

13. Daylight, Sunlight, Overshadowing, Solar Glare and Light Pollution

Introduction

- 13.1 This chapter, prepared by GIA, supersedes and replaces Chapter 13 of the December 2019 ES. This updated chapter presents an assessment of the likely effects of the Development on the daylight and sunlight amenity to the occupiers of neighbouring sensitive properties and overshadowing to existing amenity areas in the vicinity of the Site.
- 13.2 A solar glare assessment has also been undertaken due to the Development's proximity to multiple road junctions and rail tracks to and from London Bridge mainline station. In addition, a light pollution assessment has been carried out to identify any potential effects to surrounding sensitive receptors.
- 13.3 This chapter contains a description of the methods used to assess the effects and a description of the relevant baseline conditions of the Site and its surrounding area. This is followed by an assessment of the likely significant effects of the Development during the demolition and construction works and once the Development is complete and operational. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any adverse effects identified, and a description is provided of the nature and significance of likely residual effects.
- 13.4 This chapter is supplemented by the following documents:
- **Appendix 13.1:** Drawings of the existing Site and the Development;
 - **Appendix 13.2:** Daylight and Sunlight Results to surrounding sensitive receptors;
 - **Appendix 13.3:** Overshadowing Results;
 - **Appendix 13.4:** Solar Glare Results; and
 - **Appendix 13.5:** Light Pollution Results.
- 13.5 Please note that for the purposes of this ES chapter, the demolition, deconstruction, refurbishment and construction works will be referred to as 'the Works'.

Assessment Methodology and Significance Criteria

- 13.6 The non-mandatory Building Research Establishment (BRE) Guidelines suggest that residential properties have the highest requirement for daylight and sunlight and state that "*the guidelines are intended for use for rooms in adjoining dwellings where light is required, including living rooms, kitchens and bedrooms*". Therefore, this chapter focuses on those residential buildings and other sensitive receptors such as hospitals surrounding the Site which would have the potential to be affected by the Development. The uses of nearby buildings, in terms of commercial and residential, were established using external observations and Valuation Office Agency (VOA) checks. The BRE Guidelines are the industry recognised standard for assessing all matters related to daylight, sunlight and overshadowing, and the primary reference within all national and local policy.
- 13.7 When determining whether changes in light condition are in line with policy and guidance, it is important to give consideration to other contextual matters, such as instances where the existing

light levels within neighbouring properties are already low, or where the proposed residual values are commensurate with that which one would expect to find in surrounding urban areas of similar density. Furthermore, daylight and sunlight impacts of a development should be balanced against the improvements and benefits which the scheme will bring to the area.

Baseline characterisation

- 13.8 Baseline characterisation was completed by firstly undertaking a review of the surrounding land uses using information and data sourced from the VOA website. This review was undertaken for all surrounding properties in close enough proximity to the Site to be affected by the Development, to identify any residential or other sensitive properties (such as hospital facilities) to be assessed as potential sensitive receptors.
- 13.9 It should be noted that buildings with transient use such as classrooms, hospitals and student accommodation have a lower requirement for daylight and sunlight, and are therefore given a lower sensitivity than permanent residential properties.
- 13.10 This was followed by a Site visit during the month of submission to confirm the existing conditions around the Site remain accurate to those modelled. The conditions recorded are not considered to have changed from the day of the Site visit to the time of writing this ES chapter.
- 13.11 Based on the above, a three dimensional (3D) AutoCAD model was developed for the existing surrounding properties and existing buildings on-Site using a full topographical survey, photogrammetric survey and site photographs.

Scenarios assessed

- 13.12 The following scenarios have been considered and are reported within this chapter of the ES:
- Baseline;
 - Demolition and Construction ('the Works'); and
 - Complete and Operational Development;

Baseline

- 13.13 This scenario has considered the current baseline condition (as at the time of writing) at identified sensitive receptors. It is depicted on drawings 8684/01/01/001 (**Appendix 13.1**).
- 13.14 As noted in paragraph 13.6, the BRE Guidelines state that residential properties have the highest requirement for daylight and sunlight. In addition, the BRE Guidelines state that other uses such as hospitals and schools may also have a requirement for daylight and sunlight.
- 13.15 Accordingly, existing residential and hospital receptors adjoining or in proximity to the Site have been considered within this assessment. In addition, classrooms associated with the London School of Commerce have been included.
- 13.16 It should be noted that Shard Place has been included in the baseline scenario as construction is well underway, and the superstructure is very likely to be completed before work starts on the proposed Development; the scheme is due to be completed in 2020.

- 13.17 With regard to Sun Hours on Ground, as sun exposure is predominantly within southern facing aspects of the Site due to the path of the sun, only the neighbouring amenity areas located to the north of the Site have been considered within this assessment. For transient overshadowing, all neighbouring amenity areas to the north of the Site in close enough proximity to experience overshadowing from the Development have been considered.

Complete and Operational Development

- 13.18 The complete and operational Development scenario consists of the detailed Development in the context of the surrounding existing environment. This scenario assesses the potential daylight, sunlight, overshadowing, solar glare and light pollution effects of the Development on the surrounding receptors and amenity spaces as well as sensitive road junctions and train lines.
- 13.19 This scenario is illustrated on drawing number 8684/03/01/001 within **Appendix 13.1**.

Sensitive Receptors

Daylight and Sunlight

- 13.20 As set out in the assessment methodology, existing residential, hospital and educational receptors are considered to be sensitive receptors that may be affected by the Development. In addition, future residential receptors within Shard Place have been included in the assessment as they are in very close proximity to the Site and construction of Shard Place is well underway and is expected to be complete prior to the Works commencing on New City Court.
- 13.21 As shown in **Figure 13.1** and **Table 13.1**, the following residential properties, Guy's Hospital and the London School of Commerce have been considered due to their proximity to the Site.

Table 13.1: Daylight and Sunlight Receptor Locations

Receptor Location
6 London Bridge Street
43 Borough High Street
51 Borough High Street
53-55 Borough High Street
57 Borough High Street
59-61 Borough High Street
63a Borough High Street
3 Kings Head Yard
The Old King's Head Public House
22 Southwark St
St Thomas Church
Bunch of Grapes Public House, 2 St Thomas Street
Iris Brook House - Talbot Yard (Student Accommodation)
Orchard Lisle House - Talbot Yard (Student Accommodation)
Chaucer House - White Hart Yard – London School of Commerce

Receptor Location
Shard Place
Guy's Hospital – Tower Wing
Guy's Hospital – Southwark Wing

Overshadowing

- 13.22 Owing to the southerly location of the sun path, only the amenity areas located to the north of the Site have the potential to have experience alteration is sunlight with the Proposed Development implemented. Therefore, only amenity areas located from northward of the Site from due east to due west have been considered. Due to the scale of the Development and the nature of the surrounding area, the amenity area in proximity to the Site that is considered sensitive in terms of overshadowing is shown on **Figure 13.2**.
- 13.23 In addition to existing amenity area, the new amenity areas created by the proposed Development have been assessed using Sun Hours on Ground to determine the quantum of sunlight they would receive. As the amenity areas are new, a comparison against a baseline is not possible. Therefore, the amenity areas are assessed in absolute terms.

Solar Glare

- 13.24 Solar glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of a Development. Therefore, the assessment considers the effect of the Development in absolute terms and not against the baseline.
- 13.25 Nearby railway lines and roads have also been assessed for solar glare, and the locations assessed can be seen in **Figure 13.5**.

Light Pollution

- 13.26 The following properties were considered sensitive in regard to light pollution due to their close proximity to the Site:
- 2 St Thomas Street;
 - 3 Kings Head Yard;
 - 45 Borough High Street (The Old King's Head);
 - 43, 51, 53, 55, 57, 59, 63 and 63a Borough High Street;
 - Orchard Lisle House; and
 - Shard Place.
- 13.27 An assessment has been undertaken on the effects on these properties caused by the proposed Development.
- 13.28 All other sensitive receptors are considered too far from the Site to be affected by the Development in terms of light pollution.

