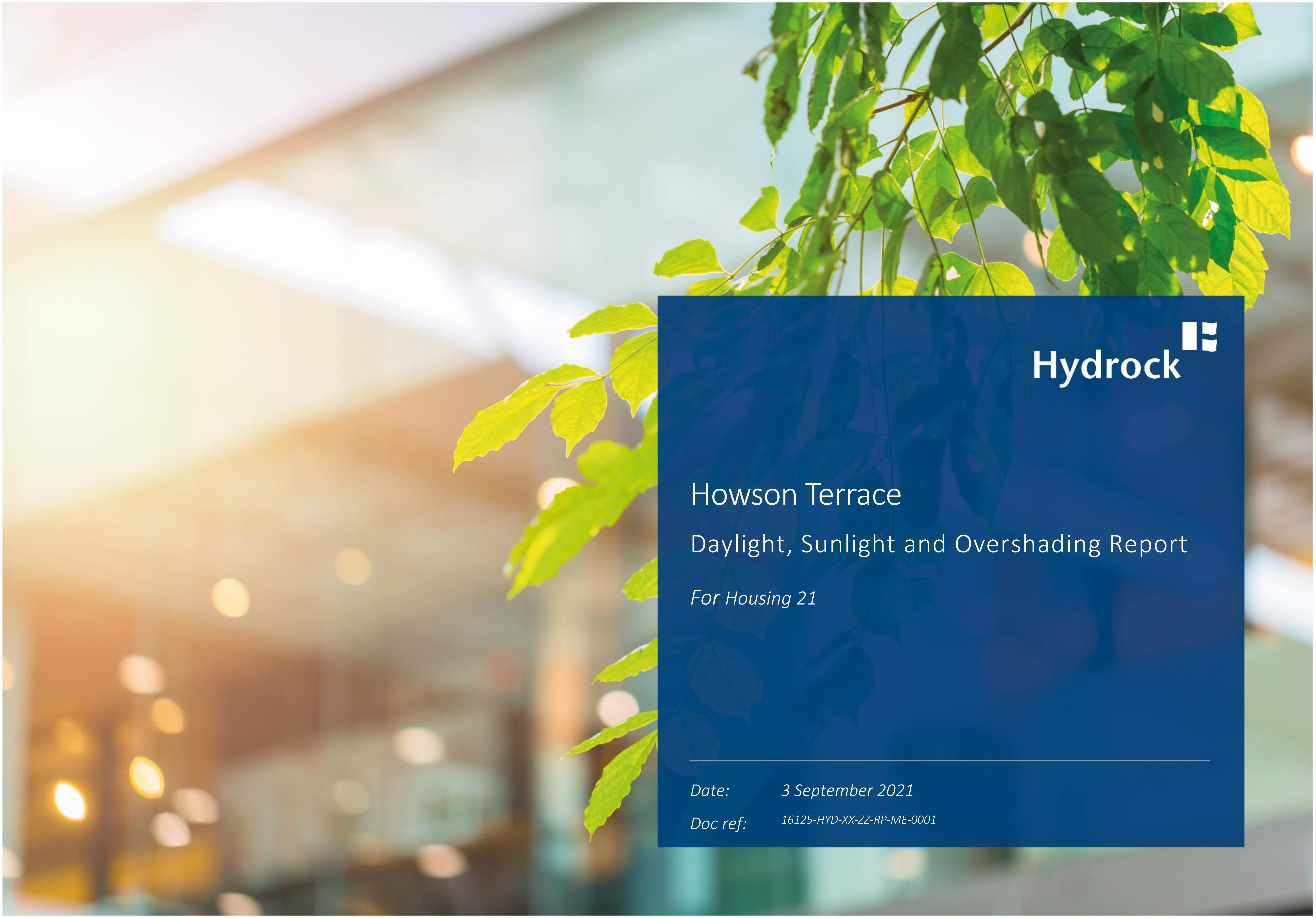

Hydrock

Howson Terrace

Daylight, Sunlight and Overshading Report

For Housing 21

Date: *3 September 2021*

Doc ref: *16125-HYD-XX-ZZ-RP-ME-0001*

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Executive Summary

A detailed study in line with BRE guidelines has investigated how the proposed design perform in terms of daylighting and sunlighting, as well as what the implications will be on the existing surrounding buildings.

The main conclusions which are contained within this report are:

- The impact of the proposed development on the following properties needed to be investigated:
  - 88-94 Petersham Road
  - 96-102 Petersham Road
  - 104-126 Petersham Road
  - Bromwich House
- Overall, the scheme is likely to have a negligible impact on the surrounding buildings when using the BRE target NSL of 0.8 and ADF of 1% for bedrooms. These methodologies were carried out as a small amount (15%) of windows of the adjacent buildings failed the VSC analysis.
- The NSL and ADF tests for the apartments of the proposed building found that all dwellings are achieving acceptable levels of daylight. All rooms are passing the BRE guideline targets for daylighting.
- The top two floors have better access to sunlight than the lower ground, ground and first floor as they are less affected by local shading from balconies and overshading from existing trees.

NPPF paragraph 123 confirms that a flexible approach to daylight and sunlight should be adopted when assessing development impacts where development makes the most efficient use of land.

A detailed study in line with BRE guidelines has investigated how the proposed design performs in terms of daylight and sunlight, as well as what the implications will be on the existing surrounding buildings. The assessment confirms that overall, the scheme has a negligible impact on the surrounding buildings when using the BRE targets for NSL and ADF. The accompanying daylight report demonstrates that the proposed building comfortably surpasses this requirement and as such would result in a scheme which provides acceptable living standards, in line with local, regional and national guidance.

Table 3: Proposed building, internal daylight results summary

Daylight Variable	Target	Pass Rate
NSL	0.8	98%
ADF - Bedrooms - Kitchen/Lounge	 1% 1.5%	90%

Table 1: Proposed building APSH and WPSH results

Variable	Pass rate
Annual Probable Sunlight Hours	57%
Winter Probable Sunlight Hours	68%

**This does not include north facing dwellings, which can be discounted from the assessment*

Table 2: Existing building impact assessment for daylight and sunlight

Existing Building	Daylight Impact	No. Windows Affected	Sunlight Impact	No. Windows Affected
88-94 Petersham Road	Negligible	0	Negligible	0
96-102 Petersham Road	Negligible	0	Negligible	0
104-126 Petersham Road	Negligible	0	Negligible	0
Bromwich House	Negligible	0	Negligible	0

1. INTRODUCTION

1.1 Purpose of Report

Hydrock has been appointed by Housing 21 to provide a daylight and sunlight assessment for the proposed development at Howson Terrace, in the London Borough of Richmond upon Thames.

This report provides the results of a daylight and sunlight assessment that has been undertaken for the proposed development including any potential adverse impacts on surrounding buildings.

The proposed development and its impact has been assessed using the criteria set out in the Building Research Establishment) BRE 'Site layout planning for daylight and sunlight – a guide to good practice' (BR 209) (Littlefair, 2011). Whilst the guide itself states that its guidelines are not mandatory, they are those predominantly referenced for daylight and sunlight standards in the U.K.

1.2 Development details

The development is a residential unit containing 28 apartments. The apartments are all of a similar layout with one-bedroom units, with the exception of a few apartments containing two bedrooms. The proposed development is five stories high, located in Richmond in south-west London.

Figure 1 Site location plan

2. POLICY REQUIREMENTS

2.1 National Planning Policy Framework (NPPF)

The NPPF has been updated and the following is of relevance to daylight and sunlight assessments:

"Local planning authorities should refuse application which they consider fail to make efficient use of land, considering the policies in this Framework. In this context when considering applications for housing authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site."

2.2 Residential Design Standards SPD (2015 Technical Update)

Policy 2.7 Daylight and sunlight

Residential developments should maximise sunlight and daylight, both within the new development and to neighbouring properties. Development should seek to minimise overshadowing or blocking of light to adjoining properties. A lack of daylight can have negative impacts on health as well as making the development gloomy and uninviting.

Developments should meet site layout requirements set out in the Building Research Establishment (BRE) Site Layout for Daylight and Sunlight – A Guide to Good Practice (1991). In particular the following minimum tests need to be applied to avoid the unacceptable loss of daylight and/or sunlight resulting from a development, including new build, extensions and conversions.

2.3 London Borough of Richmond upon Thames Local Plan

The local council has specified these requirements with regards to daylight and sunlight of new, existing, adjoining and neighbouring properties:

"The council will ensure the design and layout of buildings enables good standards of daylight and sunlight to be achieved in new development and in existing properties affected by the new development; where existing daylight and sunlight conditions are already substandard, they should be improved where possible."

2.4 Glossary of terms

Average Daylight Factor - The average daylight factor is the average indoor illuminance (from daylight) on the working plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane. It is calculated based on a uniform overcast sky.

Glare - Glare is the sensation produced by bright areas within the visual field, such as lit surfaces, parts of the luminaires, windows and/or roof lights. Glare shall be limited to avoid errors, fatigue and accidents. Glare can be experienced either as discomfort glare or as disability glare. In interior work places disability glare is not usually a major problem if discomfort glare limits are met. Glare caused by reflections in specular surfaces is usually known as veiling reflections or reflected glare.

Illuminance - The amount of light falling on a surface per unit area, measured in lux.

Point daylight factor - A point daylight factor is the ratio between the illuminance (from daylight) at a specific point on the working plane within a room, expressed as a percentage of the illuminance received on an outdoor unobstructed horizontal plane.

Uniformity - The uniformity is the ratio between the minimum illuminance (from daylight) on the working plane within a room (or minimum daylight factor) and the average illuminance (from daylight) on the same working plan (or average daylight factor).

View of sky/no-sky line - Areas of the working plane have a view of sky when they receive direct light from the sky, i.e. when the sky can be seen from working plane height. The no-sky line divides those areas of the working plane, which can receive direct skylight, from those that cannot.

Working plane - CIBSE LG10 defines the working plane as the horizontal, vertical or inclined plane in which a visual task lies. The working plane is normally taken as 0.7m above the floor for offices and 0.85 m for industry

3. BACKGROUND

Overshadowing occurs when buildings are in close proximity relative to their size. This results in reduced levels of daylight and sunlight in part, or all, of the affected buildings. Daylight refers to the level of diffuse natural light coming from the surrounding sky or reflected off adjacent surfaces, whereas sunlight refers to direct sunshine. A key difference between the two is that sunlight is highly dependent on orientation, whereas orientation has no effect on daylight.

The potential for daylight at a particular point may be quantified by using a number of different metrics. The proportion of the sky that is 'visible' from a single point can be assessed. For points located on vertical surfaces such as walls, this proportion of visible sky is termed the 'vertical sky component' or VSC.

The no sky line can also be used to assess daylight performance. The no sky line is the point on the working plane at which no sky can be viewed. This is often expressed as the percentage of working plane from which the sky can be viewed such as 80% or 0.8.

