlight
 - APSH

11.45 Approaches to assessing impact on external amenity areas:

- Sun on the Ground
- Transient Overshadowing

11.46 The impact of Solar Glare also undertaken on surrounding road users and surrounding occupants of buildings, as is the impact arising from Light Pollution.

Outline Approach for Daylight, Sunlight and Overshadow Assessments

11.47 The technical analyses carried out to inform the daylight, sunlight, and overshadowing, assessment have been undertaken by creating a digital three dimensional (3D) model of the existing Site and Proposed Development, based on measured survey data.

11.48 The 3D model uses Waldram Diagrams to establish the VSC and 3D geometric calculations for daylight distribution. This model (which is orientated to north by the use of Ordnance Survey (OS) information) enables the path of the sun to be tracked throughout the year to establish the shadow cast by the existing and proposed buildings and thus calculate the sun hours on ground in each scenario.

11.49 Where actual room layouts were available, these have been considered in regards to the modelling of the surrounding properties. Where layout information was not available assumptions have been made as to the use and internal configuration of the rooms (from external observations) behind the fenestration observed. In such cases a standard 4.2 metre (m) (14ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable (refer spreadsheets within **ES Volume III: Appendix F**). Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL and ADF.

11.50 Floor levels have been assumed for adjoining properties assessed, where access has not been obtained. This dictates the level of the working plane which is relevant for the NSL assessments

11.51 Only those surrounding properties which have windows facing towards the Site were included in the assessment. If a nearby property has no windows facing the Site, these properties would not be affected by the Proposed Development in terms of light.

Daylight

11.52 The BRE Guidelines provide that (para. 2.2.5):

“both the total amount of skylight and its distribution within the building are important”

11.53 The BRE Guidelines provide two methods of assessing daylight:

- the VSC, which assesses the quantum of skylight; and
- the NSL which considers the distribution in a room's space.

11.54 A third method of assessment, the ADF, is provided for new developments and has also been undertaken as a supplement to the VSC and NSL assessments. Each method is described in more detail below:

Vertical Sky Component

11.55 The VSC method of assessment is defined in the BRE Guidelines as the:

“ratio of that part of illuminance at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminate on a horizontal plane due to an unobstructed hemisphere of this sky”.

11.56 This ratio is the percentage of the total unobstructed view that is available, once obstructions (e.g. the Proposed Development), are placed in front of the point of view.

11.57 The assessment is calculated from the centre of a window on the outward face and measures the amount of light available on a vertical wall or window following the introduction of visible barriers, such as buildings. The VSC has been calculated by using a 'Waldram Diagram'.

11.58 The Waldram Diagram is effectively a snapshot is taken from that point of the sky in front of the window, together with all relevant obstructions to it, i.e. the buildings. For calculation purposes, trees may be ignored unless they form dense continuous belts.

11.59 The maximum VSC value is almost 40% for a completely unobstructed vertical wall or window. In terms of criteria, the BRE Guidelines provide that

“if the VSC, with the development in place, is both less than 27% and less than 0.8 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window may appear more gloomy and electric lighting will be needed more of the time”.

No Sky Line

11.60 The BRE Guidelines provide that where room layouts are known, the impact on the daylight distribution can be calculated by plotting the NSL. In terms of the surrounding receptors, it has not been possible to obtain room layouts for all of the properties and therefore layouts have been assumed where information is not available.

11.61 The NSL method is a measure of the distribution of daylight at the 'working plane' within a room. The 'working plane' means a horizontal 'desktop' plane 0.85m in height for residential properties. The NSL divides those areas of the working plane which can receive direct sky light from those which cannot. If a significant area of the working plane lies beyond the NSL (i.e. it receives no direct sky light), then the distribution of daylight in the room will be poor and supplementary electric lighting may be required.

11.62 The potential effects of daylighting distribution in an existing building can be found by plotting the NSL in each of the main rooms. For houses, this will include living rooms, dining rooms and kitchens. Bedrooms should also be analysed, although they are less important. The BRE Guidelines identify that if the area of a room that does receive direct sky light is reduced to less than 0.8 times its former value, then this would be noticeable to its occupants.

11.63 BS 8206 Part 2 states (para 5.7) that the:

“uniformity of daylight is considered to be unsatisfactory if a significant part of the working plane (normally more than 20%) lies behind the no-sky line”.

11.64 Therefore, it is implied that an NSL of at least 80% would be considered satisfactory.

11.65 In regards to deep rooms lit by one side, the BRE Guidelines state (para. 2.2.10):

“If an existing building contains rooms lit from one side only and greater than 5 m deep, then a greater movement of the no sky line may be unavoidable.”

Average Daylight Factor

11.66 The ADF is defined as:

“a ratio of total daylight flux incident on a reference area to the total area of the reference area, expressed as a percentage of outdoor illuminance on a horizontal plane, due to an unobstructed sky of assumed or known illuminance distribution”.

11.67 This daylight assessment method considers:

- the diffuse visible transmittance of the glazing to the room in question (i.e. how much light gets through the window glass);

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- the net glazed area of the window in question;
 - the total area of the room surfaces (ceiling, walls, floor and windows); and
 - the angle of visible sky reaching the window / windows in question.
- 11.68** It also makes allowance for the average reflectance of the internal surfaces of the room and of external obstruction. The BRE Guidelines and British Standard BS8206 recommend that for a fairly light-coloured room an internal reflectance value of 0.5 can be assumed.
- 11.69** As details of the materials (and colours) within the surrounding residential properties are not available, the following assumptions have been made in terms of the input variables:
- Glazing transmittance: 0.64;
 - Maintenance factor: .0.8;
 - Glazing bar factor: 0.9;
 - Overall transmittance: 0.5; and
 - Average reflectance: 0.5.
- 11.70** The recommended ADF value is dependent on the use of the room in question. The BRE Guidelines suggest a bedroom should have an ADF of 1%, a living room 1.5% and a kitchen 2%. If a given room meets its relevant criterion, then it will be regarded as having adequate daylight.
- 11.71** The BRE Guidelines provide that this method of assessment for daylight is applied for new developments rather than existing neighbouring buildings, unless the internal subdivision of the properties is known; whereby the ADF may be used to inform the light potential.
- 11.72** The ADF results for the neighbouring receptors are presented within **ES Volume III: Appendix F**.

Sunlight

Annual Probable Sunlight Hours

- 11.73** Sunlight is measured using a sun indicator which contains 100 spots, each representing 1% of APSH. Therefore, where no obstruction exists the total annual probable sunlight hours would amount to 1486 and therefore each spot equates to 14.86 hours of the total annual sunlight hours.
- 11.74** The number of spots is calculated for the Baseline and Proposed Development scenarios during the year and also during the winter period, and a comparison made between the two. This provides a percentage of APSH for each of the time periods for each window assessed.
- 11.75** The BRE Guidelines note that:
- *“In housing, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon.”*
 - *“all main living rooms of dwellings...should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun”.*
 - *“If the main living room to a dwelling has a main window facing within 90° of due north, but a secondary window facing within 90° of due south, sunlight to the secondary window should be checked.”*
 - *“...a south facing window will, in general, receive most sunlight, while a north facing one will receive it only on a handful of occasions. East and west facing windows will receive sunlight only at certain times of day”.*
- 11.76** In regards to existing surrounding receptors, the BRE Guidelines provide that a window may be adversely affected if a point at the centre of the window receives for the whole year, less than 25% of the APSH, including at least 5% of the APSH during the winter months (21st September to 21st March) and less than 0.8 times its former sunlight hours during either period, and if there is a reduction in total APSH which is greater than 4%.
- 11.77** BS 8206 Part 2 (section 5.2) states that:

“Provided that the entry of sunlight is properly controlled, it is generally welcome in most buildings in the UK. Dissatisfaction can arise as much from the permanent exclusion of sunlight as from its excess. The provision

of sunlight is important in dwellings, particularly during winter months. Sunlight is especially valued in habitable rooms used for long periods during the day.”

“Interiors in which the occupants have a reasonable expectation of direct sunlight should receive at least 25% of probable sunlight hours (see 2.10.2). At least 5% of probable sunlight hours should be received during the winter months, between 21 September and 21 March. Sunlight is taken to enter an interior when it reaches one or more window reference points.”

- 11.78** As is often the case, it is not possible to determine the room uses within each of the neighbouring properties, nor is it clear which window should be considered as the ‘main windows’. Therefore, regardless of use, all the rooms with windows facing the Site and within 90 degrees of due south have been considered in the assessment.

Summary of Criteria for Daylight and Sunlight

- 11.79** The following table provides a summary of the criteria set out within the BRE Guidelines for daylight and sunlight.

Table 11.2 Summary of Residual Effects

Method	BRE Criteria
VSC	A window may be adversely affected if its VSC measured at the centre of the window is less than 27% and less than 0.8 times its former value.
NSL	A room may be adversely affected if the daylight distribution (NSL) is reduced beyond 0.8 times its existing area.
ADF	Bedroom 1%, Living room 1.5% and kitchen 2%
APSH	A window may be adversely affected if a point at the centre of the window received for the whole year, less than 25% of the APSH including at least 5% of the APSH during the winter months (21st September to 21st March) and less than 0.8 times its former sunlight hours during either period, and for existing neighbouring buildings, if there is a reduction in total APSH which is greater than 4%.

Sun on Ground

- 11.80** The method for assessing hours in sun is the ‘sun-on-ground indicator’. The assessment applies to both to new and existing gardens / amenity areas, which are affected by new developments. The BRE Guidelines suggest that the Spring Equinox (21st March) is a suitable date for the assessment. Using specialist software, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.
- 11.81** The BRE Guidelines recommend that at least half of a garden or amenity area should receive at least 2 hours of sunlight on March 21st or the area which receives 2 hours of direct sunlight should not be reduced to less than 0.8 times its former value (i.e. there should be no more than a 20% reduction).
- 11.82** This assessment therefore reviews the percentage of an amenity area which receives 2 hours of direct sunlight (identified in yellow in the figures within **ES Volume III: Appendix F**).

Transient Overshadowing

- 11.83** The BRE Guidelines suggest that where large buildings are proposed, it is useful to plot a shadow plan to show the location of shadows at different times of the day and year. For the purpose of this assessment, transient overshadowing has been mapped on:
- 21st March (Spring Equinox);
 - 21st June (Summer Solstice); and
 - 21st December (Winter Solstice).

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- 11.84** For each of these dates, the overshadowing is calculated at hourly intervals throughout the day from 08:00 to 19:00. Some images are not included within *ES Volume III: Appendix F*. As the sun would not be present during these times (e.g. from approximately 16:00 onwards on 21st December) and thus no shadow is cast.
- 11.85** In addition, September 21st (Autumn Equinox) provides the same overshadowing images as March 21st (Spring Equinox) as the sun follows the same path at these corresponding times of year. Therefore only the March illustrations have been included and illustrate the path of the shadow on both key dates.

