

Daylight, Sunlight and Overshadowing Report

JDT Properties

FOR THE SITE AT:
166 Leatherhead Road
Chessington
KT9 2HU

Royal Borough of Kingston upon Thames



Version	Revision	Date	Author	Reviewer	Project Manager
1	A	01.03.2024	Nikolaos Protogeros	Alisha Pinheiro	Alaister Coffey

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SRE Registered Office
3 London Square | Cross Lanes
Guildford | Surrey | GU1 1UJ
01730 710044
info@sre.co.uk
www.sre.co.uk

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Executive Summary

Executive Summary

The Daylight, Sunlight & Overshadowing Report has been undertaken by SRE for the Proposed Development at 166-168 Leatherhead Road in Chessington, London on behalf of JDT Properties (the Client).

The assessments ascertain the potential impact of the Proposed Development on the surrounding buildings and all calculations follow the Building Research Establishment (BRE) guidance of "Site Layout Planning for Daylight and Sunlight" from PJ Littlefair 2022.

The Vertical Sky Component (VSC), Average Daylight Factor (ADF), Average Probable Sunlight Hours (APSH) and Overshadowing have each been calculated for all applicable windows and open spaces of the neighbouring buildings.

The daylight VSC and ADF results indicate that all of the above assessed windows and rooms in the surrounding properties will receive adequate daylight levels without any significant daylight reduction noticeable from the occupants. All of the assessed windows and rooms are compliant with the VSC and ADF BRE criteria, and therefore this impact is not deemed to be significant.

The results of the sunlight assessment (annual and winter APSH) indicates that all of the assessed windows in the surrounding properties will receive adequate sunlight levels. The assessed windows either meet the BRE APSH criteria or have a retained annual and winter APSH higher than 25% and 5%, respectively, with assessed windows facing north excluded from the APSH calculations¹. Therefore, it can be concluded none of the adjoining occupants will experience noticeable reductions in sunlight from the construction of the Proposed Development.

Regarding overshadowing, only 1no. out of the 4no. assessed surrounding garden spaces will have a minor impact. As this garden space is already heavily shaded from trees this impact is not deemed to be significant.

On balance, due to the orientation, size and proportions of the new buildings, it can be concluded that the impact of the Proposed Development on the surrounding properties is small and, in most cases, in accordance with the guidelines. None of the adjoining occupants will experience noticeable reductions in daylight or sunlight from the construction of the Proposed Development, and therefore the proposal is considered acceptable.

¹ Any windows that do not face within 90 degrees of due south can be ignored. Paul J Littlefair, BRE, 2022

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Introduction

1.0 Introduction

The Daylight, Sunlight and Overshadowing Report has been prepared by SRE at 166 Leatherhead Road in Chessington, London on behalf of JDT Properties (the Client).

The report assesses the daylight, sunlight and overshadowing effect of the Proposed Development on the surrounding buildings. The assessment is undertaken in accordance with "BRE guidance: Site Layout Planning for Daylight and Sunlight" from PJ Littlefair 2022.

The assessment and the 3-Dimensional (3D) models are based on a topographical survey, and drawings for the existing buildings and the Proposed Development provided by PMV Planning Ltd, Matthew Allchurch Architects, Royal Borough of Kingston upon Thames's planning portal and a detailed desktop study.

The assessment has been conducted using the Ladybug/Honeybee plugins for Rhino 7/Grasshopper, Radiance 5.4 and SketchUp Make 2017 software.

1.1 Measurement and Criteria for Daylight and Sunlight

The Building Research Establishment (BRE) handbook provides 3 no. methods of calculating daylight, 1 no. method in relation to daylight/sunlight impact on surrounding properties, and 1 no. overshadowing test in connection with open spaces.

The 3 no. methods for calculating daylight are as follows:

- **Vertical Sky Component (VSC).** The amount of daylight accessible to each window within the surrounding buildings are assessed against the VSC criterion, which quantifies the diffuse daylight received from the sky.
- **No Sky Line (NSL).** The habitable rooms of the residential surrounding buildings are assessed against the NSL to estimate the percentage of the working plane that receives no direct skylight. This criterion quantifies the distribution of daylight in the room.
- **Average Daylight Factor (ADF).** The habitable rooms of the residential surrounding buildings are assessed against the ADF criterion, which quantifies the level of daylight received in a room, taking into account the colours (reflectance) of the walls, floors and ceilings. This measure is widely recognised in Building Research Establishment Environmental Assessment Method (BREEAM) and Home Quality Mark (HQM) methodologies.

The method for calculating the sunlight impact on surrounding properties is:

- **Annual Probable Sunlight Hours (APSH).** The amount of direct sunlight accessible to each window within the surrounding buildings are assessed against the APSH criterion, which quantifies light that falls directly from the sun on a façade.

The method for calculating overshadowing in gardens and open spaces is:

- Access to sunlight for the external courtyards and open spaces has been assessed by calculating the amount of time that the spaces are overshadowed on 21st March.

1.2 The Application Site and Proposed Development

The Proposed Development located on 166 Leatherhead Road consists of 6 no. 3 bed 6 person (3B6P) houses and 1 no. 3B6P bungalow.

The Proposed Development is constrained to the properties outlined in Table 1.

Direction	Address Name	Address No.
South	Leatherhead Rd	170
		172
		174
		176
Southwest	Kelsey Cl	1
		2
		3
		4
North	Leatherhead Rd	162-164

Table 1 – Properties surrounding the Proposed Development

Figure 1 shows the site plan of the Proposed Development and Figure 2 to Figure 5 show the 3D geometry of the existing site and Proposed Development.



Figure 1 – Site Plan of the Proposed Development

Please see Appendix A for further architectural drawings of the existing development site survey, the Proposed Development floor plans, roof plan and elevations. Refer Appendix C for the drawings and image of the neighbouring properties used for the study.



