147 Highgate Road

Daylight and Sunlight Impact Report

Daylight and Sunlight Impact Report
Mar 2023

Revision Schedule

Daylight and Sunlight statement
Mar 2023

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	Mar 2023	Final	P Giesberg	S. Bamford	P Giesberg

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1 Introduction

It is proposed to carry out a vertical extension and remodel an existing building to provide for additional residential space above a retail function on the ground floor. This report was prepared to support the determination of the application for prior approval for the proposed development.

Site and development

The proposed development is situated on the land of the properties at 147 Highgate Road in London (Fig. 1).

Figure 1. Site Location overview

The application site is in a densely built-up urban area. Adjacent to the proposed development are a number of buildings that have residential use. All buildings are very closely situated as is typical for this kind of urban layout. This means that access to daylight is restricted for most spaces.

The proposed development currently comprises a ground floor and first floor. It is proposed to add an additional two floors on the top of the building, increasing the height in line with the properties directly adjacent.

2 Methodology and assessment criteria

2.1 General Permitted Development (England) Order 2015

Attainment of adequate natural light in habitable rooms, is a condition of the change of Dwellinghouses (Use Class C3) under the General Permitted Development (England) Order 2015 (GPDO 2015). The GDPO 2015 defines habitable rooms as any rooms used or intended to be used for sleeping or living which are not solely used for cooking purposes, but does not include bath or toilet facilities, service rooms, corridors, laundry rooms, hallways or utility rooms.

In addition to the internal daylight requirements, the nature of the extension means that there is potential that neighbouring properties would be adversely affected in terms of the daylight and sunlight that these properties enjoy.

2.2 Input data

Drawings of the proposed development and the neighbouring properties were made available by the architect. A site survey was carried out to confirm the location and size of windows in neighbouring properties.

Drawings of the baseline and proposed development are shown in Appendix 3 and 4.

2.3 Effects on existing buildings

The effects of the proposed buildings on the availability of daylight on the existing buildings have been considered. The appraisal has been carried out using the methodology set out by Paul Littlefair and co-authors in BR209 "*Site layout planning for daylight and sunlight: a guide to good practice*" (2022) (BRE Trust)

Diffuse light from the sky

It is important to safeguard the daylight that is available for nearby buildings in living rooms, kitchens and bedrooms. The Vertical Sky Component (VSC) is a measure of available daylight on a particular surface or window. The guidelines in the BRE209 document state that where a window has a VSC of 27 % or more daylighting is unlikely to be affected. In cases where the VSC is less than 27%, it is unlikely that a change in daylighting will be noticeable if a reduction in VSC is not less than 0.8 times the original value. Where information about internal layout is available a further test is the reduction in the area with a view of the sky is not more than 20%.

Where a room has more than 1 window the average weighted VSC should be used.

The VSC has been determined using the MBS Waltham module for SketchUp.

Sunlight Availability

If a living room of an existing dwelling has a window facing with 90 degrees of due south and any part of a new development subtends an angle of more than 25 degrees to the horizontal measured from the centre of the window in a vertical section perpendicular to the window then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window meets all of the following three criteria:

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

The APSH has been determined using the MBS Sunlight Exposure module for SketchUp.

Alternative targets

The BRE guidance document recognises that the numerical values provided are not always appropriate different targets may be used based on special requirements of the proposed development or its location. There are a number of examples provided where deviations of the numeral values are appropriate and suggestions to determine alternatives are described.

One of these examples relates to cases where an existing building has windows that are unusually close to the site boundary and taking more than their fair share of light. In these cases, it is suggested that a target is set by using a “mirror-image” of the building of the same height and size, an equal distance away on the other side of the boundary.

2.4 Effects on proposed development

Daylight Provision Calculations

BS EN 17037:2018+A1:2021 recognises two methods to assess daylight provision to the interior. Both should be determine using specific software.

Method 1: Calculation method using daylight factors on the reference plane
Method 2 Calculation method of illuminance levels on the reference plane using climatic data for the given site and an adequate time step.

The central requirement of the standard is set out in table 1 below.

Table 1: Recommendations of daylight provision by daylight openings in vertical and inclined surface.

Level of recommendation for vertical and inclined daylight opening	Target illuminance E_T lx	Fraction of space for target level $F_{plane,\%}$	Minimum target illuminance E_{TM} lx	Fraction of space for minimum target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	50 %	100	95 %	50 %
Medium	500	50 %	300	95 %	50 %
High	750	50 %	500	95 %	50 %
NOTE Table A.3 gives target daylight factor (D_T) and minimum target daylight factor (D_{TM}) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities.					

Using method 2 will directly provide these values. The daylight factor is a measure of the amount of daylight relative to the external daylight available. When using method 1, the requirement for the daylight factor will vary with the geographical location of the development site. So, for instance to achieve a target of 300 Lux in Athens a Daylight Factor of 1.5% is required, whereas the same 300 Lux target would require a Daylight Factor of 2.6 in Reykjavik, Iceland.

There are some specific recommendations for dwellings in the UK. These are set out in the UK National Annex to the standard. The UK committee on BS EN 17037: 2018 believes that the recommendations as stated in the table 1 are not always achievable in all rooms of a dwelling. This could be the case for instance for rooms in basements, dwellings in dense urban areas or where existing buildings are being converted into dwellings.

The UK National Annex gives guidance on minimum daylight provision in all UK dwellings. The recommendations are 100 lux for bedrooms, 150 lux for living rooms and 200 lux for kitchens to be achieved in 50% of the time that daylight is available for 50 % of the assessment grid. The recommendations for 95% of the assessment grid do not apply for to dwellings in the UK.

Building parameters

The analysis that is described in this report was carried out using the Radiance module of the MBS daylight software for SketchUp. For this study the Annual Dynamic analysis was used, which is a Climate Based Daylight Modelling approach.

The daylight in a room is determined by a wide range of factors. These factors can be external, such as nearby objects that provide both blocking of daylight and reflections. Other factors are internal and include size and

shape of rooms as well as the light reflecting characteristics of walls, ceilings and floors. Finally, the light transmittance of the glazing is a determinant of the daylight levels in a building.

BRE209 provides guidance on the transmittance values of glazing as well as the light reflectance of internal and external surfaces.

It is assumed that standard double glazed window panes remain in place (light transmittance value of 0.68). A maintenance factor for windows in an urban area, without overhand was applied to the transmittance value (0.92) as is a correction factor for window frames (0.6 for windows and 0.7 for fully glazed doors).

For the light reflectance of the internal surfaces values consistent with a modern interior in a inner city location were used: interior walls, 0.8, ceilings, 0.8, floors 0.4. External surfaces were assumed to have a reflectance value of 0.2.