However, if internal details of the building are known, then daylight can be more accurately quantified by calculating the average daylight factor (ADF). This gives a more precise measure of daylight, the results of which can in effect over-ride the VSC results. The ADF is generally only used to calculate daylight in new buildings.

Further, climate based modelling (CBM) techniques can be utilised to provide a more accurate assessment of predictive visual comfort within buildings. These techniques include spatial daylight autonomy (SDA), which considers percentage of time across a given year where appropriate illuminance levels are achieved, in addition to glare risk assessment.

These CBM techniques require more complex modelling and are more appropriate where the usage and task requirement of the space are known in more detail. For this reason, and the relative modern emergence of CBM modelling techniques, assessment at planning is rare.

Direct sunlight can be calculated by testing the annual 'probable sunlight hours' that a point receives. This is achieved by considering both the complete annual shading variation at the point, and the statistical sunshine averages for the location in question.

The average daylight factor, vertical sky component, no sky line and number of annual probable sunlight hours form the basis of the overshadowing assessment methodology used in the analysis. The average daylight factor is generally only relevant when the internal room layout and use is known.

To achieve objectivity in quantifying daylight and sunlight, the guidelines laid down in the widely accepted BRE guidebook 'Site layout planning for daylight and sunlight: a guide for good practice', 2nd edition, 2011 by P J Littlefair are adhered to.

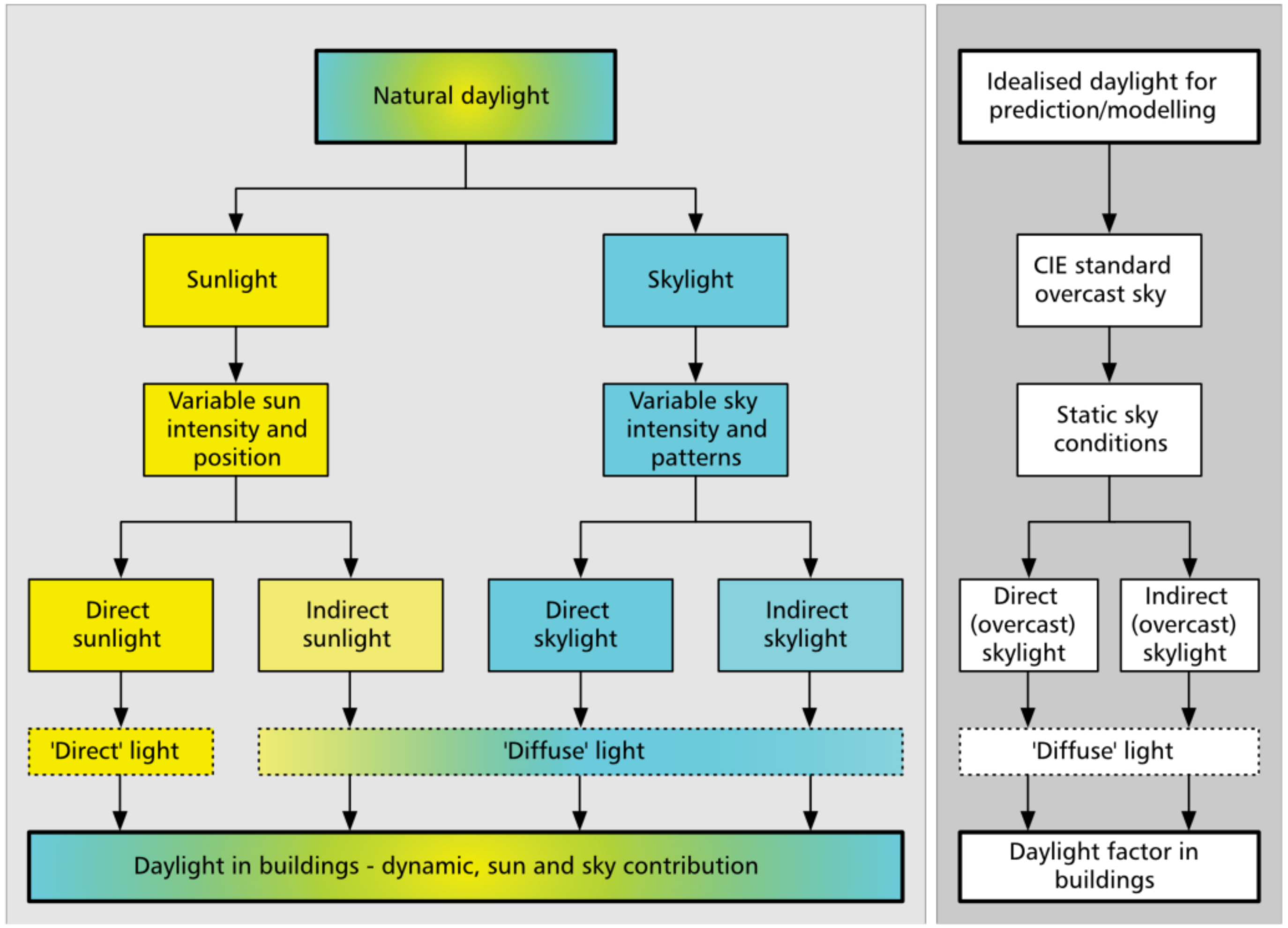


Figure 2 Natural daylight categorisation

4. METHODOLOGY

4.1 Existing Buildings

The BRE recommend that daylight is safeguarded to nearby buildings to avoid making adjoining properties appear gloomy or unattractive.

Following the recommendations contained in the BRE guide, an initial desktop assessment can be undertaken to confirm which existing dwellings require assessment. This assessment is shown in Figure 4.

A section is drawn in plane perpendicular to each potential affected window wall of the existing building. The angle to the horizontal subtended by the new development at the level of the centre of the lowest window is drawn.

If this angle is less than 25° for the whole of the development, then it is unlikely to have a significant effect on the daylight enjoyed by the existing building. If for any part of the new development, this angle is greater than 25°, a more detailed check is needed to find the loss of skylight to the existing building. Both the total amount of skylight and its distribution within the building are important.

If existing buildings surrounding the proposed development do not meet the 25 degree rule, a more detailed assessment of daylight is required. This is done using the Vertical Sky Component (VSC) in the first instance. For the proposed building to have no noticeable effect on existing dwellings, the VSC post development should be no less than 0.8 times its former value.

If internal room layouts are known a further assessment using the no sky line and average daylight factor can be carried out.

4.2 New Developments

The BRE guide cites the recommendations in BS 8206-02 Code of Practice for Daylighting as the minimum values for the ADF in each room of a dwelling. They are shown in Table 4.

The BRE guide states that it is the main habitable rooms (kitchen, living room, dining room and study), which should be tested. Daylight in bedrooms is regarded as less important but has been tested here for completeness.

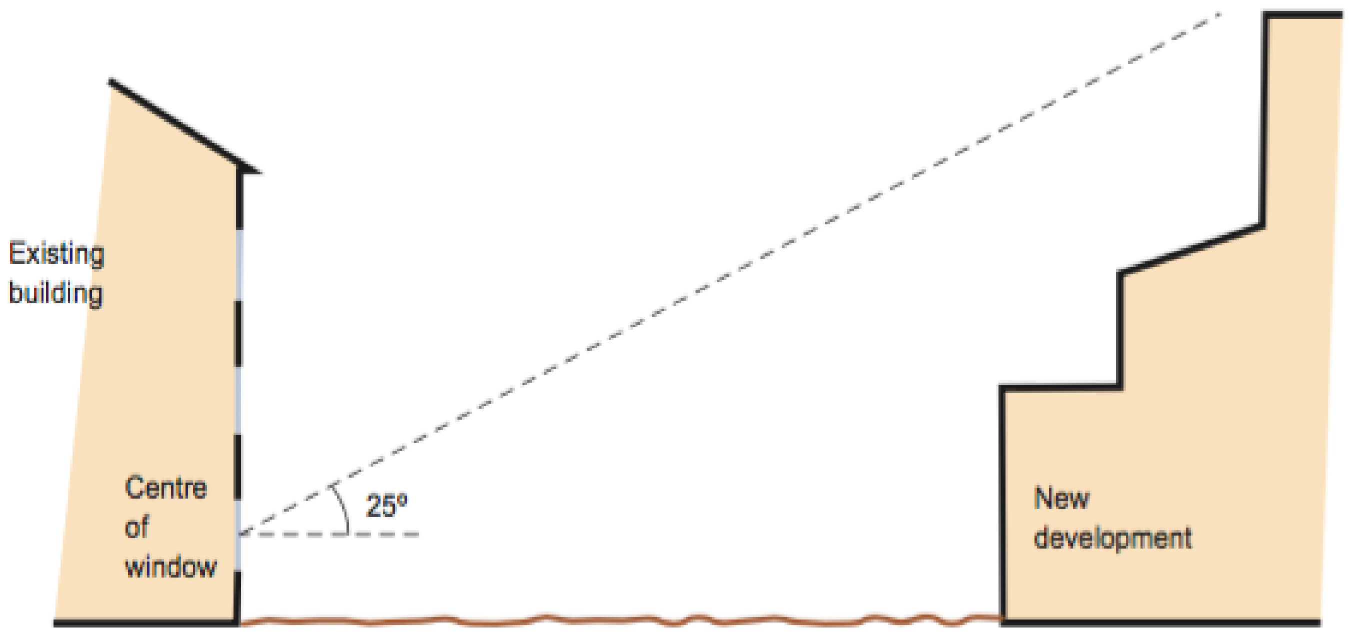


Figure 3 Existing building 25 degree check

Zone	Recommended minimum ADF
Kitchen	2.0%
Living room, dining room, study	1.5%
Bedrooms	1.0%

Table 4 BRE recommended daylight factors

The BRE have confirmed in previous correspondence with Hydrock, that in situations where the kitchen forms part of a combined kitchen/lounge/dining room, the lower daylight factor of 1.5% can be applied.

4.3 Calculating Window Sunlight

To quantify the potential for sunlight, annual probable sunlight hours are calculated for living room windows, which face within 90 degrees of due south. The recommendation is that:

'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'.

4.4 Calculating Amenity Sunlight

Overshadowing is quantified by assessing whether or not significant areas of the affected amenity space receive no direct sunlight for a large part of the year.

As required by the BRE, the 21st of March is chosen as an indicative date for shadows. If an area receives no direct sunlight at any time on that date, it will not have received any sunlight during the 6 winter months. After the 21st March, the shadows will become shorter over the summer and then start to lengthen again, returning to an equal length on September 21st.

This means that any garden or amenity areas receiving sunlight on 21st March will continue to receive sunlight for the coming six months. Hourly shadow plots can be used to show areas which are in shade from September 21st to March 21st.