Methodology for Determining Effects During the Works

- 13.29 Owing to the evolving and changing nature of the Works, the assessment of potential effects during demolition and construction of the Development on daylight, sunlight and overshadowing to surrounding receptors has not been modelled. Instead, a qualitative assessment has been undertaken using professional judgement and experience.
- 13.30 The potential daylight, sunlight and overshadowing effects relating to demolition and construction works would vary throughout the construction programme and gradually increase to the potential effects identified for the completed Development. It is considered that the completed Development represents the worst-case assessment in terms of likely effects on levels of daylight, sunlight and overshadowing received by sensitive receptors.

Methodology for Determining Complete and Operational Effects

- 13.31 The methodologies set out below have been used to determine the effects of the complete and operational Development.

Approach for Daylight, Sunlight, Overshadowing and Solar Glare Assessments

- 13.32 The technical analyses carried out to inform the assessments have been undertaken by creating a digital 3D model of the existing Site, and the complete and operational Development, based on measured survey data.

Daylight

- 13.33 The BRE Guidelines specify two primary methods for assessing daylight within an existing sensitive receptor:
- Vertical Sky Component (VSC); and
 - No Sky Line (NSL) Method.
- 13.34 These are presented in further detail below.

Vertical Sky Component (VSC) Method

- 13.35 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”.*
- 13.36 The 3D model uses a Waldram Diagram 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 existing and proposed buildings, and thus calculate the sun hours on ground in each scenario and how the Development would affect the amount of daylight being received at surrounding sensitive receptors.

- 13.37 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 Development in terms of light.
- 13.38 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.
- 13.39 Regarding existing trees, these may be ignored unless they form dense continuous belts. As stated within the BRE “where the effect of a new building on existing building is being analysed, it is usual to ignore the effect of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf.” There are no “dense continuous belts” of trees within the Site, and as such, trees are excluded from the assessment as per the BRE Guidelines.
- 13.40 The maximum VSC value is 39.9% for a completely unobstructed vertical wall or window. In terms of assessment criteria, the BRE Guidelines state that:
- “If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if either:*
- *the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value*
 - the area of the working plane in a room which can receive direct skylight is reduced to less than 0.8 times its former value.”*
- 13.41 It is acknowledged that the values in the BRE Guidelines are predicated against a 2-3 storey suburban model, therefore the application of its guidelines in inner urban environments should be treated flexibly. This form of assessment does not take account of context or detailed matters such as window size, room use, room size, window number or dual aspect rooms. This assessment also assumes that all obstructions to the sky are 100% non-reflective. It should be noted that the BRE Guidelines acknowledges this and states, in paragraph 2.2.3;
- 2.2.3 ‘The numerical values given here are purely advisory. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints.’*
- 13.42 Clearly in more urban environments, if development is to meet the scale and proportion of neighbouring buildings, large factor reductions are very difficult to avoid. GIAs experience in daylight and sunlight matters in dense urban environments suggest that weight should also be given to the retained values rather than just the percentage change. Our experience in the field would suggest that a more realistic VSC level in a dense urban environment would be considered to be around 15%.
- 13.43 GIA’s view on retained VSC levels is supported by the Greater London Authority’s hearing report for the Monmouth House and Featherstone Street development (application reference: P2015/3136/FUL) where it was considered in Para 120, Page 31:
- ‘For general guidance, whilst the BRE guidelines recommend a target value of 27% VSC when measured on an absolute scale, that value is derived from a low density suburban housing model.*

In an inner city urban environment, VSC values in excess of 20% should be considered as reasonably good, and VSC in the mid-teens should be acceptable.'

No Sky Line (NSL) Method

- 13.44 The NSL method is a measure of the distribution of daylight at the 'working plane' within a room. The 'working plane' is a horizontal plane 0.85m above finished floor level 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 may be poor and supplementary electric lighting may be required.
- 13.45 Where actual room layouts were available, these have been considered in the modelling of the internal layouts within the surrounding properties. Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL. 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 4.2m (14 ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable.
- 13.46 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 would 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.
- 13.47 British Standard (BS) 8206 Part 2 Lighting for Buildings, Code of Practice for Daylighting also states 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".*
- 13.48 Therefore, an NSL of at least 80% would be considered satisfactory.
- 13.49 In relation to deep rooms lit by windows on one side, the BRE Guidelines state in paragraph 2.2.20:
- "If an existing building contains rooms lit from one side only and greater than 5m deep, then a greater movement of the no sky line may be unavoidable."*

Sunlight

Annual Probable Sunlight Hours (APSH)

- 13.50 The APSH is a measure of sunlight that a given window may expect over the period of a year, and where there is no obstruction, equates to a maximum of 1,486 hours. Sunlight is measured using a sun indicator which contains 100 spots, each representing 1% of APSH (i.e. 14.86 hours of the total APSH).

- 13.51 The number of spots is calculated for all 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.
- 13.52 The BRE Guidelines note on page 14 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”.*
- 13.53 In regard 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 (21 September to 21 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%.
- 13.54 BS 8206 Part 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.”*
- 13.55 It is often not possible to determine the room uses within each of the neighbouring properties, nor is it clear which windows 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

13.56

- 13.57 **Table 13.2** provides a summary of the criteria set out within the BRE Guidelines for daylight and sunlight.

Table 13.2: Summary of Daylight and Sunlight Assessment Criteria

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.
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 (21 September to 21 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%.

Overshadowing

Transient overshadowing

- 13.58 The BRE Guidelines suggests that where large buildings are proposed that may affect a number of gardens or open spaces, it is useful to plot a shadow plan to illustrate the location of shadows at different times of the day and year. For the purpose of this assessment the hourly shadows were mapped for the following three key dates in the year:
- 21 March (Spring Equinox);
 - 21 June (Summer Solstice); and
 - 21 December (Winter Solstice).
- 13.59 21 September (Autumn Equinox) provides the same overshadowing images as March 21 (Spring Equinox) as the sun follows the same path at these corresponding times of year. Therefore, 21 March is used within the overshadowing assessment.
- 13.60 The transient overshadowing has been calculated at hourly intervals throughout the day from 08:00 to 19:00, and visual representations are provided in **Appendix 13.3**. Where there are gaps in timings in **Appendix 13.3**, this is because the sun would not be present during these times (for example, from approximately 16:00 onwards on 21 December) and thus no shadow can be cast. On December 21, the sun is at its lowest point causing long shadows to be cast and represents the worst-case scenario in terms of overshadowing.

Sun Hours on Ground

- 13.61 The BRE Guidelines suggest that Sun Hours on Ground assessments should be undertaken on the equinox (21st March or 21st September). Using specialist software, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.
- 13.62 It is recommended that at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March 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).

Solar Glare

13.63 Solar glare is particularly important at pedestrian crossings, road junctions and train lines, where glare can reduce visibility for drivers or pedestrians. Typically, elements considered to be reflective are either glazed apertures or metal cladding.

13.64 The BRE Guidelines includes the following statement in regard 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...”

13.65 Solar glare is not a comparative assessment; the fact it may occur in the baseline does not justify its occurrence as a result of a Development. Therefore, the assessment presented in this chapter considers the effect of the Development in absolute terms, by reference to the relevant guidance levels.

Viewpoints for Road Users and Pedestrians

13.66 As indicated previously, the assessment considers potentially sensitive viewpoints for road users and pedestrians surrounding the Site. The viewpoints are generally located at the minimum stopping distance (see paragraph 13.69 of this chapter for further information) and at the driver's eye level. The focal point is a relevant traffic element, such as signals or incoming traffic.