Light Pollution

- 11.86** Light pollution is defined as any light emitting from artificial sources into spaces where it is unwanted, such as spillage of light from office or commercial buildings onto streets, or, into residential accommodation, such as bedrooms where this would cause nuisance to the occupants. The Institute of Lighting Professionals (ILP) Guidance Notes (Ref. 11-14) provide measurable lighting level values to ascertain the acceptability of lighting levels at night.
- 11.87** It should be noted that light pollution is not always perceived as a bad thing, particularly in areas of high crime where good street lighting and light into street environments is seen as a positive attribute. The only adverse effects caused as a result of electric lighting is the intrusion of light into sensitive locations including adjacent residential accommodation; areas of special night-time interest; or needless spillage into the night sky.
- 11.88** It should also be noted that the ILP guidance relates to external luminaires. Commercial buildings with large areas of glazing can sometimes cause light intrusion from their internal luminaires to nearby sensitive receptors and quantitative Light Pollution assessments have been undertaken in relation to these internal luminaires.
- 11.89** Potential light pollution effects of a new development are typically assessed in relation to four specific criteria:
- Sky Glow is the brightening of the night sky over our towns, cities and countryside. It can be quantified by measuring the Upward Light Ratio (ULR), which is the maximum permitted percentage (%) of luminaire flux for the total installation that goes directly into the sky;
 - Light Intrusion is the spilling of light beyond the boundary of a proposed development. It is assessed as vertical illuminance in lux (Ev) measured flat at the centre of the sensitive receptor;
 - Luminaire Intensity is the uncomfortable brightness of a light source when viewed against a dark background. It is applied to each source visible from a sensitive receptor and is measured as source intensity (I) (kcd); and
 - Building Luminance which can cause an increase in the brightness of a general area and is measured in cd per metre squared (L) as an average over the building facade caused only by external lighting.
- 11.90** As it is not anticipated that the Proposed Development will include major external lighting, assessments for Sky Glow and Building Luminance have not been undertaken. However, should external lighting be incorporated, it will not cause any effects provided it is installed according to the ILP specifications. Furthermore, light fittings proposed within commercial offices of the Proposed Development will be recessed luminaires shielded from the observer's sight, which will have a low potential for impact in terms of glare. Therefore, a 'Luminaire Intensity' assessment is not considered necessary. The assessment therefore considers only the 'Light Intrusion' method of assessment.

Light Intrusion Methodology

- 11.91** The occurrence of light pollution in the baseline does not justify its occurrence in the Proposed Development Scenario, as it will not result in a comparative assessment, and therefore the assessment considers the effect of the Proposed Development in absolute terms, by reference to the relevant guidance levels.
- 11.92** The assessment has been undertaken by preparing a computer generated three dimensional model of the Proposed Development and using specialist lighting simulation software. The light fittings used for this lighting simulation represent typical recessed office luminaires regularly spaced on the proposed office ceilings achieving an average illuminance of 400 lux across the working plane. This sees all luminaires

switched on at once and no blinds or shading devices being deployed for the purpose of the Light Pollution assessment. The table below sets out the criteria based on environmental zone as per the ILP Guidance.

Table 11.3 ILP light pollution criteria for environmental zones

Environmental Zone	Sky Glow ULR (Max %) (1)	Light Intrusion (into windows) Ev (Lux) (2)		Luminaire Intensity (candelas) (3)		Building Luminance Pre-curfew (4)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L[cd/m2]
E0 – Dark areas (e.g. UNESCO Starlight Reserves, IDA Dark Sky Parks)	0	0	0	0	0	0
E1- Intrinsically dark areas (e.g. National Parks, areas of outstanding natural beauty)	0	2	0 (1*)	2,500	0	0
E2- Low district brightness (e.g. rural or small village locations)	2.5	5	1	7,500	500	5
E3- Medium district brightness (e.g. small town centres or urban locations)	5.0	10	2	10,000	1,000	10
E4- High district brightness (e.g. town/city centres with high levels of night time activity)	15.0	25	5	25,000	2,500	25

Notes:
 ULR = Upward Light Ratio of the Installation is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky
 Ev = Vertical Illuminance in Lux and is measure flat on the glazing at the centre of the window
 I = Light Intensity in Cd
 L = Luminance in Cd/m2
 Curfew = The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the planning authority. If not otherwise stated – 23.00 hrs is suggested.
 * = From Public road lighting installations only.

Solar Glare

- 11.93** Solar glare is particularly important at pedestrian and vehicular junctions, where glare can cause temporary blinding of drivers or pedestrians. Typically those elements considered reflective are either glazed apertures or metal cladding.
- 11.94** The 2011 BRE Guidelines make the following statement in regards to the potential for reflected solar glare from a new development:
 "Glare or solar dazzle can occur when sunlight is reflected from a glazed façade. This can affect road users outside and the occupants of adjoining buildings. The problem can occur either when there are large areas of reflective glass or cladding on the façade, or when there are areas of glass or cladding which slope back so that high altitude sunlight can be reflected along the ground. Thus solar dazzle is only a long term problem only for some heavily glazed (or mirror clad) buildings..."

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Viewpoints for Road Users and Pedestrians

- 11.95** The assessment considers potentially sensitive viewpoints surrounding the Site. The viewpoints are generally located at the minimum stopping distance and at the driver's eye height. The focal point is a relevant traffic element, such as signals or incoming traffic.
- 11.96** Identifying the viewpoints based on the stopping distance is calculated as the combination of thinking and breaking distances:

$$D_{total} = D_{thinking} + D_{breaking} = V \cdot T + V^2 / (2\mu \cdot g)$$

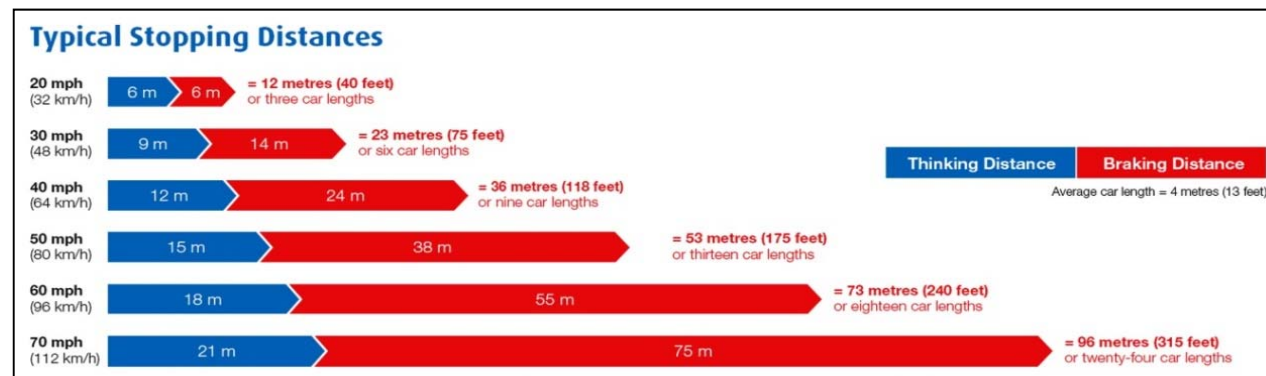
11.97 where each component is:

- V = Relevant vehicle speed, typically the road speed limit.
- T = Thinking time (0.67 sec)
- μ = Breaking effort (considered 0.65 for cars, 0.5 for buses and 0.031 for trains)
- g = Gravity acceleration.

11.98 The height of the viewpoint is considered to be 1.5m for cars, 2.0m for busses and 2.75m for trains. Figure 11-1 below identifies the typical stopping distance range for a car travelling at different speeds. Therefore, a viewpoint for car driving at 30mph (i.e. speed limit for a dense urban location) would be placed at 23m from a traffic light and at 1.5m above the ground.

11.99 The assessment also considers a driver's/pedestrian's field of view, which takes the angular extent seen at any given time, which for humans facing forwards is approximately 180 degrees.