The BRE guidance recommends that:

'For it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive two hours of sunlight on 21st March'

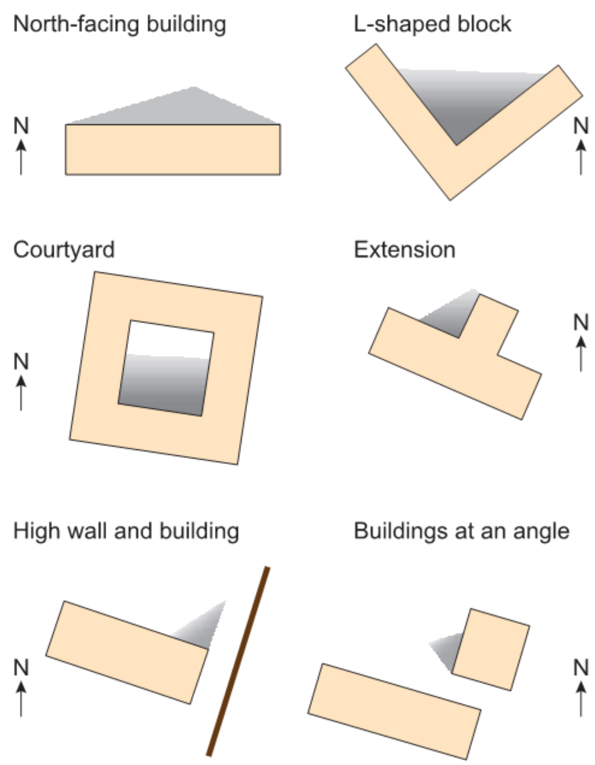


Figure 4 Typical massing where low levels of sunlight can occur

5. ASSESSMENT CRITERIA

5.1 Existing Buildings

The BRE Guidelines provide three different methods for assessing daylight for existing residential accommodation: The Vertical Sky Component (VSC) method, No Sky Line (NSL) and the Average Daylight Factor (ADF) method. In the first instances the VSC is tested, and if required the NSL and ADF can then be tested.

The BRE states that for the effect of the proposed building to be minimal, the VSC including the new development needs to be greater than 27%. If the VSC is less than 27%, this is still acceptable so long as the introduction of the new development does not result in a VSC which is less than 80% of the original existing value.

Window sunlight availability will be assessed using the annual probable sunlight hours (APSH) and winter probable sunlight hours (WPSH).

The sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:

- receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March; and
- receives less than 0.8 times its former sunlight hours during either period; and
- has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

For amenity spaces it is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.

5.2 New Development

The proposed new development at Howson Terrace will be assessed using the following criteria:

Table 5 BRE daylight, sunlight and overshadowing criteria for new development

Parameter	Criteria	Acceptability
Daylight	Vertical sky component (new buildings)	Greater than 27%
	No sky line (new dwellings)	Greater than 0.8
	Average daylight factor	Greater than 1.0% - 2.0% depending on room use
Sunlight	Annual probable sunlight hours	Window receives at least 25%
	Winter probable sunlight hours	Window receives at least 5%
Overshadowing	Area of amenity space receiving 2 hours of sunlight on 21st March	50% of space

6. DAYLIGHT AND SUNLIGHT MODEL

6.1 Accuracy

It is important to note that with any modelling exercise there are assumptions and approximations that need to be made. While building performance modelling techniques include detailed hourly simulations, they are predicted methods only and should not be relied upon as a measure of final building performance.

The latter is subject to detailed design, installation commissioning and operational profiles which are all subject to development. As far as possible, detailed of all assumptions and approximations used are supplied as part of the report. These should be read and considered carefully.

6.2 Software

The calculations have been carried out using IES Virtual Environment 2019, an accredited Building Performance Modelling (BPM) tool in accordance with CIBSE Guide AM11 (CIBSE, 2015).

IES uses a Radiance based calculation simulation for daylight. This predicts the transport of light in a virtual 3D scene using physically based models for the emission, transmission, reflection and scattering of light. The output, therefore, can inform on how the building might perform; for example, in terms of visual impression and predicted illuminance levels for particular sky conditions. Radiance is capable of producing highly accurate predictions, within 10% of measured illuminance values.

In practical terms however, there are a number of factors that will affect the accuracy and reliability of modelling predictions:

- Model geometry;
- Physical properties;
- Luminous environment;
- Sensor grid/points;
- Simulation parameters; and
- Data output.

6.3 Geometry

Three dimensional numerical models suitable for daylight/sunlight analysis were constructed to represent the current site conditions and proposed development.

These models include a representation of building adjacent to the site up to a distance judged to have an influence on the availability of natural light.

6.4 Weather

In accordance with BRE guidelines, the ADF has been based on a uniform overcast sky in accordance with BS 8206 and CIE guidelines.

Solar calculations for the purpose of sunlight availability have been carried out based on the most suitable local weather file for the development.

6.5 Glazing and room layout

Glazing properties have been assigned in accordance with BS 8206:

- Light transmittance (T) = 0.71
- Internal Reflectance (R) = Varies. Based on calculated internal surface types (wall and ceiling - light paint, floor - light carpet).
- A margin of 0.5m has been included within the model based on recommendations provided by the BRE. This contradicts the advice given in CIBSE AM11 (Building Performance Modelling) and will increase the daylight factor within the spaces.

Figure 5 Adjacent buildings key

7. PROPOSED DEVELOPMENT - EXISTING BUILDINGS IMPACT ASSESSMENT

The impact of the proposed development on the existing buildings within the vicinity of the site has been assessed. This has been undertaken using a desktop-based approach as outlined earlier in this report. For there to be no significant impact on the existing buildings, the obstruction angle from the ground floor window of the existing building must be less than 25 degrees.

The layout of existing buildings is based on the Site plan provided by the architect as seen in Figure 5. Building heights and elevations have been taken from the councils online planning register records where possible. If no information is available building elevations have been estimated from google street view. Proposed buildings have been based on architect's layouts and elevations received on 14/10/20.

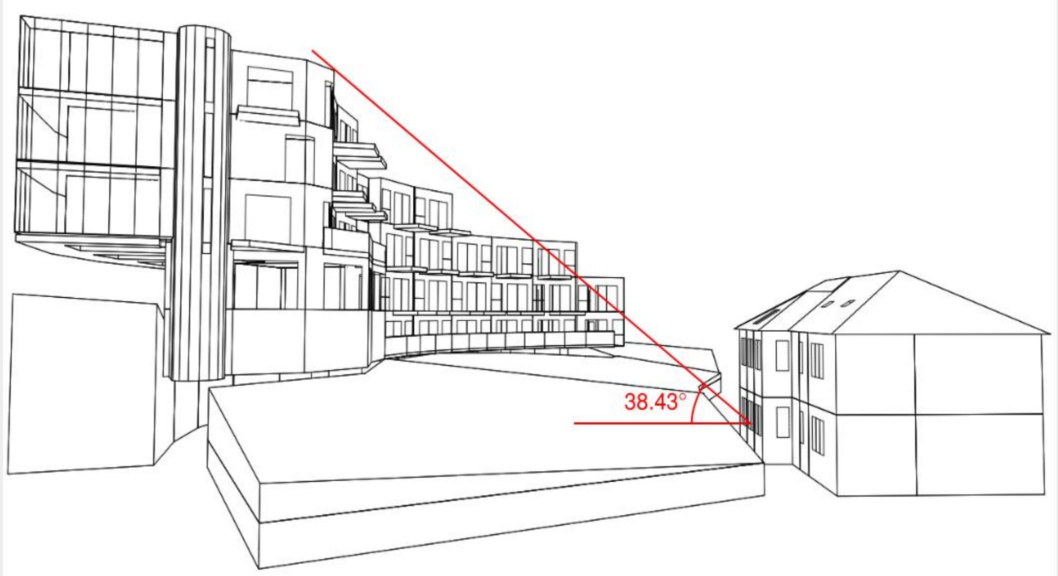
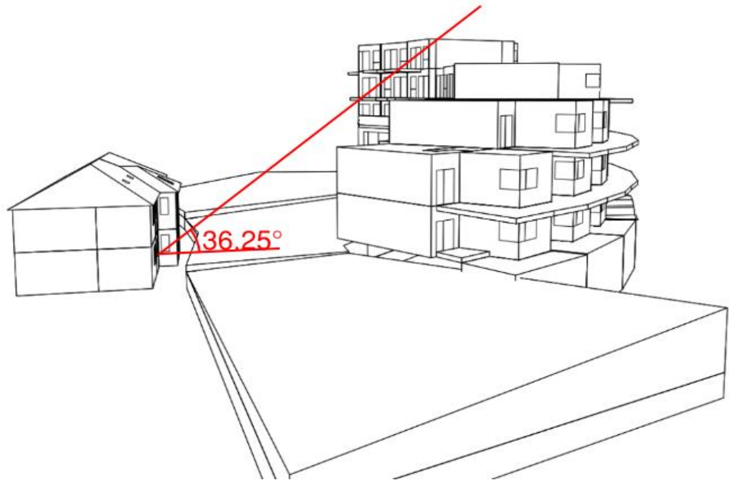
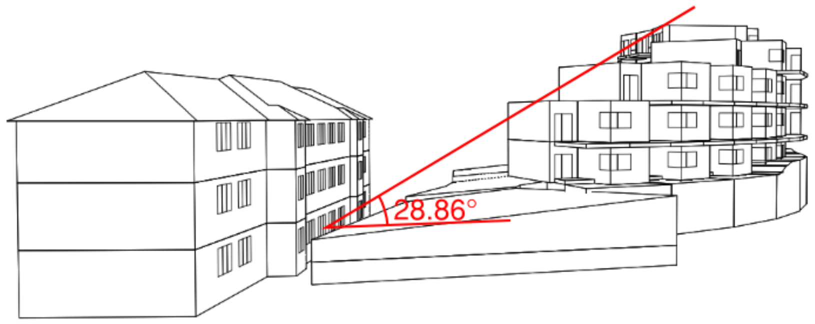
The following buildings have been assessed:

- 88-94 Petersham Road
- 96-102 Petersham Road
- 104-126 Petersham Road
- Bromwich House

7.1 Desktop Assessment

The results of the initial desktop assessment are shown in the Table 6. Buildings with an obstruction angle of greater than 25 degrees require further assessment.

Table 6 Desktop assessment results

Building	Obstruction Angle	Requires Further Assessment?
88-94 Petersham Road		Yes
Bromwich House	No windows therefore no further analysis required	No
96-102 Petersham Road		Yes
104-126 Petersham Road		Yes

7.2 Daylight Assessment

From the results of the initial desktop assessment, the buildings that require further assessment are as follows:

- 88-94 Petersham Road
- 96-102 Petersham Road
- 104-126 Petersham Road

The VSC, NSL and ADF has been investigated for each of the existing windows. In the BRE guidelines the VSC including the new development needs to be greater than 27%, or the introduction of the new development does not result in a VSC which is less than 80% of the original values without the development. If the windows failed the VSC criteria, further analysis was conducted using NSL and ADF tests. Our analysis has reported on these targets as they are industry best practice. Where the effect of the proposed building on adjacent buildings is being analysed, the effect of existing trees is ignored, as stated in the BRE guidelines. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf.