The available daylight hours were considered over the year for the full day.

As recommended in the BRE209 guidance document, a Area of Interest was defined as the internal room space offset by 30 cm from the inside of the walls. The working plane was set at 0.85m and the distance between points in the assessment grid was 0.25m.

Sunlight availability

People appreciate having sunlight in their homes. In housing the main requirement for sunlight is in living rooms. Site layout is the most important factor affecting the duration of sunlight in buildings and is divided into two main issues: orientation and overshadowing.

Where possible buildings should be designed so that at least one main window wall faces within 90 degrees of due south and a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March.

2.5 Daylight, Sunlight and the London Plan

The London Plan requires new development to be sensitive with the impact on neighbouring properties with regards to daylight and sunlight. It also requires new homes to achieve good levels of lighting. For this it refers to the BRE guidance document.

It does however warn against rigidly implementing the numerical values in all cases. For daylight in the new spaces it states:

"Quantitative standards on daylight and sunlight should not be applied rigidly, without carefully considering the location and context and standards experienced in broadly comparable housing typologies in London."

With regards to the impact on existing properties it states that new development should

"…avoid causing 'unacceptable harm' to the amenity of surrounding land and buildings, particularly in relation to privacy and overshadowing and where tall buildings are proposed. An appropriate degree of flexibility needs to be applied when using BRE guidelines to assess the daylight and sunlight impacts of new development"

2.6 Scope of assessment

This purpose of this report is to demonstrate compliance with the UK wide accepted guidance criteria on daylight and sunlight. For this reason, not all windows and rooms have been analysed. Where room layout are identical on various floors only the lowest floor where compliance was demonstrated was analysed and reported here. Similarly with neighbouring windows: if a window is shown to comply than windows further away or on higher floors will also comply and no further analysis is needed.

The guidelines mainly address daylight impact on neighbouring residential properties, although it also states that certain non-domestic buildings can have a reasonable expectation of good levels of daylight. These buildings may include schools, hospitals, hotels and hostels, small workshop and some offices.

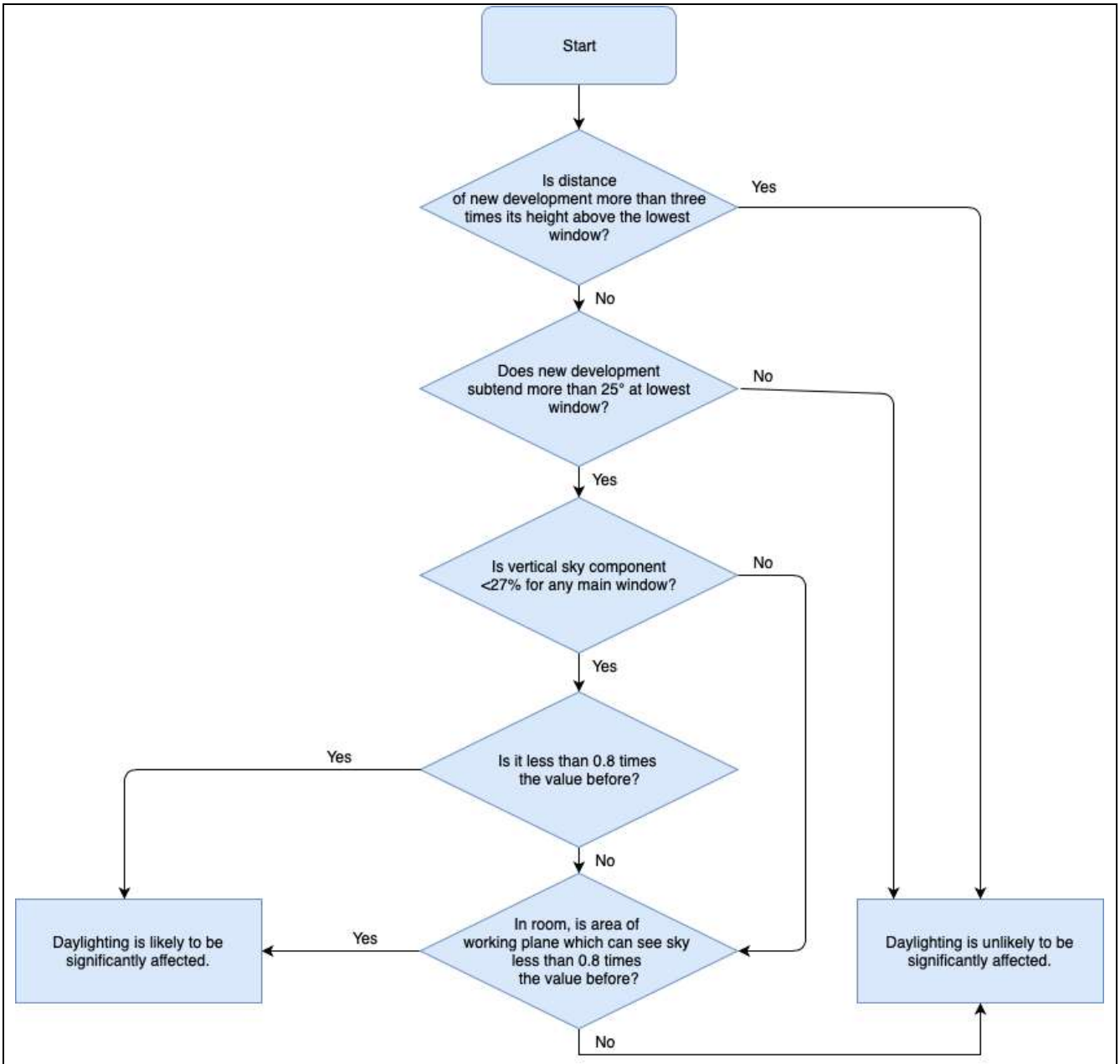


Figure 2. Decision chart daylight in existing buildings.

Appendix 1 provides an overview of the windows to habitable rooms within the proposed development and the numbering used to refer to these windows throughout this report.

3 Results

3.1 Vertical Sky Component Neighbouring Properties

There are a number of windows around the proposed development that are potentially affected by the proposed development regarding daylight. The windows are shown in Appendix 1 and the results with regards to Vertical Sky Component are shown in table 2.