Figure 2 – 3D representation of the existing site from the North



Figure 3 – 3D representation of the proposed site from the North

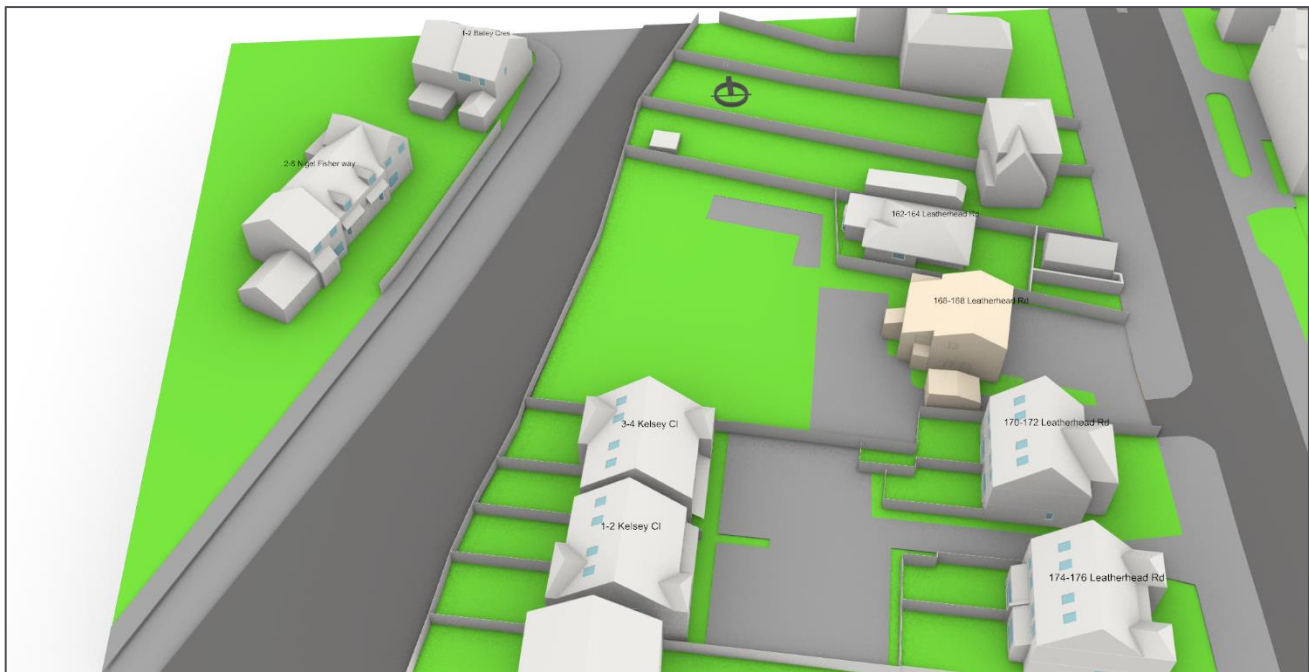


Figure 4 – 3D representation of the existing site from the South

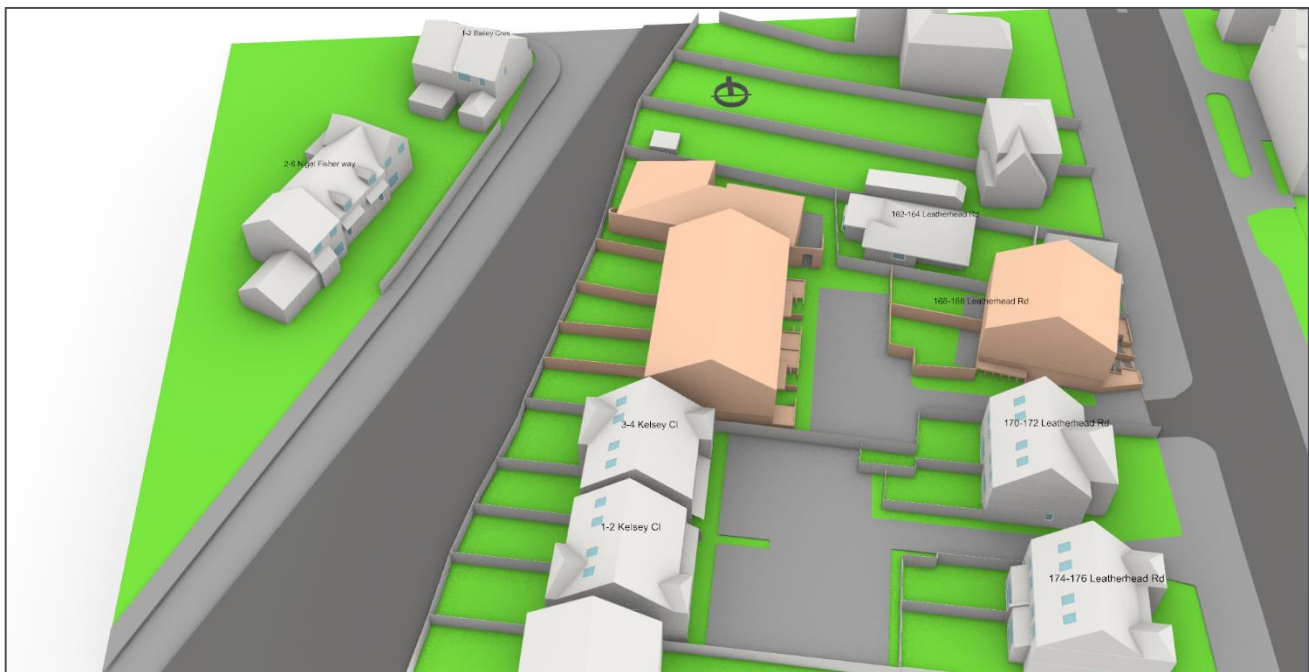


Figure 5 – 3D representation of the proposed site from the South

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Principles and Methodology

2.0 Principles and Methodology

2.1 Daylight - Vertical Sky Component (VSC)

The amount of skylight that reaches the windows of potentially affected dwellings is assessed by determining the VSC. The vertical sky component is a measure of the amount of the sky visible from the centre point of a window. It is the ratio of direct skylight that reaches the outside plane at the centre of a window, to the amount of sky light that reaches the horizontal plane. This ratio is expressed as a percentage.

The maximum VSC that could be achieved for a completely unobstructed vertical window/wall is almost 40%. A window that achieves >27% is considered to provide good levels of skylight.

The BRE guidelines also state that:

“Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window. In the case of a floor-to-ceiling window such as a patio door, a point 1.6 m above ground (or balcony level for an upper storey) on the centre line of the window may be used ... If a room has two or more windows of equal size, the mean of their VSCs may be taken. The reference point is in the external plane of the window wall. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed.”

“Existing windows with balconies above them typically receive less daylight. Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and area receiving direct skylight, for both the existing and proposed situations, without the balcony in place...this will show that the presence of the balcony, rather than the size of the new obstruction, was the main factor in the relative loss of light.”

2.2 Average Daylight Factor (ADF)

Traditionally, daylight has been evaluated quantitatively, using the ADF. The daylight factor is defined as a ratio that represents the amount of illumination available indoors relative to the illumination present outdoors at the same time under an overcast sky.

ADF is normally expressed as a percentage of the illuminance available to an unobstructed point outdoors, under an overcast sky of known luminance and luminance distribution. This is the most detailed of the daylight calculations and considers the physical nature of the rooms and windows, including; window transmittance, window size, room size, angle of external obstruction and room surface reflectivity.

Although there are various recommendations for typical Average Daylight Factor values, an average value between 2% and 5% is considered satisfactory². The BRE good practice guide³, does recommend an ADF of ≥5% if there is no supplementary electric lighting, or ≥2% if supplementary electric lighting is provided. However, interiors with very high ADFs (>6%) sometimes have problems with summertime overheating or excessive heat loss in winter.

The minimum recommendations for dwellings, as outlined in the BRE guidance are:

- 2.0% for kitchens
- 1.5% for living rooms
- 1.0% for bedrooms.

Section 2.1.14 of the BRE guidance goes on to state that:

² *The Relationship between wall reflectance and daylight factor in real rooms* (Simm & Coley, 2011)

³ *BRE guidance: Site Layout Planning for Daylight & Sunlight* (PJ Littlefair, 2022)

“non-daylit internal kitchens should be avoided wherever possible, especially if the kitchen is used as a dining area too. If the layout means that a small internal galley-type kitchen is inevitable, it should be directly linked to a well day lit room.”

In addition, other regional guidance in the form of the Greater London Authority’s (GLA) note on daylight was taken into account when interpreting the results. The note published by GLA states the following:

“BRE guidelines confirm that the acceptable minimum ADF target value depends on the room use. That is 1% for bedroom, 1.5% for living room and 2% for a family kitchen. In cases where one room serves more than one purpose, the minimum ADF should be that for the room with the higher value. Notwithstanding this, the independent daylight and sunlight review states that, in practice, the principal use of rooms designed as a ‘living room/kitchen/dining’ is a living room. Accordingly, it would be reasonable to apply a target of 1.5% to such rooms.”

A preliminary internal daylight analysis is conducted for all windows at centre pane with ADF values calculated based on the BRE formula:

o $ADF = (T * M * A_w * \theta) / (A * ((1 - R) * R))$

With the following ADF assumptions:

- o T = 0.68 (Window Transmittance)
- o M = 0.8 (Maintenance Factor)
- o $A_w = (\text{Net Window Area (0.85)})$
- o A = Area of all room surfaces (Ceiling, Floor and Walls)
- o Room = 4*4 and 2.5 height
- o R = 0.5 (Average Reflectance of internal surfaces, fairly light-coloured rooms R=0.5).

The results of the VSC are used to find the corresponding θ values stated in the BRE guidelines - Appendix C of the “Site Layout Planning for Daylight and Sunlight” from PJ Littlefair 2022.

2.3 No-Sky Line (NSL), Daylight Distribution

The NSL is a measure of the distribution of diffuse daylight within a room. The NSL simply follows the division between those parts of a room that can receive some direct skylight from those that cannot. If from a point in a room on the working plane (a plane 850mm above the floor) it is possible to see some sky then that point will lie inside the NSL contour. Conversely, if no sky is visible from that point then it would lie outside the contour.

The BRE guidelines also state that:

“Where room layouts are known, the impact on the Daylight Distribution in the existing building can be found by plotting the ‘No-Sky Line’ in each of the main rooms, living rooms, dining rooms and kitchens; bedrooms should also analysed although they are less important.”

BRE also recommend that Daylight Distribution within neighbouring properties should remain at least 0.8 of the former value.

2.4 Sunlight – Annual Probable Sunlight Hours (APSH)

The APSH test calculates the percentage of statistically probable hours of sunlight received by each window in both the summer (March 21st through to September 21st) and the winter months (September 21st to March 21st).

BRE guidance state that:

“If this window reference point can receive more than one quarter of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months on 21st September and 21st March,

then the room should still receive enough sunlight. Also, if the overall annual loss of APSH is 4% or less, the loss of sunlight is small. Any reduction in sunlight access below this level should be kept to a minimum. If the available sunlight hours are both less than the amount given and less than 0.8 times their former value, either over the whole year or just during the winter months, then the occupants of the existing building will notice the loss of sunlight.

If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken. If a room has two windows on opposite walls, the APSH due to each can be added together."

In summary, when the sunlight reduction falls below 0.8 of their existing value (greater than 20% reduction) or the centre of at least one window to a main living room can receive less than 25% of annual probable sunlight hours, and less than 5% of annual probable sunlight hours in the winter months, these losses will be noticed by the occupants. The BRE guidelines also state that:

"All main living rooms of dwellings should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block out too much sun."

The APSH calculations have been conducted with the use of the Chartered Institution of Building Services Engineers (CIBSE) London TRY weather file, and in order to determine whether an hour is sunny, the definition of 'bright sunshine' given in 'Guide to Meteorological Instruments and Methods of Observation (WMO-No. 8)' has been used⁴.

2.5 Overshadowing

The impact of the Proposed Development on existing surrounding gardens or amenity areas is assessed against benchmarks provided within the BRE Guidance. The BRE criterion is as follows:

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

Open spaces would normally include:

- Gardens, usually the main back garden of a house
- Parks and playing fields
- Children's playgrounds
- Outdoor swimming pools and paddling pools
- Seating areas such as those between non-domestic buildings and in public squares
- Focal points for views such as a group of monuments or fountains.

Trees and fences lower than 1.5m have been excluded from the model. The BRE Guide states:

"Trees may be ignored unless they form dense continuous belts... Normally, trees and shrubs need not be included, partly because their shapes are almost impossible to predict, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building. This applies especially to deciduous trees."

2.6 Methodology

2 no. detailed 3D models with all the surrounding buildings have been created using the software 'SketchUp Make 2017': 1 no. to reflect the current conditions, and 1 no. the proposed design. Both are then imported into the Grasshopper plugin for Rhino 7 3D software.

⁴ If the direct solar irradiance is greater than 120W/m², the hour is considered to be a probable sunlight hour.

The Ladybug/Honeybee plugins for Rhino 7/Grasshopper and the Radiance 5.4 software, are then used to calculate the VSC, ADF and APSH at the centre of any potentially affected windows and to calculate the overshadowing impact of the Proposed Development on surrounding gardens.

Please see Appendix B for illustrations of the models, and Appendix C for the neighbouring buildings' plan/elevation drawings from the planning portal.

2.7 Scale and Significance

In terms of sensitivity, surrounding dwellings are considered highly sensitive to daylight and sunlight levels, and specifically habitable rooms such as living rooms, kitchens and bedrooms.

Commercial spaces such as offices and retail areas are not considered sensitive receptors and are therefore not assessed.


The scale used within the report to assess the significance is:

- Negligible (no effect), above 0.8 reduction factor
- Minor, 0.8 – 0.7 reduction factor
- Moderate, 0.7 – 0.6 reduction factor
- Major, below 0.6 reduction factor.

Moderate and major categories are deemed to be 'significant', unless otherwise stated,

Minor are deemed to be 'not significant' unless otherwise stated, and

Negligible are considered 'not significant'.

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Daylight and Sunlight: Impact on Surrounding Properties

3.0 Daylight and Sunlight: Impact on Surrounding Properties

The relevant windows (individually numbered, Figure 6 to Figure 11) of each of the surrounding properties have been assessed in order to evaluate the potential daylight/sunlight (VSC, ADF & APSH) impacts that the Proposed Development may have on them, and any subsequent impact on the internal daylighting of relevant habitable rooms.