Figure 6 and Figure 7 show which windows are passing and failing the analysis. The total figures of the adjacent buildings analysis are summarised in Table 7, for detailed results of each window refer to the Appendix. The first set of results show the number of windows that pass the BRE target of 27%. The second results column takes into account the reduction in VSC of the existing buildings due to the proposed building. 80% of this VSC value is calculated and tested against the VSC values for the proposed building. If the proposed building values are still less than this, further analysis on NSL and ADFs need to be conducted.

Table 7 Summary of adjacent buildings VSC results

Results	BRE targets >27%	%	BRE Target < 27% but is 0.8 times its former value	%
Pass	100	67%	127	85%
Fail	49	33%	22	15%

Table 7 shows that overall, 33% of windows are failing to meet the target of 27%, these still have a high level of daylighting, and only 15% of windows have less than 80% of their previous VSC value.

7.2.1 88-94 Petersham Road

26% of the windows are failing in this development with 74% passing. The rooms on the first floor are most likely to be bedrooms, which means that the impact is only minorly adverse. The ground floor rooms are likely to be living rooms which require higher levels of light. This means that further NSL and ADF analysis is required.

7.2.2 96-102 Petersham Road

40% of the windows fail the VSC Criteria. Since this is a residential building, this may have an adverse effect on the residents as the BRE qualifies as having a particularly strong requirement for daylight in residential areas. Thus, further NSL and ADF analysis is required here.

7.2.3 104-126 Petersham Road

All windows pass the BRE 27% target. This means that they are still likely to have good access to daylight regardless of the proposed building. Therefore, no further analysis is required.

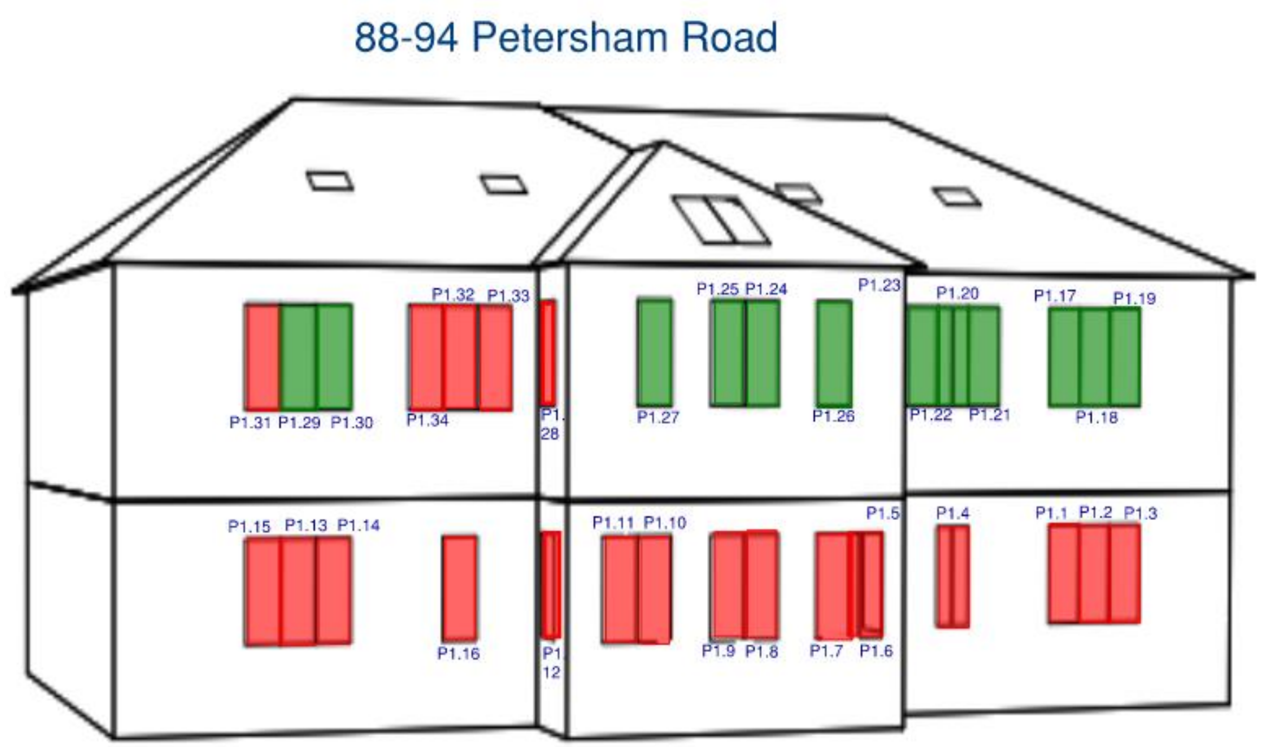


Figure 6: 88-94 Petersham Road VSC results

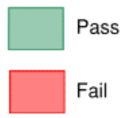


Figure 7: 96-102 Petersham Road VSC results

7.3 Further Daylight Analysis

Further analysis using more detailed methodology to quantify the amount of daylight in the adjacent buildings - 88-94 Petersham Road and 96-102 Petersham Road - is required, as some windows failed the first VSC test. The first analysis is the 'No Sky Line' (NSL) test and if rooms fail this criterion, the 'Average Daylight Factor' (ADF) test is conducted.

7.3.1 No Sky Line

To achieve a pass for the NSL test, a value higher than 0.8 needs to be achieved. As can be seen in Table 8 and Table 9, two rooms fail the BRE requirements for NSL. This means further analysis using ADF is required.

7.3.2 Average Daylight Factor

The ADF for the adjacent buildings have been calculated and assessed against the BRE criteria as follows:

- Kitchens – 2%
- Bedrooms and studios – 1%
- Living Rooms – 1.5%

The BRE have confirmed in previous correspondence with Hydrock, that in situations where the kitchen forms part of a combined kitchen/lounge/dining room, the lower daylight factor of 1.5% can be applied.

7.3.3 Conclusions to Further Daylight Analysis

Having undertaken further analysis required following the VSC and NSL tests, Table 8 and Table 9 show that all rooms now pass the BRE requirements for ADF. This means that the existing buildings are acceptable for daylight and are within the BRE guidelines.

Table 8: ADF and NSL results for 88-94 Petersham Road

88-94 Petersham Rd				
Room	**No Sky Line**	**Pass/Fail (NSL > 0.8)**	**Average Daylight Factor**	**ADF Pass/Fail (Bedrooms >1%, Living rooms > 1.5%)**
GROUND FLOOR				
Bed 1	1.00	Pass	3.60	Pass
Bed 2	0.60	Fail	2.00	Pass
Bed 3	0.92	Pass	2.70	Pass
Bed 4	1.00	Pass	2.70	Pass
FIRST FLOOR				
Bed 1	1.00	Pass	3.80	Pass
Bed 2	0.68	Fail	2.20	Pass
Bed 3	0.96	Pass	2.90	Pass
Bed 4	1.00	Pass	3.00	Pass

Table 9: ADF and NSL results for 96-102 Petersham Road

96-102 Petersham Rd				
Room	**No Sky Line**	**Pass/Fail (NSL > 0.8)**	**Average Daylight Factor**	**ADF Pass/Fail (Bedrooms >1%, Living rooms > 1.5%)**
GROUND FLOOR				
Bed 1	1.00	Pass	3.40	Pass
Bed 2	0.78	Fail	2.10	Pass
Bed 3	0.68	Fail	2.20	Pass
Bed 4	1.00	Pass	2.60	Pass
FIRST FLOOR				
Bed 1	1.00	Pass	3.70	Pass
Bed 2	0.96	Pass	2.30	Pass
Bed 3	0.92	Pass	2.40	Pass
Bed 4	1.00	Pass	3.00	Pass

7.4 Overshading of Amenity Spaces

Adjacent to the development there are some areas of green public space. To ensure that the development does not have an adverse impact these amenity areas, they should receive at least two hours of sunlight on 21st March.

Results are shown in Figure 9, Figure 10 and Figure 8 White squares indicate that the area gets less than 2 hours of sunlight on September 21st, the blue areas indicate low levels of sunlight (~2 - 4 hours) progressing through to red which indicates high levels of sunlight (~11 hours).

Overall, the building does not severely overshade any existing nearby properties or have an adverse impact on amenity areas such as private gardens. This means that the proposed building passes the overshading criteria, as there are no adjacent areas that receive less than 2 hours of sunlight on September 21st.

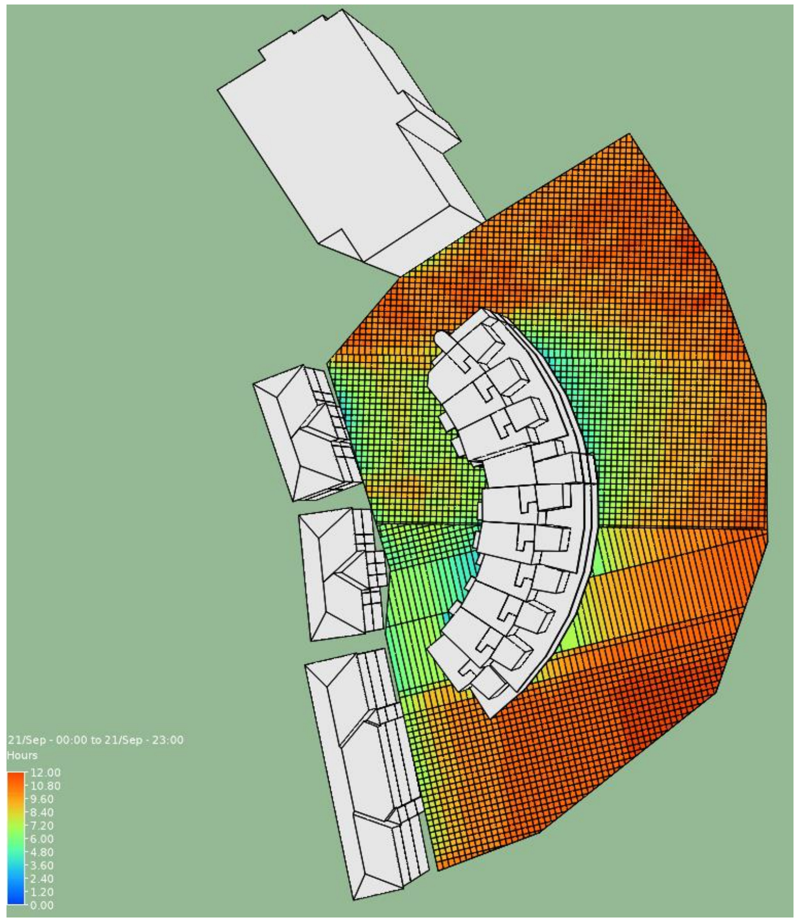


Figure 9: Overshading analysis

7.5 Access to Sunlight for Existing Buildings

Any windows within 90° of due south will need to be checked to ensure that the proposed development does not impact on access to sunlight. There are no windows on the adjacent buildings which meet this orientation, the majority facing north east, and so no further sunlight analysis is required on the existing buildings.

