

Daylighting Impact Assessment

29-35 Station Road, Reading

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1.0 Introduction

This daylighting assessment has been prepared by Fabric Building Physics Ltd to assess any daylighting impact of the proposed new development at 29-35 Station Road, Reading. Specifically, Fabric has been appointed to undertake an assessment of the internal day-lighting within the proposed development and ensure that any impact of the development proposals on adjacent properties is within acceptable limits as defined by BRE Guide 209 – Site Layout for Sunlight and Daylight 2011.

Furthermore, an additional assessment has been completed to compare the scale and massing of the development proposals to the Broadway Maylan scheme previously approved in 2005/6. The aim is to ascertain whether the current development proposals results in a comparable sunlight and daylight impact on the surroundings.

This analysis completed for this report has been derived from a 3d computer model compiled from both a Z-mapping 3d model and the architect's planning submission drawings.

There have been a number of recent planning applications within the near vicinity of the development proposals. In order to assess the cumulative impact of these various applications, the alterations to Thames Tower, the Station Hill proposals and the recently approved application for additional residential accommodation at the adjacent Garrard House site have been included in the analysis.

1.1 Site Context

The development site is located within Reading town centre. The existing building occupies a rectilinear plot bounded by Garrard Street to the north and Station Road to the east.



Figure 1: Aerial View of Site Location

The development proposals are for the replacement of the existing buildings with a 22 storey mix use tower; comprising commercial premises at the lower levels and residential from the second floor upwards. The scheme incorporates 107 flats.

The buildings in the immediate surroundings are between 6 and 15 storeys tall. Two multi-storey car parks are located to the west and northwest of the development site, which form part of the Station Hill development site.

This report considers the impact of the development proposals on the adjacent residential properties at Icon House, Projection East and Projection West and the rear of 5-9 Merchants Place. Further east facing windows, located south of the Icon House east elevation were also included in the assessment, although it is believed these are rooms located within the Ibis hotel and would not necessarily require consideration.

1.2 Planning Policy

The Reading Borough Council planning applications checklist (July 2013) states a requirement for a Sunlight and Daylight Assessment for all applications involving:

- Buildings exceeding four storeys in height where adjoining other developed land or public open spaces,
- Where proposed buildings or extensions could lead to overshadowing of other
- proposed buildings or spaces within the same development site
- Where the application site is itself subject to significant shading from adjoining buildings or trees.

Policy CS7: Design and the Public Realm

All development must be of high design quality that maintains and enhances the character and appearance of the area of Reading in which it is located. The various components of development form, including: -

- Layout: urban structure and urban grain;
- Landscape;
- Density and mix;
- Scale: height and massing; and
- Architectural detail and materials.

Will be assessed to ensure that the development proposed makes a positive contribution to the following urban design objectives: -

- Character - a place with its own identity and sense of place
- Continuity and enclosure
- Quality of the public realm
- Ease of movement and permeability
- Legibility - clear image and easy to understand
- Adaptability – capable of adaptation over time
- Diversity – meets a wide range of needs.

Developments will also be assessed to ensure that they: -

- Respond positively to their local context and create or reinforce local character and distinctiveness, including protecting and enhancing the historic environment of the Borough and providing value to the public realm;
- Create safe and accessible environments where crime and disorder or fear of crime does not undermine quality of life or community cohesion;

Address the needs of all in society and are accessible, usable and easy to understand by them and are visually attractive as a result of good high quality

built forms and spaces, the inclusion of public art and appropriate materials and landscaping.

Reading Borough Council: Sites & Detailed Policies Document (Adopted Oct 2012) Policy DM4: Safeguarding Amenity

Development will not cause a significant detrimental impact to the living environment of existing or new residential properties, in terms of:

- Privacy and overlooking;
- Access to sunlight and daylight;
- Visual dominance and overbearing effects of a development;
- Noise and disturbance;
- Artificial lighting;
- Vibration;
- Dust and fumes;
- Smell; or
- Crime and safety.

The position of habitable rooms, windows and outdoor living spaces will be particularly important. A back-to-back distance of 20 metres between dwellings is usually appropriate, although the circumstances on individual sites may enable dwellings to be closer without a detrimental effect on privacy.

As well as immediate impacts, other aspects to which this policy applies will include matters such as hours of operation of businesses, and effects of traffic movements, particularly of heavy goods vehicles (HGVs). Proposals which would generate regular movements of HGVs on residential roads will not be acceptable.