Figure 11.1 Typical Stopping Distances for a car

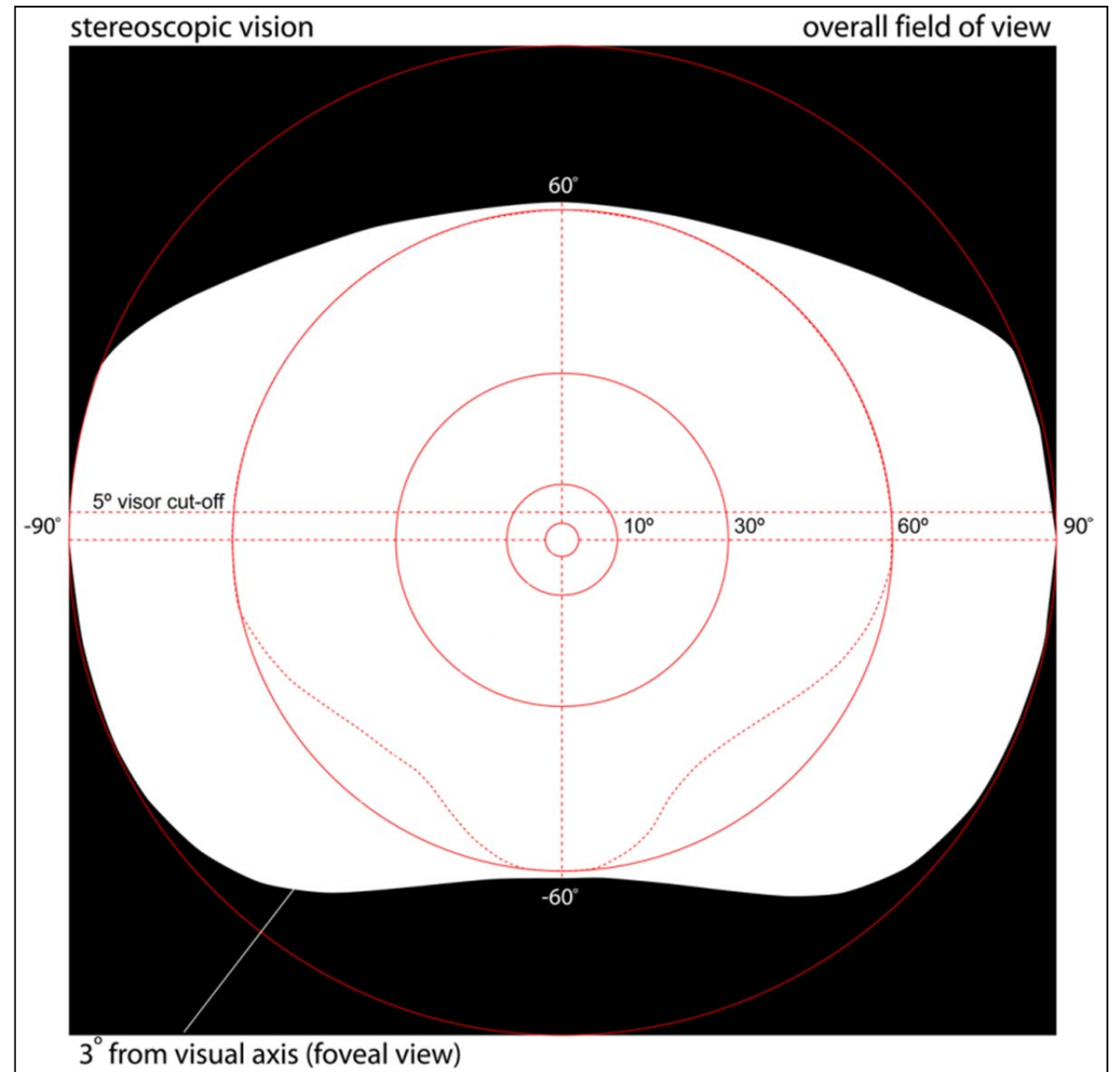


Solar Glare Technical Assessment

- 11.100** The potential for reflected solar glare or dazzle from the glazed or reflective façades from a development are assessed using specialist lighting software. The assessment shows the path of the sun for the entire year around the development. From this, two computer generated angular images are produced for each selected viewpoint, indicating the area which sees the reflection of the sunpath at any point during the year. A modified diagram portraying a standardised extent of human vision is then overlaid onto the image.
- 11.101** The assessment is undertaken on the basis that the fovea centralis, also generally known as the fovea, is a part of the eye, located in the center of the macula region of the retina. The fovea is responsible for sharp central vision (also called foveal vision), which is necessary in humans for reading, watching television or movies, driving, and any activity where visual detail is of primary importance (Ref. 11-15). The macula corresponds to the central 13 degrees of the visual field; the fovea to the central 3 degrees (Ref. 11-16).
- 11.102** Figure 11.2 below highlights the degrees of vision corresponding to the foveal view, with a red circle of 3° angle in order to identify the area most sensitive to reflected solar glare. Another red circle represents the

incidence of the 30° radius of our typical field of view in order to identify a secondary area of sensitivity to potential reflected glare instances.

Figure 11.2 Field of Vision Diagram



- 11.103** The degrees of vision provide a reference from which potential issues can be judged. At 3°, the potential for the reflected glare to cause a hazard is high and mitigation would be required. Between 3° and 30°, there is the potential that there would be an issue as a result and mitigation may be necessary.
- 11.104** As stated in the CIE 146:2002 (Ref. 11-17), occurrences at angles beyond 30° would be of little significance in most situations, but may be relevant in exceptional circumstances. When seated in a driving seat of a typical car, for example, the limits of the windscreen would generally obstruct the driver's view at angles

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beyond 30° from the line of sight. Therefore the risk of reflective solar glare causing a hazard is reduced and, as such, mitigation efforts would make only a minor difference.

11.105 The methodology for solar glare is not aimed at addressing the intensity of an instance of reflected solar glare, but its occurrence, duration throughout the year, and the location of this occurrence in respect of an individual's line of sight. It is also noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account.

11.106 Although great care is taken in identifying typical viewpoints, this does not guarantee that there are no additional sensitive locations where reflected solar glare could present a particular risk. This assessment is based on the assumption that in an urban environment moving traffic represents the biggest risk factor and so viewpoints and focus points are selected accordingly. For practical reasons the area of the assessment is limited to the area surrounding a new development. The occurrence of reflected solar glare at greater distances is not subject of this assessment.

Significance Criteria

Effect Significance Terminology Overview

11.107 The assessment of effect significance outlined within the below sections is consistent with the terminology and criteria outlined within **Chapter 2: EIA Methodology** of this ES and accords with the relevant standards and guidance. The terminology used to describe the sensitivity of resources / receptors and magnitude of the impact will be as follows:

- High;
- Medium;
- Low; and
- Very Low.

11.108 The key terminology to be used to describe the classification of effects is as follows and is further described in the below sections of this chapter:

- Major;
- Moderate;
- Minor; and
- Negligible.

11.109 The nature of the effects may be either adverse (negative) or beneficial (positive).

11.110 Following the classification of an effect using this methodology, a clear statement is then made as to whether the effect is significant or not significant. As a general rule, the following criteria is applied:

- 'Moderate' or 'major' effects are deemed to be **'significant'**;
- 'Minor' effects are considered to be **'not significant'**, although they may be a matter of local concern; and
- 'Negligible' effects are considered to be **'not significant'** and not a matter of local concern.

Evaluating Effects and Significance – Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution

Daylight and Sunlight

11.111 For daylight and sunlight, the BRE Guidelines outline the approach within the accompanying appendix, in terms of assigning criteria to assess the effects:

“Adverse impacts occur when there is a significant decrease in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space... The assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied.”

“Where the loss of skylight or sunlight fully meets the guidelines, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more

appropriate. Where the loss of light is only just within the guidelines and a larger number of windows or open space are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.”

“Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- Only a small number of windows or limited area of open space are affected;
- The loss of light is only marginally outside the guidelines;
- An affected room has other sources of skylight or sunlight; and
- The affected building or open space only has a low level of requirement for skylight or sunlight.

11.112 The classification of major adverse is documented within Paragraph 7 (BRE Guidelines):

“Factors tending towards a major adverse impact include:

- a large number of windows or large area of open space are affected;
- the loss of light is substantially outside the guidelines;
- all the windows in a particular property are affected; and
- the affected indoor or outdoor spaces have a particular strong requirement for skylight or sunlight, eg. a living room in a dwelling or a children's playground”.

11.113 Where the BRE Guidelines are met, the impacts will be considered negligible.

11.114 With regard to the BRE Guidelines, professional judgement has therefore been used to determine whether the potential impacts will result in adverse or beneficial effects. The criteria for determining the category of effect is based on percentage alterations, as follows:

- 20-29.9% alteration = minor;
- 30-39.9% alteration = moderate; and
- 40% alteration = major.

11.115 When assigning criteria per property, consideration is given to the proportion of rooms/windows affected, as well as the percentage alterations, absolute changes, and any other relevant factors, such as there may be mitigating factors such as balconies, overhangs or design features which may also affect the determination of assigning the criteria.

Sun on Ground

11.116 Whilst the BRE Guidelines provide that at least 50% of an amenity area should receive 2 hours of direct sunlight or the proportion of the area should not be reduced by more than 20%, it does not provide any further guidance on the scale of effect significance. Therefore the assessment of significance has been undertaken using professional judgement using the parameters set out in the table below.

Table 11.4 Criteria for Determining the Effect of Sun on Ground

Category of Effect	Alteration from existing area which receives 2 hours of direct sunlight.
Negligible	0 to 19.99% or 50% of area receives 2 hours of direct sunlight.
Minor	20 to 29.99%
Moderate	30 to 39.99%
Major	>40%

Transient Overshadowing

11.117 The BRE Guidelines give no criteria for the significance of transitory overshadowing other than to suggest that by establishing the different times of the day and year when shadow would be cast over a surrounding area.

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11.118 The assessment of potential effects as a result of transient overshadowing is therefore based upon professional judgement, taking into consideration the conditions of the existing Site and surrounding area, and comparing against the effect of the transient overshadowing.

Light Pollution

11.119 Table 11.5 sets out the criteria for assessing light pollution based on professional judgement.

Table 11.5 Criteria for Determining the Effect of Light Pollution

Significance	% above/below light intrusion limit
Negligible	0 to 19.99%
Minor	20 to 29.99%
Moderate	30 to 39.99%
Major	>40%

Solar Glare

11.120 There are no quantitative criteria within the 2011 BRE Guidelines or elsewhere regarding acceptable levels of solar glare experienced at a viewpoint. Professional judgement has therefore been applied to assign the degree of effect from the impact of solar glare arising from the Proposed Development.

11.121 Generally, glare reflected at steeper angles is less likely to cause nuisance or distraction as one has to look upwards to see it.

Table 11.6 Criteria for Determining the Effect of Solar Glare based on professional judgement

Significance	Description
Negligible	No reflections are visible or if visible all occur at angles greater than 30° from the driver's line of sight and so, as stated by the CIE, will be of "little significance"
Minor	Solar reflections are visible within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time
Moderate	Solar reflections are visible within 10° and 5° of the driver's line of sight occurring for a long period of time.
Major	Solar reflections are visible within 5° of a driver's line of sight.

Note – mitigating factors such as alternative and unaffected signals/traffic lights and car visor angle may result in the assignment of significance which differs from the above numerical guidelines.

Assessment Methodology and Significance Criteria - Update 2015

March 2015 ES Addendum

11.122 Since the submission of the December 2014 ES, no changes have been made to the daylight, sunlight, overshadowing, light pollution and solar glare assessment methodology and the methodology presented in the December 2014 ES remains valid for the purposes of this ES Addendum.

November 2015 Amendments

11.123 The proposed approach to assessing the impact of the Amended Proposed Development is to qualitatively review the impact of the November 2015 Amendments using professional judgement, with the aid of the daylight and sunlight modelling results acquired for the December 2014 ES.

11.124 The November 2015 Amendments are relatively minor in terms of their nature and scale for considering the potential impact on daylight and sunlight conditions, and a qualitative review is considered an appropriate

method for assessment. The methodology is considered to remain valid for the purposes of assessing the Amended Proposed Development.

Baseline Conditions

Residential Properties

11.125 There are a total of 32 residential properties (shown in Table 11.7 below) which have been assessed for daylight and sunlight and their location in relation to the Site is illustrated on Figure 11.3.

Table 11.7 Residential Properties assessed for Daylight and Sunlight

Residential Properties
Burham Uddin House
Commercial Street
No. 154, 167, and 169
Elder Street
No. 3, 5, 7, 9, 11 & 13, 15, 17, 30, 34, and 36
Folgate Street
No. 6/6A, 8, 10, 12-14, 16, 17/17A, 18, 19, 21, and 23-27
Shoreditch High Street
No. 21-26 (the rear), 30, 31, 223, 226, 227, and 228
Spital Square
No. 4

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Figure 11.3 Location of Residential Receptors (highlighted pink)



11.126 This section assesses the existing (current) baseline conditions as can be seen at the time of preparing this ES (September 2014). The baseline is depicted on drawings 3005/58 to 60 (*ES Volume III: Appendix F*).

11.127 A total of 460 windows serving 288 rooms have been assessed for daylight within the 32 surrounding residential properties, with 157 windows facing the Site (located within 90 degrees of due south and therefore requiring an assessment in regards to sunlight).

Amenity Areas

11.128 There are no existing public amenity areas directly adjacent to and north of the Site. Overshadowing effects to areas of amenity situated further afield (rear gardens of Burham Uddin House and football pitches near Shoreditch Station) from the Site are captured within the Transient overshadowing assessment.

Baseline Daylight and Sunlight Assessment Summary

11.129 Table 11.8 below sets out a summary of the results of the baseline daylight and sunlight assessment. Details of the baseline daylight and sunlight assessment results are provided in *ES Volume III: Appendix F*.

11.130 The results of the baseline assessment indicate that out of the 460 windows assessed, 190 (41%) have an existing VSC of 27% or more.

11.131 In regards to the NSL, 181 (63%) out of the 288 rooms assessed have a daylight distribution to at least 80% of the total room area.

