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Introduction

10.1 This chapter of the ES assesses the potential impact of the Proposed Development in respect of daylight and sunlight. It assesses the impact of the change in lighting conditions within the existing neighbouring residential dwellings which could be affected by the proposed development and tests the availability of daylight and sunlight within the proposed new dwellings to determine if they will achieve the required design standard for those rooms to be used as habitable rooms by the future occupants. The assessment has regard to the likely impact of the Proposed Development on the neighbouring residential buildings.

10.2 The planning policies and guidance relating to this assessment and the methods used are described below and set out in more detail within **Technical Appendix D of Volume III** of this ES. The potential impact of the Proposed Development on daylight and sunlight is assessed with respect to relevant target criteria. The assessment has been carried out by GVA Schatunowski Brooks

Planning Policy Context

10.3 This section reviews the existing national, regional and local planning policy relevant to daylight and sunlight aspects of the proposed development.

National Planning Policy

10.4 The National Planning Policy Framework (Ref. 15-1) contains no policies specifically relevant to daylight, and sunlight, although the framework expresses the need to ensure that new development results in an acceptable level of amenity.

Regional Planning Policy

10.5 The London Plan (Ref. 15-2) places importance on the creation and maintenance of a high quality environment for London. Under Policy 7.6 'Architecture', the Plan states that: *"Buildings and structures should: ... be of the highest quality design and in particular...[and] not cause unacceptable harm to the amenity of the surrounding land and buildings, particularly residential buildings, in relation to ... overshadowing,.... This is particularly important for tall buildings..."*

10.6 Under Policy 7.7 'Location and Design of Tall and Large Buildings', the London Plan states that: *"Tall and large buildings should be part of a plan-led approach to changing or developing an area by the identification of appropriate, sensitive and inappropriate locations. Tall and large buildings should not have an unacceptably harmful impact on their surroundings"*.

10.7 Applications for tall or large buildings should include an urban design analysis that demonstrates the proposal is part of a strategy that will meet the criteria below.

Local Planning Policy

Camden's Local Development Framework Core Strategy

10.8 The application site is within the London Borough of Camden and the proposals have therefore been considered against Camden Council's Local Development Framework (LDF) Core Strategy 2010. In particular, the impacts have been considered against Policy DP 26-*Managing the Impact of Development on Occupiers and Neighbours* which states that:

- *"The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The factors we will consider include:*

- Visual Privacy and Overlooking*
- Overshadowing and Outlook*
- Sunlight, Daylight and Artificial Light Levels*
- Noise and Vibration levels*
- Odour Fumes and Dust*
- Microclimate*
- The inclusion of Appropriate Attenuation Measures"*

10.9 In addition, paragraph 26.3 of the LDF states that:

" A development's impact on visual privacy, overlooking, overshadowing, outlook, access to daylight and disturbance from artificial light can be influenced by its design and layout, the distance between properties, the vertical levels of onlookers or occupiers and the angle of views. These issues will also affect the amenity of the new occupiers. We will expect that these elements are considered at the design stage of a scheme to prevent potential negative impact of the development on occupiers and neighbours. To assess whether acceptable levels of daylight and sunlight are available to habitable spaces, the Council will take into account the standards recommended in the British [sic] Research Establishment's, Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice (1991)".

10.10 There is a typographical error in the Council's policy in that the technical documents referred to is the *Building Research Establishment* recommendations rather than "British". In addition, those guidelines have been revised and updated, and the current edition is the 2011 second edition.

10.11 At national, regional and local level, the recognised and accepted objective scientific standards adopted for measuring the impact on daylight and sunlight are the BRE Guidelines. It should however be noted that these guidelines were prepared using a low density suburban housing model of domestic scale housing rather than multi-storey developments in a high density inner city suburban environment. The numerical targets in the Guidelines therefore need to be applied flexibly and is recognised in the *Introduction* of the guidelines where it states that:

"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the document should not be seen as an instrument of planning policy. Its aim is to help rather than to constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre, or in an area with modern high rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".

10.12 It should also be noted that the 2011 edition of the guidelines contains an additional appendix (Appendix F) which provides further guidance on how to set alternative target values where the height and pattern of develop is denser.