Where an otherwise acceptable development could change its character to a use that would have a greater impact on amenity without needing planning permission, conditions will be applied to restrict such changes.

2.0 BRE Guidelines

BRE report 209 – Site Layout Planning for Sunlight and Daylight (2011) defines the criteria and methodology for the assessment of daylight, sunlight and overshadowing within new and existing developments. The purpose of the guide is to provide a framework to ensure adequate daylighting is provided in new development and minimise the impact of new development on adjacent existing buildings.

The handbook provides guideline standards to be maintained in existing buildings and a simplified methodology to determine whether any negative impact is 'material' or within acceptable limits. The handbook discusses the limits of applicability of the defined standards, with particular emphasis on the need to interpret the guideline standards flexibly subject to the site context, constraints and design requirements;

The advice given here is not mandatory and this document should not be seen as an instrument of planning policy; its aim is to help rather than 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. (Page 1, Paragraph 1.6)

Note that numerical values given here are purely advisory. Different criteria may be used, based upon the requirements for daylighting in an area viewed against other site layout constraints. Another important issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light'. (Page 7, Paragraph 2.2.3)

2.1 Daylight

Where a proposed development does not subtend the 25° angle from a point 2m above ground level projected from an existing building, it can be concluded that the development proposals will not have a material impact on the existing daylighting levels and therefore no further analysis is required. This process is to be undertaken for all adjacent / potentially affected buildings.

Where proposed development does subtend the 25° line, the potential impact on existing buildings is assessed using Vertical Sky Component and No Sky Line calculations. The latter requires knowledge of the internal floorplan of the potentially affected building.

For new development, the BRE guidelines state:

Daylight provision in new rooms may be checked using the average daylight factor calculation. The ADF is a measure of the overall amount of daylight in a space... In housing, BS 8206 also gives minimum values of ADF of 2%

for kitchens, 1.5% for living rooms and 1% for bedrooms. (Page 7, Paragraph 2.2.3)

2.1.1 Vertical Sky Component

The Vertical Sky Component (VSC) is defined as:

This is the ratio of the direct sky illuminance falling on the vertical wall at a reference point (usually the centre of the window), to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE (Commission Internationale de L'Eclairage) overcast sky is used, and the ratio is expressed as a percentage.

This is the principle measurement of how much sky is visible from a vertical surface and is used to assess the impact of new development on adjacent properties. An unobstructed vertical surface can achieve a maximum VSC of 39.6%.

The BRE guidelines state that for a room to be able to continue to receive sufficient daylight, the windows should be capable of achieving a VSC of greater than 27 per cent. Furthermore, new development should seek to limit any reduction below this level to within 0.8 times the original value to ensure adequate daylighting potential is maintained.

2.1.2 No Sky Line

The no sky line / view of sky divides points on the working plane (0.85m above FFL for residential) which have and do not have a direct view of the sky. Areas located beyond the no-sky line will usually appear darker and more gloomy compared with the rest of the room. The BRE handbook states:

If, following construction of a new development, the no sky line moves so that the area of the existing room, which does received direct skylight, is reduced to less than 0.8 times its former value this will be noticeable to the occupants, and more of the room will appear poorly lit. This is also true if the no-sky line encroaches on key areas like kitchen sinks and worktops.

2.1.3 Average Daylight Factor

The Average Daylight Factor (ADF) is the ratio of illuminance achieved on a working plane in a room, relative to the unobstructed horizontal illuminance achieved outside. The CIE standard overcast sky is used and the ratio is expressed as a percentage

2.2 Sunlight

For access to direct sunlight, the BRE guidelines propose a single methodology, Annual Probable Sunlight Hours, to assess direct solar access for both existing and new build development. Separate criteria are defined for the assessment of direct sun in external open spaces.

2.2.1 Annual Probable Sunlight Hours

The BRE guidelines states that:

In general a dwelling, or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided:

- *At least one main window wall faces within 90° of due south and*
- *The centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March.*
- *Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.*

The APSH assesses the likelihood of direct sunlight including the effects of cloud cover rather than relying solely on solar geometry. BR209 defines 'probable sunlight hours' as the total number of hours in the year that sun is expected to shine on unobstructed ground, allowing for average levels of cloud cover for the location in question based on historical climate data. APSH is measured at the window face and are calculated for each window using the sunlight availability indicators provided in BR 209 Appendix A for the latitude that most closely matches the site.