Table 2. VSC on windows in neighbouring properties

Window	Habitable Room	V. S. C.	existing	%	Standard test
1	Yes	33.26	26.93	0.81	Pass
2	No	22.33	5.98	0.27	N/A
3	Yes	27.16	8.50	0.31	No
4	Yes	31.71	31.02	0.98	Pass
6	No	20.89	17.21	0.82	Pass
7	No	31.18	25.51	0.82	Pass
8	Yes	29.09	28.60	0.98	Pass
9	Yes	17.02	15.63	0.92	Pass
11	Yes	24.31	21.01	0.86	Pass
12	Yes	14.01	11.37	0.81	Pass
13	Yes	17.15	13.68	0.80	Pass

Windows 2 and 3 are affected when considering the standard test parameters (VSC below 27 and reduction more than 20%). Window 2 serves a bathroom and is therefore not considered. Window 3 is to a bedroom. When considering the alternative test that takes into account whether the building of the affected windows is itself a good neighbour the reduction would be acceptable. The standard test under these circumstances is to create a baseline that is derived by mirroring the affected building and determine the VSC that it would provide to itself. As the building is right up on the boundary, the building would block its own light completely. Clearly the proposed design of the extension at 147 Highgate Road, does leave space between the boundary and the neighbouring building to allow access to daylight. The windows would therefore comply with this alternative test.

3.2 Sunlight on Windows

The main windows to living rooms of the surrounding properties are all located to the front façade of the respective buildings and are not affected by the proposed development.

3.3 Daylight in Proposed Development

Appendix 2 shows the daylight distribution in each of the rooms that were analysed for this report. The threshold was set appropriate to each proposed use of the room: for bedrooms 100 Lux 50% of the time, living rooms and dining rooms 150 Lux and for combined kitchen, living and dining rooms it was set at 200 Lux. The results are shown in table 3.

Table 3. Daylight Target in Rooms in Proposed Development

Room	Target	>50	Compliant
Flat 1 Bedroom 1	100	100%	Yes
Flat 1 Bedroom 2	100	97%	Yes
Flat 1 KLD	200	79%	Yes
Flat 2 Bedroom 1	100	100%	Yes
Flat 2 KLD	200	65%	Yes
Flat 2 Bedroom 2	100	100%	Yes

(KLD means Kitchen Living Dining Room)

3.4 Discussion and conclusion

A daylight and sunlight assessment was carried out. Both the effects of the proposed development on neighbouring properties and the exposure of the proposed development itself to daylight were analysed

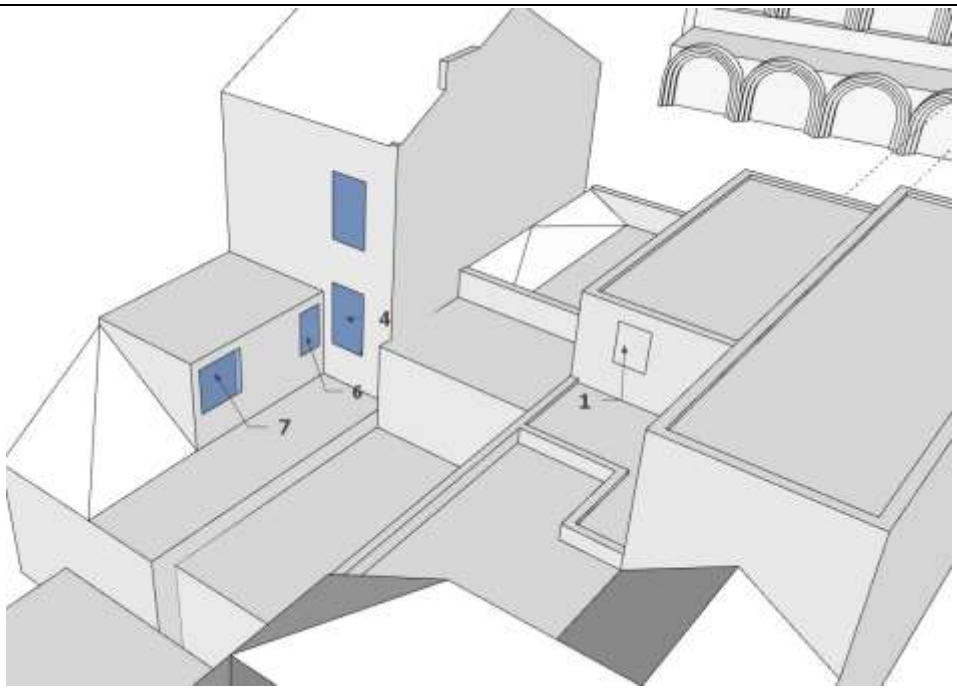
11 windows were identified as potentially being affected by the vertical extension towards the rear of the building. Of these windows 2 windows showed non-compliance with the standard guidance values in the BRE guidelines. These windows were to the rear of the proposed development at first floor level. One of these windows was identified as a bathroom and therefore a non-habitable room and the other was a identified as a bedroom.

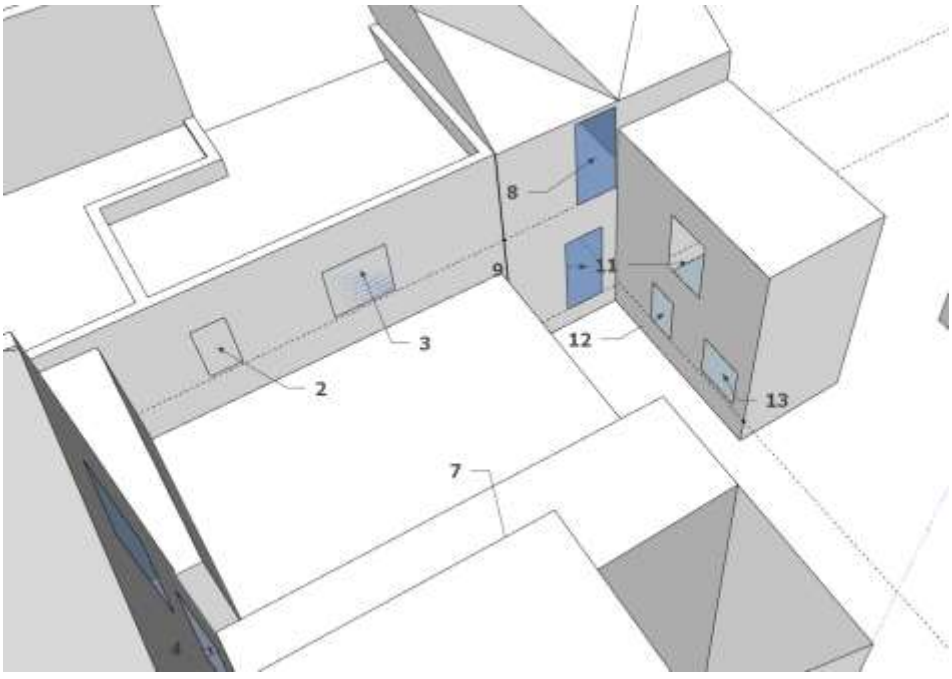
Both the BRE guidelines and the London Plan urge flexibility in certain circumstances. In densely built-up areas in inner city areas, the general layout provides for great restrictions on the available daylight and sunlight. This would apply in this case. The BRE guidance gives some examples of determining alternative target values. One of those is considering whether the affected building itself is a good neighbour and stands a reasonable distance away from the boundary. That is not the case in this situation. When considering the effect on a mirror-image of the affected building, the windows would be completely blocked. Therefore, any access to light is better than the mirror-image would produce. In addition to this, bedrooms are less sensitive to the availability than for instance a living room would be.