11.132 The results of the sunlight assessment indicate 134 (85%) out of the 157 windows assessed have a baseline total APSH of at least 25% with at least 5% in the winter period.

Table 11.8 Baseline Daylight and Sunlight Results

Address	Total No. Windows that meet VSC criteria (>27%)		Total No. of Rooms that receive NSL in excess of 80%		Total no. of windows that meet APSH criteria	
	Pass	Total	Pass	Total	Pass	Total
Burham Uddin House	50	83	51	59	58	76
Commercial Street						
154 Commercial Street	35	39	21	23	18	18
167 Commercial Street	2	5	4	4	5	5
169 Commercial Street	1	5	3	5	5	5
Elder Street						
30 Elder Street	3	11	3	9	0	0
34 Elder Street	1	5	5	5	0	0
36 Elder Street	0	1	1	1	0	0
3 Elder Street	11	31	7	12	0	0
5 Elder Street	1	11	0	6	0	0
7 Elder Street	1	11	0	6	0	0
9 Elder Street	3	22	6	14	0	0
11 & 13 Elder Street	4	19	3	11	0	0
15 Elder Street	3	12	2	6	0	0
17 Elder Street	2	11	2	6	0	0
Folgate Street						
6/6A Folgate Street	2	8	1	5	0	0
8 Folgate Street	2	8	1	5	0	0
10 Folgate Street	3	14	2	6	0	0
12-14 Folgate Street	10	26	11	14	0	0

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Address	Total No. Windows that meet VSC criteria (>27%)		Total No. of Rooms that receive NSL in excess of 80%		Total no. of windows that meet APSH criteria	
	Pass	Total	Pass	Total	Pass	Total
16 Folgate Street	3	12	4	5	0	0
17/17A Folgate Street	1	9	1	7	0	0
18 Folgate street	3	14	2	6	0	0
19 Folgate Street	2	6	6	6	0	0
21 Folgate Street	5	9	6	6	1	6
23-27 Folgate Street	4	20	4	16	0	0
Shoreditch High Street						
30 Shoreditch High Street	2	6	4	4	6	6
31 Shoreditch High Street	2	6	3	3	6	6
Rear of 21-26 Shoreditch High Street	7	8	8	8	8	8
223 Shoreditch High Street	8	8	4	4	8	8
226 Shoreditch High Street	8	8	3	3	8	8
227 Shoreditch High Street	6	6	4	4	6	6
228 Shoreditch High Street	5	5	3	3	5	5
Spital Square						
4 Spital Square	0	21	6	16	0	0
Totals	190	460	181	288	134	157

Sun on Ground Baseline Summary

11.133 There are no existing areas of amenity space directly adjacent to and north of the Site and therefore a baseline assessment is not required.

Transient Overshadowing Baseline Summary

11.134 Full details of the transient assessment can be found in *ES Volume III: Appendix F*.

11.135 On March 21st, there is no shadow cast by the existing buildings on any of the surrounding areas of amenity space.

11.136 Shadow is cast on June 21st by the existing buildings, on the gardens to the rear of Burham Uddin House between the hours of 6pm to 8pm. However, no shadow is currently cast by the existing buildings on either the courtyard behind 30 Elder Street or the rear gardens of 3-17 Elder Street.

11.137 On December 21st, shadow is cast further afield due to the low position of the sun and therefore the existing levels of shadow are currently cast across the surrounding streets. However, no shadow is cast on either the rear garden of Burham Uddin House or football pitches as a result of the existing buildings..

Light Pollution

11.138 Light pollution is not a comparative assessment and thus the baseline light pollution levels have not been assessed.

Solar Glare

11.139 Solar glare is not a comparative assessment and thus the baseline solar glare instances have not been assessed.

Summary of Sensitive Receptors

11.140 From the review of the baseline conditions, the below Table 11.9 presents the receptors likely to be affected by the Proposed Development and their sensitivity.

Table 11.9 List of Sensitive Receptors for Assessment

Receptor
Residential Properties: <ul style="list-style-type: none"> Burham Uddin house; Commercial Street; Elder Street; Folgate Street; Shoreditch High Street; Spital Square; and Proposed s3 Block.
Amenity Areas: <ul style="list-style-type: none"> Football pitches located next to Shoreditch Station Rear Garden of Burham Uddin House
Junctions on Highway Network: <ul style="list-style-type: none"> Viewpoint 1 – Travelling north along Shoreditch High Street and stopping at a pedestrian crossing; Viewpoint 2 – Travelling east along Worship Street and stopping at a pedestrian crossing; Viewpoint 3 – Travelling west along Fleur de Lis Street and stopping at a road junction; Viewpoints 4 and 5 – Travelling south along Shoreditch High Street and stopping at traffic light; Viewpoints 6 and 7 – Travelling south along Great Eastern Street and stopping at traffic light; Viewpoint 8 – Travelling south along Shoreditch High Street and stopping at traffic light; and Viewpoint 9 – Travelling south along Shoreditch High Street and stopping at traffic light

Baseline Conditions - Update 2015

March 2015 ES Addendum

11.141 Since submission of the December 2014 ES, no significant development has occurred in the area of the Site that may result in significant changes to the baseline conditions.

November 2015 Amendments

11.142 It is considered that there have not been any material changes to the daylight, sunlight, overshadowing, light pollution and solar glare baseline conditions since the submission of the December 2014 ES and March 2015 ES Addendum. It is considered that the baseline remains valid for the consideration of the likely impacts arising from the Amended Proposed Development.

Environmental Design and Management

11.143 The way that potential environmental impacts have been or will be avoided, prevented, reduced or off-set through design and / or management of the Proposed Development are outlined below and have been taken into account as part of the assessment of potential effects. Proposed environmental enhancements are also described where relevant.

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Demolition and Construction

11.144 No design and / or management measures are proposed at this stage of the Proposed Development

Operation

11.145 No design and / or management measures are proposed at this stage of the Proposed Development.

Environmental Design and Management - Update 2015

March 2015 ES Addendum

11.146 No further environmental design / Management measures were considered.

November 2015 Amendments

11.147 No further environmental design / Management measures were considered.

Potential Effects and Mitigation Measures

11.148 The following section details the assessment of potential impacts and resulting effects on daylight and sunlight levels from the demolition and construction phase, and during the operational phase of the Proposed Development.

Site Preparation, Demolition and Construction Effects

11.149 The potential impacts in relation to daylight and sunlight, overshadowing, light pollution and solar glare would vary throughout the demolition and construction phase, depending on the level of obstruction caused. However, the potential impacts would almost certainly be less than that of the completed Proposed Development as the extent of the permanent massing increases throughout the construction phase.

11.150 Therefore, it has not been considered necessary to undertake a technical assessment to understand the potential impacts in terms of daylight, sunlight, overshadowing, solar glare and light pollution throughout the demolition and construction phases upon the surrounding residential properties and amenity spaces. However, the following general qualitative assessment of impacts during the demolition and construction phases can be made.

Demolition Impacts

11.151 The potential impacts of the demolition of the existing buildings and structures on the Site would lead to a temporary improvement in daylight, sunlight, and overshadowing impacts to those properties and open spaces located within close proximity to the Site.

11.152 There is then potential for portable external lighting apparatus to be used during the demolition phase which may result in minor instances of light pollution. However, it is likely such units will be in use during working hours only and the impacts would be temporary (i.e. only last as long as the portable lighting units are in use) and can be mitigated through the positioning of the lighting units away from the sensitive receptors (i.e. residential properties).

11.153 The potential impacts during the demolition phase to daylight, sunlight and overshadowing likely result in a **minor beneficial** effect (temporary). In terms of light pollution, the potential impact would likely result in a **negligible to minor adverse** effect (temporary).

Construction Impacts

11.154 The construction of new buildings / massing on the Site would have a gradual impact on the levels of daylight, sunlight and overshadowing on the surrounding receptors as the massing of the proposed buildings increases over time. Therefore, the impacts in terms of daylight, sunlight and overshadowing would increase incrementally as the construction progressed and would be no worse than the completed development.

11.155 In regards to solar glare, potential impacts would only occur as the glazing and metal cladding were installed and therefore, will be no worse than the Proposed Development.

11.156 Potential temporary impacts may occur in terms of light pollution with the use of portable lighting units during the construction phase. However, it is likely that these will only be used during working hours and can be mitigated by positioning the lighting units in such a way to avoid light spill into the neighbouring residential properties.

11.157 The potential impacts during the construction phase to daylight, sunlight and overshadowing would likely increase as the construction progress; however, the effect would likely be no worse than the completed development. In terms of solar glare, the potential impact would only occur as the glazing and metal cladding were installed, resulting in an effect that would likely be no worse than the completed development.

Site Preparation, Demolition and Construction Effects - Update 2015

March 2015 ES Addendum

11.158 Since the submission of the December 2014 ES, no changes have been made to the demolition and construction methodology. Therefore the conclusions from the demolition and construction assessment presented in the December 2014 ES remains valid.

November 2015 Amendments

11.159 No changes have been made to the demolition and construction methodology, and therefore the conclusions from the demolition and construction assessment presented in the December 2014 ES and March 2015 ES Addendum remains valid.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Table 11.10 Summary of the Daylight Results (VSC, NSL)

Address	VSC						NSL					
	Total No. of Windows	No. Windows that meet BRE criteria	Below BRE Guidelines				Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria	Below BRE Guidelines			
			20-30% Reduction	30-40% Reduction	>40% Reduction	Total			20-30% Reduction	30-40% Reduction	>40% Reduction	Total
Burham Uddin House	83	76	3	4	0	7	59	59	0	0	0	0
Commercial Street												
154 Commercial Street	39	39	0	0	0	0	23	22	1	0	0	1
167 Commercial Street	5	5	0	0	0	0	4	4	0	0	0	0
169 Commercial Street	5	5	0	0	0	0	5	5	0	0	0	0
Elder Street												
30 Elder Street	11	11	0	0	0	0	9	8	1	0	0	1
34 Elder Street	5	5	0	0	0	0	5	5	0	0	0	0
36 Elder Street	1	1	0	0	0	0	1	1	0	0	0	0
3 Elder Street	31	29	2	0	0	2	12	8	3	1	0	4
5 Elder Street	11	11	0	0	0	0	6	6	0	0	0	0
7 Elder Street	11	11	0	0	0	0	6	5	0	0	1	1
9 Elder Street	22	22	0	0	0	0	14	11	0	2	1	3
11 & 13 Elder Street	19	19	0	0	0	0	11	9	0	1	1	2
15 Elder Street	12	12	0	0	0	0	6	6	0	0	0	0
17 Elder Street	11	11	0	0	0	0	6	6	0	0	0	0
Folgate Street												
6/6A Folgate Street	8	8	0	0	0	0	5	5	0	0	0	0
8 Folgate Street	8	8	0	0	0	0	5	5	0	0	0	0
10 Folgate Street	14	14	0	0	0	0	6	6	0	0	0	0
12-14 Folgate Street	26	25	0	1	0	1	14	14	0	0	0	0
16 Folgate Street	12	11	0	0	1	1	5	4	0	0	1	1
17/17A Folgate Street	9	9	0	0	0	0	7	7	0	0	0	0
18 Folgate street	14	14	0	0	0	0	6	4	2	0	0	2
19 Folgate Street	6	6	0	0	0	0	6	6	0	0	0	0
21 Folgate Street	9	9	0	0	0	0	6	6	0	0	0	0
23-27 Folgate Street	20	20	0	0	0	0	16	16	0	0	0	0
Shoreditch High Street												
30 Shoreditch High Street	6	6	0	0	0	0	4	4	0	0	0	0
31 Shoreditch High Street	6	3	3	0	0	3	3	3	0	0	0	0
Rear of 21-26 Shoreditch High Street	8	6	2	0	0	2	8	6	2	0	0	2
223 Shoreditch High Street	8	8	0	0	0	0	4	4	0	0	0	0
226 Shoreditch High Street	8	8	0	0	0	0	3	3	0	0	0	0
227 Shoreditch High Street	6	6	0	0	0	0	4	4	0	0	0	0