13.67 Identifying the viewpoints based on the stopping distance is calculated as the combination of thinking and braking distances, using the following formula:

$$D_{total} = D_{thinking} + D_{braking} = V \cdot T + \frac{V^2}{2\mu \cdot g}$$

13.68 Where each component is:

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

13.69 The height of the viewpoint is considered to be 1.5m for cars and 2.0m for buses. **Figure 13.3** identifies the typical stopping distance range for a car travelling at different speeds. Therefore, a viewpoint for a car driving at 20mph (32km/h) (i.e. speed limit for a dense urban location) would be placed at 12m from a traffic light and 1.5m above the ground.

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

Railway lines

- 13.71 In addition to road users, instances of solar reflection also have the potential to effect train drivers and their view of traffic signals. Due to the proximity of the Site to the railway line running to and from London Bridge Mainline Station, an assessment has been undertaken from these viewpoints.

Solar Glare Technical Assessment

- 13.72 The potential for reflected solar glare or dazzle from glazed or reflective façades from the Development has been 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 have been 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.
- 13.73 The assessment has been undertaken on the basis that the fovea centralis (also generally known as the fovea) is a part of the eye, located in the centre 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, driving, and any activity where visual detail is of primary importance. The macula corresponds to the central 13° of the visual field; the fovea to the central 3°.
- 13.74 **Figure 13.4** highlights the degrees of vision corresponding to the foveal view, with a red circle of 3° of 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.
- 13.75 The degrees of vision provide a reference from which significant effects can be identified. 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 could be an issue and mitigation may be necessary.
- 13.76 As stated in the Commission Internationale de L'Eclairage guidance CIE 146:2002, 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 beyond 30° from the line of sight. Therefore, the risk of reflective solar glare causing a hazard is reduced and, as such, mitigation would make only a minor difference.
- 13.77 The methodology for solar glare is not aimed at addressing the intensity of an instance of reflected solar glare, but rather its occurrence, duration throughout the year and the location of this occurrence in respect of an individual's line of sight. It is also to be noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account.

Light Pollution

- 13.78 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 residential accommodation, where this would cause nuisance to the occupants. The ILP Guidance Notes¹ provide suggested lighting level values to ascertain the acceptability of lighting levels of light pollution.

- 13.79 It should be noted that artificial light is not always perceived as being negative, particularly in areas of high crime where good street lighting and light into street environments is seen as a positive attribute. Adverse effects caused as a result of electric lighting include the intrusion of light into sensitive locations such as adjacent residential accommodation, areas of special night-time interest, or needless spillage into the night sky.
- 13.80 It should also be noted that the ILP Guidance relates and refers to external luminaires. However, commercial buildings with large areas of glazing and possible night-time usage can sometimes cause light intrusion from their internal luminaires. For this reason, quantitative light pollution assessments can be undertaken in relation to these internal luminaires.
- 13.81 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.

Light Intrusion Methodology

- 13.82 Light pollution is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of the proposed Development. Therefore, the assessment considers the effect of the proposed Development in absolute terms, by reference to the relevant guidance levels.
- 13.83 The assessment has been undertaken by preparing a computer generated 3D 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 within the proposed commercial building in order to achieve an average illuminance of 500 lux across the working plane. This assessment assumes that all luminaires are switched on at once and no blinds or shading devices are deployed for the purpose of the light pollution assessment. For this reason, it should be considered a worst-case scenario.
- 13.84 Table 13.3 below sets out the environmental zones as per the ILP Guidance which have been applied in this assessment.

Table 13.3 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/m ²]
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.

- 13.85 With reference to **Table 13.3**, taken from the ILP guidance, the Site is classified as environmental zone E4. This zone allows for a maximum pre-curfew light intrusion level of 25 lux and a maximum post-curfew light intrusion level of 5 lux.

Significance Criteria

Effect Significance Terminology Overview

- 13.86 In terms of sensitivity, surrounding properties are considered highly sensitive to daylight and sunlight levels, and specifically habitable rooms within the properties such as living rooms, kitchens and bedrooms, in accordance with the BRE Guidelines. All existing residential receptors, assessed within this chapter are considered highly sensitive due to the expectation of natural light

and given equal weighting, and therefore each individual receptor is not assigned a level of sensitivity as per the usual EIA methodology i.e. high, medium, low or very low. However, buildings with transient occupants such as student accommodation, educational facilities and hospitals are considered lower sensitivity as they are not permanent residences and are transient in nature.

- 13.87 For transient overshadowing, all public areas of open space such as parks, squares and private gardens in proximity to the Site are considered highly sensitive and are considered within the assessment.
- 13.88 The key terminology to be used to describe the magnitude of effects is as follows and is further described in the below sections of this chapter:
- Major;
 - Moderate;
 - Minor; and
 - Insignificant.
- 13.89 The nature of the effects may be either adverse (negative) or beneficial (positive).
- 13.90 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, in relation to sunlight, daylight, overshadowing and solar glare the following criteria is applied:
- 'Minor', 'Moderate' or 'Major' effects are deemed to be 'significant';
 - 'Insignificant' effects are considered to be 'not significant'.

Evaluating Effects and Significance – Daylight, Sunlight and Overshadowing

Daylight and Sunlight

- 13.91 For daylight and sunlight, the BRE Guidelines outline the approach within the accompanying Appendix I, in terms of assigning criteria to assess the effects:
- Section 3 of Appendix H states: *“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.”*
 - Paragraph 5 of Appendix H states: *“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.”*
 - Paragraph 6 of Appendix H states: *“Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or long-term, local, adverse of major significance. 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.”

13.92 The classification of major adverse is documented within Paragraph 7 of the 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, e.g. a living room in a dwelling or a children’s playground”.*

13.93 Where the BRE Guidelines are met, the effects would be considered insignificant.

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

- 0 – 19.9% alteration = Insignificant;
- 20 - 29.9% alteration = Minor;
- 30 - 39.9% alteration = Moderate; and
- Greater than 40% alteration = Major.

13.95 For instances where existing VSC, NSL and APSH levels within a property are low, any alteration may result in a disproportionate percentage change, whereby the actual change in daylight or sunlight within the property experienced by the occupant may not be as noticeable as the percentage change would suggest. This is one example of when professional judgement is taken into account.

13.96 Therefore, when assigning an overall significance per property, consideration has been 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.

13.97 Where room uses are unknown, all rooms assessed within the property or building are considered habitable to give the worst-case scenario for potential daylight and sunlight effects caused by the Development.

13.98 Where the scale of VSC levels and NSL levels within a property differ, professional judgement has also been used to determine an overall significance. In addition, if the scale of total APSH and Winter PSH differ greatly, professional judgement has also been used to determine the significance of the effect. This has been based on the factors previously stated.

Overshadowing

Transient Overshadowing

- 13.99 The BRE Guidelines do not include criteria for the significance of transitory overshadowing other than to identify the different times of the day and year when shadow would be cast over a surrounding area.
- 13.100 The assessment of potential effects as a result of transient overshadowing is therefore based on professional judgement, taking into consideration the conditions of the existing Site and surrounding area, and comparing these conditions against the effect of the transient overshadowing arising from the Development.

Sun Hours on Ground

- 13.101 It is suggested in the BRE guidelines that for an area to appear adequately sunlit throughout the year, at least half (50%) of any assessment area should see direct sunlight for at least two hours on the 21st March. If, as a result of new development, an existing assessment area will not meet BRE guidelines and the area which can receive two hours of direct sunlight on the 21st March is reduced to less than 0.8 times its former area, then the loss of sunlight is likely to be noticeable.
- 13.102 Where the results show compliance with the BRE guidelines criteria, the occupants are unlikely to experience any noticeable change to their sunlight amenity levels. For the purposes of this assessment, such an effect would be considered insignificant. Should the relevant criteria not be achieved, a judgment has to be made as to the significance of the effect based on the level of loss, retained sunlight levels and the relevant baseline scenario.
- 13.103 The table below sets out the numerical criteria adopted in relation to the sun on ground assessment.