The buildings to the south, 170-176 Leatherhead Road; to the southwest, 1-4 Kelsey Close; to the north, 162-164 Leatherhead Road; and to the northwest, 128 Balley Cres and 2-8 Nigel Fisher Way.



Figure 6 - Illustration of window openings at 162-164 Leatherhead Road (view from southwest).

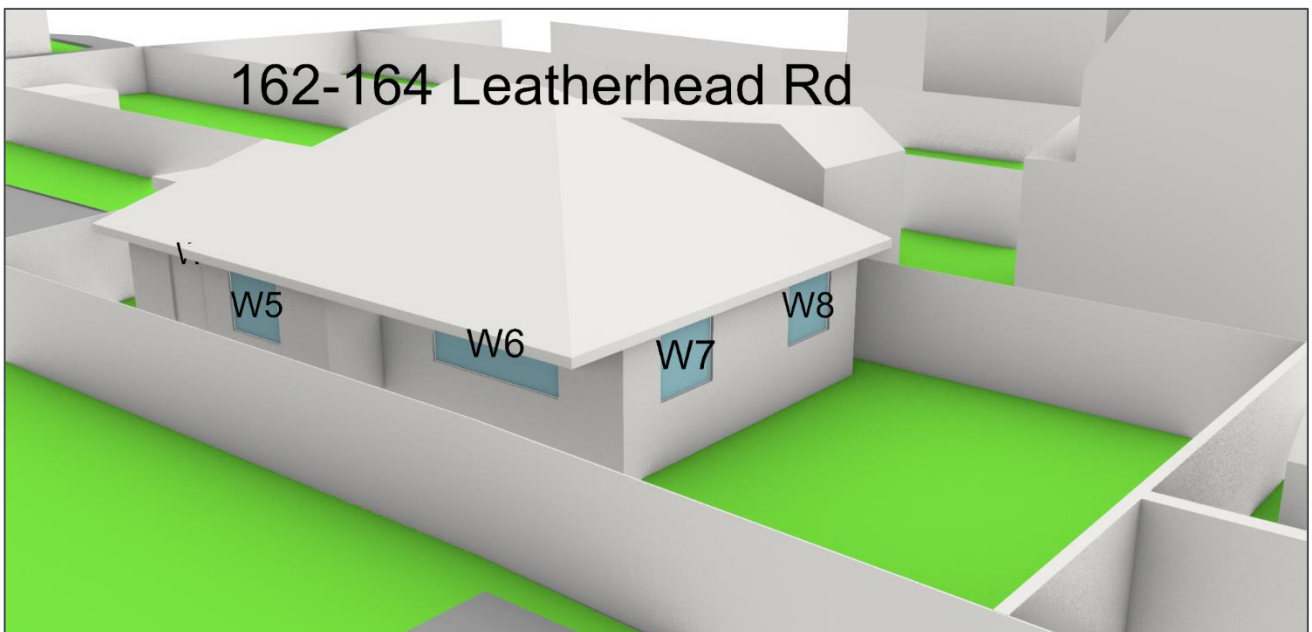


Figure 7 - Illustration of window openings at 162-164 Leatherhead Road (view from southeast)

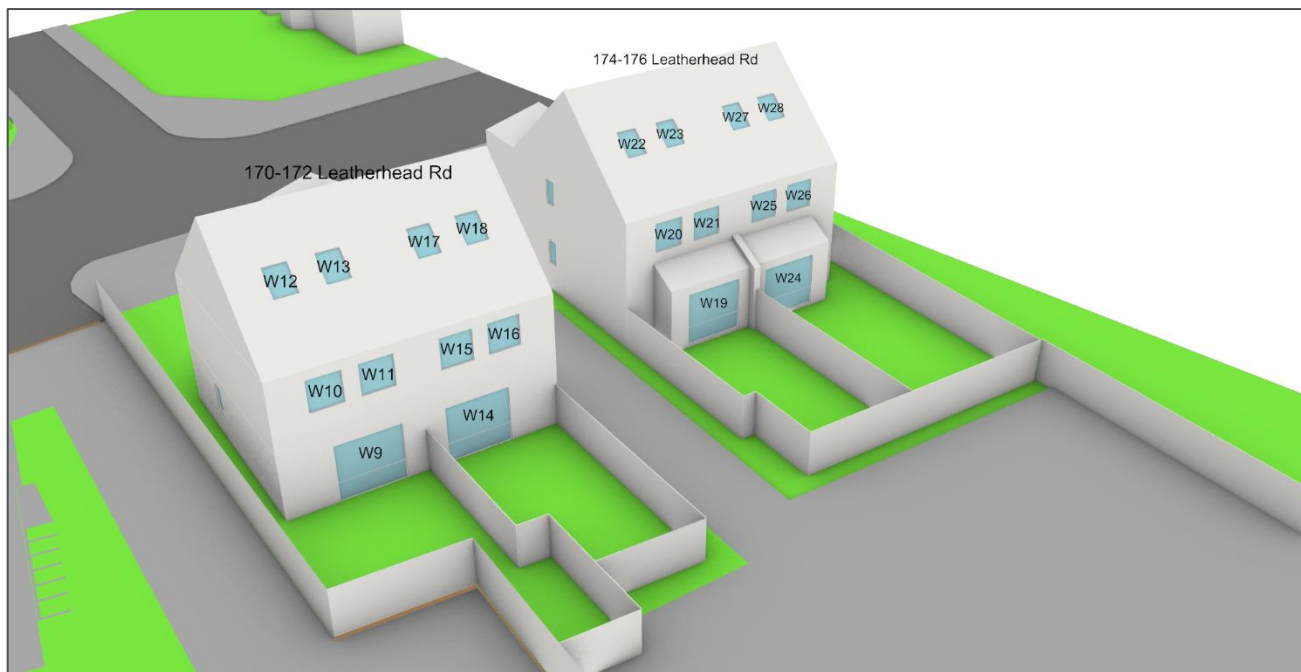


Figure 8 - Illustration of window openings at 170-176 Leatherhead Road (view from North)

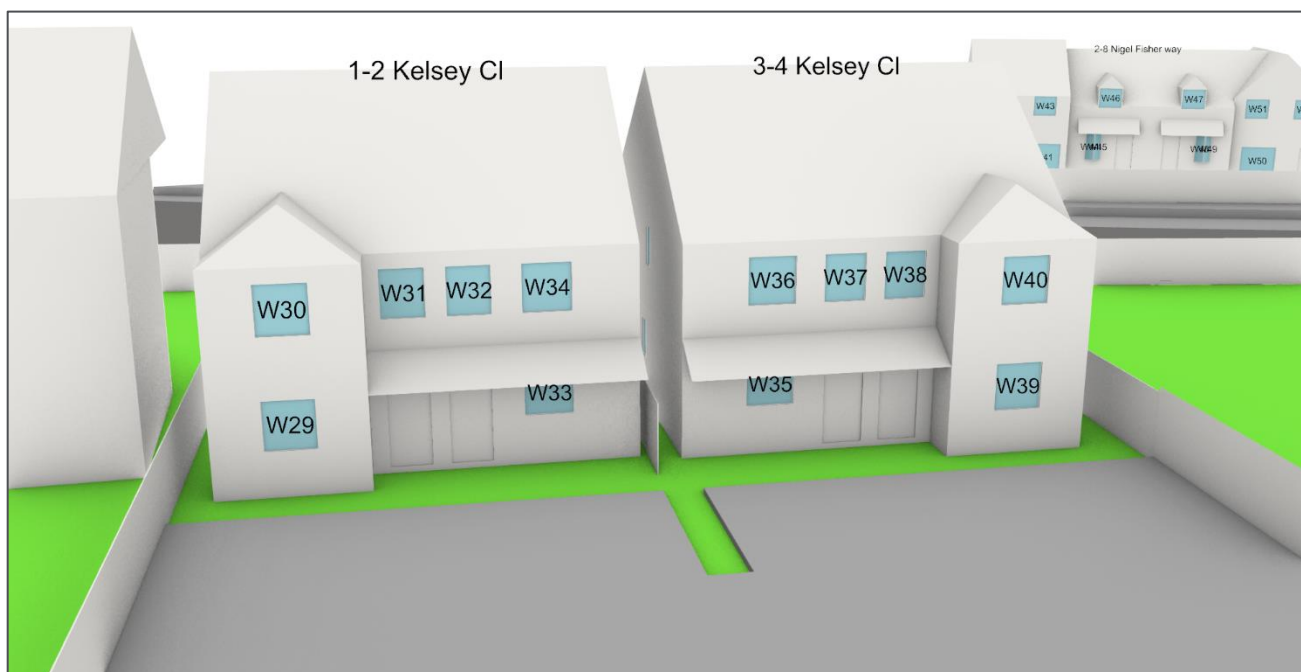


Figure 9 - Illustration of window openings at 1-4 Kelsey Close (view from East)