The daylight levels in the rooms within the proposed development are all well above the minimum requirements that are set out in BS EN 17037:2018+A1:2021.

Overall, it is concluded that the proposed development is consistent with the BRE guideline published in "*Site layout planning for daylight and sunlight: a guide to good practice*" (2022) (BRE Trust).

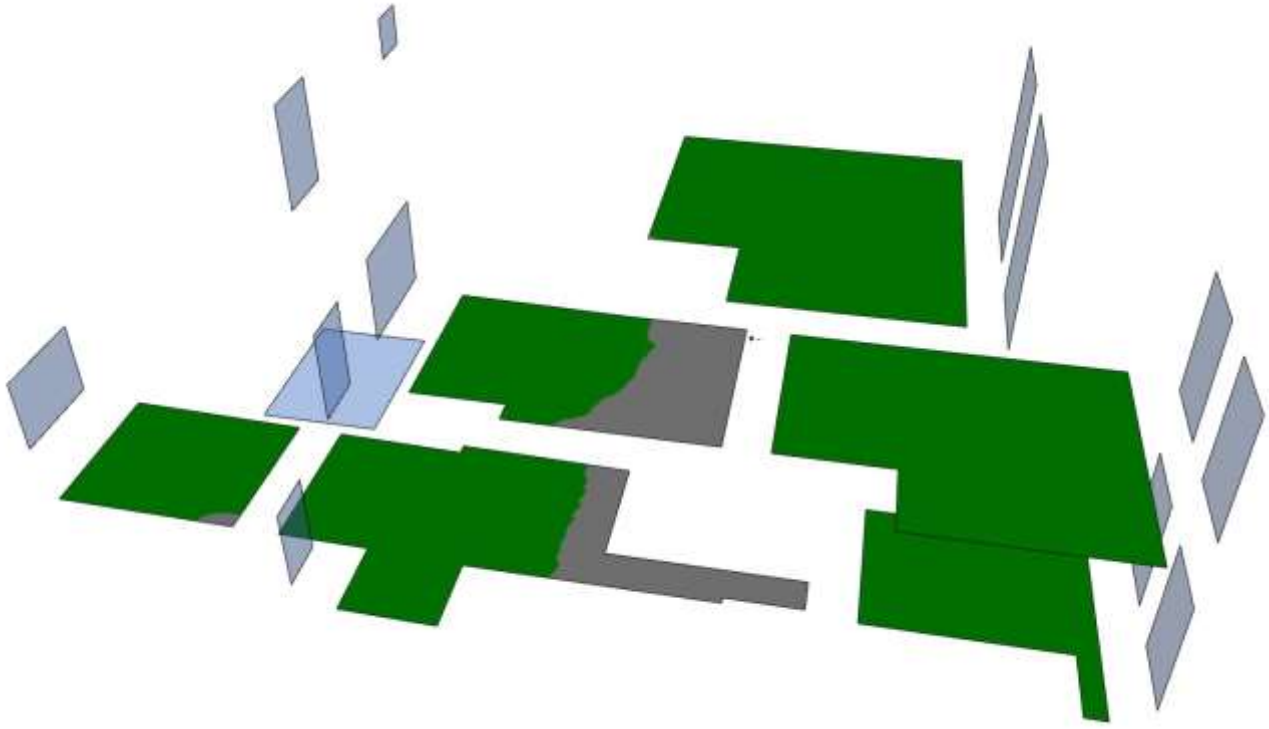
Appendix 1 Window Labelling