Table 13.4 Sun on ground Significance Criteria

Significance	Numerical criteria on 21st March
Insignificant	Over 50% of the amenity area will receive 2 hours of sunlight or less than 20% alteration in area which receives 2 hours of direct sunlight.
Minor adverse	20-29.9% reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).
Moderate adverse	30-39.9% reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).
Major adverse	40%+ reduction in the area which receives 2 hours of direct sunlight (and below 50% retained area).

Internal Overshadowing Assessment

- 13.104 The purpose of the internal overshadowing assessment is to ascertain whether the proposed Development would provide associated amenity space considered acceptable in terms of overshadowing. It is not considered appropriate to ascribe significance as there is no 'baseline' against which the internal overshadowing conditions can be considered and assessed. Relevant

consideration has however been given as to whether good levels of sunlight can be achieved within the new amenity areas created by the proposed Development, using the assessment criteria as set out in the BRE criteria.

Solar Glare

- 13.105 There are no quantitative criteria within the BRE Guidelines or elsewhere regarding acceptable levels of solar glare. Generally, however, solar reflections at high altitudes are less likely to cause nuisance or distraction as one has to look upwards to see it.
- 13.106 Professional judgement has therefore been applied to assign the significance of solar glare arising from the proposed Development and to determine the criteria for assessing the significance of solar glare set out in **Table 13.5**.
- 13.107 Multiple viewpoints may be chosen for each of the traffic lanes, train line or signals affected. In terms of significance criteria however, professional judgement has been used to determine the effect at the location rather than the individual perspectives at a signal traffic junction. Factors that could influence the significance of effect may include:
- sunlight availability probability;
 - area of façade off which reflections are visible;
 - period of time reflections are visible;
 - angle at which reflections are visible from line of sight;
 - views of the development being obscured for example by trees; and
 - the time of day at which the solar reflection will occur for example during peak traffic times.
- 13.108 Initially, the following guide will be used to ascertain the possible significance for each view and the factors listed above will then be taken into consideration to determine the overall significance for the designated viewpoint.

Table 13.5 Criteria Used for Determining the Effect of Solar Glare

Significance guidance	Possible factors
Insignificant	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.	

Light Pollution

- 13.109 The ILP Guidance Notes do not provide details on assigning of significance of effects for light pollution, therefore this is based on professional judgement considering the extent of the residential façade adversely affected as well as the extent to which the thresholds set out in the guidance are exceeded. Table 13.6 highlights the criteria used to assign a specific significance.

Table 13.6 Criteria Used for Determining the Effect of Light Pollution

Significance	Description
Insignificant	A small alteration from the existing scenario which is unlikely to be noticeable to the receptor. This may involve a small number of technical infringements of the numerical level suggested in the appropriate guidelines which should also be viewed in the context of the urban character of the area.
Minor	An alteration from the existing scenario which may be marginally noticeable to the sensitive receptor. This may include a number of marginal infringements of the numerical level suggested in the appropriate guidelines which should be viewed in the context of the urban character of the area.
Moderate	An alteration from the existing scenario which may cause a moderate noticeable change to the sensitive receptor. This may consist of a large proportion of marginal infringements of the numerical values suggested in the relevant guidelines and/or a small percentage of significant infringements.
Major	An alteration from the existing scenario which may cause a major noticeable change to the sensitive receptor. This may consist of a large proportion of significant infringements of the numerical values suggested within the relevant guidelines.

Assumptions and Limitations

- 13.110 Where actual room layouts were available, these have been considered when modelling the internal layouts of 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 4.2m (14ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable. Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL.
- 13.111 Floor levels have been assumed for surrounding properties where access has not been obtained. With the working plane located 850mm above the finished floor level, this has the potential to affect the assessment of NSL.
- 13.112 For solar glare, although great care is taken in identifying the most likely sensitive 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 assessment is limited to the area

surrounding the proposed Development as viewpoints within this area are the most sensitive in terms of Solar Glare. At greater distances, the view of the Development in a driver's line of sight would likely be partially obscured by surrounding schemes and only the upper portion of the building would be visible, which would typically be located above the driver's visor cut-off line. As such, the occurrence of reflected solar glare at greater distances is not the subject of this assessment

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

Baseline Conditions

Existing Baseline

- 13.114 The study area comprises an urban area with buildings of multiple tenures and scales ranging from three storey buildings to the larger buildings of the News Building, The Shard and Guy's Hospital in close proximity to the Site to the north, north-east and east respectively.
- 13.115 The existing baseline is shown in Drawings 8684/01/01/001 in **Appendix 13.1**.

Existing Daylight and Sunlight to Surrounding Sensitive Receptors

- 13.116 The baseline daylight and sunlight conditions for the 18 identified surrounding sensitive receptors have been assessed, as summarised in Table 13.7.

Table 13.7 Summary of Baseline Daylight and Sunlight Levels

Address	Total No. Windows that meet VSC criteria (>27%)		Total No. of Rooms that receive NSL in excess of 80%		Total No. of Rooms that meet APSH criteria	
	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria
6 London Bridge Street	12	0	12	3	12	4
43 Borough High Street	9	3	8	7	8	7
51 Borough High Street	2	1	2	2	2	2
53-55 Borough High Street	5	2	4	4	4	4
57 Borough High Street	3	0	3	3	3	2
59-61 Borough High Street	17	11	8	8	8	7
63a Borough High Street	20	1	15	6	5	2
3 Kings Head Yard	8	0	3	3	1	1
The Old Kings Head	23	0	8	3	2	1
22 Southwark St	28	14	24	17	12	12

Address	Total No. Windows that meet VSC criteria (>27%)		Total No. of Rooms that receive NSL in excess of 80%		Total No. of Rooms that meet APSH criteria	
	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria	Total Assessed	Total that meet criteria
St Thomas Church	8	4	4	4	4	4
Iris Brook House Talbot Yard	71	11	61	37	19	6
Orchard Lisle House - Talbot Yard	131	43	110	67	0	0
Guys Campus (Tower Wing)	1083	78	240	235	23	0
Guys Campus (Southwark Wing)	103	25	29	20	5	5
Bunch of Grapes Pub	3	3	3	0	3	3
Chaucer House - White Hart Yard	82	44	20	20	0	0
Shard Place	519	412	221	201	144	113
Total	2127	652	775	640	255	173

- 13.117 Of the 18 properties considered as sensitive receptors, a total of 2,127 windows serving 775 rooms were assessed for daylight and 255 rooms were assessed for sunlight.
- 13.118 For daylight in the baseline condition, 652 of the 2,127 (31%) windows assessed for VSC and 640 of the 775 (83%) rooms assessed for NSL would meet BRE criteria for daylight of 27% VSC and 80% NSL. For sunlight, 173 of the 255 (68%) rooms assessed meet BRE criteria of 25% Total APSH and 5% Winter APSH.
- 13.119 Low existing daylight and sunlight levels can be attributed to the dense urban location and architectural features such as balconies, large roof overhangs and recessed windows. These reasons may reduce a property's daylight availability, resulting in low existing daylight and sunlight levels. Owing to these low existing levels, any development on the Site would lead to disproportionate adverse effects.

Existing Overshadowing to Sensitive Surrounding Amenity Areas

- 13.120 The existing Transient Overshadowing images can be seen within **Appendix 13.4**.
- 13.121 Due to the relative lack of neighbouring amenity areas, the existing overshadowing is considered low. The amenity areas associated with Southwark Cathedral are largely only affected in early mornings and late evenings in the baseline scenario.

Internal Overshadowing Assessment

- 13.122 The purpose of the internal overshadowing assessment is to ascertain whether the proposed Development would provide associated amenity space considered acceptable in terms of overshadowing. As amenity areas associated with the Development are new there is no baseline against which the internal overshadowing conditions can be considered and assessed. Relevant consideration has however been given as to whether good levels of sunlight can be achieved

within the new amenity area created by the Proposed Development, using the assessment criteria as set out in the BRE criteria.