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Address	VSC						NSL					
	Total No. of Windows	No. Windows that meet BRE criteria	Below BRE Guidelines			Total	Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria	Below BRE Guidelines			Total
			20-30% Reduction	30-40% Reduction	>40% Reduction				20-30% Reduction	30-40% Reduction	>40% Reduction	
228 Shoreditch High Street	5	5	0	0	0	0	3	3	0	0	0	0
Spital Square												
4 Spital Square	21	21	0	0	0	0	16	16	0	0	0	0
Totals	460	444	10	5	1	16	288	271	9	4	4	17

*Grey highlighted cells results that exceed BRE Guidelines

Effects Once the Site is Operational

11.160 As further discussed in the below sections, sensitive receptors could be affected by the operation of the Proposed Development in terms of:

- Daylight to Surrounding Properties;
- Sunlight to Surrounding Properties;
- Sun on Ground;
- Transient Overshadowing;
- Light Pollution; and
- Solar Glare.

Daylight to Surrounding Properties

11.161 The potential daylight impacts on surrounding residential properties arising from the Proposed Development have been assessed against the baseline conditions in regards to VSC and NSL conditions in accord with the BRE guidelines. Full details of the results can be found in **ES Volume III: Appendix F** and are summarised in Table 11.10.

11.162 A total of 460 windows serving 288 rooms have been assessed within the 32 surrounding residential properties in terms of daylight.

11.163 A total of 444 windows out of the 460 assessed will meet the BRE Guidelines for VSC. A total of 271 out of the 288 rooms assessed will meet the BRE guidelines for NSL. The potential impact of the Proposed Development on the residential properties is likely to result in a **negligible** effect.

11.164 A total of 20 out of the 33 properties assessed will therefore meet the BRE Guidelines.

11.165 The remaining properties for which there are potential impacts (highlighted grey within Table 11.10) are discussed below.

12-14 Folgate Street

11.166 A total of 25 out of the 26 windows assessed will meet the BRE guidelines for VSC.

11.167 The remaining window will experience an alteration of 33% however this window has a very low existing level of VSC at 0.54% whereby any alteration no matter how small would result in a disproportionate percentage change and trigger a transgression of the BRE guidelines. In absolute terms the alteration in VSC (0.18) is unlikely to be noticeable to any occupant of the property.

11.168 All of the rooms within this property will meet the criteria for NSL.

11.169 Given that the degree of alteration is unlikely to be noticeable, in terms of the BRE Guidelines for VSC to the occupant, the likely effect is considered to be **negligible**.

16 Folgate Street

11.170 There are 12 windows within this property which are relevant for assessment, of which 11 will meet the BRE criteria for VSC,

11.171 The remaining window will experience a transgression in excess of 40%. However this window has a very low existing VSC of circa 1% in absolute terms whereby any alteration, even relatively small in terms of massing, could result in a disproportionate alteration in VSC and thus a transgression of the Guidelines.

11.172 Given the low existing levels of VSC to this window, it is likely that the occupant already relies on electric lighting to supplement the existing poor daylight levels. Therefore it is unlikely that the small absolute alteration of less than 1% VSC would be significantly noticeable.

11.173 In regards to NSL, 4 out of the 5 rooms assessed would meet the BRE criteria. The remaining room will experience an alteration beyond 40% however has a low existing daylight distribution, such that any alteration could result in a disproportionate percentage change.

11.174 Given the high level of compliance and the degree of alterations, the likely effect is considered to be **minor adverse**.

18 Folgate

11.175 All 14 windows will meet the BRE guidelines for VSC.

11.176 A total of 4 out of the 6 rooms assessed will meet the BRE guidelines in terms of NSL.

11.177 The remaining 2 rooms will experience alterations between 20-30%. Both rooms have low existing daylight distributions to approximately 23-32% of the total room area compared to the 80% recommended by the BS 8206. Any alteration could result in a disproportionate percentage change triggering a breach. The proportion of the room area which has a view of the sky will be reduced by approximately 5% as a result of the Proposed Development.

11.178 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

30 Elder Street

11.179 All of the windows within this property will meet the BRE guidelines for VSC.

11.180 In terms of NSL, 8 out of the 9 rooms assessed will meet the BRE criteria.

11.181 The remaining room will experience an alteration of 22% compared to the 20% recommended by the BRE guidelines. This room however has a low existing daylight distribution of approximately 23% of the total room area, such that any alteration could result in a disproportionate percentage change. The absolute change in NSL within this room equates to less than a square metre.

11.182 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

3 Elder Street

11.183 A total of 29 out of the 31 windows within this property will meet the BRE Guidelines for VSC.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

11.184 The remaining 2 windows will experience alteration between 22-25% and the absolute alterations will be equivalent to 4% VSC. In addition, both windows have low existing levels of VSC below the BRE Guidelines (recommended 27%) whereby any alteration could result in a disproportionate percentage change.

11.185 In total, 8 out of the 12 rooms assessed will meet the BRE Guidelines. Of the remaining 4 rooms, 3 will experience alterations between 20-30% in terms of NSL, where 2 will retain a VSC of 21-23%, which could be considered commensurate with an inner urban location.

11.186 One room will experience an alteration of 39% in regards to NSL however this room has a low existing daylight distribution whereby any alteration could result in a disproportionate percentage change.

11.187 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

7 Elder Street

11.188 All of the windows within this property will meet the BRE guidelines for VSC.

11.189 In terms of NSL, 5 out of the 6 rooms assessed will meet the BRE criteria.

11.190 The remaining room will experience an alteration beyond 40% (NSL) however this room has a relatively low existing level of daylight distribution whereby an alteration could result in a disproportionate percentage change. In addition, the window serving this room will retain a VSC of at approximately 26% and therefore this room will receive a relatively good level of daylight.

11.191 Given the isolated transgression, the likely effect of the Proposed Development on this property is considered to be **minor adverse**.

9 Elder Street

11.192 All 22 windows within this property will meet the BRE guidelines for VSC.

11.193 In terms of NSL, 11 out of the 14 rooms assessed will meet the BRE guidelines.

11.194 2 rooms will experience an alteration between 30-40% however will retain an NSL to at least 50% of the total room area which could be considered commensurate with an inner urban location. The remaining room will experience an alteration beyond 40% (NSL). As all of these rooms are located on the upper floors it is likely that they are bedrooms which are considered less sensitive in terms of daylight compared to living rooms.

11.195 The likely effect on this property is considered to be **moderate adverse**.

11 and 13 Elder Street

11.196 All of the 19 windows assessed within this property will meet the BRE guidelines for VSC.

11.197 In regards to NSL, 9 out of the 11 rooms assessed will meet the BRE guidelines. One room will experience an alteration of 30-40% whereas the remaining room will experience an alteration in excess of 40%. However both rooms have low existing levels of NSL whereby any alteration could result in a disproportionate percentage change.

11.198 The affected rooms are located on the upper floors and therefore are likely to be bedrooms which are considered less sensitive in terms of daylight compared to living rooms.

11.199 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

Burham Uddin House

11.200 A total of 76 out of the 83 windows assessed within this property will meet the BRE guidelines for VSC.

11.201 A total of 3 windows will experience alterations between 20-30%, of which 2 will retain an absolute VSC of at least 21% compared to the BRE recommended 27%.

11.202 4 windows will experience an alteration between 30-40%; however, 3 of these will retain at least 16%, which could be considered appropriate within an inner urban location.

11.203 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

154 Commercial Road

11.204 All 39 windows within this property will meet the BRE guidelines in regards to VSC.

11.205 In regards to NSL, one room on the first floor will experience an alteration of 27.5%; however, it will retain a daylight distribution to at least 71% of the total room area, which could be considered appropriate within an inner urban location.

11.206 All of the 22 remaining rooms will meet the BRE criteria for NSL.

11.207 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

31 Shoreditch High Street

11.208 There are 6 windows within this property, of which 3 (50%) will meet the BRE guidelines for VSC.

11.209 The remaining 3 windows will experience alterations between 20-30%; however, all 3 windows will retain an absolute VSC of at least 15%, which could be considered appropriate within an inner urban location.

11.210 In regards to NSL, all of the rooms assessed will meet the BRE guidelines.

11.211 The effect of the Proposed Development on this property is considered to be **minor adverse**.

Rear of 21-26 Shoreditch High Street

11.212 Out of the 8 windows assessed for VSC, 6 (75%) will meet the BRE criteria.

11.213 The remaining 2 windows will experience alterations between 23-26%; however, these 2 windows will retain absolute levels of VSC which are marginally below the BRE recommended 27%.

11.214 In regards to NSL, 6 (75%) out of the 8 rooms assessed will meet the BRE guidelines. The remaining 2 rooms will experience an alteration of approximately 22%, compared to the 20% suggested within the BRE guidelines. Both rooms will retain a daylight distribution to at least 75% of the total room area, which could be considered appropriate within a dense urban environment.

11.215 The likely effect of the Proposed Development on this property is considered to be **minor adverse**.

Sunlight to Surrounding Properties

11.216 The potential sunlight impacts of the Proposed Development have been assessed against the baseline. Full details can be found in **ES Volume III: Appendix F** and are summarised in Table 11.11.

11.217 A total of 157 windows have been assessed in regards to sunlight, of which 153 windows will meet the BRE guidelines. Where all of the windows within a property meet the BRE guidelines, the likely effect of the Proposed Development is considered to be **negligible** to the respective property.

11.218 All of the windows within the properties, represented by the un-shaded rows in Table 11.11, will meet the BRE guidelines. The remaining properties are discussed below.

Burham Uddin House

11.219 There are 76 windows within this property which are relevant for assessment in regards to sunlight of which 75 windows will meet the BRE guidelines in regards to both total and winter sunlight.