For existing adjacent dwellings, where a main window faces within 90 degrees of south and development proposals subtend the 25° line, there is potential for the existing sunlight amenity to be adversely affected. This will be the case if the centre of the window:

- *Receives less than 25% of APSH or less than 5% APSH between 21st September and 21 March and*
- *Receives less than 0.8 times its former sunlight hours during either period and*
- *Has a reduction in sunlight hours received over the whole year greater than 4% of APSH*

3.0 Reference Windows

Refer to Drawing 1427-WIN-01 for identification of the reference windows in the development proposals. Drawing 1427/VSC/01 details the window reference locations for Icon House.

4.0 Analysis Results

4.1 Icon House

The window location and internal layouts for Icon House, Ibis House and Projection East and West are based on the Twigg Brown planning drawings for the development.

There are 79 windows assessed within the Icon House elevations that are near to or oriented towards the proposed development at 29-35 Station Road. There are additional windows, notably on the north elevation that do not face the development site and have therefore not been included in the assessment.

The assessment includes the completion of both Vertical Sky Component and No Sky Line / View of Sky analysis. Both the current proposals and the previously consented Broadway Malyan scheme have been assessed in comparison to the existing situation. The results are presented in drawings VSC/01 and VOS/1-10.

The living rooms to the Icon House accommodation are all provided with balconies and corner glazing and have dual aspect.

1. The development proposals are predicted to result in a reduction to the existing VSC of all windows at Icon House facing the development site. However, the comparative analysis of the results indicates that the proposed scheme results in a comparable negative impact compared to previously consented scheme. The absolute reduction in VSC between the two scenarios is minimal, especially for the living rooms Windows x.08 & x.11). In these locations the reduction between to the two scenarios is almost negligible due to the presence of the balcony above.
2. The minimal difference between the two scenarios is illustrated further in the No-Sky Line analysis results detailed in drgs. VOS/1-10 in the Appendix.
3. These drawings detail the location of the no-sky line, or area of the working plane with a direct view of the sky in the current, proposed and previously consented condition.
4. At floors 1-7 of Icon House, it is predicted that the development proposals shall result in a loss of working plane with a direct view of the sky of less than 0.6m² compared to the previously consented scheme, with the majority of the losses less than 0.3m².
5. At the upper floors (8-10), the largest predicted loss of 1.43 m² is predicted for room 208, a bedroom. However, the area of the working plane with a direct view of the sky would remain at more than 50% of the room area.

4.2 5-9 Merchants Place

The building at 5-9 Merchants Place incorporates commercial premises at ground and first floor. It is not thought to include residential accommodation, but the VSC analysis is included in the appendix for completeness.

1. Of the 12 windows located on the east facing elevation at the rear of 5-9 Merchants Place, 4 are predicted to experience a reduction to their existing VSC values to less than 0.8 times their existing value. The absolute reduction in visible sky is small, but due to the poor existing context, this represents a disproportionately high part of the existing value.

4.3 29-35 Station Road

The development proposals include 108 flats, incorporate a mixture of 1, 2 & 3 bedroom units.

1. The Average Daylight Factor (ADF) analysis included in the Appendix demonstrates that 102 living / kitchen / dining rooms will exceed the BRE threshold of 1.5% for living rooms. Furthermore, 96 of these spaces also achieve an ADF greater than 2%, the threshold for kitchens. All bedrooms exceed the 1% target with many achieving more than 2%. The ADF modelling assumed average internal reflectance of 0.5 and glazing visible transmittance of 0.68.
2. The no-sky line modelling was completed using a 200mm spacing for the analysis grid. The west facing living accommodation at the lower floors has the lowest area of working plane with a direct view of the sky. The living rooms to flats 4, 5 & 6 have 34%, 38% & 30% of the working plane respectively with a direct view of the sky.
3. At fourth floor level, flats 16 & 17 have a direct sky view for 58% & 50% respectively, increasing to 61% & 72% for the same flats at fifth floor level. It is therefore contended that given the site constraints, a significant majority of the principal habitable rooms achieve an acceptable skylight area of working plane.
4. The Annual Probable Sunlight Hours results are presented in the Appendix. As is to be expected given the site context, the west facing flats on floors experience less direct sunlight than the BRE recommendations, but by the 6th floor, the west facing windows achieve 25% of annual probable sunlight hours. From the 7th floor upwards all west and south facing windows achieve both the 25% annual probable sunlight hours and greater than 5% during the winter months.