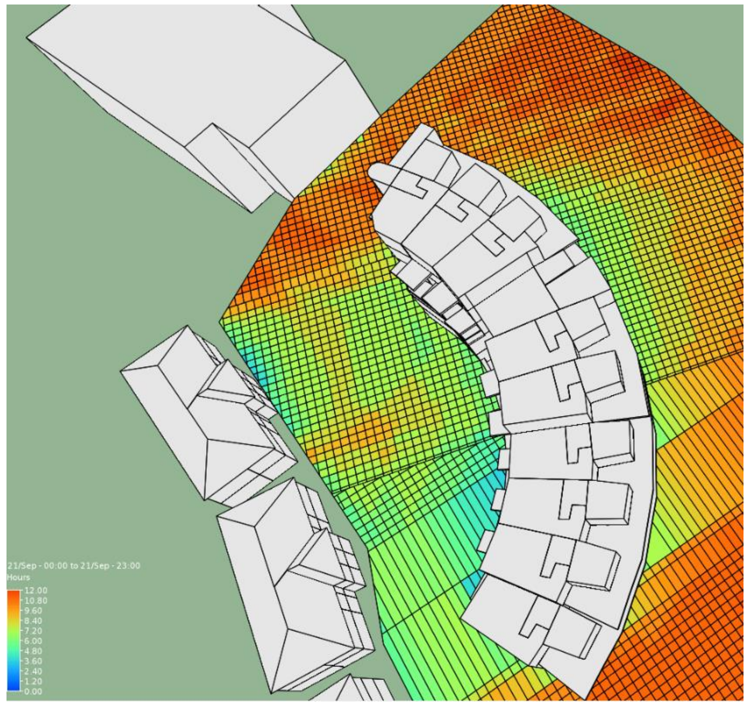


Figure 10: Overshading analysis

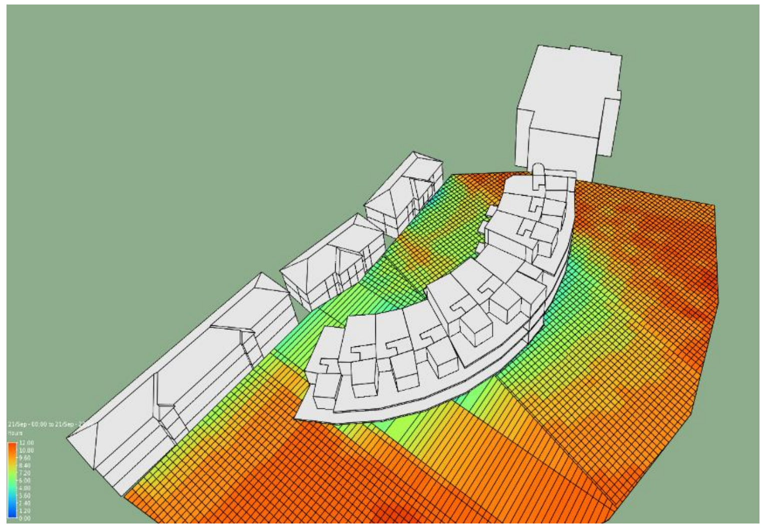


Figure 8: Overshading analysis

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8. DAYLIGHT AND SUNLIGHT IMPACT ASSESSMENT

The impact on the existing buildings has been classified according to the methodology outlined in Appendix I of BR 209. It is worth noting that the assessment of impact depends on a combination of factors and there is no simple rule of thumb that can be applied.

The following is given as guidance:

- Negligible - Where reduction in skylight is well within the guidelines set out within BR 209.
- Minor Adverse – Where loss of skylight only just meets guidelines or areas that fall outside of guidelines are small or not critical.
- Moderate Adverse – Where loss of skylight is outside the guidelines or a large area of open space/windows are affected.
- Major Adverse – A large number of open space/windows are affected and the loss of skylight is substantially outside the guidance.

Table 10 shows the summary of the impact assessment on the existing buildings for both daylight and sunlight. There will be not be a high impact on the existing buildings in terms of daylight.

Table 10 Existing building impact assessment for daylight and sunlight

Existing Building	Daylight Impact	No. Windows Affected	Sunlight Impact	No. Windows Affected
88-94 Petersham Road	Negligible	0	Negligible	0
96-102 Petersham Road	Negligible	0	Negligible	0
104-126 Petersham Road	Negligible	0	Negligible	0
Bromwich House	Negligible	0	Negligible	0

9. PROPOSED DEVELOPMENT ASSESSMENT

9.1 Proposed Building Daylight Analysis

To analyse how the proposed building performs in terms of daylight all apartments have been analysed, first testing the VSC in their windows. The daylight performance of bedrooms, living rooms and kitchens has been assessed. The apartments were tested and Figure 11, Figure 13, Figure 12 and Figure 14 show the windows that passed or failed the BRE guidelines where the VSC needs to be greater than 27%. Table 11 shows the pass rate of this test. The windows that have failed are mainly due to balconies limiting the VSC, and the glass doors on the east-facing façade have failed due to U-shaped blocks limiting the amount of daylight. There is also some overshading from existing trees, limiting the amount of daylight mainly on the south-east facing façade. This means further analysis on NSL and ADF is required to examine the failing windows in more detail.

Table 12: Summary of proposed building VSC results

Results	No. of windows where BRE targets >27%	% of windows
Pass	108	32%
Fail	230	68%

9.1.1 No Sky Line

To achieve as pass for the NSL a value higher than 0.8 needs to be achieved. As can be seen in Table 12 all rooms, with the exception of one, pass the BRE requirements for NSL. An ADF analysis was carried out on the room that has failed the NSL analysis. The ADF test was also extended to the other rooms to validate the NSL results.

9.1.2 Average Daylight Factor

The ADF for each modelled unit has been calculated and assessed against the BRE criteria as follows:

- Kitchens – 2%
- Bedrooms and studios – 1%
- Living Rooms – 1.5%

The BRE have confirmed in previous correspondence with Hydrock, that in situations where the kitchen forms part of a combined kitchen/lounge/dining room, the lower daylight factor of 1.5% can be applied. As can be seen in Table 12, 90% of kitchen/living room areas and bedrooms pass the BRE ADF criteria. This shows an acceptable daylight performance since the vast majority of rooms have already passed the NSL criteria. The main focus of this analysis is the one room that failed the NSL has passed the ADF analysis, as can be seen in Table 21 in the Appendix A. This means all rooms have met the BRE guidelines.

Table 11: ADF and NSL results for proposed building

Daylight Variable	Target	No. of rooms passing	No. of rooms failing	Pass Rate
NSL	0.8	58	1	98%
ADF -Bedrooms -Kitchen/Lounge	1% 1.5%	53	6	90%

The ADF value will change depending on the season, since the proposed building is shaded by existing trees. In the summer when the trees are in leaf, the ADF will be lower than in winter, however, daylight provision is more important in winter. This is because outdoor illuminances will be lower, so less light is available. The proposed building was modelled using the worst-case scenario - with existing trees that are opaque and do not have relative transparencies specified in Figure 15 in the next section. This means that the results should be slightly better in practice.

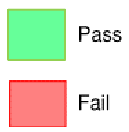


Figure 11: South-east facing façade VSC analysis

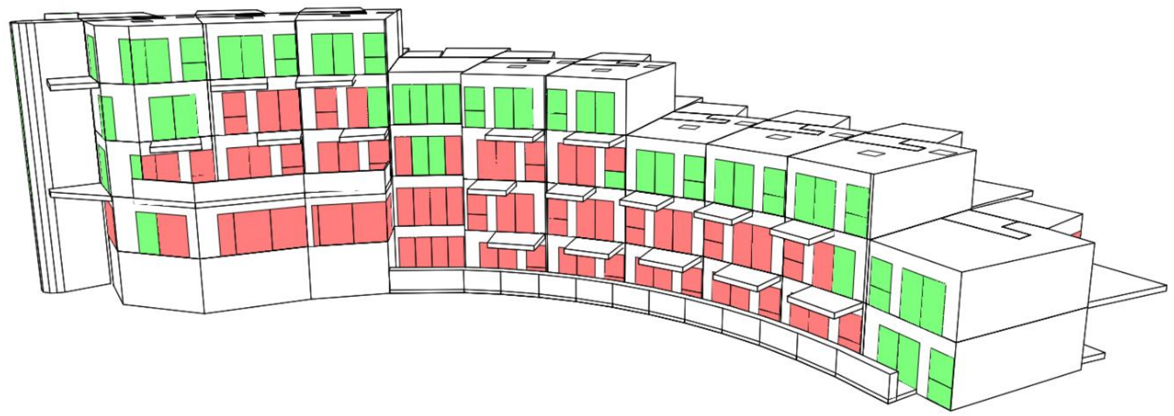


Figure 13: West-facing façade VSC analysis

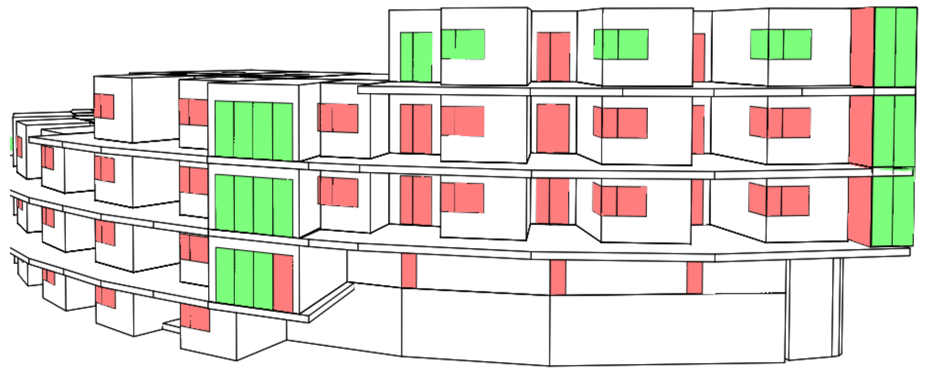


Figure 12: North-east facing façade VSC analysis

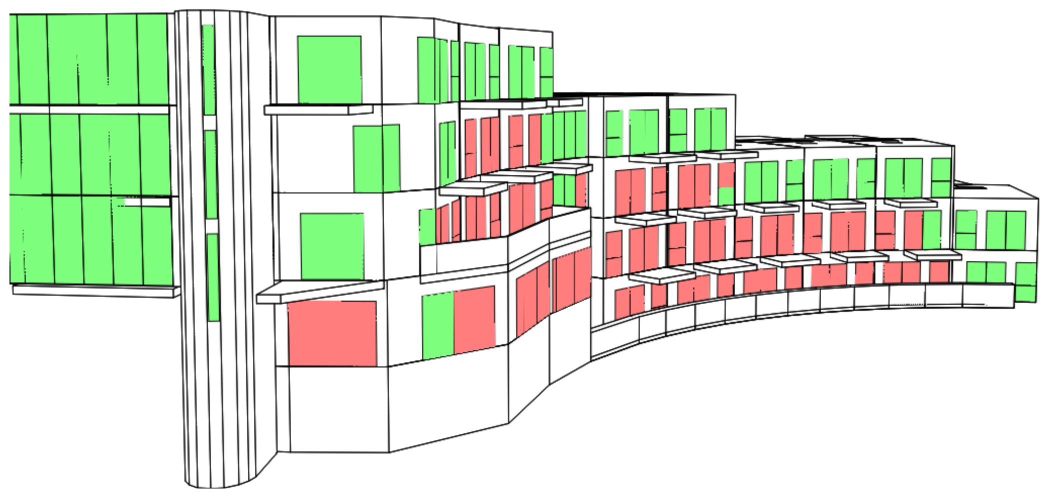


Figure 14: North-facing façade VSC analysis

9.2 Proposed Buildings Sunlight Analysis

9.2.1 Window Sunlight

To ensure that there is sufficient exposure to sunlight for the proposed development the Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) have both been tested on all the developments windows except those located on north facing facades, as these are not expected to achieve the target values.