Assessment of Likely Significant Effects

The Works

- 13.123 The likely effects in relation to the daylight and sunlight amenity and overshadowing for the surrounding properties and amenity areas would vary throughout the demolition and construction works, depending on the level of obstruction caused. The effects would almost certainly be less than that of the completed Development, given that the extent of permanent massing would increase throughout the construction stage, until the buildings are complete.
- 13.124 The effects to daylight, sunlight and overshadowing during demolition would be beneficial until the point of construction. As construction works would steadily increase in magnitude as the superstructure is built and then clad. Those effects that are perceptible, as the superstructure and cladding progress, would be similar to those once the Development is complete and operational, as presented below. It is therefore considered that the completed Development represents the worst-case assessment in terms of likely daylight, sunlight and overshadowing effects.
- 13.125 During the Works, a number of tall cranes are likely to be present on-site, however their size and temporary presence would lead to generally imperceptible effects of a temporary nature. As such, the overall effect would range from being **insignificant** at the start of the works to effects ranging from **insignificant to long-term, permanent, adverse of major significance**, once the Development is complete, as set out in the assessment of the complete and operational Development below.

Completed and Operational Development

Daylight

- 13.126 The full daylight assessment for the Development can be found within **Appendix 13.2** and is summarised in Table 13.8.
- 13.127 In terms of daylight and sunlight, measures including massing alterations were implemented during the design process to minimise the impacts on daylight to surrounding sensitive receptors as much as possible while still ensuring the provision of a viable scheme. These design interventions are included within the assessment, and constitute iterative design as opposed to mitigation measures.
- 13.128 Overall, of the 2,127 windows assessed for VSC 1,753 (82%) would meet BRE criteria. Of the 775 rooms assessed for NSL, 643 (83%) would meet BRE criteria.
- 13.129 The three properties highlighted in grey in Table 13.8 would experience no or little alteration (below 20%), and the effect on daylight to these properties would therefore be insignificant.
- 13.130 The remaining affected properties are discussed in detail in the following paragraphs.

Table 13.8 Effects to VSC and NSL to Surrounding Sensitive Receptors

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			
			20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total			20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	Total
6 London Bridge Street	12	3	5	4	0	9	12	12	0	0	0	0
43 Borough High Street	9	2	6	1	0	7	8	5	3	0	0	3
51 Borough High Street	2	0	2	0	0	2	2	0	0	1	1	2
53-55 Borough High Street	5	1	4	0	0	4	4	4	0	0	0	0
57 Borough High Street	3	0	2	1	0	3	3	2	1	0	0	1
59-61 Borough High Street	17	16	1	0	0	1	8	8	0	0	0	0
63a Borough High Street	20	9	7	2	2	11	15	12	0	1	2	3
3 Kings Head Yard	8	8	0	0	0	0	3	3	0	0	0	0
The Old Kings Head	23	21	0	2	0	2	8	8	0	0	0	0
22 Southwark St	28	28	0	0	0	0	24	24	0	0	0	0
St Thomas Church	8	6	0	0	2	2	4	4	0	0	0	0
Iris Brook House Talbot Yard	71	19	3	34	15	52	61	30	11	9	11	31
Orchard Lisle House - Talbot Yard	131	6	36	2	87	125	110	38	1	2	69	72
Guys Campus (Tower Wing)	1083	1080	2	0	1	3	240	240	0	0	0	0
Guys Campus (Southwark Wing)	103	102	1	0	0	1	29	29	0	0	0	0
Bunch of Grapes Pub	3	3	0	0	0	0	3	3	0	0	0	0
Chaucer House - White Hart Yard	82	37	19	20	6	45	20	20	0	0	0	0
Shard Place	519	412	39	41	27	107	221	201	11	0	9	20
Total	2127	1753	127	107	140	374	775	643	27	13	92	132

6 London Bridge Street (Residential)

- 13.131 A total of 12 windows serving 12 rooms were assessed for daylight within this building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.
- 13.132 For VSC, three of the 12 (25%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.133 Of the affected windows, five would experience an alteration in VSC levels of 20-29.9 % which is considered a Minor Adverse effect. The remaining four affected windows would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. It should be noted that three of these affected windows (W1/F01, W1/F02 and W1/F03) have low existing VSC values of 5.1%, 7.6% and 11% respectively (against a BRE target of 27%) meaning the percentage losses are exaggerated. The actual loss in VSC to these windows ranges between

1.5% and 2.5%. The remaining affected window W1/F04, which is located further up the building, will enjoy an existing VSC of 18.9% and experience a reduction of 32.8% of the total VSC.

13.134 For NSL, all 12 rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.

13.135 Overall and based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse of moderate significance**.

63a Borough High Street (Residential)

13.136 A total of 20 windows serving 15 rooms were assessed for daylight within this building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.137 For VSC, nine of the 20 (45%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.

13.138 Of the 11 affected windows, seven would experience an alteration in VSC levels of 20-29.9% which is considered a Minor Adverse effect and two affected windows would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The two windows experiencing a moderate adverse effect (W1/F01 and W4/F02) have low existing VSC levels of 10.7% and 3% in the existing scenario meaning the actual change has the ability to become exaggerated in percentage terms. The windows will undergo an absolute loss of 3.3% and 0.9% respectively. The remaining two windows, W2/F01 and W2/F02, would experience an alteration in excess of 40% which is considered a Major Adverse effect, however, similarly they both have low existing VSC values of 5.4% and 6.8% respectively, and the absolute loss to these levels would be 3.1% in both instances.

13.139 For NSL, 12 of the 15 rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.

13.140 Of the three affected rooms, one would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining two rooms would experience an effect in excess of 40% which is considered a Major Adverse effect.

13.141 It should also be noted that this building is heavily obstructed by 59-61 Borough High Street, which largely results in low existing levels of light.

13.142 Overall and based on professional judgement, the effect to daylight within this building would be **long-term, local, adverse of moderate significance**.

53-55 Borough High Street and 57 Borough High Street (Two Buildings - Residential)

13.143 A total of se windows serving seven rooms were assessed for daylight within these buildings. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.

13.144 For VSC, one of the eight windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.

- 13.145 Of the affected windows, six would experience an alteration in VSC levels of 20-29.9 % which is considered a Minor Adverse effect and one would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect.
- 13.146 For NSL, six of the seven of the rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.147 The one affected room would experience an alteration between 20-29.9% which is considered a Minor Adverse effect.
- 13.148 Overall and based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance**.

59-61 Borough High Street (Residential)

- 13.149 A total of 17 windows serving eight rooms were assessed for daylight within these buildings. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.
- 13.150 For VSC, 16 of the 17 windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.151 The one affected window (W4/F01) serves a bedroom and would experience an alteration in VSC levels of 21.5 % which is considered a Minor Adverse effect.
- 13.152 For NSL, all eight rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.153 Overall and based on professional judgement, the effect to daylight within these buildings would be **Insignificant**.

The Old King's Head (Residential Element)

- 13.154 A total of 23 windows serving eight rooms were assessed for daylight within these buildings. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology. Whilst this is a mainly commercial building, it has not been possible to determine precisely where the residential element is located, therefore, all windows/ rooms within the building have been assessed.
- 13.155 For VSC, 21 of the 23 (93%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect. It should be noted that 19 of these 21 windows would experience improvements in VSC of between 1% and 43% VSC.
- 13.156 The two adversely affected windows, W19/F01 and W17/F02, would experience an alteration in VSC levels of 34% and 34.4% respectively, which is considered a Moderate Adverse effect.
- 13.157 For NSL, all eight rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.158 Overall and based on professional judgement, the effect to daylight within these buildings would be **Insignificant**.

St Thomas Church (Residential Element)

- 13.159 A total of eight windows serving four rooms were assessed for daylight within these buildings. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.
- 13.160 For VSC, six of the eight windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.161 The two affected window would experience an alteration in VSC levels in excess of 40% which is considered a Major Adverse effect, however, these rooms are within the steeple of the former church building and each room is served by four windows facing in different directions
- 13.162 Although both affected windows would experience a Major Adverse effect, it should be noted that both windows retain levels of VSC of 15% and are accompanied by unaffected windows serving the same room.
- 13.163 For NSL, all four rooms fully comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.164 Overall and based on professional judgement, the effect to daylight within this building would be **Insignificant**.