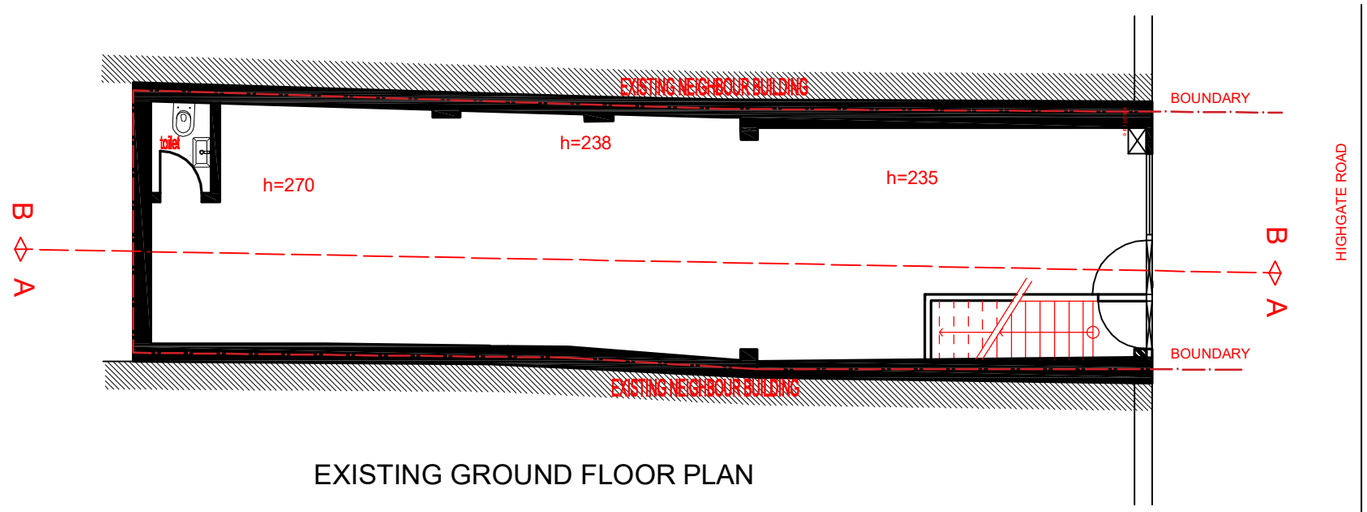


Windows to the rear of 147 Highgate Road

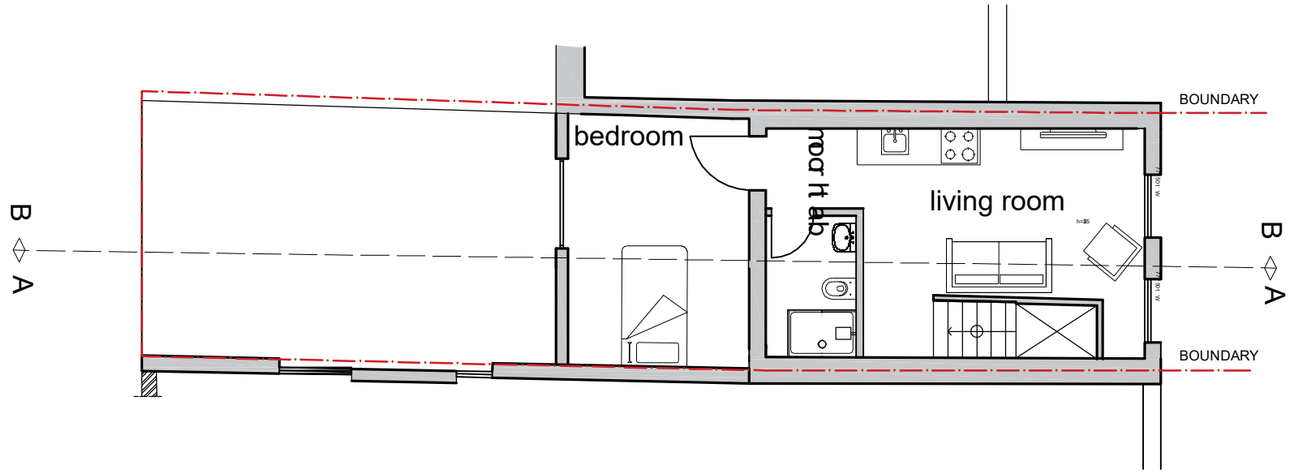
Appendix 2 Daylight Graphs



Appendix 3 Floor Plans Existing Building



EXISTING GROUND FLOOR PLAN



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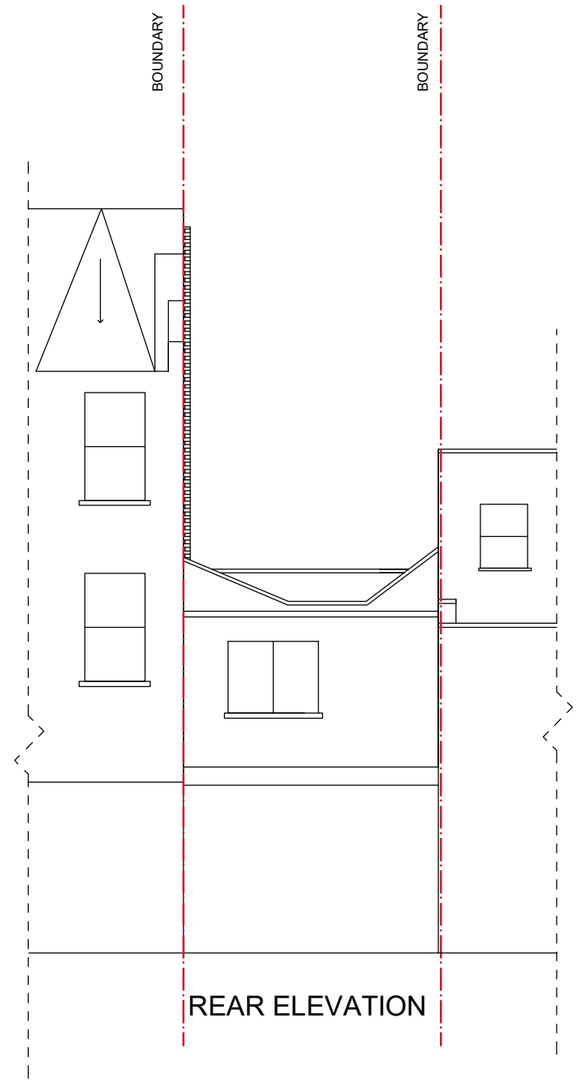
EXISTING FRONT ELEVATION



REAR ELEVATION

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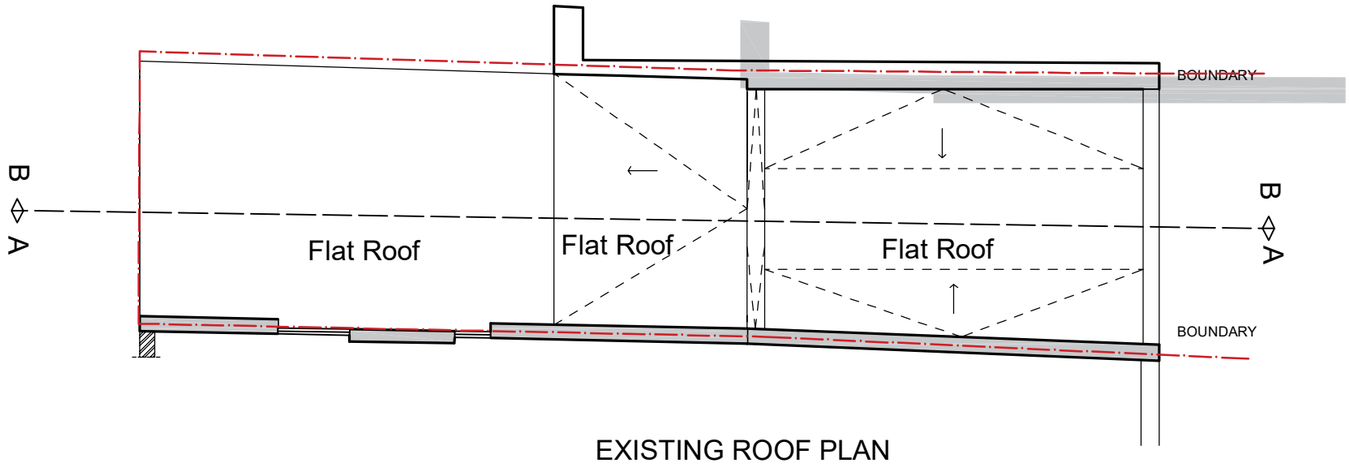