10.13 For New-Build dwellings the BRE Guidelines applies the use of Average Daylight Factors to measure internal daylight quality. The advice is set out in Appendix C of the Guidelines where reference is made to the more detailed advice in the British Standard Code of Practice for Daylighting, BS8206 Part 2 and the CIBSE Daylighting and Window Design Guide, LG10.

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Assessment Methodology and Significance Criteria

- 10.14** The BRE guidelines state that only those windows that have a “reasonable expectation of daylight or sunlight” need to be assessed. Any impact to the surrounding windows that do not have a reasonable expectation of daylight or sunlight is therefore considered to be non-significant.
- 10.15** Whilst the target standards in the Guidelines can be applied to commercial and non-domestic buildings where there is a reasonable expectation of daylight, for the purpose of Camden’s amenity policy, the protection of daylight and sunlight is limited to the impact on “...habitable spaces...”, as referred to in Paragraph 26.3 of Camden’s LDF as cited above at 15.9 The extent of the assessment is therefore limited to the impact on habitable rooms within the existing neighbouring dwellings. For the purpose of the Guidelines, a “Habitable” room is a living room, family kitchen- a kitchen that is large enough to accommodate a habitable use apart from food preparation, usually defined as a kitchen that has an internal area in excess of (13m²), or a Bedroom.
- 10.16** Examples of windows that are not considered to have a reasonable expectation of daylight or sunlight are those that serve commercial properties. These types of property are generally designed to rely on electric lighting rather than natural daylight or sunlight. In addition to commercial buildings, windows to residential properties which are considered to serve non-habitable rooms, such as entrance ways, garages, bathrooms or store rooms are also not assessed.
- 10.17** Site information relating to the conditions on the application site prior to the Crossrail works (the pre-Crossrail baseline) and the conditions at the application site following Crossrail works (the post-Crossrail baseline), as well as the existing surrounding buildings and surrounding window locations was utilised for the technical assessments. A 3D model of the Proposed Development was used to assess the impacts for the construction and operational phases.

Daylight

- 10.18** Where the internal arrangements of the buildings are not known, the BRE guidelines set out three methods for assessing the daylight impacts on neighbouring properties. These methods are summarised as follows:
1. The first method is to strike a line at an angle of 25° from the centre of the existing windows. If the profile of the Proposed Development sits beneath the 25° angle line then the development is unlikely to have a substantial impact on the daylight enjoyed by the existing building. If the Proposed Development protrudes past the 25° angle line then the second test needs to be applied. This angular test is usually used as a screening exercise to determine if more detailed numerical testing is required. In this assessment, this first method has not been used as it does not reflect the differing heights of the buildings (sensitive receptors) in the local area;
 2. The second method provides a more accurate method of analysing daylight levels, by calculating the Vertical Sky Component (VSC) at the centre point of each affected window. The VSC is an external daylighting calculation that measures the amount of direct daylight to a specific window point on the outside of a property. The calculations fundamentally assess the amount of sky that can be seen, converting the result into a percentage. A window with no obstructions will achieve a maximum value of 39.62% VSC. However, the BRE guidelines suggest that 27% VSC is indicative of a good level of daylight. Therefore, if a window does not achieve 27% VSC in the development case, then the third test is considered necessary; and
 3. The third method involves calculating the VSC at the window in the existing situation prior to re-development, i.e. the base case. The BRE guidelines suggest that if the VSC for the development case is both less than 27% and less than 0.8 times its former value, then the occupants of the existing building are likely to notice the reduction.

- 10.19** In conjunction with the VSC test, the BRE guidelines advise that the distribution of daylight be assessed. This test separates those areas of the working plane (desktop height) that can receive direct skylight and those that cannot. The BRE guidelines suggest that the distribution of daylight is assessed using the No-Sky Line (NSL) test. The BRE guidelines states that:

“If a significant area of the working plane lies beyond the no-sky line (i.e., it receives no direct skylight), then the distribution of daylight in the room will look poor and supplementary electric lighting will be required.”