Iris Brook House - Talbot Yard (Student Accommodation)

- 13.165 A total of 71 windows serving 61 rooms were assessed for daylight within this student accommodation building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.
- 13.166 For VSC, 11 of the 71 (37%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.167 Of the affected windows, 22 would experience an alteration in VSC levels of between 30-39.9% which is considered a Moderate Adverse effect. The remaining eight windows would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.168 For NSL, 25 out of 48 (52%) of the rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.169 Of the affected rooms, nine affected rooms would experience an alteration between 20-29.9% which is considered a Minor Adverse effect and nine would experience an alteration of between 30-39.9% which is considered a Moderate Adverse effect. The remaining five rooms would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.170 Overall, based on professional judgement, and due to the temporary nature of student accommodation, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance**.

Orchard Lisle House – Talbot Yard (Student Accommodation)

- 13.171 A total of 131 windows serving 110 rooms were assessed for daylight within this student accommodation building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.

- 13.172 For VSC, six of the 131 (5%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.173 Of the affected windows, 36 would experience an alteration in VSC levels of 20-29.9 % which is considered a Minor Adverse effect and two would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining 87 windows would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.174 For NSL, 38 of the 110 (35%) of the rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.175 Of the affected rooms, one affected room would experience an alteration between 20-29.9% which is considered a Minor Adverse effect and two rooms would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining 69 rooms would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.176 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitivity of student accommodation, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance**.

Guy's Campus – Tower Wing (Hospital)

- 13.177 A total of 1,083 windows serving 240 rooms were assessed for daylight within this hospital building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.
- 13.178 For VSC, 1,080 of the 1,083 (99%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.
- 13.179 Of the affected windows, two (W9/F00 and E11/F04) would experience an alteration in VSC levels of 26 and 20.3% respectively, which is considered a Minor Adverse effect and one would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.180 It should be noted that the window that would experience a Major Adverse effect has a very low existing VSC value of 0.2%. Therefore, any alteration would result in a disproportionate percentage change, that in reality, is unlikely to be noticeable.
- 13.181 For NSL, all 240 of the rooms comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.182 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitive of a hospital, the effect to daylight within these buildings would be **Insignificant**.

Guy's Campus – Southwark Wing (Hospital)

- 13.183 A total of 103 windows serving 29 rooms were assessed for daylight within this hospital building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.
- 13.184 For VSC, 102 of the 103 (99%) windows assessed would meet BRE Guideline criteria which would represent an Insignificant effect.

- 13.185 The affected window, W9/F04, would experience an alteration in VSC levels of 24.8 % which is considered a Minor Adverse effect.
- 13.186 For NSL, all 29 of the rooms fully comply with BRE Guideline criteria and are therefore considered to experience an Insignificant effect.
- 13.187 Overall, based on professional judgement, and due to the temporary nature and resulting lower sensitivity of student accommodation, the effect to daylight within these buildings would be **Insignificant**.

43 Borough High Street (Residential)

- 13.188 A total of nine windows serving eight rooms were assessed for daylight within this residential building. GIA were able to obtain floor plans for this property and have incorporated them within the 3D model to allow for more accurate results.
- 13.189 For VSC, two of the nine windows assessed would meet BRE Guideline criteria.
- 13.190 Of the affected windows, six would experience an alteration in VSC levels of between 20-29.9% which is considered Minor Adverse effect, and the remaining window would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect.
- 13.191 For NSL, five of the eight rooms fully comply with BRE Guideline criteria.
- 13.192 Of the affected rooms, all three would experience an alteration between 20-29.9 % which is considered a Minor Adverse effect.
- 13.193 It is important to note that this property is recessed between two buildings on either side, creating flank walls which would limit the amount of daylight available from oblique angles.
- 13.194 Overall, based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance**.

51 Borough High Street (Residential)

- 13.195 A total of two windows serving two rooms were assessed for daylight within this residential building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.
- 13.196 For VSC, none of the windows assessed would meet BRE Guideline criteria.
- 13.197 The affected windows, W1/F04 and W2/F04, would experience an alteration in VSC levels of 25% and 28.4% respectively, which is considered a Minor Adverse effect. Furthermore, both windows retain in excess of 18% VSC.
- 13.198 For NSL, none of the rooms fully comply with BRE Guideline criteria.
- 13.199 Of the affected rooms, one (R1/F04) would experience an alteration of 34% which is considered a Moderate Adverse effect. The remaining room would experience an alteration of 42% which is considered a Major Adverse effect.
- 13.200 Overall, based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance**.

Chaucer House (London School of Commerce - Educational)

- 13.201 A total of 82 windows serving 20 rooms were assessed for daylight within this student accommodation building. GIA were unable to obtain floor plans for this property and have therefore made reasonable assumptions as to their dimensions, which is relevant when considering the NSL methodology.
- 13.202 For VSC, 37 of the 82 (45%) windows assessed would meet BRE Guideline criteria.
- 13.203 Of the affected windows, 19 would experience an alteration between 20-29.9 % which is considered a Minor Adverse effect and 20 would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining six windows would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.204 For NSL, all 20 rooms fully comply with BRE Guideline criteria and are considered to experience an Insignificant effect.
- 13.205 It is important to note that these are windows and rooms associated with the London School of Commerce and are not residential. The use of the rooms would be transient and likely to rely on artificial lighting as is the case with most educational buildings and would have a lower requirement for daylight. Therefore, due to the educational use, this building has a lower sensitivity to daylight.
- 13.206 Overall, based on professional judgement and the lower sensitivity to daylight, the effect to daylight within these buildings would be **long-term, local, adverse of minor significance**.

Shard Place (Residential Element)

- 13.207 A total of 519 windows serving 221 rooms were assessed for daylight within this part retail part residential building.
- 13.208 For VSC, 412 of the 519 (79%) windows assessed would meet BRE Guideline criteria.
- 13.209 Of the affected windows, 39 would experience an alteration between 20-29.9 % which is considered a Minor Adverse effect and 41 would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining 27 windows would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.210 Of the 27 major adverse impacts recorded, 10 will be localised to bedrooms, which are considered to be less sensitive by virtue of their use. The remaining 17 major adverse impacts will all be recorded within LKDs which pass the NSL methodology, due to the presence of multiple additional windows serving the same room.
- 13.211 For NSL, 201 of the 221 rooms fully comply with BRE Guideline criteria.
- 13.212 Of the affected rooms, 11 would experience an alteration between 20-29.9 % which is considered a Minor Adverse effect. The remaining nine rooms would experience an alteration in excess of 40% which is considered a Major Adverse effect, however, all 20 rooms serve bedrooms, which are considered to be less sensitive.
- 13.213 Overall, based on professional judgement, the effect to daylight within these buildings would be **long-term, local, adverse of moderate significance**.

Sunlight

- 13.214 The full sunlight assessment can be found in **Appendix 13.2** of this ES and the summary results are presented in **Table 13.9**.
- 13.215 Of the 255 rooms assessed for sunlight, 216 (85%) would meet the BRE criteria for both total and Winter PSH and are therefore considered an Insignificant effect.
- 13.216 The 14 buildings highlighted in grey in **Table 13.9** experience little or no change in sunlight levels with the completed Development in place and are therefore considered an insignificant effect.
- 13.217 The remaining affected properties are discussed in detail following **Table 13.9**.