Window sunlight is tested by assessing the percentage of annual probable sunlight hours that are received. Where possible dwellings should have at least one window to a main living space that achieves at least 25% of annual probable sunlight hours and 5% of winter probable sunlight hours. Existing trees were taken into account in this analysis and the ADF analysis above, since they are large and may block sunlight. The relative transparency is the proportion of light that passes through the tree crown. This is shown in Figure 15 below (taken from the BRE guidelines).

Table H1: Transparencies of tree crowns to solar radiation

Botanical name	Common name	Transparency (% radiation passing) Full leaf	Bare branch
Acer pseudoplatanus	Sycamore	20	60
Acer saccharinum	Silver maple	15	55
Aesculus hippocastanum	Horse chestnut	20	55
Betula pendula	European birch	20	55
Fagus sylvatica	European beech	20	45*
Fraxinus exelsior	European ash	25	65
Gleditsia	Locust	30	80
Quercus robur	English oak	20	55*
Tilia cordata	Lime	10	55

* The beech, and some oaks, tend to retain dead leaves for much of the winter, reaching bare branch condition only briefly before new leaf growth in the spring. The transparency value for beech is an average winter value.

Figure 15: Transparencies of existing trees

The worst-case scenario of completely opaque trees was used in this analysis, meaning this is inherently conservative. Results for the proposed building APSH and WPSH are summarised in Table 13, Figure 16 and Figure 17. Detailed results are shown in Table 21 in the Appendix A.

Table 13: APSH and WPSH results

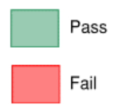
Variable	No. of rooms passing	No. of rooms failing	Pass rate
Annual Probable Sunlight Hours	16	12	57%
Winter Probable Sunlight Hours	19	9	68%

As seen in Table 13 the rooms perform better in the WPSH analysis than the APSH analysis. Figure 16 and Figure 17 show that the lower ground, ground floor and first floor do not perform as well as the second and third floor in terms of sunlight as all the living rooms on top two floors pass these criteria well. The lower floors perform worse due to overshading from existing trees and local shading from above balconies. However, since the worst-case scenario was modelled, the living rooms will perform better in practice, since the relative transparencies in Figure 15 will be taken into account.

9.2.2 Limitations of assumptions

It is generally more difficult to calculate the effects of trees on daylight and sunlight due to their irregular geometry and the proportion of light penetrating through them. This means that the trees were modelled to the heights and radiuses specified in the architectural site plan issued on 30/07/2021.

Figure 16: APSH results for living rooms



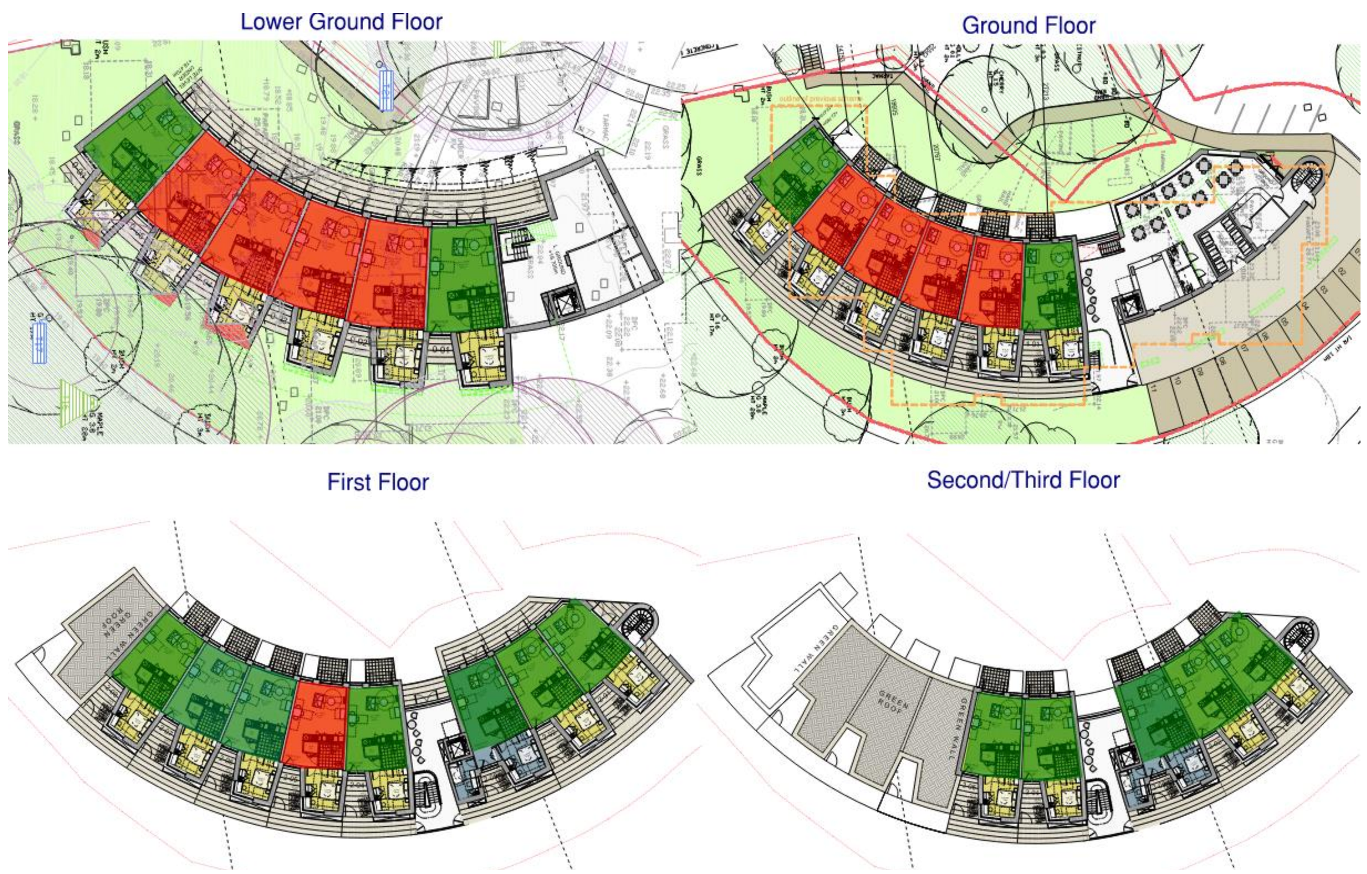


Figure 17: WPSH results for living rooms

10. CONCLUSIONS

An assessment of site layout planning for daylight and overshading has been carried out in accordance with BRE guide BR 209.

The team has sought to maximise opportunities for daylight access availability in accordance with BRE good practice guidance whilst also taking into account other site requirements and objectives. Although the guide does give numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.

The impact assessment of the proposed development on the existing buildings is within guidelines and acceptable for daylight and sunlight. This was proven through the NSL and ADF analysis where all rooms passed after more detailed methodology. A summary of the results is shown in Table 16. There is a 100% pass rate for all the existing buildings and the proposed building is also unlikely to overshade any amenity areas such as private gardens. There is likely to be a negligible daylight impact from the proposed building on the existing adjacent buildings.

Almost 70% of the windows of the proposed building failed the VSC analysis as shown in Table 17. This meant further analysis using NSL and ADF was also required. There is a good pass rate for the NSL and ADF tests, meaning the proposed building is within BRE guidelines and acceptable for daylight. This is shown in Table 14.

The building does not perform as well in terms of sunlight accessibility, as shown in Table 15. The top two floors perform well, and the first floor has an acceptable amount of sunlight in most rooms, but there are a number of rooms failing in the lower two floors. This is largely due to the heavy shading to them imposed by the balconies and local trees. It should be noted however, that these spaces perform better in winter, when sunlight is most valuable.

The buildings impact on local overshadowing has been assessed, and it can be seen that there is negligible impact on the adjacent area.

From the above it can be seen that care has been taken to consider the role of daylight and sunlight in design, and its impacts. It should be noted that NPPF paragraph 123 confirms that a flexible approach to daylight and sunlight should be adopted when assessing development impacts where development makes the most efficient use of land, and that the design has sought to balance the challenges of maximising availability to residents with the benefits inherent in the provision of 28 residential accommodation units.

Table 16: Existing building impact assessment for daylight and sunlight

Existing Building	Daylight Impact	No. Windows Affected	Sunlight Impact	No. Windows Affected
88-94 Petersham Road	Negligible	0	Negligible	0
96-102 Petersham Road	Negligible	0	Negligible	0
104-126 Petersham Road	Negligible	0	Negligible	0
Bromwich House	Negligible	0	Negligible	0

Table 17: Summary of proposed building VSC results

Results	No. of windows where BRE targets >27%	% of windows
Pass	108	32%
Fail	230	68%

Table 14: Proposed daylight results summary

Daylight Variable	Target	No. of rooms passing	No. of rooms failing	Pass Rate
NSL	0.8	58	1	98%
ADF -Bedrooms -Kitchen/Lounge	1% 1.5%	53	6	90%

Table 15: APSH and WPSH results

Variable	Pass rate
Annual Probable Sunlight Hours	57%
Winter Probable Sunlight Hours	68%

**This does not include north facing dwellings, which can be discounted from the assessment*

Appendix A

Detailed VSC, ADF and NSL, APSH and WPSH results for proposed and existing buildings.