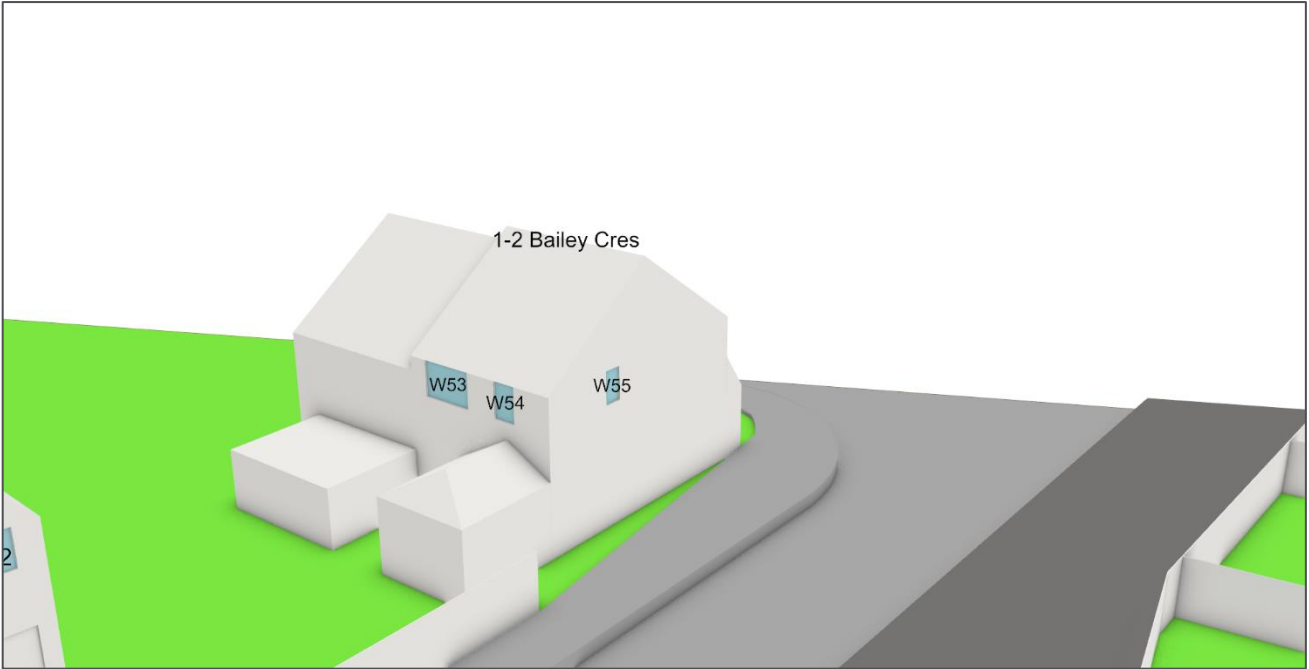


Figure 10 - Illustration of window openings at 1-2 Bailey Cres (View from South)

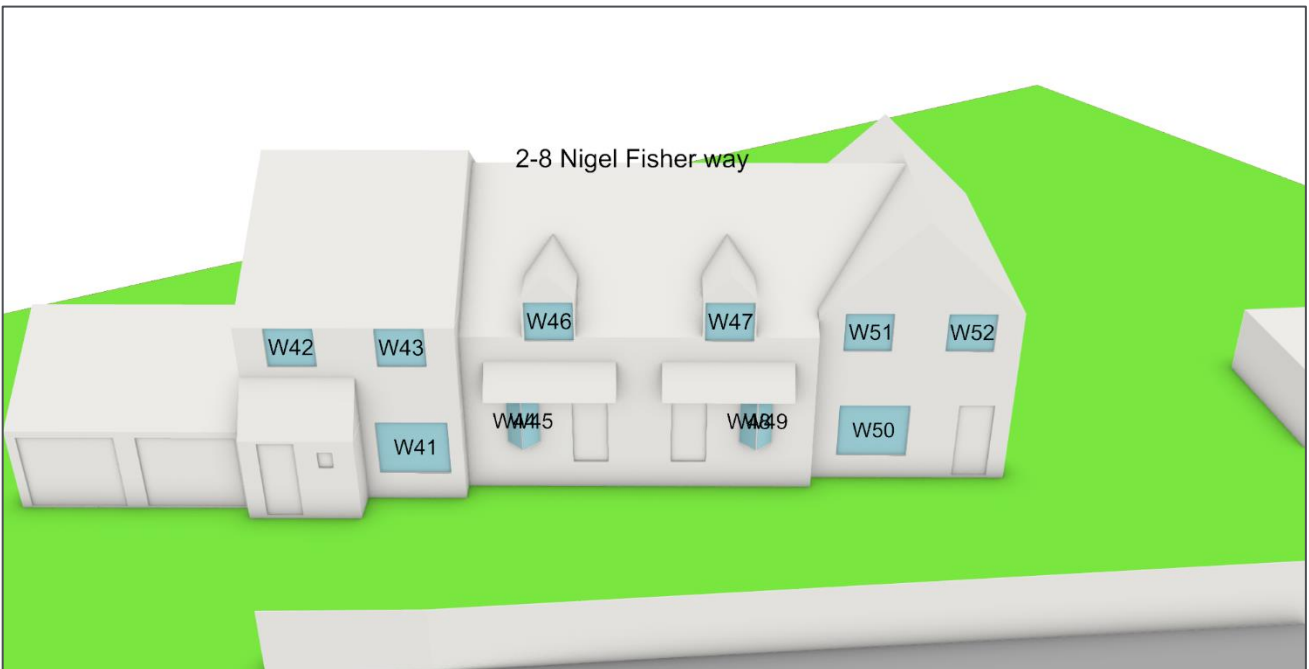


Figure 11 - Illustration of window openings at 2-8 Nigel Fisher Way (View from East)

The majority of windows at 162-164 Leatherhead Road and 4no. windows at 1-4 Kelsey Close are located below overhangs, and in line with the BRE guide, a separate calculation has been conducted without the overhangs (Figure 12 and Figure 13), in order to determine whether the presence of the overhangs/balconies, rather than the size of the new Proposed Development, was the main factor in the relative loss of light.



Figure 12 - Illustration of window openings at 162-164 Leatherhead Road (view from south), without overhangs

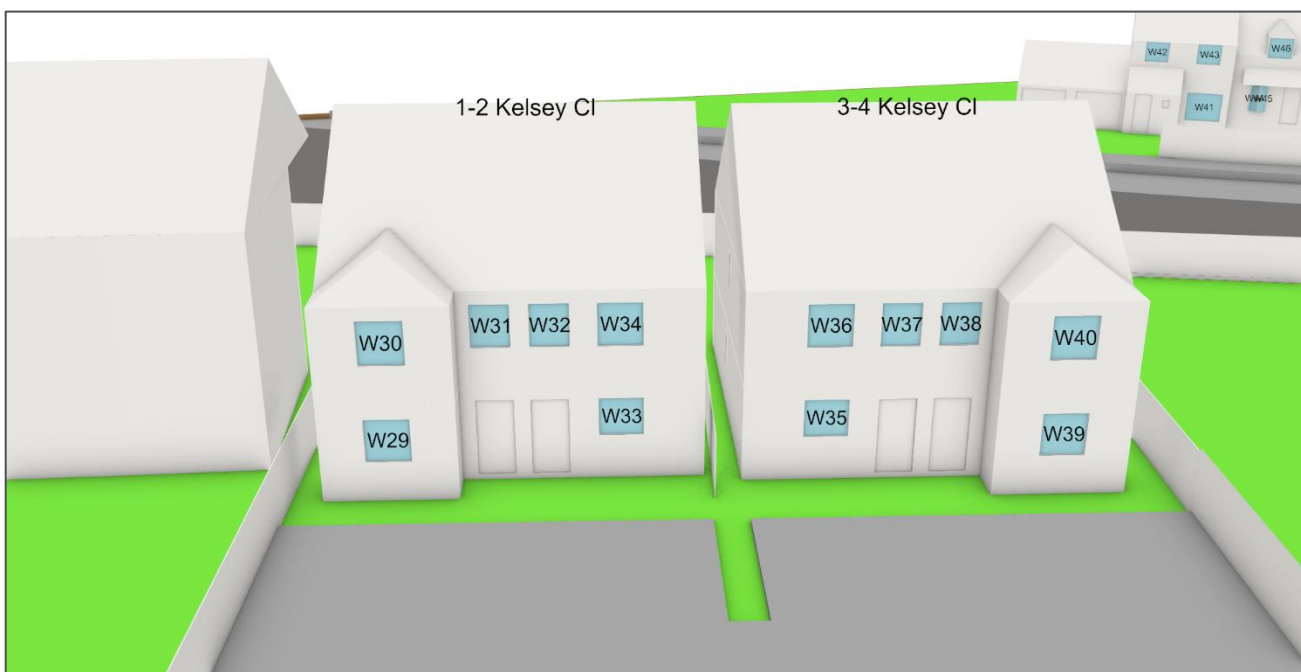


Figure 13 - Illustration of window openings at 1-4 Kelsey Close (View from East), without overhangs

3.1 Results on Assessed Windows, Daylight

Assessments have been undertaken on the numbered windows (Figure 6 to Figure 11) in order to evaluate the daylight impacts that the Proposed Development may have.

VSC

Based on the results of the VSC assessment, as demonstrated within Appendix D, all 55no. of the surrounding assessed windows comfortably achieve the BRE VSC criteria. As such, the impact is not deemed to be significant.

Simplified ADF (with overhangs)

Based on the simplified ADF analysis, BRE formula, all 55no. of the surrounding assessed windows comfortably achieve the BRE ADF criteria beyond the 20% threshold, therefore this impact is not deemed to be significant.

Overall, the daylight VSC, and ADF results indicate that all of the above assessed windows and rooms in the surrounding properties will receive adequate daylight levels without any significant daylight reduction noticeable from the occupants. All of the assessed windows and rooms are compliant with the VSC and ADF BRE criteria, and therefore this impact is not deemed to be significant.

3.2 Results on Assessed Windows, Sunlight


Assessments have been undertaken on the numbered windows (Figure 6 to Figure 11), in order to evaluate the sunlight impact that the Proposed Development may have. The assessed windows facing north are excluded from the APSH calculations⁵.

The results of the sunlight assessment (annual and winter APSH) indicates that all of the above assessed windows in the surrounding properties will receive adequate sunlight levels. The assessed windows comply with the BRE criteria, will either meet the BRE APSH criteria or have a retained annual and winter APSH higher than 25% and 5%, respectively.

Therefore, it can be concluded that none of the adjoining occupants will experience noticeable reductions in sunlight from the construction of the Proposed Development.

Full calculations for VSC, ADF and APSH are listed in Appendix D.

⁵ Any windows that do not face within 90 degrees of due south can be ignored. Paul J Littlefair, BRE, 2022



Overshadowing:
Impact on Surrounding
Properties

4.0 Overshadowing: Impact on Surrounding Properties

A shadow range analysis was undertaken from 07:00 to 18:00 on 21st of March (equinox) on the surrounding gardens for the existing conditions and the Proposed Development (Figure 14 to Figure 17).

The shadow range analysis indicates that the exposure to sunlight could be impacted by the Proposed Development and further analysis has been carried out.