11.220 One window will experience an alteration beyond 40% in regards to total sunlight; however, this window will experience no alterations in the winter. This window has a low existing level of sunlight with a total APSH of 15% compared to the 25% APSH recommended by the BRE guidelines. In such circumstances, any alteration in sunlight could result in a disproportionate percentage change triggering a transgression.

11.221 Given the high level of compliance within this property, the likely effect of the Proposed Development is considered to be **minor adverse**.

Rear of 21-26 Shoreditch High Street

11.222 Out of the 8 windows assessed within this property, 5 will meet the BRE guidelines for both total and winter sunlight.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

11.223 Three windows will experience alterations in winter sunlight in excess of 40%; however, all three windows will retain values between 3-4% winter APSH, which could be considered appropriate within an inner urban location such as that of the Site. In addition, the position of the sun is lower during the winter period; therefore, all three windows will retain total APSH values of 34-40% in excess of the BRE recommended 25%.

11.224 Given that all of the windows within this property will meet the BRE criteria for total APSH and the retained levels of winter APSH, the likely effect of the Proposed Development on this property is considered to be **minor adverse**.

Sun on Ground

11.225 There are no existing areas of amenity space directly adjacent to and north of the Site; therefore, a sun on ground assessment has not been undertaken.

11.226 The potential effect to the surrounding areas of amenity space and wider context is captured within the transient overshadowing assessment.

Transient Overshadowing

11.227 Full details of the transient overshadowing assessment can be found within **ES Volume III: Appendix F** and is summarised below:

March 21st

11.228 Whilst the level of overshadowing will increase as result of the Proposed Development, there will be no additional shadow cast on the surrounding areas of amenity space.

11.229 Therefore, the likely effect of the Proposed Development on the surrounding areas of amenity space is considered to be **negligible**.

June 21st

11.230 On June 21st, the Proposed Development will cast shadow on the surrounding area and on Burham Uddin House; however this will not be any more than that cast by the existing buildings.

11.231 Therefore, the likely effect of the Proposed Development is considered to be **negligible**.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Table 11.11 Summary of the Sunlight Results

Address	Total No. Windows	Meet BRE Guidelines Total & Winter	Window which do not meet the BRE criteria					
			Below threshold for Winter APSH			Below threshold for Total APSH		
			20-30% Reduction	30-40% Reduction	>40% Reduction	20-30% Reduction	30-40% Reduction	>40% Reduction
Burham Uddin House	76	75	0	0	0	0	0	1
Commercial Street								
154 Commercial Street	18	18	0	0	0	0	0	0
167 Commercial Street	5	5	0	0	0	0	0	0
169 Commercial Street	5	5	0	0	0	0	0	0
Folgate Street								
21 Folgate Street	6	6	0	0	0	0	0	0
Shoreditch High Street								
30 Shoreditch High Street	6	6	0	0	0	0	0	0
31 Shoreditch High Street	6	6	0	0	0	0	0	0
Rear of 21-26 Shoreditch High Street	8	5	0	0	3	0	0	0
223 Shoreditch High Street	8	8	0	0	0	0	0	0
226 Shoreditch High Street	8	8	0	0	0	0	0	0
227 Shoreditch High Street	6	6	0	0	0	0	0	0
228 Shoreditch High Street	5	5	0	0	0	0	0	0
Totals	157	153	0	0	3	0	0	1

**Grey highlighted cells indicate results that exceed BRE Guidelines*

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

December 21st

11.232 Shadow will be cast further afield during the winter period due to the low position of the sun in the winter period. On December 21st, shadow will be cast on the football pitches located next to Shoreditch Station located to the north of the Site. This will occur between 12pm and 2pm.

11.233 The likely effect of the Proposed Development is considered to be **minor adverse**.

Light Pollution

11.234 A light intrusion assessment has been undertaken for those sensitive receptors located in close proximity to the commercial elements of the Proposed Development. The location of the residential receptors located in close proximity to the commercial elements of the Proposed Development tested can be found in **ES Volume III: Appendix F**.

11.235 The assessment undertaken assume a worst case scenario whereby the offices are fully in use post 11pm. It is unlikely that this will be the case; therefore, the impact may be less significant than that identified below.

11.236 The pre-curfew analyses have shown that none of the residential properties analysed will receive a level of illuminance in excess of the 25lux pre-curfew limit. However, a number of these properties may receive illuminance levels that exceed the 5lux post-curfew limit, as summarised below:

View 1- Burham Uddin House

11.237 One window on the first floor of the residential units within Burham Uddin House exceeds the 5lux post-curfew limit. As this represents very small percentage of the windows analysed, it is considered that the likely effect of the Proposed Development will be **minor adverse**.

View 2 – 3 Elder Street

11.238 The levels of illuminance on the windows of the residential property at no. 3 Elder Street do not exceed the post-curfew limit; therefore, the likely effect of the Proposed Development is considered to be **negligible**.

View 3 – 6-18 Folgate Street

11.239 The levels of illuminance on the windows of the residential properties at no. 12 to no. 18 Folgate Street do not exceed the post-curfew limit. A few windows on no. 6 to no. 10 Folgate Street receive illuminance levels right above 5lux. The area of the windows that exceed this limit is small and the maximum value exceeds the limit by 25%.

11.240 As such, it is considered that the likely effect of the Proposed Development will be **minor adverse**.

View 4 – Proposed S3 (north elevation)

11.241 The majority of the windows on the north façade of S3 will receive a level of illuminance higher than the 5lux post-curfew limit. The maximum value exceeds this limit by 100%.

11.242 As such, it is considered that the likely effect of the Proposed Development on this building will be **major adverse**. However, if the offices are not in use beyond 11pm, the effect may be less.

View 5 – Proposed S3 (west elevation)

11.243 The majority of the windows on the west façade of S3 will receive a level of illuminance higher than the 5lux post-curfew limit. The maximum value exceeds this limit by 150%.

11.244 As such, it is considered that the likely effect of the Proposed Development on this building will be **major adverse**. However, if the offices are not in use beyond 11pm, the effect may be less.

Solar Glare

11.245 The solar glare assessments have been undertaken from viewpoints located at the major junctions surrounding the Site. Their exact locations are provided in **ES Volume III: Appendix F** and are summarised below.

Viewpoint 1 – Travelling North along Shoreditch High Street and stopping at a pedestrian crossing

11.246 Small instances of reflection are visible beyond 30 degrees from the driver's line of sight and therefore, as per the CIE, are considered less significant.

11.247 There are no instances of reflection within 30 degrees of a driver's line of sight and thus the likely effect of the Proposed Development is considered to be **negligible**.

Viewpoint 2 – Travelling East along Worship Street and stopping at a pedestrian crossing

11.248 A number of instances of reflection are visible after 6pm in the summer months between 5 and 20 degrees from the driver's line of sight.

11.249 These reflections are brief and occur over small areas of the proposed elevation at glare angles greater than 5 degrees. It should also be noted that as there is no particular point of attention from this viewpoint, and in the case of the driver's line of sight following a moving target at the road junction, the glare angle will increase accordingly.

11.250 Therefore, it is considered that the likely effect of the Proposed Development will be **minor adverse**.

Viewpoint 3 – Travelling West along Fleur de Lis Street and stopping at a road junction

11.251 A number of instances of reflection are visible between 6am and 9am (from mid-February to mid-October, between 8 and 30 degrees from the driver's line of sight), and after 6pm (from mid-April to mid-May and mid-July to mid-August, between 5 and 8 degrees from the driver's line of sight).

11.252 The majority of these reflections occur over large areas of the elevation at glare angles between 10 and 30 degrees. The reflections between 5 and 10 degrees from the driver's line of sight would occur for a short period of time and it is considered that they would be of the same level of risk as the rest of the reflections.

11.253 Again, it should be noted that there is no particular focal point of attention from this viewpoint and that Fleur de Lis is not a 'high use' street, with very little and slow traffic.

11.254 Additional instances of reflection are visible beyond 30 degrees of a driver's line of sight; however, as per the CIE, these are of little significance.

11.255 Therefore, the likely effect of the Proposed Development from this viewpoint is considered to be **minor to moderate adverse**. The impacts on receptors could be mitigated with the use of a car's sun visor.

Viewpoints 4 and 5 – Travelling South along Shoreditch High Street and stopping at traffic light

11.256 There are no visible instances of solar reflection from these viewpoints; therefore, the likely effect of the Proposed Development is considered to be **negligible**.

Viewpoints 6 and 7 – Travelling South along Great Eastern Street and stopping at traffic light

11.257 There are no visible instances of solar reflection from these viewpoints. Therefore, the likely effect of the Proposed Development is considered to be **negligible**.

Viewpoint 8 – Travelling South along Shoreditch High Street and stopping at traffic light

11.258 Instances of reflection are visible after 7pm (from mid-April to mid-August, between 18 and 25 degrees from the driver's line of sight).

11.259 Given that no instances of reflection occur within 10 degrees of a driver's line of sight and the short period of time at which these occur, the likely effect is considered to be **minor adverse**.

Viewpoint 9 – Travelling South along Shoreditch High Street and stopping at traffic light

11.260 There are no visible instances of solar reflection from this viewpoint.

11.261 Therefore, the likely effect of the Proposed Development is considered to be **negligible**.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Internal Daylight, Sunlight and Overshadowing within the Proposed Development

- 11.262 Full detailed results of the internal daylight, sunlight and overshadowing assessments can be found in **ES Volume III: Appendix F** and are summarised below.
- 11.263 Plot S3 has been designed to provide high quality residential accommodation within a dense urban environment. As a result, slightly lower levels of daylight are to be expected in certain areas of the building; however, the Proposed Development has been designed to maximise the levels of daylight and sunlight wherever possible. All habitable rooms have been designed in line with the room depth criteria where applicable.
- 11.264 Overall, good levels of daylight will be enjoyed throughout the building, with 91 of the 124 habitable rooms meeting or exceeding the recommended levels of ADF. All but five of the rooms with lower levels of daylight are either bedrooms or kitchens serving units, with well-lit living areas or large Living Kitchen Diners (LKD), which see levels of daylight in excess of those recommended for living rooms (but slightly below the level recommended for kitchens). The level of daylight within five remaining rooms have been maximised and they also serve units with good levels of light in other rooms. In general, it is considered that that the proposed building at S3 performs very well in relation to daylight.
- 11.265 In terms of sunlight, the proposed S3 building performs well with the great majority of all tested windows seeing in excess of the levels of APSH recommended by the BRE.
- 11.266 Lower levels of sunlight can be found on the lower ground floor looking into the courtyard, on the first floor of the east facade and behind recessed balconies. This is to be expected in such a design and the levels retained are considered acceptable for such a design and appropriate for people's expectations of living within the dense urban environment of central London. It is therefore considered that the Proposed Development performs well in terms of sunlight.
- 11.267 Overall, it can be concluded that the Proposed Development will provide future occupants with accommodation that can be considered acceptable in terms of daylight and sunlight.