Table 13.9 Effects to APSH to Surrounding Sensitive Receptors

Address	Total No. of Rooms	No. Rooms that meet BRE criteria	Total APSH			Winter APSH		
			Below BRE Guidelines			Below BRE Guidelines		
			20-29.9% Reduction	30-39.9% Reduction	>40% Reduction	20-29.9% Reduction	30-39.9% Reduction	>40% Reduction
6 London Bridge Street	12	4	3	1	3	0	0	2
63a Borough High Street	5	5	0	0	0	0	0	0
53-55 Borough High Street	4	4	0	0	0	0	0	0
57 Borough High Street	3	3	0	0	0	0	0	0
59-61 Borough High Street	8	8	0	0	0	0	0	0
3 Kings Head Yard	1	1	0	0	0	0	0	0
The Old Kings Head Pub	2	2	0	0	0	0	0	0
22 Southwark St	12	12	0	0	0	0	0	0
St Thomas Church	4	4	0	0	0	0	0	0
Iris Brook House - Talbot Yard	19	19	0	0	0	0	0	0
Guys Campus (Tower Wing)	23	23	0	0	0	0	0	0
Guys Campus (Southwark Wing)	5	5	0	0	0	0	0	0
Bunch Of Grapes Pub, 2 Southwark Street	3	3	0	0	0	0	0	0
43 Borough High Street	8	8	0	0	0	0	0	0
51 Borough High Street	2	2	0	0	0	0	0	0
Shard Place	144	113	4	16	11	0	0	12
TOTAL	255	216	7	17	14	0	1	14

6 London Bridge Street (Residential)

- 13.218 A total of 12 rooms were assessed for sunlight within this building.
- 13.219 Four (33%) of the 12 rooms assessed would meet BRE criteria for both total and winter PSH, which is therefore considered to equate to an Insignificant effect.
- 13.220 Of the affected rooms for winter PSH, two would experience an alteration in excess of 40% which is considered a Major Adverse effect.

- 13.221 For total APSH, three rooms would experience alterations between 20-29.9% which is considered a Minor Adverse effect, and one would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining three rooms would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.222 Overall, based on professional judgment, the effect to these buildings is considered to be **long-term, local, adverse of moderate significance**.

Shard Place (Residential Element)

- 13.223 A total of 144 rooms were assessed for sunlight within this building.
- 13.224 113 of the 144 (78%) rooms assessed would meet BRE criteria for both total and winter PSH.
- 13.225 Of the affected rooms for winter PSH, 12 would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.226 For total APSH, four rooms would experience alterations between 20-29.9% which is considered a Minor Adverse effect, and 16 would experience an alteration between 30-39.9% which is considered a Moderate Adverse effect. The remaining 11 rooms would experience an alteration in excess of 40% which is considered a Major Adverse effect.
- 13.227 Overall, based on professional judgment, the effect to these buildings is considered to be **long-term, local, adverse of moderate significance**.

Overshadowing

- 13.228 Full details of the Transient Overshadowing assessment can be found within **Appendix 13.3** and the results are summarised below.
- 13.229 The commentary below should be read in conjunction with the Transient Overshadowing and Sun Hours on Ground images presented within the full assessment provided in **Appendix 13.3**.
- 13.230 The Transient Overshadowing assessment has been used to identify any area of public or private amenity space which may be significantly affected by the Development. The areas affected are discussed below.

Public & Communal Amenity

Amenity space associated with Southwark Cathedral

21 March (equinox)

- 13.231 There is the potential for slight additional shadow on the southern section of cathedral amenity areas for one hour from 11:00 GMT on the 21 March up to 12:00 GMT. The additional shadow from the Development would not affect the amenity areas to the north of the Cathedral.
- 13.232 It should be noted that on March 21st, from 12:00 GMT onwards, the cathedral's amenity areas would be not be affected by any shadow and would experience approximately six hours of direct sunlight.

21 June (summer solstice)

13.233 This area would not be affected by the Development at this time of year.

21 December (winter solstice)

13.234 This area would not be affected by the Development at this time of year.

13.235 Overall, the effect from overshadowing as a result of the proposed Development is considered **Insignificant**.

Amenity space associated with Guy's Hospital Courtyard

21 March (equinox), 21 June (summer solstice) and 21 December (winter solstice)

13.236 This area would not be affected by the Development at any point throughout the year.

13.237 Overall, the effect from overshadowing as a result of the Development is considered **Insignificant**.

The Place Terrace (News Building)

21 March (equinox)

13.238 There is the potential for slight additional shadow on the western section of The Place Terrace area between 13:00 GMT on the 21 March up to approximately 15:30 GMT.

21 June (summer solstice)

13.239 This area would not be affected by the Development at this time of year.

21 December (winter solstice)

13.240 This area would not be affected by the Development at this time of year.

13.241 Overall, the effect from overshadowing as a result of the proposed Development is considered **Insignificant**.

Sun Hours on Ground

13.242 For Southwark Cathedral and Guy's Hospital Courtyard, both amenity areas see no alterations in sun hours on ground and are fully in line with BRE Guidelines. The effect of overshadowing is considered insignificant for both areas.

13.243 In addition, the sun hours on ground assessment shows that The Place Terrace is also fully BRE compliant with the Development in Place. The Place Terrace would experience a 1% reduction and would therefore experience 2 or more hours of sunlight on 99% of its area. The effect of overshadowing is considered **Insignificant** for The Place Terrace.

London Bridge Station Public Plaza

13.244 The London Bridge Station Public Plaza amenity area would only experience a 3% reduction in sun hours on ground and the effect is therefore considered **Insignificant**.

The News Building Public Plaza

- 13.245 The News Building Public Plaza would experience a reduction in sunlight from 22% to 11%. Although there is a reduction to the sunlight that this amenity area would receive on March 21st, it should be noted that this area has a low existing level of sun hours on ground. In addition, by the 5th April, 50% of the area would receive direct sunlight.
- 13.246 As this amenity area would be BRE compliant only 15 days after March 21st, the effect to this amenity area is considered **Insignificant**.

Communal areas within Shard Place - Ground Floor, 16th Floor and Roof Level.

- 13.247 The communal areas associated with Shard Place are fully BRE compliant and therefore the effect to these amenity areas are considered **Insignificant**.

Front Open Space at 9 Thomas Street

- 13.248 The area to the front of 9 Thomas Street experience a reduction in sunlight with the Development in place, however, the area would remain BRE compliant. Due to the BRE compliance of this amenity area, the effect is considered **Insignificant**.

Overshadowing within the Site

- 13.249 In addition to amenity areas external to the Site, an assessment was conducted to assess the sunlight availability for the proposed amenity areas within the Site.
- 13.250 The main amenity area associated with the Development is fully BRE compliant, and would receive sunlight on 78% of its area for approximately three to four hours.
- 13.251 In addition, the circulation space to the North of the Development including the St Thomas Entrance and East Courtyard would not meet the BRE recommendations, as this section of amenity within the Site would receive 2 hours of sunlight on 3% of its area.

Solar Glare

- 13.252 The full solar glare assessment is provided at **Appendix 13.4**.
- 13.253 The assessment has been undertaken from signalised road junctions, pedestrian crossings and railway tracks near to the Site which are considered sensitive in terms of solar glare (noted by the road name reference BH_1, ST_1, etc.). The receptor locations are shown in **Figure 13.5**. A total of 27 locations have been assessed in terms of solar glare.
- 13.254 All solar glare assessments consider a worst-case scenario, assuming clear sky conditions.
- 13.255 In accordance with the solar glare significance criteria presented in paragraphs 13.72 - 13.77, solar reflections occurring at angles greater than 30° from the driver's line of sight will not affect the driver's responsiveness and therefore can be considered insignificant. In addition, viewpoints where the portion of the façade of the Development visible is very small and the distance is greater than 15° of a driver's line of sight are also considered insignificant. The list of the locations from where this applies, and therefore the Development is considered to have an **insignificant** effect are the eight listed below:
- BH_1;

- BH_2;
- BH_4;
- BH_5;
- BH_6;
- LB_1;
- CR; and
- TLB_E_2.