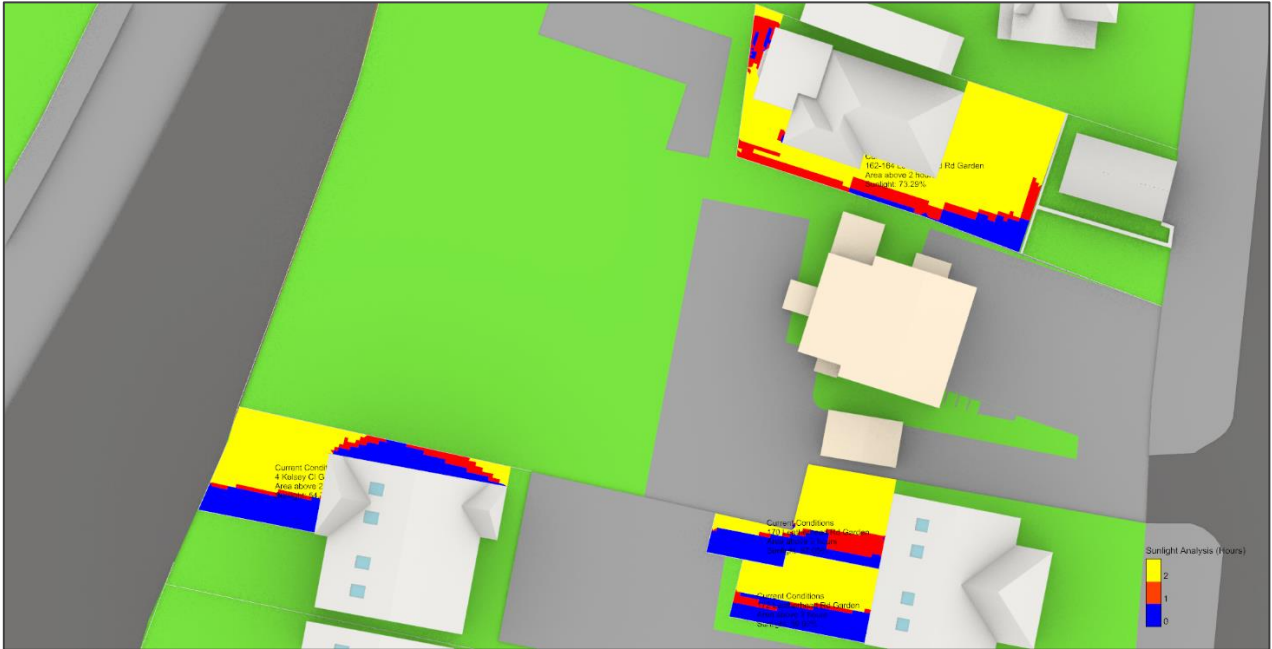


Figure 14 - Detailed shadow range analysis from 07:00 to 17:00 on 21st of March for the assessed surrounding garden. Area of garden receiving more than 2 hours of direct sunlight highlighted with yellow - existing conditions.

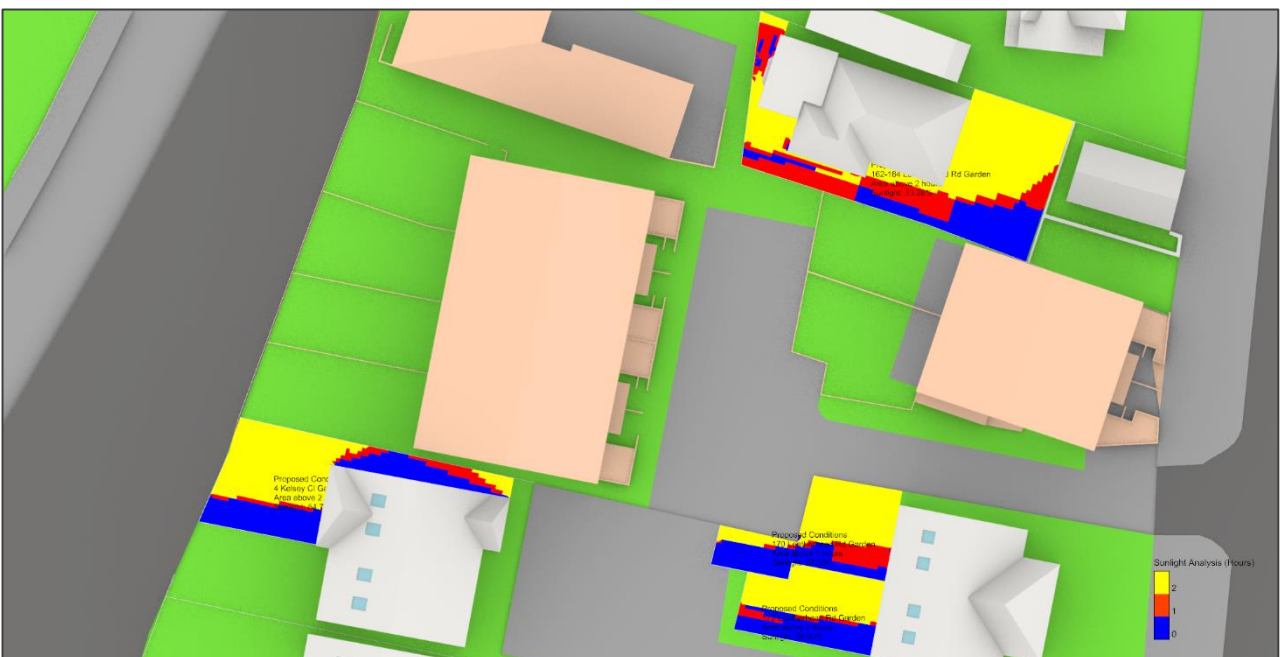


Figure 15 - Detailed shadow range analysis from 07:00 to 17:00 on 21st of March for the assessed surrounding gardens. Area of garden receiving more than 2 hours of direct sunlight highlighted with yellow – Proposed Development.

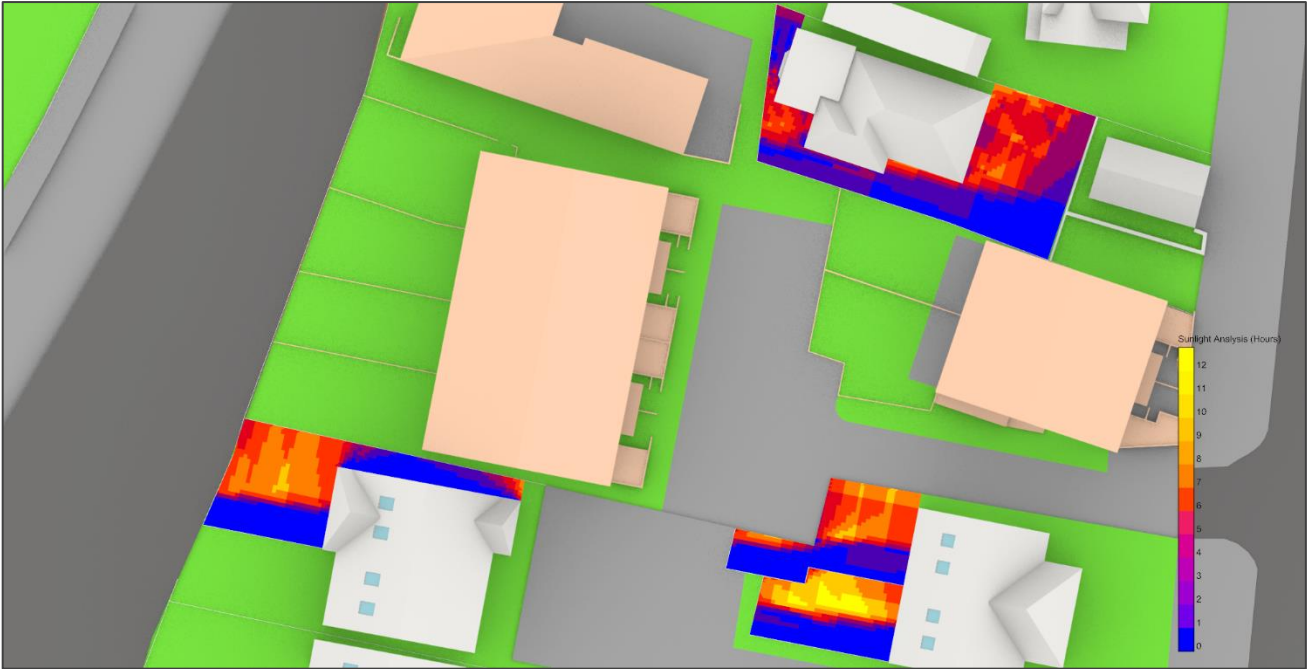


Figure 16 - Shadow range analysis from 07:00 to 18:00 on 21st of March – existing conditions

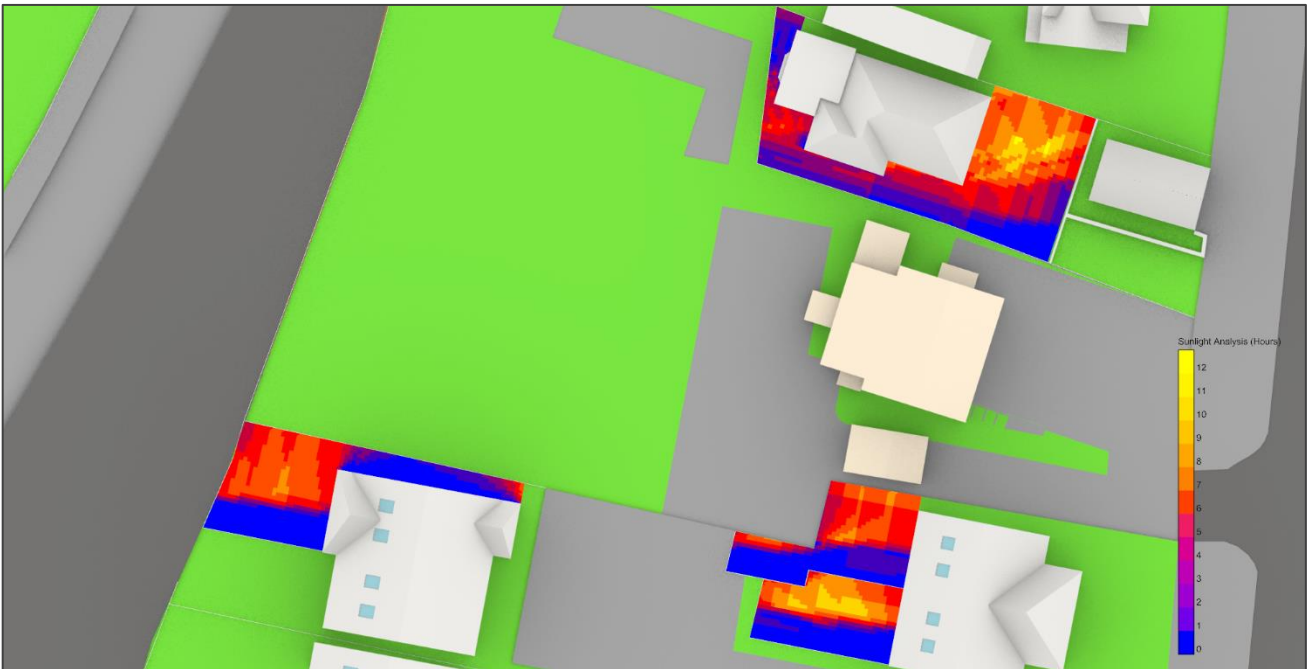


Figure 17 - Shadow range analysis from 07:00 to 18:00 on 21st of March – Proposed Development

The results from the analysis, shown in Table 2, indicate that only 1no. out of the 4no. assessed garden/open space will have a minor impact. As this garden space is already heavily shaded from trees and hence, therefore this impact is not deemed to be significant.