5.0 Appendix 1 - Glossary

Daylight

Visible part of the global solar radiation – includes sunlight and skylight components as described below.

Sunlight

Visible part of the solar radiation that reaches the Earth's surface directly as parallel rays after selective attenuation by the atmosphere. Note, this is sometimes known as beam radiation.

Skylight

Visible part of the solar spectrum that reaches the Earth's surface diffusely as a result of scattering by the Earth's atmosphere.

Obstruction Angle

The angular altitude of the top of an obstruction above the horizontal, measured from a given reference point in a vertical plane in a section drawn perpendicular to the vertical plane.

Annual Probable Sunlight Hours (APSH)

Long-term average of the total number of hours during the year that direct sunlight reaches a reference point. The reference point can be located on a horizontal or vertical surface. The APSH calculation includes the statistical likelihood of cloud cover in a specific location. It is therefore a more appropriate predictor of sunlight hours than shadow diagrams which do not consider cloud cover.

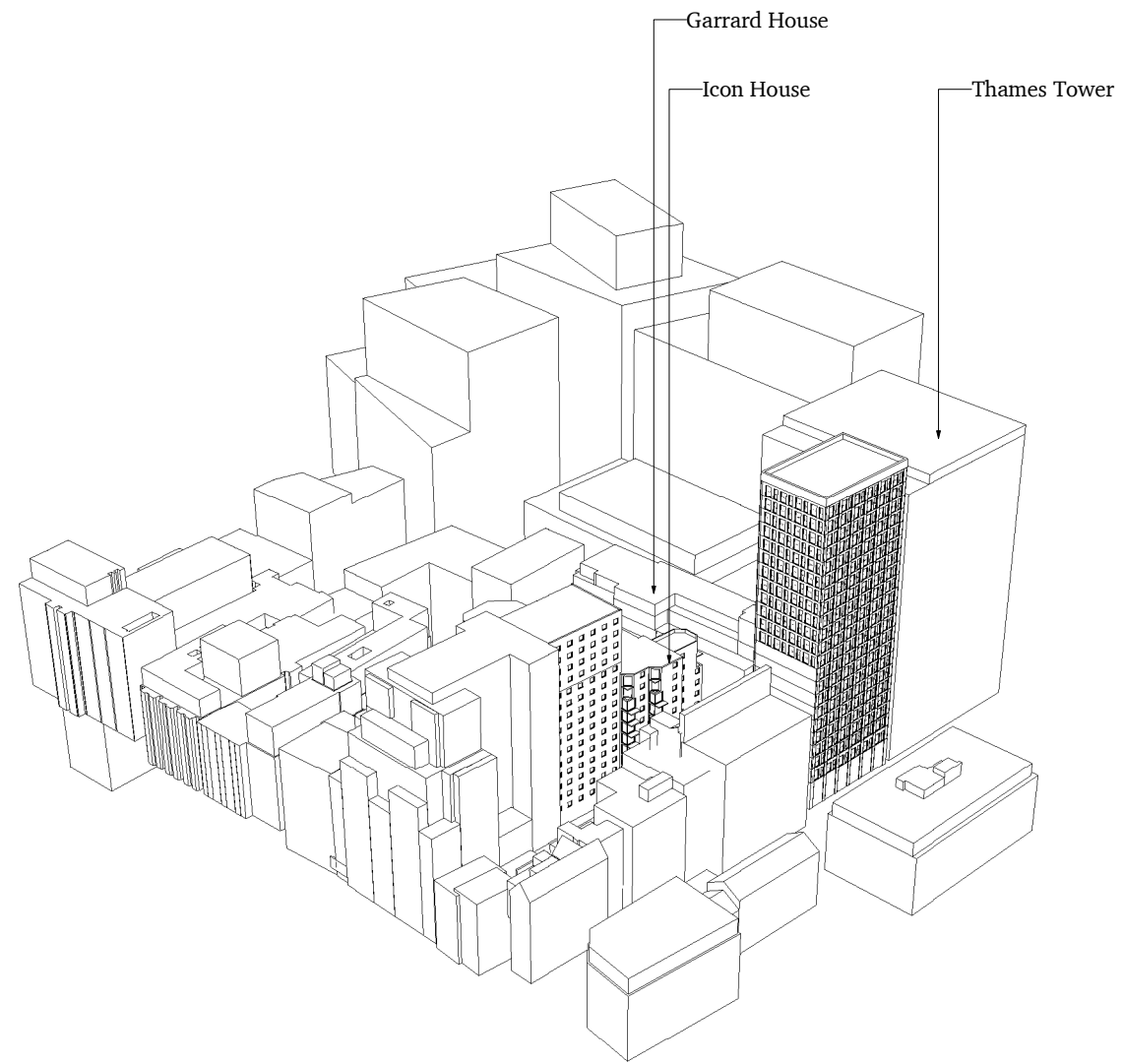
Vertical Sky Component (VSC)