- 10.20** The British Standard BS8206-2:2008 (clause 5.7) suggests that ‘a significant area’ is more than 20%, i.e. less than 80% of the room area should be in front of the no-sky line in order to provide satisfactory uniformity of daylight.
- 10.21** For existing properties the BRE guidelines suggest that if the reduction of the no-sky line area is less than 0.8 times its former value, then the occupants may notice a reduction in the amount of direct daylight.

Sunlight

- 10.22** With regard to sunlighting, the BRE sunlight availability indicator is used to assess the Annual Probable Sunlight Hours (APSH), which is expressed as a percentage. The BRE guidelines state that:

“If this window reference point can receive more than one quarter of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March, then the room should still receive enough sunlight”.

- 10.23** A window is therefore considered to enjoy good levels of sunlight if it can receive 25% APSH of which at least 5% are in the winter months. As stated above, the winter months are between the 21 September and 21 March.

- 10.24** Sunlighting may be adversely affected if less sunlight is experienced than suggested above, and may be noticeable if less than 0.8 times the former level of sunlight is experienced after the development is completed.

- 10.25** The BRE guidelines also note:

“It is suggested that all main living rooms of dwellings, and conservatories, 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.”

- 10.26** Therefore, any windows facing 90° of due north need not be analysed as they have a lower expectation of sunlight.

Significance Criteria

- 10.27** Significance criteria have been based on the recommendations set out in the BRE guidelines, as relevant to the Proposed Development’s locality, and using professional judgement and experience. The criteria have been defined using the same terminology used in the Crossrail ES.

- 10.28** When establishing the various reduction ratios for the significance criteria, consideration was given to the city centre setting of the application site and the case conditions present at the pre- and post-Crossrail baselines. This is because the reduction ratio used by the BRE guidelines can be considered misleading in city centre locations, particularly where the base case values are small. In these situations a relatively small change in the actual amount of daylight could represent a high percentage change in the overall figure. In

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such a situation the assessment result would show a significant change in daylight whereas in reality the actual reduction is small, having regard to the original base case.

10.29 The significance criteria that have been applied to the daylight, sunlight and overshadowing assessment are given in Table 15-1.

Table 15-1 Significance Criteria

Criteria		Impact
Improvement over baseline value.		Sig (beneficial)
Daylight: A VSC of: >27% or, where baseline already below 27%, a reduction <0.8 times existing Or where NSL > 0.8 times existing	Sunlight to neighbouring properties: Total APSH: >25%, of which >5% are in Winter	NSig
Daylight: A reduction of VSC to <27% - and/or reduction >0.2 times existing. Or where NSL < 0.8 times existing	Sunlight to neighbouring properties: An Total APSH of: <25%, of which <5% are in Winter	Sig (adverse)

Note: NSig = Not Significant; S = Significant;

Baseline Conditions

10.30 This ES assess the potential impacts of the Proposed Development against two distinct baselines. Firstly, the construction impact has been assessed against the situation at the application site following the completion of the Crossrail works (the post-Crossrail baseline).

10.31 Secondly, the operational phase of the Proposed Development has been assessed against the application site prior to the Crossrail works commencing (the pre-Crossrail baseline). This represents a more realistic set of conditions (i.e. what would be there in the absence of the Crossrail works) against which to test the Proposed Development against, in terms of daylight, sunlight and overshadowing.

Identification of Potentially Sensitive Receptors

10.32 The potentially sensitive receptors identified below are the same for the Pre-Crossrail and Post-Crossrail baseline conditions.

10.33 Only the surrounding residential properties are considered to have a “reasonable expectation of daylight or sunlight”. All of the other surrounding commercial and non-domestic buildings rely on permanent artificial supplementary lighting throughout the day and are considered to have a lower expectation of daylight and sunlight such that assessments are not required. Therefore this assessment considers the following sensitive building:

- 8-10 Southampton Row.

10.34 8-10 Southampton Row is within the Applicant’s ownership and is temporarily occupied by Crossrail contractors as Site Offices and welfare facilities. After completion of the development it is intended that the building will revert to its previous use, including residential. The parts of the building that are temporarily

occupied as Site Offices and welfare facilities for construction operatives do not fall within the definition of habitable rooms for the purpose of the Council’s Amenity Policy and are therefore not Receptors that need to be tested as part of this EIA. The rooms/windows within 8-10 Southampton Row that are likely to be returned to habitable use following the development have however been tested as Sensitive Receptors in their present form for the purpose of assessing the potential impact.