Table 19: Daylighting impact assessment results for 88-94 Petersham Road

Window ID	VSC with proposed building	Pass/Fail (BRE Target > 27)	VSC with existing buildings (before proposed building)	Pass/Fail (BRE Target > 27)	80% of VSC value with existing buildings	Pass/Fail (BRE < 27) but VSC > 0.8
P1.1	26.61	Fail	31.24	Pass	24.992	Pass
P1.2	26.75	Fail	31.06	Pass	24.848	Pass
P1.3	26.80	Fail	31.09	Pass	24.872	Pass
P1.4	24.03	Fail	28.45	Pass	22.76	Pass
P1.5	16.08	Fail	16.14	Fail	12.912	Pass
P1.6	26.08	Fail	31.9	Pass	25.52	Pass
P1.7	25.97	Fail	31.92	Pass	25.536	Pass
P1.8	26.03	Fail	31.64	Pass	25.312	Pass
P1.9	25.95	Fail	31.66	Pass	25.328	Pass
P1.10	25.41	Fail	31.97	Pass	25.576	Fail
P1.11	25.29	Fail	32.11	Pass	25.688	Fail
P1.12	15.71	Fail	18.02	Fail	14.416	Pass
P1.13	25.07	Fail	32.23	Pass	25.784	Fail
P1.14	25.13	Fail	32.12	Pass	25.696	Fail
P1.15	25.00	Fail	32.34	Pass	25.872	Fail
P1.16	21.77	Fail	28.34	Pass	22.672	Fail
P1.17	28.58	Pass	33.04	Pass	26.432	Pass
P1.18	29.25	Pass	32.83	Pass	26.264	Pass
P1.19	29.14	Pass	32.94	Pass	26.352	Pass
P1.20	27.34	Pass	31.73	Pass	25.384	Pass
P1.21	27.89	Pass	32.67	Pass	26.136	Pass
P1.22	24.87	Fail	29.21	Pass	23.368	Pass
P1.23	18.7	Fail	18.53	Fail	14.824	Pass
P1.24	27.77	Pass	33.58	Pass	26.864	Pass
P1.25	27.80	Pass	34.12	Pass	27.296	Pass
P1.26	28.30	Pass	33.99	Pass	27.192	Pass
P1.27	27.95	Pass	33.74	Pass	26.992	Pass
P1.28	18.91	Fail	20.96	Fail	16.768	Pass
P1.29	27.65	Pass	34.3	Pass	27.44	Pass
P1.30	27.74	Pass	34.21	Pass	27.368	Pass
P1.31	27.81	Pass	34.79	Pass	27.832	Fail
P1.32	24.86	Fail	31.39	Pass	25.112	Fail
P1.33	19.78	Fail	27.1	Pass	21.68	Fail
P1.34	26.73	Fail	32.96	Pass	26.368	Pass

Table 18: Daylighting impact assessment results for 96-102 Petersham Road

Window ID	VSC with proposed building	Pass/Fail (BRE Target > 27)	VSC with existing buildings (before proposed building)	Pass/Fail (BRE Target > 27)	80% of VSC value with existing buildings	Pass/Fail (BRE < 27) but VSC > 0.8
P2.119	24.33	Fail	31.5	Pass	25.2	Fail
P2.120	24.43	Fail	31.61	Pass	25.288	Fail
P2.121	24.48	Fail	31.86	Pass	25.488	Fail
P2.122	20.95	Fail	28.58	Pass	22.864	Fail
P2.123	15.4	Fail	18.16	Fail	14.528	Pass
P2.124	24.06	Fail	30.82	Pass	24.656	Fail
P2.125	24.09	Fail	30.71	Pass	24.568	Fail
P2.126	23.85	Fail	30.29	Pass	24.232	Fail
P2.127	23.99	Fail	30.19	Pass	24.152	Fail
P2.128	23.91	Fail	29.51	Pass	23.608	Pass
P2.129	23.91	Fail	29.42	Pass	23.536	Pass
P2.130	16.64	Fail	16.24	Fail	12.992	Pass
P2.131	24.89	Fail	28.69	Pass	22.952	Pass
P2.132	24.66	Fail	28.51	Pass	22.808	Pass
P2.133	25.13	Fail	29.09	Pass	23.272	Pass
P2.134	20.92	Fail	24.89	Fail	19.912	Pass
P2.135	27.16	Pass	33.98	Pass	27.184	Fail
P2.136	27.02	Pass	34.23	Pass	27.384	Fail
P2.137	27.44	Pass	34.06	Pass	27.248	Pass
P2.138	24.93	Fail	32.38	Pass	25.904	Fail
P2.139	26.67	Fail	33.03	Pass	26.424	Pass
P2.140	23.41	Fail	30.02	Pass	24.016	Fail
P2.141	18	Fail	20.53	Fail	16.424	Pass
P2.142	26.96	Fail	33.08	Pass	26.464	Pass
P2.143	26.5	Fail	32.83	Pass	26.264	Pass
P2.144	26.91	Fail	33.87	Pass	27.096	Fail
P2.145	26.93	Fail	32.89	Pass	26.312	Pass
P2.146	20.23	Fail	20.59	Fail	16.472	Pass
P2.147	28.13	Pass	32.75	Pass	26.2	Pass
P2.148	28.51	Pass	32.55	Pass	26.04	Pass
P2.149	27.63	Pass	32.88	Pass	26.304	Pass
P2.150	25.14	Fail	29.31	Pass	23.448	Pass
P2.151	21.4	Fail	24.39	Fail	19.512	Pass
P2.152	26.01	Fail	31.43	Pass	25.144	Pass

Table 20: Detailed VSC results for proposed building

Window ID	VSC with proposed building	Pass/Fail (BRE Target > 27)
HT.85	7.33	Fail
HT.86	36.94	Pass
HT.87	37.57	Pass
HT.88	32.13	Pass
HT.89	34.56	Pass
HT.90	35.92	Pass
HT.91	35.71	Pass
HT.92	36.44	Pass
HT.93	36.17	Pass
HT.94	9.39	Fail
HT.95	39.68	Pass
HT.96	39.7	Pass
HT.97	34.46	Pass
HT.98	37.07	Pass
HT.99	39.01	Pass
HT.100	38.2	Pass
HT.101	39.28	Pass
HT.102	39.27	Pass
HT.103	26.62	Fail
HT.104	39.68	Pass
HT.105	39.69	Pass
HT.106	35.82	Pass
HT.107	38.57	Pass
HT.108	39.54	Pass
HT.109	39.1	Pass
HT.110	39.65	Pass
HT.111	39.65	Pass
HT.112	39.78	Pass
HT.113	35.31	Pass
HT.114	38.63	Pass
HT.115	39.17	Pass
HT.116	39.14	Pass
HT.117	39.05	Pass
HT.118	38.5	Pass
HT.119	39.4	Pass
HT.120	35.3	Pass
HT.121	20.65	Fail
HT.122	20.76	Fail
HT.123	39.11	Pass
HT.124	38.37	Pass
HT.125	32.05	Pass
HT.126	39.04	Pass
HT.127	39.08	Pass
HT.128	39.13	Pass
HT.129	38.53	Pass
HT.130	20.11	Fail
HT.131	21.01	Fail
HT.132	38.9	Pass
HT.133	38.94	Pass
HT.134	29.75	Pass
HT.135	39.16	Pass
HT.136	39.14	Pass
HT.137	39.44	Pass
HT.138	39.01	Pass
HT.139	31.17	Pass
HT.140	27.48	Pass
HT.141	37.11	Pass
HT.142	37.16	Pass
HT.143	29.5	Pass
HT.144	1.53	Fail
HT.145	28.19	Pass
HT.146	28.54	Pass
HT.147	28.72	Pass
HT.148	29.86	Pass
HT.149	19.38	Fail
HT.150	31.43	Pass
HT.151	34.45	Pass
HT.152	37.17	Pass
HT.153	27.51	Pass
HT.154	3.43	Fail
HT.155	3.34	Fail
HT.156	15.95	Fail
HT.157	16.41	Fail
HT.158	4.05	Fail
HT.159	23.29	Fail
HT.160	21.83	Fail
HT.161	14	Fail
HT.162	23.95	Fail
HT.163	2.19	Fail
HT.164	2.21	Fail
HT.165	13.95	Fail
HT.166	13.62	Fail
HT.167	3.65	Fail
HT.168	32.15	Pass
HT.169	25.7	Fail
HT.170	22.89	Fail
HT.171	13.13	Fail
HT.172	6.53	Fail
HT.173	6.28	Fail
HT.174	13.42	Fail
HT.175	13.12	Fail
HT.176	3.42	Fail
HT.177	22.11	Fail
HT.178	25.68	Fail
HT.179	0.74	Fail
HT.180	28.66	Pass
HT.181	34.18	Pass
HT.182	30.04	Pass
HT.183	34.3	Pass
HT.184	20.77	Fail
HT.185	18.62	Fail
HT.186	37.11	Pass
HT.187	37.92	Pass
HT.188	37.96	Pass
HT.189	38.07	Pass
HT.190	28.43	Pass
HT.191	20.08	Fail
HT.192	19.79	Fail
HT.193	14.63	Fail
HT.194	14.38	Fail
HT.195	36.32	Pass
HT.196	37.55	Pass
HT.197	37.41	Pass
HT.198	37.58	Pass
HT.199	22.87	Fail
HT.200	23.3	Fail
HT.201	22.4	Fail
HT.202	0.5	Fail
HT.203	28.85	Pass
HT.204	27.01	Pass
HT.205	28.64	Pass
HT.206	28.93	Pass
HT.207	5.54	Fail
HT.208	23.52	Fail
HT.209	19.4	Fail
HT.210	16.8	Fail
HT.211	19.98	Fail
HT.212	33.34	Pass
HT.213	28.17	Pass
HT.214	3.27	Fail
HT.215	2.97	Fail
HT.216	14.16	Fail
HT.217	14.38	Fail
HT.218	1.96	Fail
HT.219	21.49	Fail
HT.220	17.61	Fail
HT.221	12.02	Fail
HT.222	17.48	Fail
HT.223	0.34	Fail
HT.224	0.06	Fail
HT.225	6.82	Fail
HT.226	7.99	Fail
HT.227	1.68	Fail
HT.228	19.17	Fail
HT.229	17.31	Fail
HT.230	14.86	Fail
HT.231	14.49	Fail
HT.232	3.93	Fail
HT.233	3.91	Fail
HT.234	8.28	Fail
HT.235	7.21	Fail
HT.236	2.95	Fail
HT.237	6.56	Fail
HT.238	8.15	Fail
HT.239	0.45	Fail
HT.240	23.84	Fail
HT.241	27.93	Pass
HT.242	22.45	Fail
HT.243	27.21	Pass
HT.244	12.86	Fail
HT.245	11.82	Fail
HT.246	36.51	Pass
HT.247	36.83	Pass
HT.248	37.52	Pass
HT.249	36.62	Pass
HT.250	20.09	Fail
HT.251	1.57	Fail
HT.252	1.25	Fail
HT.253	4.96	Fail
HT.254	4.72	Fail
HT.255	36.06	Pass
HT.256	36.4	Pass
HT.257	37.16	Pass
HT.258	36.48	Pass
HT.259	5.74	Fail
HT.260	4.46	Fail
HT.261	5.14	Fail
HT.262	13.74	Fail
HT.263	13.91	Fail
HT.264	31.41	Pass
HT.265	34.53	Pass
HT.266	36.66	Pass
HT.267	35.46	Pass
HT.268	14.65	Fail
HT.269	20.24	Fail