13.256 The number of locations to be considered further is therefore reduced to 19 locations.

13.257 Of the remaining 19 locations, 15 are considered to have a **long term, local, adverse effect of minor significance**. This is because solar reflections occur within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time. In addition, the minor adverse significance is due to mitigating factors such as reflections occurring from a small section of façade, potential reflections occurring over a short period of time, unaffected traffic signals and being able to deploy a car visor which would shield the majority of reflections. The junctions considered Minor Adverse are listed below:

- US;
- SW_1;
- SW_3;
- SS;
- LB_2;
- LB_3;
- ST_1;
- ST_3;
- ST_4;
- TLB_E_1_A;
- TLB_E_1_B;
- TLB_N_1_A;
- TLB_N_1_C;
- TLB_W_1_A; and
- TLB_W_1_B.

13.258 The remaining four locations assessed are discussed in further detail in subsequent paragraphs.

Borough High Street BH_3 (Northbound)

13.259 From viewpoint BH_3 instances of solar reflection may be visible on the façade of the Development from 5° to 8° of a driver's line of sight. The reflections closest to the driver's line of sight would occur between 11:00 to 12:00 GMT from mid-November to mid-January.

13.260 Although the solar reflections from this viewpoint BH_3 occur from 5° of a driver's line of sight at times, all solar reflections would occur above the driver's visor cut-off line.

- 13.261 It should be noted that as solar reflections would occur during the winter months, the probability of clear skies and direct sunlight hitting the façade during the one hour, is 30%.
- 13.262 Overall, owing to the brief periods of solar reflections potentially occurring and the low probability of direct sunlight, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of minor significance**.

Southwark Street SW_2 (Eastbound)

- 13.263 From viewpoint SW_2 instances of solar reflection may be visible on the façade of the Development from 4° to 16° of a driver's line of sight. The reflections closest to the driver's line of sight would occur between 18:00 to 19:00 GMT from mid-March to mid-September and Mid-October to Mid-February.
- 13.264 Although the solar reflections from this viewpoint SW_2 occur from 4° of a driver's line of sight at times, the largest sections of solar reflections would occur above the driver's visor cut-off line. Any potential solar reflections occurring below the driver's visor cut off line occur on very small sections of the façade resulting in reflections lasting short periods of time and only between 18:00 and 19:00 GMT.
- 13.265 The potential solar reflections above the driver's visor cut off line would occur between 9:00 and 11:00 and 18:00 to 19:00 GMT.
- 13.266 Overall, owing to the brief periods of solar reflections potentially occurring below the driver's visor cut off line, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of moderate significance**.

London Bridge Station – Track North view 2 TLB_N_1

- 13.267 From viewpoint TLB_N_1 instances of solar reflection may be visible on the façade of the Development from 5° to 13° of a train driver's line of sight. Potential reflections would occur between 18:00 to 20:00 GMT from mid-April to mid-August.
- 13.268 It should be noted that from this viewpoint, there are no signals directly in front of the Developments facade, and therefore the effect is considered lower. This is because any obstruction would not prevent the driver from seeing signal changes.
- 13.269 Furthermore, solar reflections are by definition less intense when compared to the direct view of the sun. For this viewpoint the driver is travelling south-east and therefore may expect to have a direct view of the sun in the sky. Without the building in place, the driver would have direct view of the sun in the early morning throughout most of the year and therefore the building would be shading the direct view of the sun for a portion of the day.
- 13.270 Overall, based on professional judgement, the effect of solar glare at this section of track is considered to be **long term, local, adverse effect of moderate significance**.

London Bridge Station – Track West view 1 TLB_W_1

- 13.271 From viewpoint TLB_W_1 instances of solar reflection may be visible on the façade of the Development from 3° to 16° of a train driver's line of sight. Potential reflections would occur

between 10:00 to 11:00 and 18:00 to 20:00 GMT from mid-February to mid-April and Mid-August to Mid-October, and Mid-November to Mid-January.

- 13.272 Although the solar reflections from viewpoint TLB_W_1 occur from 3° of a train driver's line of sight at times, the largest sections of solar reflections would occur at the top levels of the proposed building. Any potential solar reflections occurring on the lower portion of the building would be very small and last only for a short periods of time and between 18:00 and 19:00 GMT.
- 13.273 Overall, based on professional judgement, the effect of solar glare at this junction is considered to be **long term, local, adverse effect of minor significance**.

Overshadowing internal to the proposed Development

- 13.274 The full Sun Hours on Ground assessment can be seen in **Appendix 13.3**.
- 13.275 The assessment indicates that the Main Courtyard associated with the proposed Development would receive two or more hours of direct sunlight on 78% of its areas on March 21st. The new amenity area is therefore fully BRE compliant.

Light Pollution

- 13.276 Both light pollution assessments can be found in **Appendix 13.5** and are discussed in detail below.

Light Intrusion

- 13.277 The most sensitive receptors for light intrusion are considered to be residential buildings, highlighted in the map presented in **Figure 13.1**.
- 13.278 The residential receptors assessed due to their close proximity to the proposed Development are as follows:
- Bunch of Grapes Pub (Residential element);
 - St Thomas Church;
 - 3 Kings Head Yard;
 - The Old King's Head Pub (Residential element);
 - 43, 51, 53-55, 57, 59-61 and 63a Borough High Street;
 - Orchard Lisle House; and
 - Shard Place.
- 13.279 The results of the assessment indicate that pre-curfew (before 11pm), the levels of light trespass would be very limited and well within the 25 lux level suggested by the ILP for a city centre location for the residential buildings assessed.
- 13.280 The assessment also indicates that post-curfew (after 11pm), the levels of light trespass would be well below the 5 lux level suggested by the ILP for a city centre location for the property assessed. As such, the effect of light pollution for all sensitive receptors assessed (pre and post curfew) is considered **Insignificant**.

- 13.281 The exception to the above is for St Thomas Church, which meets the ILP Guidance pre-curfew, but breaches post-curfew. However, the assessment uses the worst-case scenario of 500 lux. When the assessment adopts a post-curfew illuminance of 300 lux, the effects are also reduced to **Insignificant**. This is also a result of the inclusion of occupancy sensors and reduces post-curfew illuminance output.
- 13.282 The adoption of a maximum post-curfew illuminance of 300 lux, is a condition in order for effects to remain Insignificant.

Mitigation Measures and Likely Residual Effects

Table 13.10 summarises the likely significant effects, mitigation measures and likely residual effects identified within this chapter.

Table 13.10 Summary of Likely Significant Effects, Mitigation Measures and Likely Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
The Works			
Daylight, sunlight and overshadowing effects during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Solar glare effects during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Daylight, sunlight and overshadowing during construction.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.	None proposed.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.
Solar glare during construction.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.	None proposed.	Effects would gradually change from beneficial to those expected once the Development is complete and operational.
Light pollution during demolition.	Temporary, beneficial effects considered likely during demolition.	None proposed.	Temporary, beneficial effects considered likely during demolition.
Completed and Operational Development			
Daylight	Long term, local, Insignificant to 8 properties, minor adverse to 5 properties, moderate adverse to 5 properties.	None proposed.	Long term, local, Insignificant to 8 properties, minor adverse to 5 properties, moderate adverse to 5 properties.

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Sunlight	Long term, local, Insignificant to 14 properties, moderate adverse to 2 properties.	None proposed.	Long term, local, Insignificant to 14 properties, moderate adverse to 2 properties.
Overshadowing	Insignificant to all amenity areas.	None proposed.	Insignificant to all amenity areas.
Solar Glare	Long term, local, insignificant to 8 locations, minor adverse to 17 locations, moderate adverse to 2 locations.	None proposed	Long term, local, insignificant to 8 locations, minor adverse to 17 locations, moderate adverse to 2 locations.
Light Pollution	Insignificant to all properties.	None proposed.	Insignificant to all properties.

13.283 As part of the design process, the massing and façade details of the Development were informed by the potential daylight and sunlight effects. However, owing to the scale of the Development in comparison to the existing buildings, its close proximity and low existing daylight and sunlight levels, changes in conditions would be unavoidable.

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