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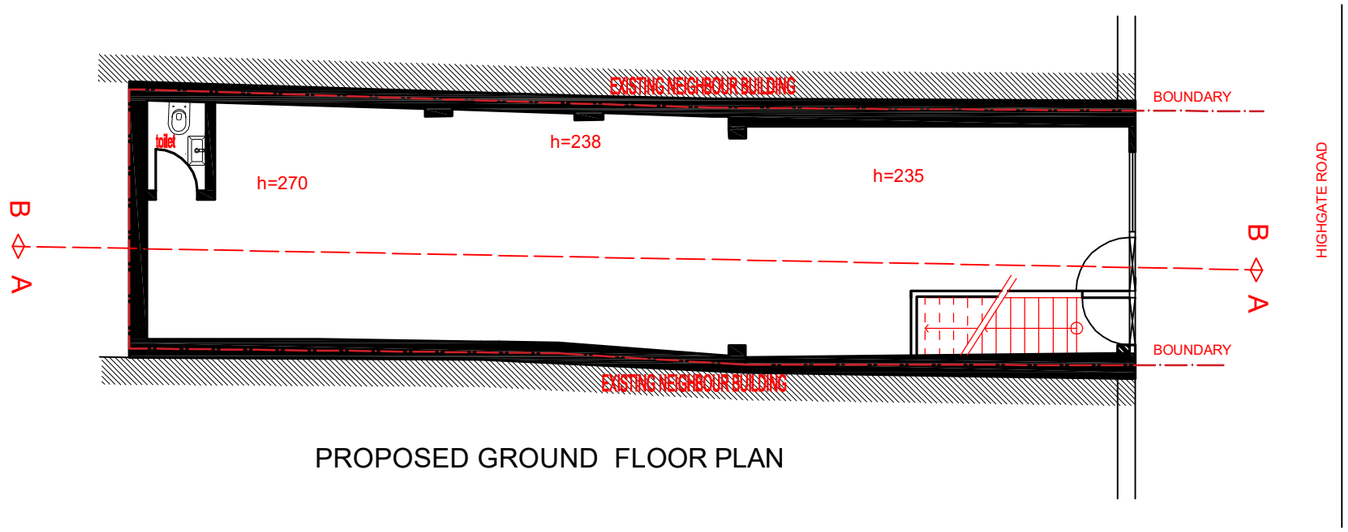
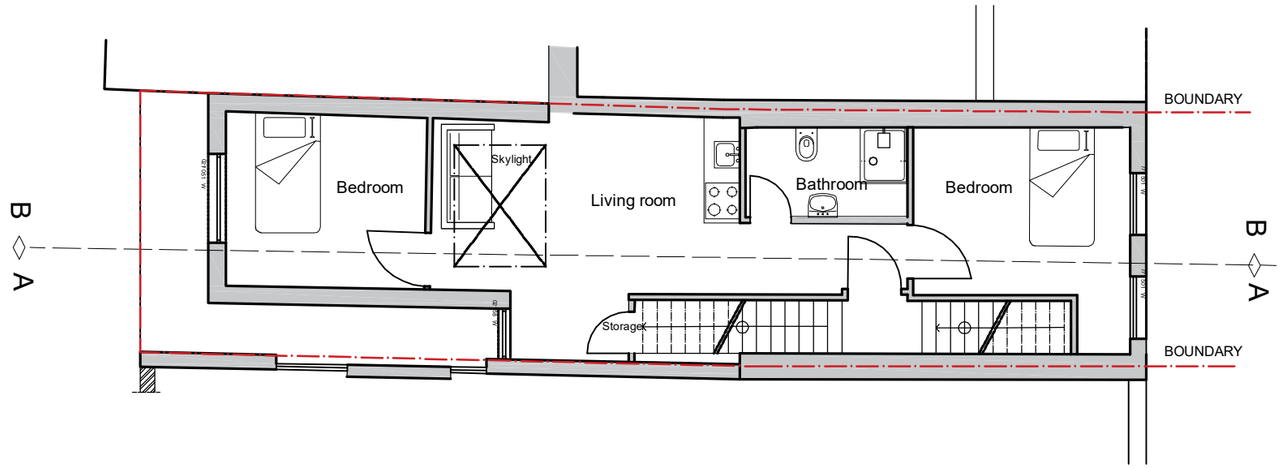
Appendix 4 Floor Plans Proposed Development



PROPOSED GROUND FLOOR PLAN



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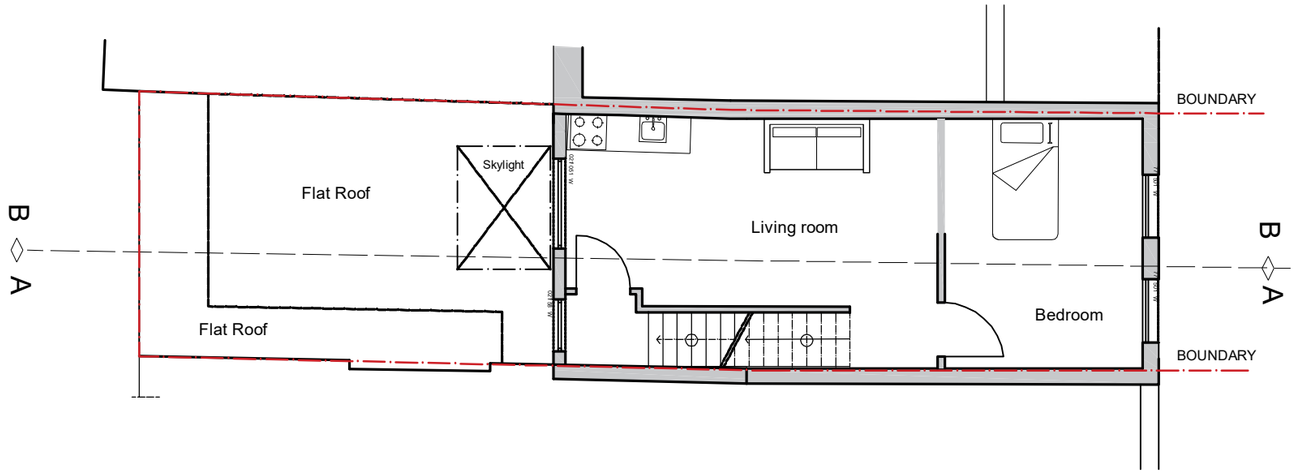