The ratio, expressed as a percentage, of that part of illuminance, at a point on a given vertical plane that is received directly from a standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. This is the principle measurement of how much sky is visible from a vertical surface and is used to assess the impact of new development on adjacent properties.

Visible Sky Angle θ (VSA)

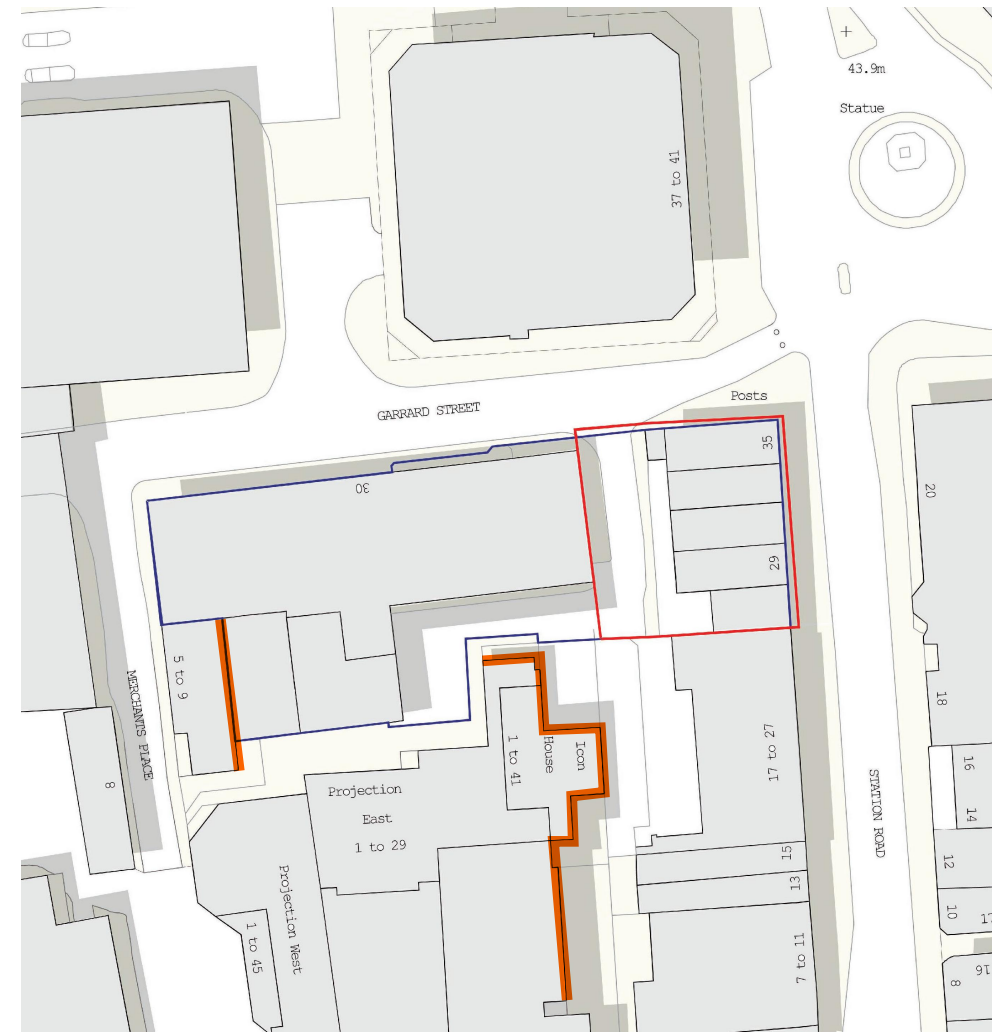
An angular measurement that results from deducting the obstruction angle from a right angle taken from a given reference point in a vertical plane. Ignoring the effects of shading by window reveals, the VSA is equal to 90° minus the Obstruction Angle.

6.0 Appendix 2 – Site Plan & Context



View from Southeast

Site Location Plan



Residential elevations considered in assessment