10.35 No gardens or designated amenity areas have been identified close to the application site that could be affected by the Proposed Development and it is therefore unnecessary for any form of overshadowing analysis to be undertaken. In addition, there are no issues in respect of light pollution or any potential for solar glare.

Proposed Development

10.36 The Proposed Development will comprise residential dwellings at first to eighth floor levels and as the occupants of those proposed “new” habitable rooms will have an expectation of daylight, it is necessary to measure the availability of daylight and sunlight within those rooms to determine whether those future occupants will enjoy an adequate level of amenity in accordance with the recognised design standards. However, as this is a New-Build development, there are no existing Baseline Conditions from which to measure any “impact” and the daylight and sunlight availability within these proposed new habitable rooms has therefore been measured on an absolute scale rather than through any comparison. As a result, there is no “impact” assessed as such, but instead, the suitability for use for a habitable purpose is assessed based on relevant criteria for new habitable rooms.

Pre-Crossrail Baseline

10.37 For the Baseline Conditions prior to the commencement of the Crossrail works, the obstruction caused by the pre-existing buildings was used to establish the levels of natural light at that Baseline. That massing was built-up into a computer 3D model from survey information and a 3D model derived from a Z Map model.

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10.38 A summary of the baseline conditions in relation to daylight and sunlight is provided in Table 15-2

Table 15-2 Sensitive Receptors existing Daylight and Sunlight Levels

Description	Proportion of windows > 27% VSC	Proportion of rooms with NSL > 80%	Proportion of windows with APSH > 25% (>5% winter)	Number of North Facing Windows	Description
8-10 Southampton Row	40.5% (15 out of 37)	18.8% (3 out of 16)	100% (9 out of 9)	28	In the pre-Crossrail baseline condition, this building receives relatively low but good levels of daylight and sunlight.

Post-Crossrail Baseline

10.39 The post-Crossrail baseline will comprise the Crossrail intervention shaft and head house.

Potential Impacts

10.40 Potential impacts during the construction and operational phases are described in the following sections. The full tabular results of the daylight and sunlight assessment are provided in **Technical Appendix D of Volume III** of this ES.

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Construction Impacts

Daylight, Sunlight, Overshadowing

10.41 To begin with, impacts will be non significant (**NSig**) where this application site is a cleared of existing buildings and replaced with the Crossrail intervention shaft and head house, however, throughout construction, the daylight and sunlight conditions will gradually change to reflect the increasing height and massing of the Proposed Development, until it reaches its maximum extents (i.e. the completed development impacts).

Completed Development Impacts

10.42 Operational impacts of the completed Proposed Development have been considered against the pre-Crossrail baseline.

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10.43 A summary of daylight and sunlight results is provided in Table 15-3.

Table 15-3 Daylight and Sunlight Impacts to Sensitive Receptors

Description	Proportion of Windows with VSC > 27%	Proportion of Windows VSC > 0.8 times existing (where VSC < 27%)	Proportion of rooms with NSL > 0.8 times existing	Proportion of windows with APSH > 25% (>5% winter)	Number of windows with > 0.8 times existing (APSH < 25% (<5% winter)
8-10 Southampton Row	21.6% (8 out of 37)	62.2% (23 out of 37)	62.5% (10 out of 16)	100% (9 out of 9)	100% (9 out of 9)

8-10 Southampton Row

10.44 The receptors in 8-10 Southampton Row comprise corner rooms which are multi-aspect served by more than one window, each of which has a different plane of outlook due to the curved/circular nature of those particular rooms. Each window will therefore have a different VSC value depending on the perpendicular outlook from the plane of the window as well as each room having multiple VSC values. In such circumstances it is clearly inappropriate to rely on any single VSC value and it is also scientifically incorrect to take a mean or median of those VSC values. With multi-aspect rooms, the internal Daylight Distribution and Average Daylight Factor values are more representative of internal daylight quality. The impact on those corner rooms' receptors should therefore be measured using Daylight Distribution and ADF. There are however rooms in the central part of the rear of 8-10 Southampton Row that are single aspect and therefore do not have the benefit of light from other sources. These rooms have been tested as "habitable" rooms even though they may not be used for habitable purposes both prior to vacation, and following refurbishment after completion of the Crossrail works.