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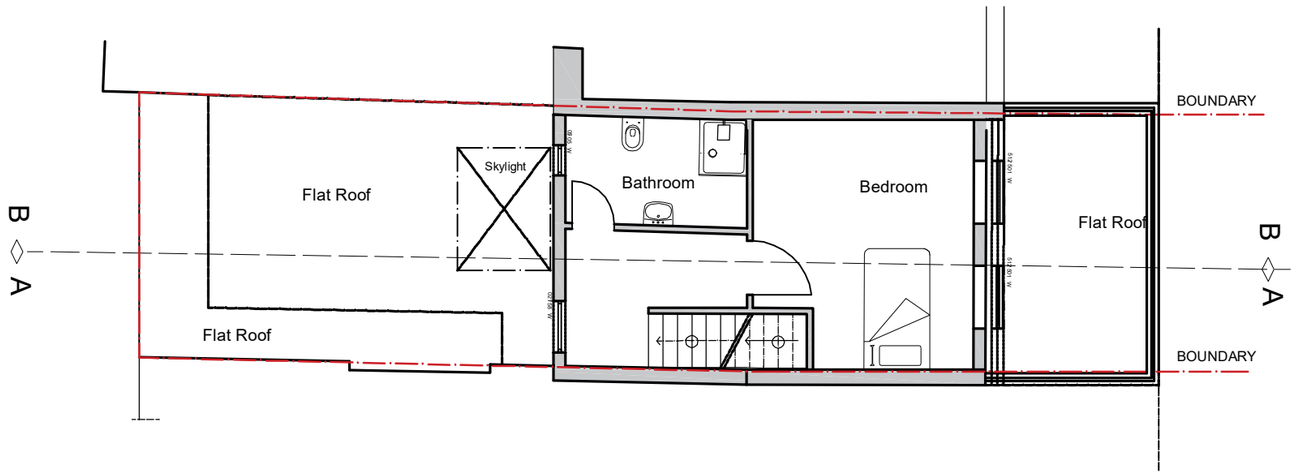

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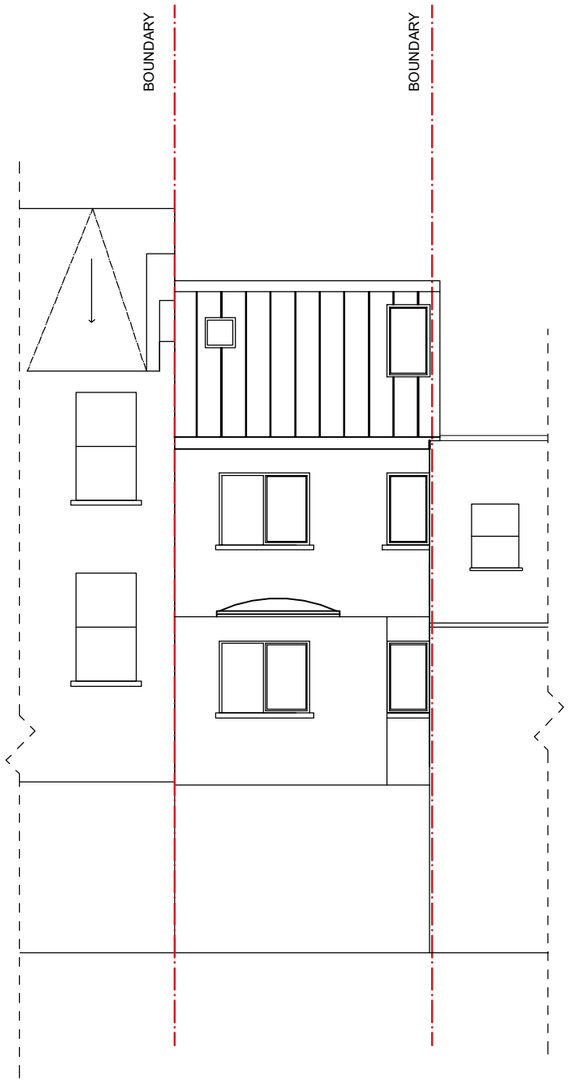
PROPOSED FRONT ELEVATION



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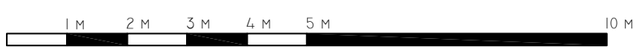

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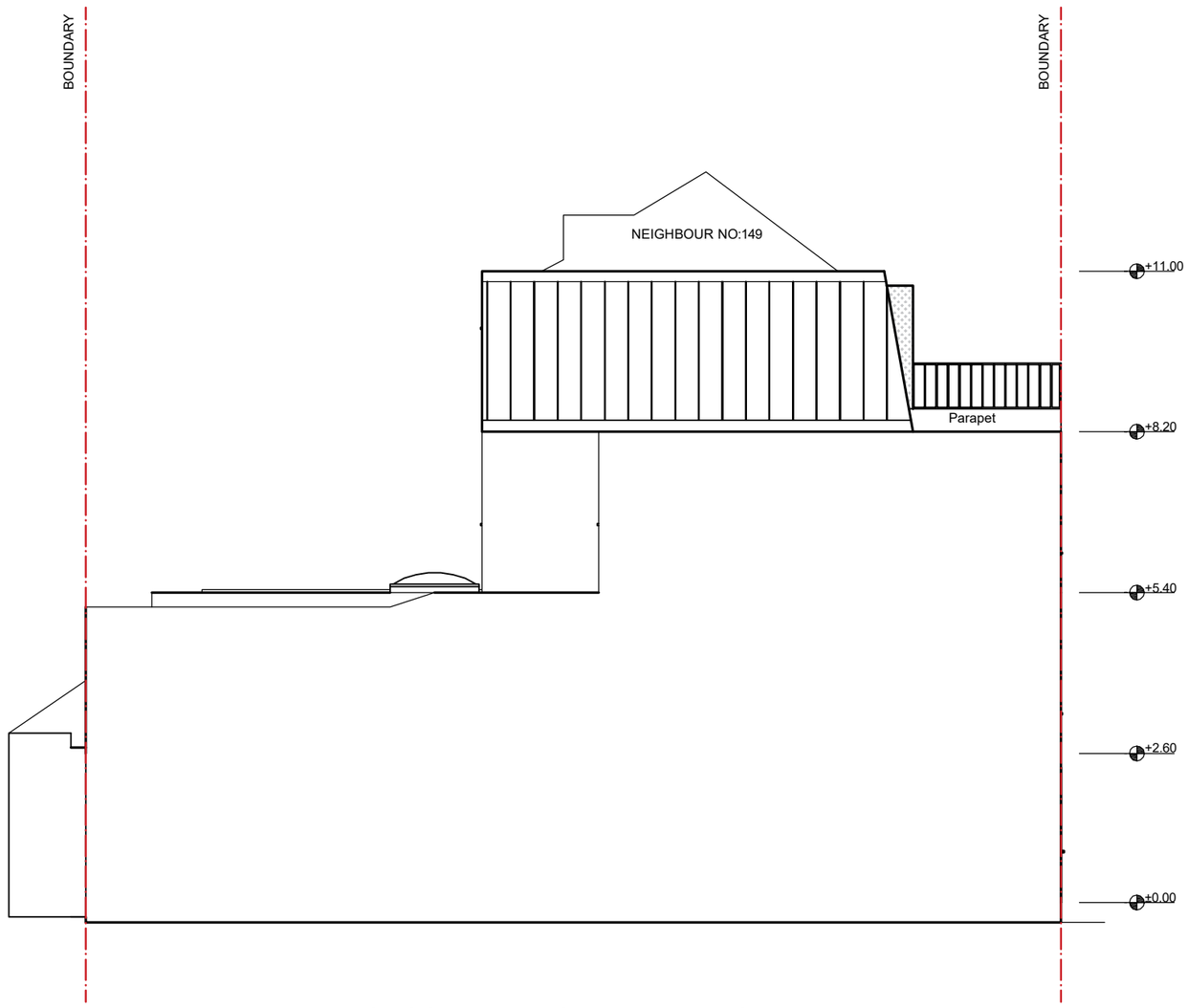