Garden Address	Percentage of garden with ≥ 2 hours of direct sunlight. Proposed	Percentage of garden with ≥ 2 hours of direct sunlight. Existing	Area Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
162-164 Leatherhead Rd	53.28	73.29	27.3	0.727	Yes	Minor
170 Leatherhead Rd	57.05	57.05	0	1	No	Negligible
172 Leatherhead Rd	59.92	59.92	0	1	No	Negligible
4 Kelsey Cl	54.79	54.79	0	1	No	Negligible

Table 2 – Summary of the detailed shadow range analysis from 07:00 to 17:00 on 21st of March, for the surrounding garden s

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Conclusions

5.0 Conclusions

This Daylight, Sunlight & Overshadowing Report has been undertaken by SRE for the Proposed Development at 166 - 168 Leatherhead Road in Chessington, London on behalf of JDT Properties (the Client).

The assessments ascertain the potential impact of the Proposed Development on the surrounding buildings and all calculations follow the Building Research Establishment (BRE) guidance of "Site Layout Planning for Daylight and Sunlight" from PJ Littlefair 2022.

The Vertical Sky Component (VSC), Average Daylight Factor (ADF), Average Probable Sunlight Hours (APSH) and Overshadowing have each been calculated for all applicable windows and open spaces of the neighbouring buildings.

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Regarding overshadowing, only 1no. out of the 4no. assessed surrounding garden spaces will have a minor impact, but as this garden space is already heavily shaded from trees this impact is not deemed to be significant.

On balance, due to the orientation, size and proportions of the new buildings, it can be concluded that the impact of the Proposed Development on the surrounding properties is small and, in most cases, in accordance with the guidelines. None of the adjoining occupants will experience noticeable reductions in daylight or sunlight from the construction of the Proposed Development, and therefore the proposal is considered acceptable.

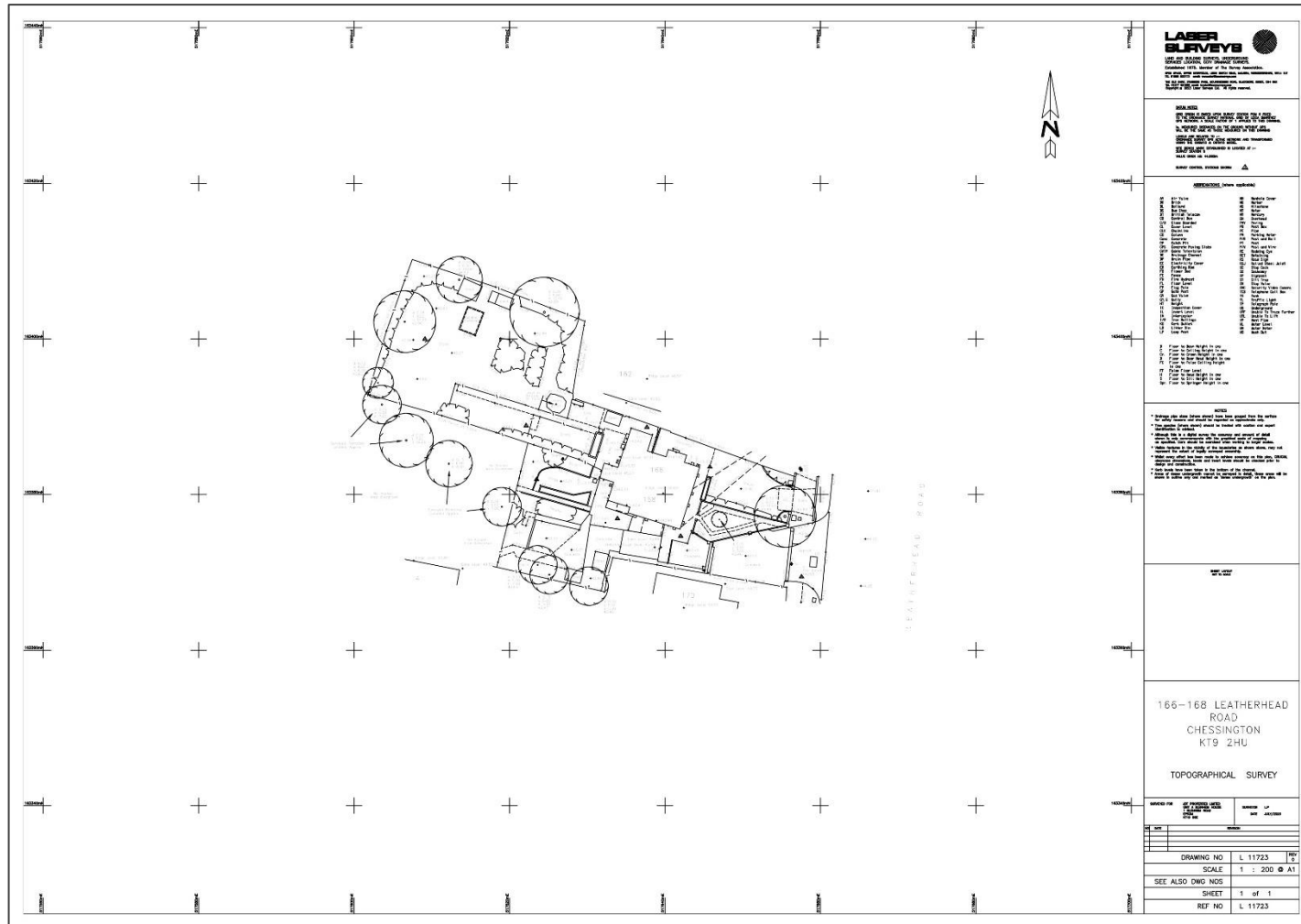
⁶ Any windows that do not face within 90 degrees of due south can be ignored. Paul J Littlefair, BRE, 2022