HT.270	19.85	Fail
HT.271	3.47	Fail
HT.272	3.73	Fail
HT.273	24.85	Fail
HT.274	21.15	Fail
HT.275	18.74	Fail
HT.276	26.92	Fail
HT.277	2.96	Fail
HT.278	9.62	Fail
HT.279	9.74	Fail
HT.280	3.06	Fail
HT.281	3.13	Fail
HT.282	25.49	Fail
HT.283	20.29	Fail
HT.284	15.63	Fail
HT.285	24.29	Fail
HT.286	3.03	Fail
HT.287	10.75	Fail
HT.288	10.16	Fail
HT.289	27.53	Pass
HT.290	26.84	Fail
HT.291	27.57	Pass
HT.292	27.58	Pass
HT.293	7.04	Fail
HT.294	12.91	Fail
HT.295	12.67	Fail
HT.296	32.67	Pass
HT.297	34.35	Pass
HT.298	35.22	Pass
HT.299	35.75	Pass
HT.300	19.3	Fail
HT.301	7.65	Fail
HT.302	7.66	Fail
HT.303	1.67	Fail
HT.304	1.32	Fail
HT.305	26.39	Fail
HT.306	21.88	Fail
HT.307	22.94	Fail
HT.308	29.34	Pass
HT.309	1.27	Fail
HT.310	5.1	Fail
HT.311	4.71	Fail
HT.312	2.75	Fail
HT.313	2.58	Fail
HT.314	25	Fail
HT.315	20.08	Fail
HT.316	21.77	Fail

HT.317	26.17	Fail
HT.318	1.6	Fail
HT.319	8.52	Fail
HT.320	9.03	Fail
HT.321	3.66	Fail
HT.322	3.42	Fail
HT.323	22.64	Fail
HT.324	17.93	Fail
HT.325	20.3	Fail
HT.326	24.9	Fail
HT.327	2.92	Fail
HT.328	11.87	Fail
HT.329	12.18	Fail
HT.330	3.18	Fail
HT.331	3.19	Fail
HT.332	20.7	Fail
HT.333	15.89	Fail
HT.334	18.49	Fail
HT.335	21.47	Fail
HT.336	3.97	Fail
HT.337	11.99	Fail
HT.338	12.15	Fail
HT.339	2.88	Fail
HT.340	2.71	Fail
HT.341	20.08	Fail
HT.342	16.92	Fail
HT.343	14.96	Fail
HT.344	19.41	Fail
HT.345	4.06	Fail
HT.346	11.48	Fail
HT.347	11.31	Fail
HT.348	2.27	Fail
HT.349	4.18	Fail
HT.350	3.33	Fail
HT.351	18.54	Fail
HT.352	27.1	Pass
HT.353	29.18	Pass
HT.354	19.97	Fail
HT.355	19.3	Fail
HT.356	19.65	Fail
HT.357	22.22	Fail
HT.358	20.58	Fail
HT.359	20.91	Fail
HT.360	15.68	Fail
HT.361	14.15	Fail
HT.362	16.89	Fail
HT.363	13.38	Fail

HT.364	15.75	Fail
HT.365	7.43	Fail
HT.366	5.47	Fail
HT.367	28.32	Pass
HT.368	30.99	Pass
HT.369	34.61	Pass
HT.370	34.08	Pass
HT.371	7.09	Fail
HT.372	9.95	Fail
HT.373	9.72	Fail
HT.374	2.65	Fail
HT.375	3.06	Fail
HT.376	19.78	Fail
HT.377	17.89	Fail
HT.378	16.62	Fail
HT.379	16	Fail
HT.380	3.25	Fail
HT.381	10.09	Fail
HT.382	9.63	Fail
HT.383	2.82	Fail
HT.384	3.04	Fail
HT.385	18.37	Fail
HT.386	16.46	Fail
HT.387	14.17	Fail
HT.388	12.49	Fail
HT.389	3.31	Fail
HT.390	12.12	Fail
HT.391	12.39	Fail
HT.392	3.65	Fail
HT.393	3.48	Fail
HT.394	15.63	Fail
HT.395	13.87	Fail
HT.396	12.99	Fail
HT.397	11.8	Fail
HT.398	4.04	Fail
HT.399	13.4	Fail
HT.400	13.79	Fail
HT.401	3.11	Fail
HT.402	3.29	Fail
HT.403	12.93	Fail
HT.404	10.09	Fail
HT.405	10.74	Fail
HT.406	9.95	Fail
HT.407	4.23	Fail
HT.408	12.75	Fail
HT.409	12.27	Fail
HT.410	3.23	Fail

HT.411	2.87	Fail
HT.412	14.18	Fail
HT.413	9.69	Fail
HT.414	9.75	Fail
HT.415	9.14	Fail
HT.416	3.78	Fail
HT.417	12.06	Fail
HT.418	11.81	Fail
HT.419	13.8	Fail
HT.420	16.44	Fail
HT.421	12.63	Fail
HT.422	14.75	Fail

Table 21: NSL and ADF results for proposed building

Room	NSL	Pass/Fail	ADF	Pass/Fail
Flat 0-01 Bedroom	1.00	Pass	1.3	Pass
Flat 0-02 Bedroom	1.00	Pass	1.3	Pass
Flat 0-03 Bedroom	1.00	Pass	1.4	Pass
Flat 0-04 Bedroom	1.00	Pass	1.2	Pass
Flat 0-05 Bedroom	1.00	Pass	1.0	Pass
Flat 0-06 Bedroom	1.00	Pass	1.1	Pass
Flat 1-01 Bedroom	1.00	Pass	1.3	Pass
Flat 1-02 Bedroom	1.00	Pass	1.2	Pass
Flat 1-03 Bedroom	1.00	Pass	1.2	Pass
Flat 1-04 Bedroom	0.97	Pass	0.7	Fail
Flat 1-05 Bedroom	1.00	Pass	0.4	Fail
Flat 1-06 Bedroom	1.00	Pass	1.0	Pass
Flat 2-01 Bedroom	1.00	Pass	1.4	Pass
Flat 2-02 Bedroom	1.00	Pass	0.9	Fail
Flat 2-03 Bedroom 1	1.00	Pass	1.3	Pass
Flat 2-03 Bedroom 2	1.00	Pass	1.1	Pass
Flat 2-04 Bedroom	1.00	Pass	1.1	Pass
Flat 2-05 Bedroom	1.00	Pass	1.0	Pass
Flat 2-06 Bedroom	1.00	Pass	1.8	Pass
Flat 2-07 Bedroom	0.92	Pass	0.4	Fail
Flat 2-08 Bedroom	0.78	Fail	1.0	Pass
Flat 3-01 Bedroom	1.00	Pass	1.6	Pass
Flat 3-02 Bedroom	1.00	Pass	1.5	Pass
Flat 3-03 Bedroom 1	1.00	Pass	3.0	Pass
Flat 3-03 Bedroom 2	1.00	Pass	1.4	Pass
Flat 3-04 Bedroom	1.00	Pass	2.2	Pass
Flat 3-05 Bedroom	1.00	Pass	2.0	Pass
Flat 4-01 Bedroom	1.00	Pass	4.0	Pass
Flat 4-02 Bedroom	1.00	Pass	4.6	Pass
Flat 4-03 Bedroom 1	1.00	Pass	4.0	Pass
Flat 4-03 Bedroom 2	1.00	Pass	4.0	Pass

Room	NSL	Pass/Fail	ADF	Pass/Fail
Flat 0-01 Living room	0.98	Pass	1.1	Fail
Flat 0-02 Living room	0.99	Pass	1.2	Fail
Flat 0-03 Living room	0.98	Pass	1.5	Pass
Flat 0-04 Living room	0.98	Pass	1.6	Pass
Flat 0-05 Living room	0.99	Pass	1.8	Pass
Flat 0-06 Living room	0.99	Pass	2.7	Pass
Flat 1-01 Living room	0.98	Pass	1.7	Pass
Flat 1-02 Living room	0.99	Pass	1.8	Pass
Flat 1-03 Living room	0.98	Pass	1.9	Pass
Flat 1-04 Living room	0.98	Pass	2.0	Pass
Flat 1-05 Living room	0.99	Pass	2.2	Pass
Flat 1-06 Living room	1.00	Pass	3.1	Pass
Flat 2-01 Living room	0.99	Pass	4.0	Pass
Flat 2-02 Living room	0.87	Pass	1.7	Pass
Flat 2-03 Living room	0.99	Pass	1.7	Pass
Flat 2-04 Living room	0.98	Pass	2.1	Pass
Flat 2-05 Living room	0.99	Pass	2.0	Pass
Flat 2-06 Living room	1.00	Pass	5.2	Pass
Flat 2-07 Living room	1.00	Pass	5.0	Pass
Flat 2-08 Living room	1.00	Pass	5.5	Pass
Flat 3-01 Living room	0.99	Pass	3.7	Pass
Flat 3-02 Living room	0.98	Pass	1.8	Pass
Flat 3-03 Living room	0.99	Pass	2.1	Pass
Flat 3-04 Living room	1.00	Pass	5.8	Pass
Flat 3-05 Living room	1.00	Pass	5.8	Pass
Flat 4-01 Living room	1.00	Pass	8.5	Pass
Flat 4-02 Living room	1.00	Pass	5.8	Pass
Flat 4-03 Living room	1.00	Pass	5.8	Pass

Table 22: APSH and WPSH values

Living room	Highest APSH	Annual Result pass/fail	Highest WPSH	Winter result pass/fail
0-01	15.12	Fail	5.77	Pass
0-02	2.41	Fail	1.48	Fail
0-03	4.84	Fail	3.54	Fail
0-04	4.72	Fail	4.31	Fail
0-05	3.79	Fail	3.72	Fail
0-06	13.57	Fail	8.05	Pass
1-01	25.89	Pass	11.13	Pass
1-02	5.56	Fail	3.18	Fail
1-03	6.11	Fail	4.39	Fail
1-04	4.56	Fail	4.17	Fail
1-05	3.54	Fail	2.38	Fail
1-06	23.22	Fail	6.34	Pass
2-01	30.15	Pass	10.42	Pass
2-02	30.28	Pass	10.41	Pass
2-03	28.12	Pass	15.61	Pass
2-04	32.91	Pass	14.34	Pass
2-05	5.91	Fail	3.44	Fail
2-06	74.11	Pass	24.41	Pass
2-07	75.02	Pass	23.32	Pass
2-08	73.92	Pass	27.98	Pass
3-01	53.23	Pass	16.36	Pass
3-02	38.24	Pass	15.7	Pass
3-03	51.54	Pass	20.9	Pass
3-04	87.23	Pass	32.27	Pass
3-05	85.38	Pass	31.2	Pass
4-01	95.83	Pass	34.55	Pass
4-02	96.38	Pass	34.69	Pass
4-03	95.17	Pass	34.9	Pass