PROPOSED LEFT SIDE ELEVATION

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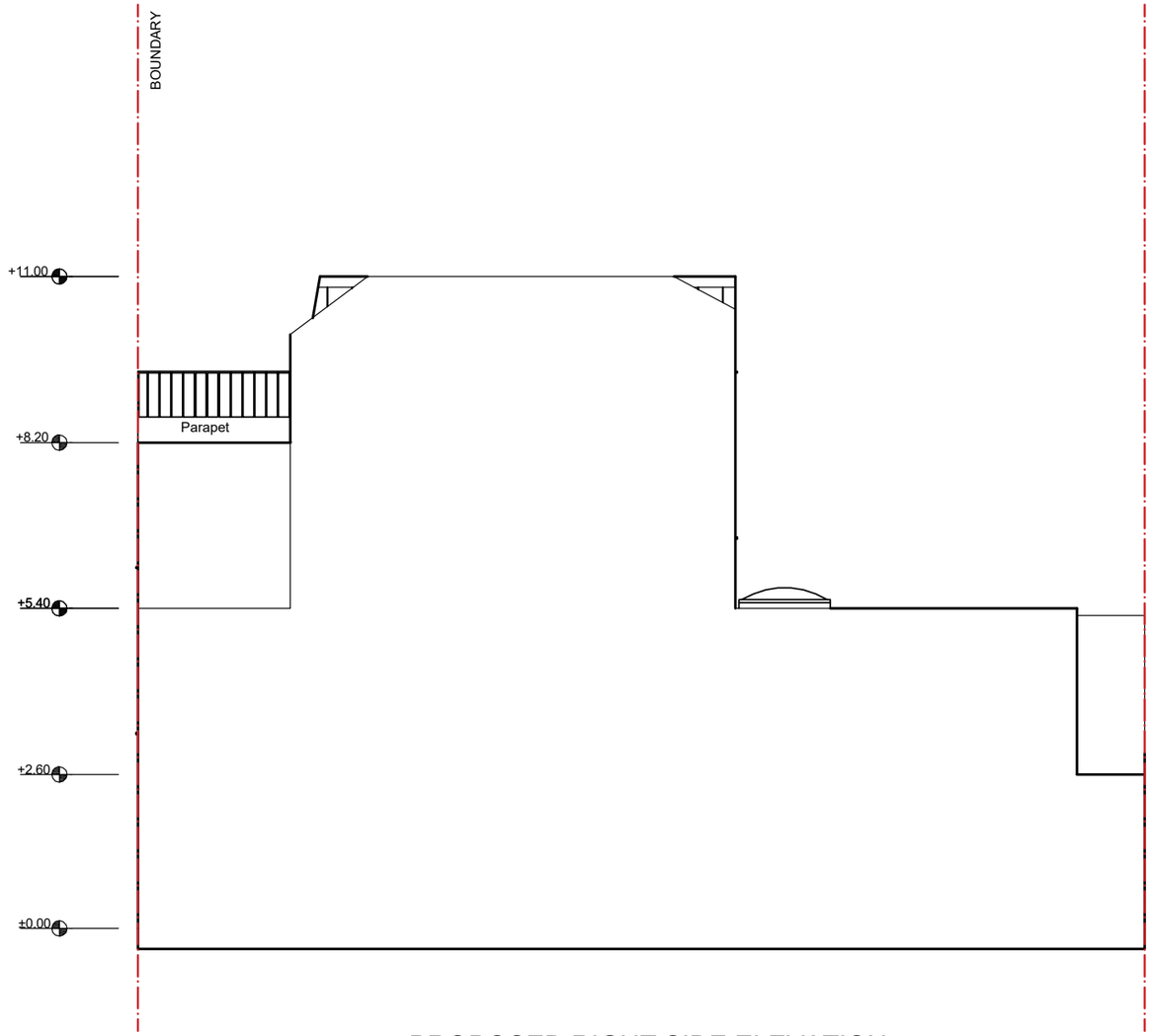

PROPOSED RIGHT SIDE ELEVATION

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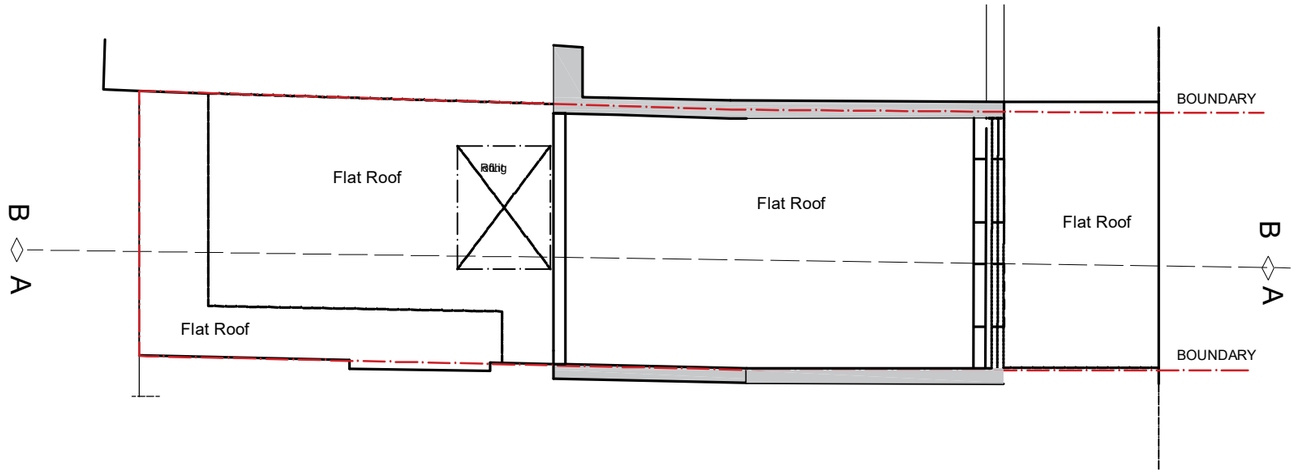

PROPOSED ROOF PLAN

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