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Appendices

Appendix A – Existing and Proposed Architectural Drawings

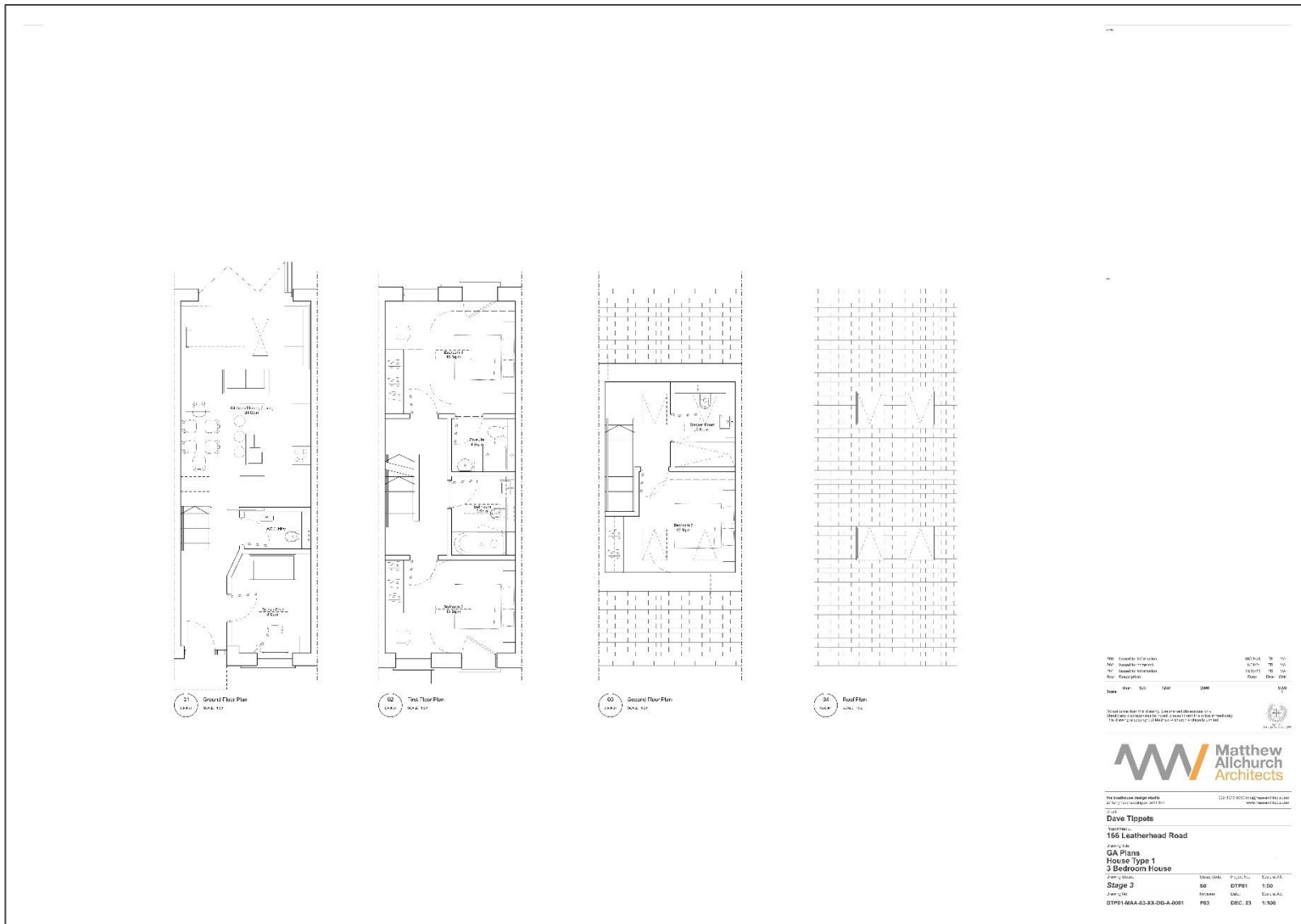
Existing – Site Survey



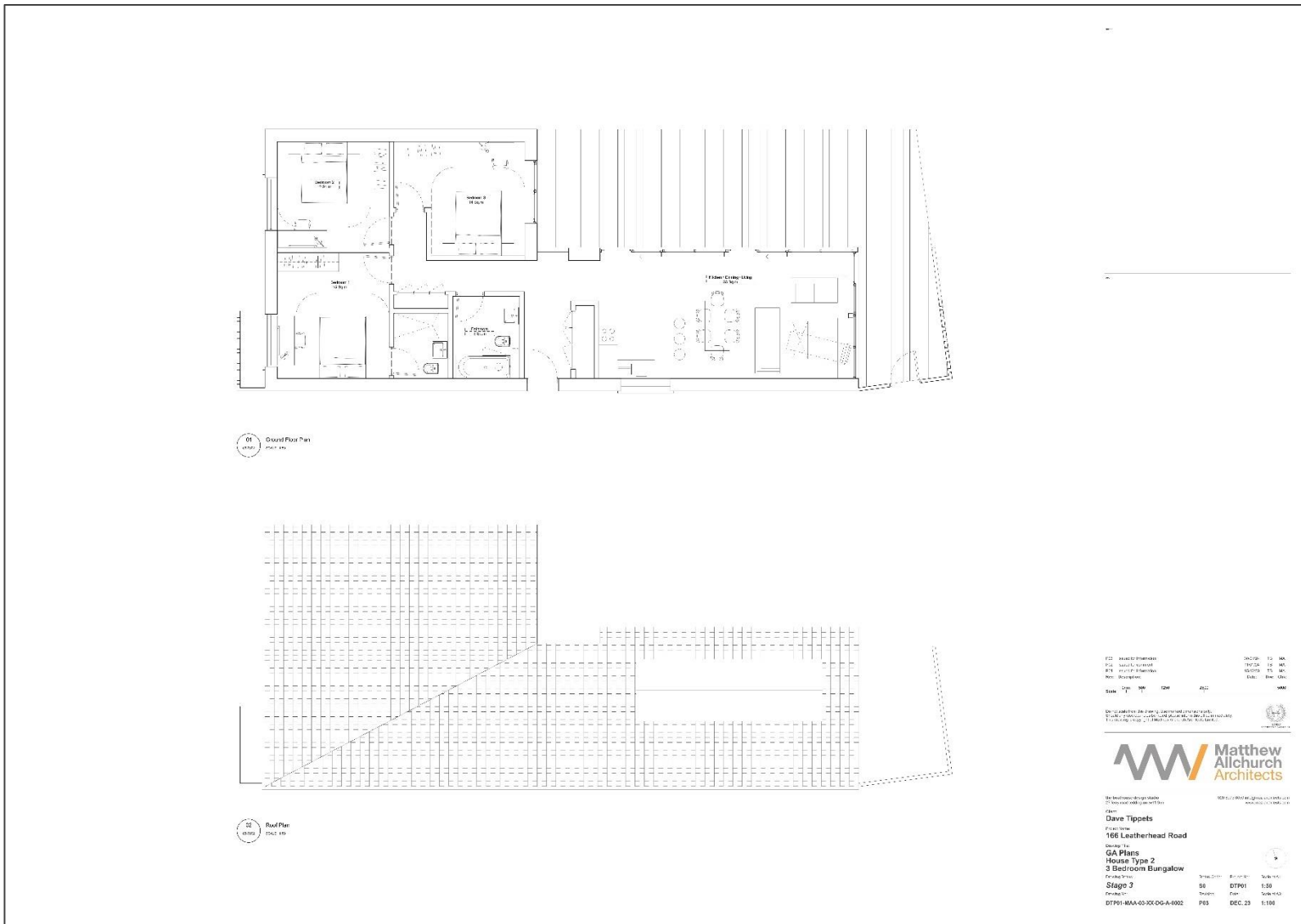
Proposed – Ground Floor Plan



Proposed – House Type 1



Proposed – House Type 2



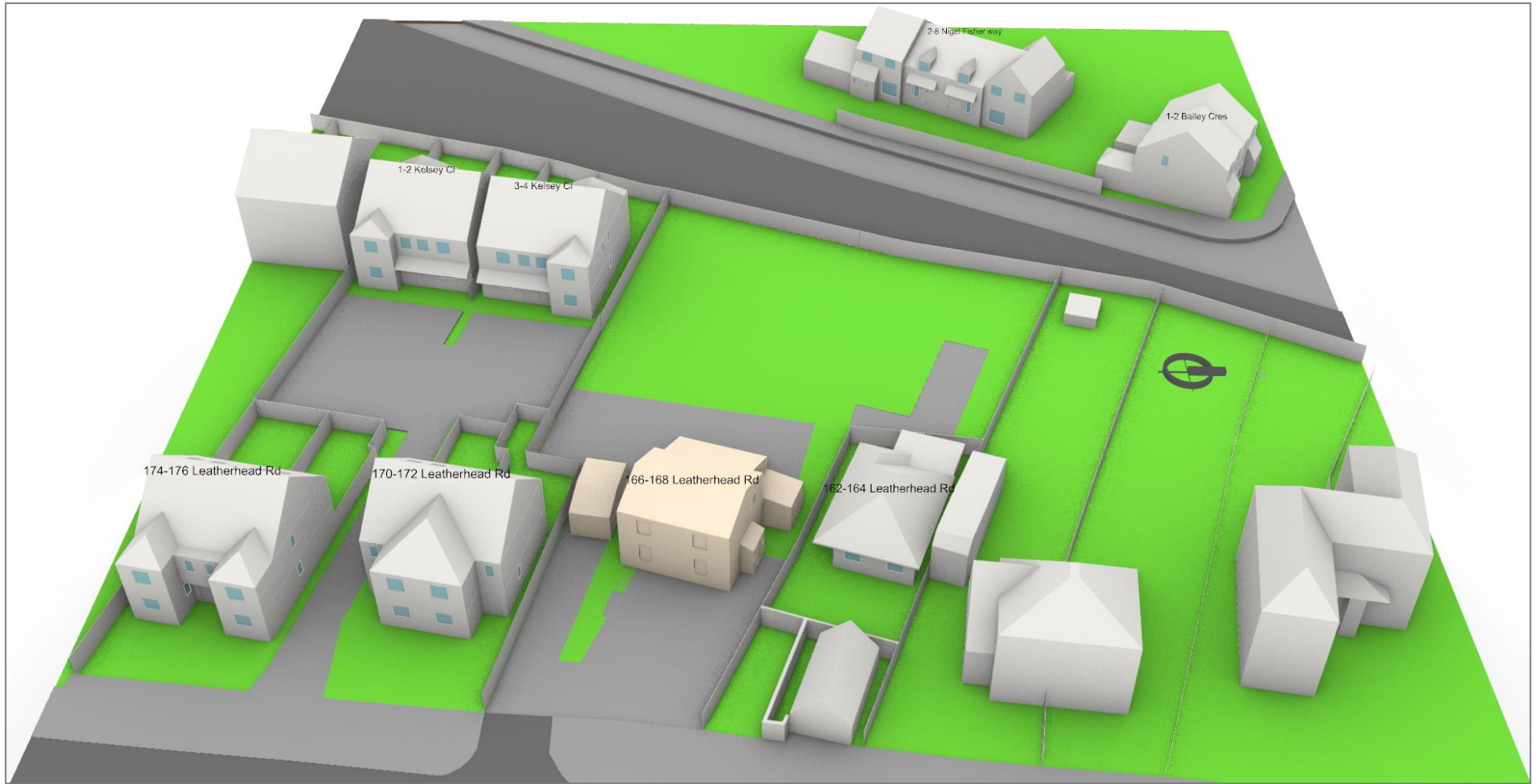
Appendix B - Existing and Proposed Site 3D Model