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- 11.268 In regards to daylight and sunlight to the surrounding receptors, the removal of the three bridges means that the December 2014 ES presented the worst case scenario and therefore the effects of the Revised Scheme will be no worse than those reported in the December 2014 ES.
- 11.269 As the facades do not alter significantly then there will be no alteration to the effects previously reported in the December 2014 ES for either overshadowing or solar glare, and therefore the conclusions presented in the December 2014 ES remain valid.

November 2015 Amendments

- 11.270 The November 2015 Amendments comprise of internal and minor external massing changes, which are not considered to significantly alter the overall massing of the Revised Scheme considered for the March 2015 ES or the external finishes relevant for light pollution.
- 11.271 It is considered that the nature and scale of the November 2015 Amendments are not likely to affect the assessments presented within the December 2014 ES and subsequent March 2015 ES Addendum. It is therefore concluded that the likely residual effects to amenity and property concluded in the December 2014 ES remain valid.

Mitigation and Monitoring Measures

- 11.272 From the assessment, this section outlines the mitigation measures proposed, that are over-and-above the environmental design and management measures covered previously. Where appropriate, future monitoring and / or environmental management required to verify the predictions and/or fine tune mitigation measures, or ensure the potential effects are adequately controlled, are also outlined.

- 11.273 The measures accounted for both the demolition and construction, and operational phases, are outlined below.

Demolition and Construction

- 11.274 Throughout the demolition and construction phases, the use of portable lighting units may result in minor adverse effects in regards to light pollution. Positioning of temporary lighting units, so as to avoid light spill into sensitive residential receptors in close proximity to the Site, will be undertaken to reduce these the effect of the portable lighting units.

Operational

- 11.275 The Proposed Development has been designed with consideration to the daylight and sunlight amenity within the surrounding properties. As the massing of the Proposed Development is fixed, no further mitigation measures are suggested.
- 11.276 The results of the solar glare assessment indicate that the effects will be minor adverse or can be mitigated through the use of a car visor, however no further mitigation measures are considered necessary for the Proposed Development itself.
- 11.277 In terms of light pollution, the Proposed Development will result in major adverse effects to the Site S3 residential building. Mitigation in the form of roller blinds, lighting strategies to reduce output of luminaires on the surrounding properties or sensor controlled light fittings will be implemented to mitigate the impacts.

Mitigation and Monitoring Measures - Update 2015

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- 11.278 No additional mitigation measures or changes to those measures identified previously are assessed as being required to alleviate the impacts associated with the proposed changes.

November 2015 Amendments

- 11.279 No additional mitigation measures or changes to those measures identified previously are assessed as being required to alleviate the impacts associated with the November 2015 Amendments.

Residual Effects and Conclusions

Residual Effects – Update 2015

- 11.280 Table 11.12 summarises the potential residual effects of the Proposed Development on daylight, sunlight, overshadowing, solar glare and light pollution below presents the residual effects following the assessment of the Amended Proposed Development.

Table 11.12 Summary of Residual Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution Effects

Resource / Receptor	Effect (incorp. environmental design & management)	Mitigation and Monitoring	Residual Effect (incorp. mitigation & monitoring)	Significance Conclusion
Demolition and Construction				
Residential				
Daylight	No worse than the completed development	N/A	No worse than the completed development	Not Significant

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Resource / Receptor	Effect (incorp. environmental design & management)	Mitigation and Monitoring	Residual Effect (incorp. mitigation & monitoring)	Significance Conclusion
Sunlight	No worse than the completed development	N/A	No worse than the completed development	Not Significant
Light Pollution	Negligible to minor adverse	Positioning of portable lighting units so as not to spill light into the surrounding residential properties.	Negligible	Not Significant
Amenity Areas				
Overshadowing	No worse than the completed development	N/A	No worse than the completed development	Not Significant
Junctions on Highway Network				
Solar Glare	No worse than the completed development	N/A	Negligible	Not Significant
Completed and Operational				
Residential				
Daylight: • 9 Elder Street	Moderate adverse	Given that the scheme is fixed, further mitigation measures are not considered available.	Moderate adverse	Significant
Daylight: • Burham Uddin House; • 154 Commercial Road; • 16, 18 Folgate Street; • 3, 7, 11 & 13, 30 Elder Street; and • Rear of 21-26, 31 Shoreditch High Street.	Minor adverse	Given the nature of the effect, further mitigation measures are not considered necessary.	Minor adverse	Not Significant
Daylight: • 12-14 Folgate Street; and • All other residential properties assessed.	Negligible	No mitigation required.	Negligible	Not Significant
Sunlight • Burham Uddin House; and • Rear of 21-26 Shoreditch High Street.	Minor adverse	Further mitigation measures are not considered necessary.	Minor adverse	Not Significant
Sunlight • All other	Negligible	No mitigation required.	Negligible	Not Significant

Resource / Receptor	Effect (incorp. environmental design & management)	Mitigation and Monitoring	Residual Effect (incorp. mitigation & monitoring)	Significance Conclusion
residential properties.				
Light Pollution • Proposed S3 building (north elevation); • Proposed S3 building (west elevation)	Major adverse	Blinds, sensor lighting or lighting strategies would all reduce the light intrusion into the neighbouring properties.	Minor Adverse	Not Significant
Light Pollution • Burham Uddin House; • 6-18 Folgate Street;	Minor adverse	Blinds, sensor lighting or lighting strategies would all reduce the light intrusion into the neighbouring properties.	Negligible	Not Significant
Light Pollution • 2-3 Elder Street	Negligible	No Mitigation required	Negligible	Not Significant
Amenity Areas				
Transient Overshadowing December 21 st .	Minor adverse	Further mitigation measures are not considered necessary.	Minor adverse	Not Significant
Transient Overshadowing • March 21 st ; and June 21 st .	Negligible	No mitigation required	Negligible	Not Significant
Junctions on Highway Network				
Solar Glare • Viewpoint 3	Minor to moderate adverse	Given the nature of the effect, further mitigation measures are not considered necessary.	Minor to moderate adverse	Significant
Solar Glare • Viewpoint 2; and • Viewpoint 8.	Minor adverse	Given the nature of the effect, further mitigation measures are not considered necessary.	Minor adverse	Not Significant
Solar Glare • Viewpoint 1; • Viewpoint 4 and 5; • Viewpoint 6 and 7; and • Viewpoint 9.	Negligible	No mitigation required.	Negligible	Not Significant

Conclusion – Update 2015

11.281 A review of the daylight, sunlight, overshadowing, light pollution and solar glare effects of the Amended Proposed Development has concluded that the likely daylight and sunlight conditions arising from the November 2015 Amendments is consistent with the conditions presented in the December 2014 ES and

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

March 2015 ES Addendum. As such, the conclusions set out within the March 2015 ES Addendum, and the December 2014 ES, remain valid.

Effect Interactions and Cumulative Effect Assessment

Assessment of Combined Effect of Individual Effects on a Single Receptor

11.282 The combined effect of individual effects occurs when a single receptor is affected by more than one effect at any point in time. An exercise which tabulates the residual effects identified within the ES against relevant receptors, and so identifies the potential for combined cumulative effects, has been undertaken.

11.283 Reference should be made to **Chapter 16: Effect Interactions** of this ES for further details.

Assessment of Cumulative Effect of the Proposed Development with Other Development Schemes

11.284 This section of the chapter assesses the potential effects of the Proposed Development in combination with the potential effects of other development schemes within the surrounding area, as listed within **Chapter 2: EIA Methodology** of this ES.

11.285 The cumulative effects will be unchanged from those reported for the Proposed Development alone and, therefore, this section focuses on the cumulative effects once the Proposed Development is completed.

Cumulative Effects Once the Proposed Development is Completed and Operational

11.286 Full details of the daylight and sunlight assessment results for the cumulative scenario can be found in **ES Volume III: Appendix F** and are summarised below.

11.287 The assessment of effects in the Proposed Development scenario presents a worst case scenario in regards to solar glare and it is likely that the cumulative schemes may obscure the view of the Proposed Development from some of the viewpoints assessed. However, it is anticipated that the effects would be unchanged and thus would remain as reported within the Proposed Development Scenario.

11.288 In regards to light pollution, the effects would be unchanged from those reported in the Proposed Development Scenario.

Daylight

11.289 In regards to VSC, the results of the cumulative assessment indicate that 285 out of the 460 windows assessed will meet the BRE guidelines, whereas 262 out of the 288 rooms assessed will meet the BRE guidelines for NSL.

11.290 The levels of compliance, in regards to both VSC and NSL, are lower than the Proposed Development (which is likely a result of the combination of developing Principal Place and Bishopsgate Goodsyrd at the same time as the Proposed Development).

11.291 For those properties not highlighted light grey within Table 11.5, the likely levels of compliance will be unchanged from the Proposed Development Scenario. The remaining properties are discussed in more detail below.

11.292 The following properties were previously identified as experiencing **minor** and **moderate adverse** daylight effects as a result of the Proposed Development and the level of compliance is reduced as a result of the cumulative scenario:

- 12-14 Folgate Street and 16 Folgate Street - both of these properties look down the street between the Proposed Development blocks and therefore have a tunnelled aspect which will be obscured by the Bishopsgate Goodsyrd development. The majority of the percentage alterations range between 20-30% and therefore the likely effect for both of these properties remains **minor adverse**.
- 3 Elder Street – has a view of the Proposed Development from one elevation and a view of the Bishopsgate Goodsyrd development on the return elevation and therefore there will experience cumulative daylight impacts. The likely effect to this property as a result of the cumulative scenario is considered to be **minor to moderate adverse**.

- 30 Elder Street – as with 3 Elder Street, this property will be effected by the cumulative obstruction of the Proposed Development along with Principal Place. The likely effect however remains **minor adverse**.
- Burham Uddin House and 154 Commercial Road – the levels of compliance for VSC and NSL are reduced in the cumulative scenario. These properties overlook both the Proposed Development and the Bishopsgate Goodsyrd development and therefore the potential impacts are as a result of the combination of the obstruction caused by the two developments rather than the Proposed Development in isolation. The likely effect under this scenario is **moderate to major adverse**.
- 31 Shoreditch High Street and Rear of 21-26 Shoreditch High Street – the affected windows within these properties are not only obstructed by the Proposed Development but also the Bishopsgate Goodsyrd development. The combination of both developments being constructed at the same time results in cumulative daylight impacts. The likely effect in terms of daylight to these properties as a result of the cumulative scenario is considered to be **moderate adverse**.

11.293 The following properties were identified as **negligible** in the Proposed Development scenario, however as a result of the consideration of the other development schemes, the properties have the potential to experience adverse impacts. The impacts to these properties are caused predominantly as a result of the cumulative schemes and combination of their construction at the same time as the Proposed Development rather than the Proposed Development in isolation. This is evident as the Proposed Development scenario identified a negligible effect to the following properties:

- 4 Spital Square;
- 6/6A Folgate Street;
- 8 Folgate Street;
- 10 Folgate Street;
- 19 Folgate Street;
- 21 Folgate Street;
- 23-27 Folgate Street; and
- 36 Elder Street.