10.45 There are 16 rooms within 8-10 Southampton row which are classed as Receptors, and out of those 16 Receptors, 3 of the central rooms will not achieve the target recommendations for Vertical Sky Components and Daylight Distribution. 81% of the rooms will therefore experience **NSig** impacts. The remaining 3 rooms will amount to 19% of the Receptors and will therefore experience an impact that would be classed as a **Sig Adverse** impact. This is a relatively small proportion, and as the impact will be to the central rooms which are not the main living rooms or primary habitable rooms, both now and once the building is refurbished following completion of the Crossrail works, the overall impact on the level of amenity enjoyed by the occupants will not be material.

10.46 The sunlight tests show that all of the windows that fall within the BRE sunlight criteria will continue to receive in excess of 25% of APSH and more than 5% of those APSH will be available in the winter months. All of the windows will therefore comfortably satisfy the BRE Guidelines and the impact to these windows will therefore be **NSig**.

Mitigation Measures

10.47 Mitigation measures are not considered necessary for construction impacts as any habitable rooms within 8-10 Southampton Row during the construction phase will be vacant and unoccupied.

10.48 For impacts associated with the completed Proposed Development, the daylight and sunlight results for the potential impacts against the pre-Crossrail baseline show that **NSig** and **Sig (adverse)** impacts will occur for residents. No further mitigation measures are required for impacts to any other sensitive receptors as mitigation has already been incorporated into the design through minimising bulk and massing, building orientation and set backs.

Residual Impacts and Conclusions

10.49 As further mitigation measures are not considered necessary, the residual impacts are as those identified in the potential impacts sections of this ES chapter. The residual impacts are therefore as follows.

10.50 Table 15-4 sets out the residual impacts from the Proposed Development.

Table 15-4 Summary of Residual Impacts

Description	Nature and Timescale of Impact	Geographic Scale	Significance
Construction			
Construction activities (including light pollution)	Negligible; Short-term	Local	NSig
Completed Development			
Daylight Levels to 8-10 Southampton Row	Negligible to adverse; Long-term	Local	NSig to Sig
Sunlight Levels to 8-10 Southampton Row	Negligible ; Long-term	Local	NSig

Cumulative Impact Assessment

10.51 No other Proposed Developments in close proximity of the application site, which could have an additional impact on the sensitive receptors, have been identified. There will therefore be no additional cumulative impact to be considered.

Daylight and Sunlight within the Proposed New Dwellings

10.52 The availability of daylight and sunlight that will be received within the habitable rooms in the proposed new dwellings has been tested and the results have been annexed at **Technical Appendix D of Volume III**. Those results show that all of the proposed new habitable rooms will meet the target design standards for their specific room uses taken from the British Standard Code of Practice for Daylighting, BS8206 Part 2 and Appendix C of the BRE Guidelines.

10.53 All of the windows that face within 90 degrees of due south, and hence fall within the BRE Sunlight Criteria, have been tested for APSH and winter sunlight. The BRE Sunlight Criteria does however apply primarily to the principal Living Room within each dwelling.

10.54 The application of the target standards for Sunlight depend on the actual orientation of the window being tested. That is, a window that faces due south will receive the maximum amount of sunlight throughout the

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day, whereas a window that faces due east or due west is only capable of receiving direct sunlight in the early morning or late afternoon respectively. The numerical targets in the BRE Guidelines therefore need to be adjusted to reflect the orientation of each of the windows. Taking this into account, the numerical values of APSH achieved for the windows are very good and demonstrate that where Living Rooms have windows that face within 90 degrees of due south, they will receive good levels of sunlight.

10.55 The results of the Daylight and Sunlight Amenity Analysis for the Proposed Development demonstrate that the future occupants of all of those dwellings will enjoy a good level of internal daylight and sunlight amenity.

References

- Ref. 15-1 Department for Communities and Local Government, (2012); National Planning Policy Framework, March 2012
- Ref. 15-2 The Mayor of London (2011); The London Plan: Spatial Development Strategy for Greater London