11.294 For nearly all of these properties at least half or more will meet the BRE guidelines for VSC in the cumulative scenario. Where there are transgressions the alterations are between 20-31% and all of the rooms within these properties meet the BRE guidelines for NSL.

11.295 Therefore whilst there will be cumulative daylight impacts as a result of the Proposed Development and cumulative schemes being constructed at the same time, the likely effect is considered to be **minor adverse**.

Sunlight

11.296 The results indicate that a total of 153 windows out of the 157 windows assessed will meet the BRE guidelines. The level of compliance will be unchanged from the Proposed Development and, therefore, there will be no cumulative sunlight effects.

11.297 The likely cumulative effects remain as reported within the Proposed Development scenario.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Table 11.13 Summary of Cumulative Sunlight Results

Address	Sunlight Cumulative		Sunlight Proposed	
	Total No. Windows	Meet BRE Guidelines Total & Winter	Total No. Windows	Meet BRE Guidelines Total & Winter
Burham Uddin House	76	75	76	75
Commercial Street				
154 Commercial Street	18	18	18	18
167 Commercial Street	5	5	5	5
169 Commercial Street	5	5	5	5
Folgate Street				
21 Folgate Street	6	6	6	6
Shoreditch High Street				
30 Shoreditch High Street	6	6	6	6
31 Shoreditch High Street	6	6	6	6
Rear of 21-26 Shoreditch High Street	8	5	8	5
223 Shoreditch High Street	8	8	8	8
226 Shoreditch High Street	8	8	8	8
227 Shoreditch High Street	6	6	6	6
228 Shoreditch High Street	5	5	5	5
Totals	157	153	157	153

Overshadowing

There is one area of amenity space within Principal Place, which is located in close proximity to the Site; therefore, it has been assessed in regards to sun hours on ground. Full details of the results can be found in **ES Volume III: Appendix F**. The results indicate that at least 56% of this area of amenity will receive 2 hours of direct sunlight on March 21st and will therefore meet the BRE guidelines. In addition, the levels of sunlight will be much higher during the summer period when this amenity area is most likely to be in use. Therefore the likely effect on this area is considered to be **negligible**.

11.298 In terms of transient overshadowing, the level of effects will be similar to that of the Proposed Development in isolation throughout the year; however, the Proposed development will no longer cast shadow on the football pitches as these will be developed as part of the Bishopsgate Goodsyrd Development and, therefore, the likely effect in the cumulative scenario is considered to be **negligible**.

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Table 11.15 Summary of Cumulative Daylight Results

Address	VSC Cumulative		VSC Proposed		NSL Cumulative		NS Proposed	
	Total No. of Windows	No. Windows that meet BRE criteria	Total No. of Windows	No. Windows that meet BRE criteria	Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria	Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria
Burham Uddin House	83	65	83	76	59	59	59	59
Commercial Street								
154 Commercial Street	39	16	39	39	23	18	23	22
167 Commercial Street	5	0	5	5	4	4	4	4
169 Commercial Street	5	1	5	5	5	5	5	5
Elder Street								
30 Elder Street	11	7	11	11	9	8	9	8
34 Elder Street	5	5	5	5	5	5	5	5
36 Elder Street	1	0	1	1	1	1	1	1
3 Elder Street	31	12	31	29	12	6	12	8
5 Elder Street	11	11	11	11	6	6	6	6
7 Elder Street	11	11	11	11	6	5	6	5
9 Elder Street	22	22	22	22	14	11	14	11
11 & 13 Elder Street	19	19	19	19	11	9	11	9
15 Elder Street	12	12	12	12	6	6	6	6
17 Elder Street	11	11	11	11	6	6	6	6
Folgate Street								
6/6A Folgate Street	8	5	8	8	5	5	5	5
8 Folgate Street	8	4	8	8	5	5	5	5
10 Folgate Street	14	8	14	14	6	6	6	6
12-14 Folgate Street	26	8	26	25	14	11	14	14
16 Folgate Street	12	7	12	11	5	4	5	4
17/17A Folgate Street	9	9	9	9	7	7	7	7
18 Folgate street	14	14	14	14	6	4	6	4
19 Folgate Street	6	5	6	6	6	6	6	6
21 Folgate Street	9	7	9	9	6	6	6	6
23-27 Folgate Street	20	7	20	20	16	16	16	16
Shoreditch High Street								
30 Shoreditch High Street	6	2	6	6	4	4	4	4
31 Shoreditch High Street	6	1	6	3	3	3	3	3
Rear of 21-26 Shoreditch High Street	8	1	8	6	8	6	8	6
223 Shoreditch High Street	8	0	8	8	4	4	4	4
226 Shoreditch High Street	8	0	8	8	3	3	3	3
227 Shoreditch High Street	6	0	6	6	4	4	4	4
228 Shoreditch High Street	5	0	5	5	3	3	3	3

11 Daylight, Sunlight, Overshadowing, Solar Glare & Light Pollution

Address	VSC Cumulative		VSC Proposed		NSL Cumulative		NS Proposed	
	Total No. of Windows	No. Windows that meet BRE criteria	Total No. of Windows	No. Windows that meet BRE criteria	Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria	Total No. of Rooms	No. Rooms that meet the 0.8 times former value criteria
Spital Square								
4 Spital Square	21	15	21	21	16	16	16	16
Totals	460	285	460	444	288	262	288	271

*Grey highlighted cells indicate results that have changed from the Proposed Development Scenario

Assessment of Cumulative Effect of the Site with Other Development Schemes - Update 2015

March 2015 ES Addendum

11.299 As there are no new cumulative schemes and the alterations to the scheme are minor the cumulative effects reported in the December 2014 ES remain valid.

November 2015 Amendments

11.300 As per the approach adopted for assessing the impact of the Amendment Proposed Development, having regard to the assessment of the Site with other development schemes the assessment has similarly adopted the approach to qualitatively assess using professional judgement, with the aid of the daylight and sunlight modelling results acquired for the December 2014 ES.

11.301 The number of cumulative schemes since the March 2015 ES Addendum has been updated, with the application for Bishopsgate Goodsyard development being amended. The Bishopsgate scheme now proposes to include Plot K, a commercial block over the railway in the western part of the site. The remainder of the proposed changes to the Bishopsgate scheme relate to other elements further away and are unlikely to affect the daylight, sunlight, overshadowing, light pollution and solar glare assessment considered within the December 2014 ES and March 2015 ES Addendum. In any event the proposed changes to the various blocks within the Bishopsgate scheme involve a reduction in the massing and/or height and therefore have the potential to result in marginal improvements to the daylight and sunlight conditions for the surrounding receptors.

11.302 The introduction of the commercial block within Plot K has the potential to impact on the assessments of daylight, sunlight and overshadowing conditions on surrounding properties and amenity spaces. The introduction has the potential to alter the results of the technical assessments and modelling data. However, it is considered that the potential change in impact arising from the amendment to the Bishopsgate scheme is unlikely to affect the overall of significance of the effects as reported in the December 2014 ES and March 2015 ES Addendum.

Summary of the 2011 Consented Scheme

11.303 A technical report was produced (dated November 2010) and comprised of an assessment of the daylight (using VSC and BRE criteria) and sunlight levels (BRE criteria) on surrounding residential properties (i.e. residential properties identified at Burham Uddin House, along Elder Street and Folgate Street). An internal daylight and sunlight analysis was also undertaken for the proposed occupants of the development (along 5 to 11A Folgate Street), although the residential element was removed from the final approved scheme – it has been included for completeness.

11.304 In relation to the effect of the proposed scheme, there will be either no alteration or an imperceptible alteration to the daylight amenity experienced by neighbouring residential dwellings, and no change in

11.305 their sunlight amenity. Consequently, the proposed mass was BRE compliant in terms of its affect upon neighbouring dwellings.

11.306 In relation to the proposed (initially) residential accommodation on Folgate Street, only 2 kitchens to the rear of the scheme would have fallen beneath the BRE recommended standard due to the provision of external amenity space in the form of a balcony for the flat above. In both instances, the kitchens would have retained a sense of natural light. The sunlight issues have not changed from that experienced within the existing situation as the façade is retained and therefore inherited, notwithstanding this 46% of the windows will comply with or exceed and in some cases substantially exceed the total APSh target values suggested by the BRE Guidelines. Whilst 33 out of 37 (89%) will retain in excess of 21% APSh which whilst below guidance for a suburban environment would be regarded as very good for an urban context.

11.307 The BRE Guidelines suggest that they should be interpreted flexibly in densely developed, historic and urban locations precisely such as this, and that the technical results be interpreted with this in mind and consider more appropriate levels in such circumstances. It was concluded that the areas which do not strictly comply, i.e. 2 rooms in daylight terms, do not amount to a significant breach of the BRE Guidelines and that a pragmatic view be taken in this instance.

References

- Ref. 11-1 Buildings Research Establishment (BRE) (2011); BRE Handbook 'Site Layout Planning for Daylight and Sunlight' a guide for good practice.
- Ref. 11-2 Environmental Protection Act, Section 79, 1990
- Ref. 11-3 National Planning Policy Framework, 2012
- Ref. 11-4 Planning Practice Guidance (2014)
- Ref. 11-5 Greater London Authority (2011); The London Plan: Spatial Development Strategy of Greater London.
- Ref. 11-6 Greater London Authority (2013); Early Minor Alterations to the London Plan.
- Ref. 11-7 Greater London Authority (2014); Draft Further Alterations to the London Plan.
- Ref. 11-8 Supplementary Planning Advice on High Buildings and Strategic Views in London, 1999
- Ref. 11-9 LBTH (2010); Core Strategy.
- Ref. 11-10 LBTH (2012); Managing Development Document.
- Ref. 11-11 Commission for Architecture and the Built Environment (CABE) (2007); Guidance on Tall Buildings.
- Ref. 11-12 British Standards Institution (BSI) (2008); BS8206-2: 2008 Lighting for buildings; Code of Practice for Daylighting. BSI.
- Ref. 11-13 Chartered Institution of Building Services Engineers (CIBSE) (1999); Applications Manual: Window Design of the Chartered Institute of Building Services Engineers.
- Ref. 11-14 Institute of Lighting Professionals (2011) Guidance notes for the reduction of obtrusive light
- Ref. 11-15 "Simple Anatomy of the Retina". Webvision. University of Utah, <http://webvision.med.utah.edu/book/part-i-foundations/simple-anatomy-of-the-retina/>
- Ref. 11-16 (Robert H. Spector (1990). Clinical Methods: The History, Physical, and Laboratory Examinations, 3rd edition, Chapter 3 - www.ncbi.nlm.nih.gov/books/NBK220/)
- Ref. 11-17 Commission Internationale de L'Eclairage: guidance notes for the reduction of obtrusive light (2005)

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- Ref. 11-18 Greater London Authority, (2015); The London Plan: Spatial Proposed Development Strategy for Greater London (Consolidated with Alterations since 2011).
- Ref. 11-19 Greater London Authority, (2015); Minor Alterations to The London Plan: Spatial Proposed Development Strategy for Greater London (Consolidated with Alterations since 2011).