3D representation of the existing site from the West



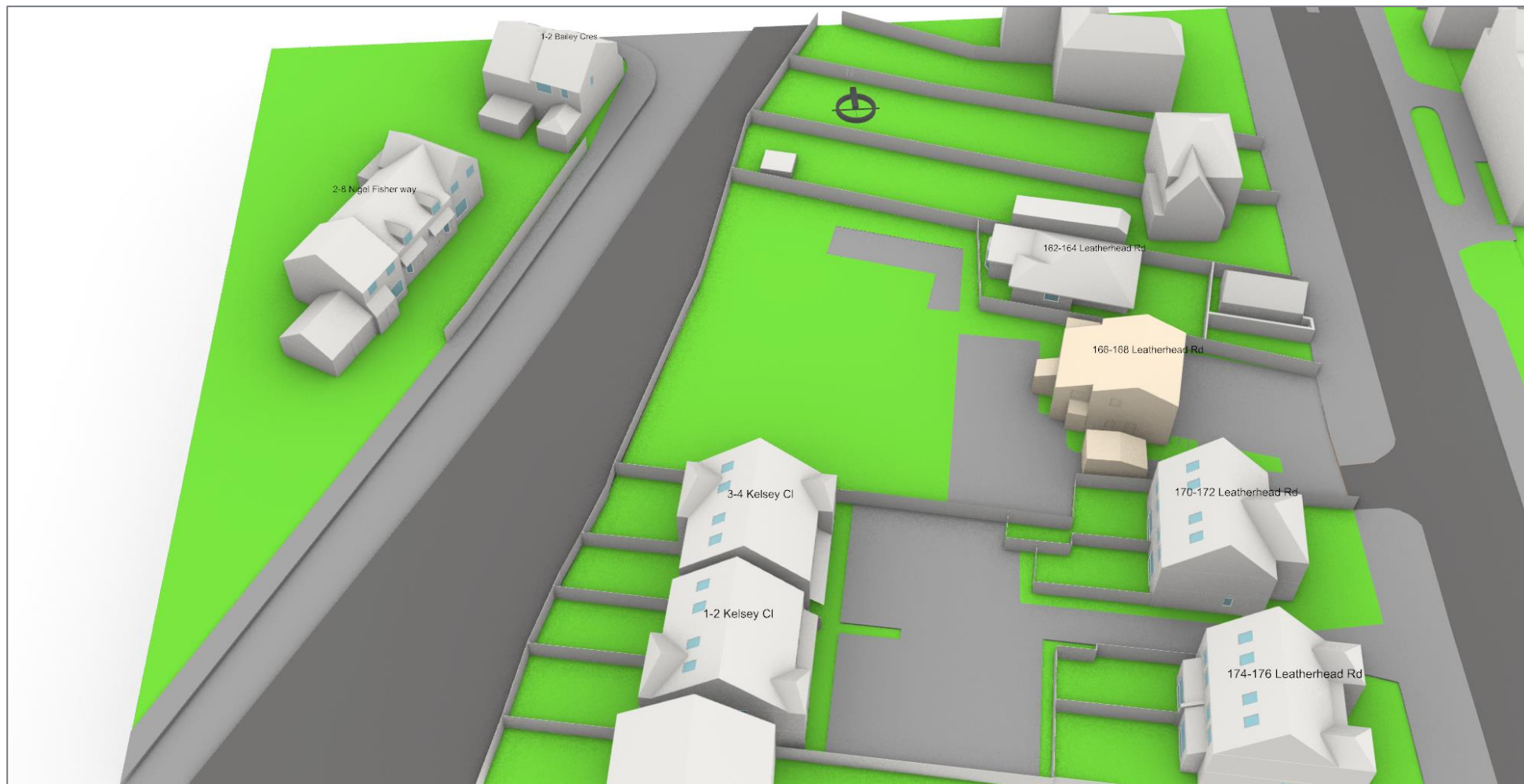
3D representation of the proposed site from the West



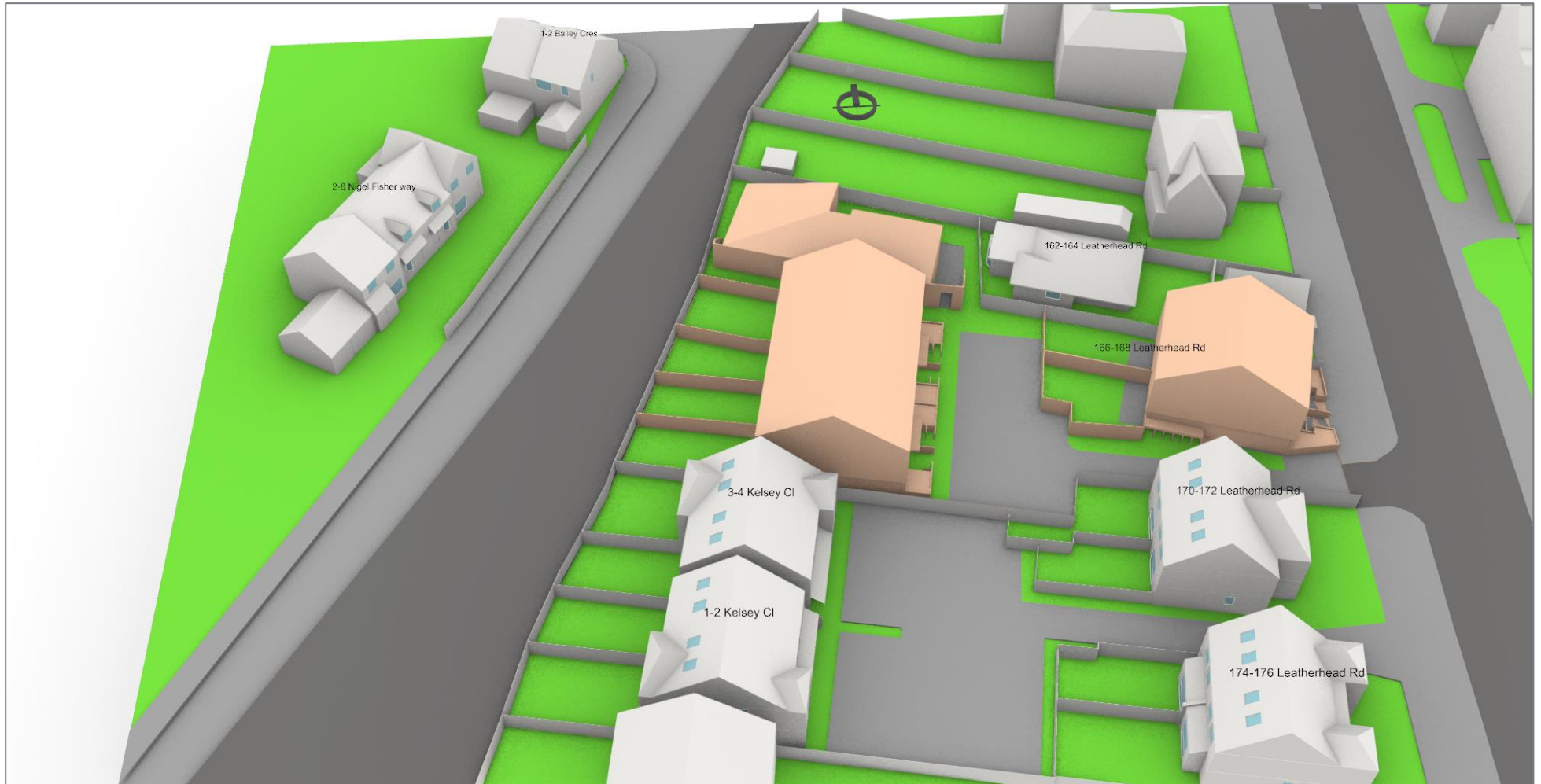
3D representation of the existing site from the East



3D representation of the proposed site from the East



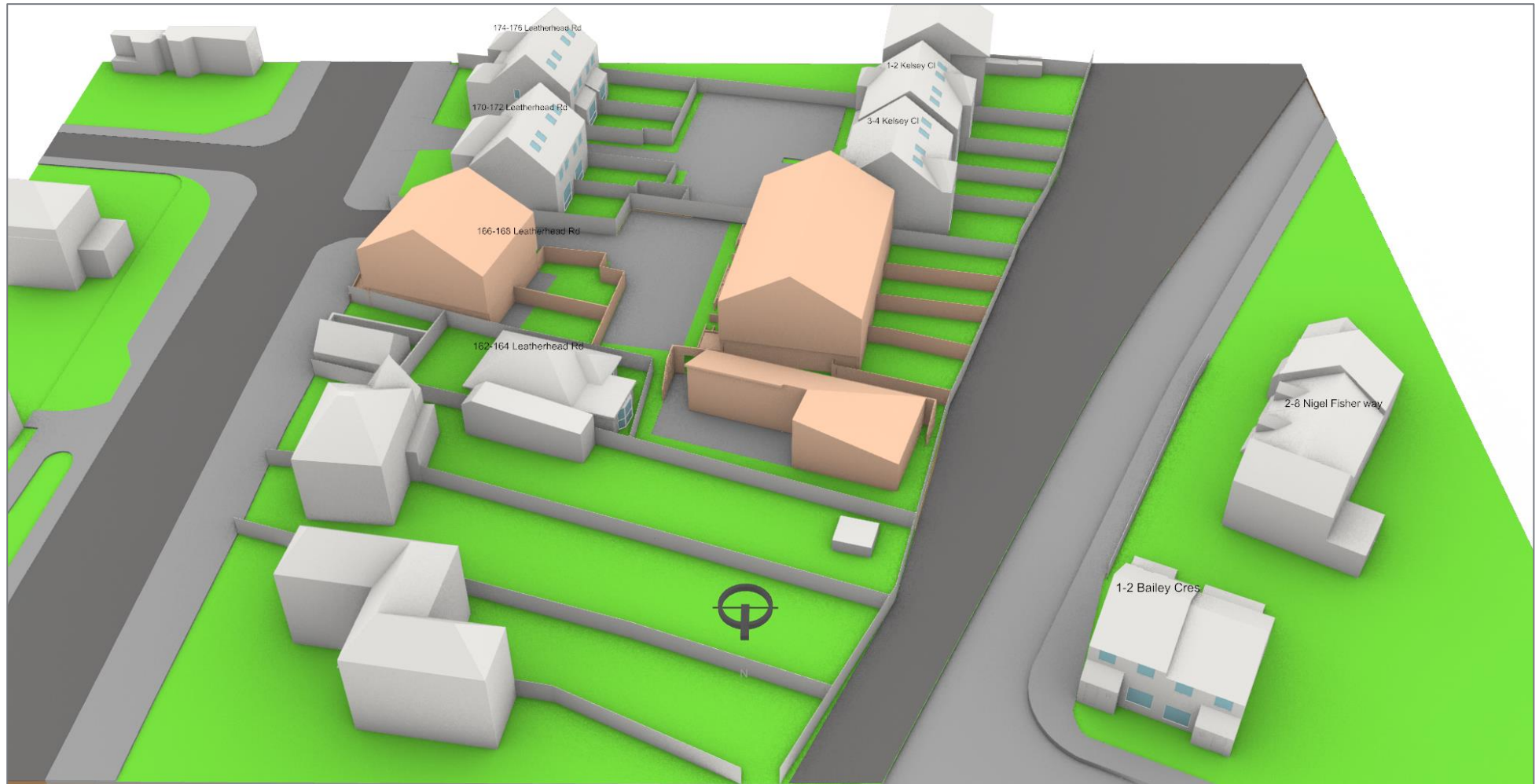
3D representation of the existing site from the South



3D representation of the proposed site from the South



3D representation of the existing site from the North

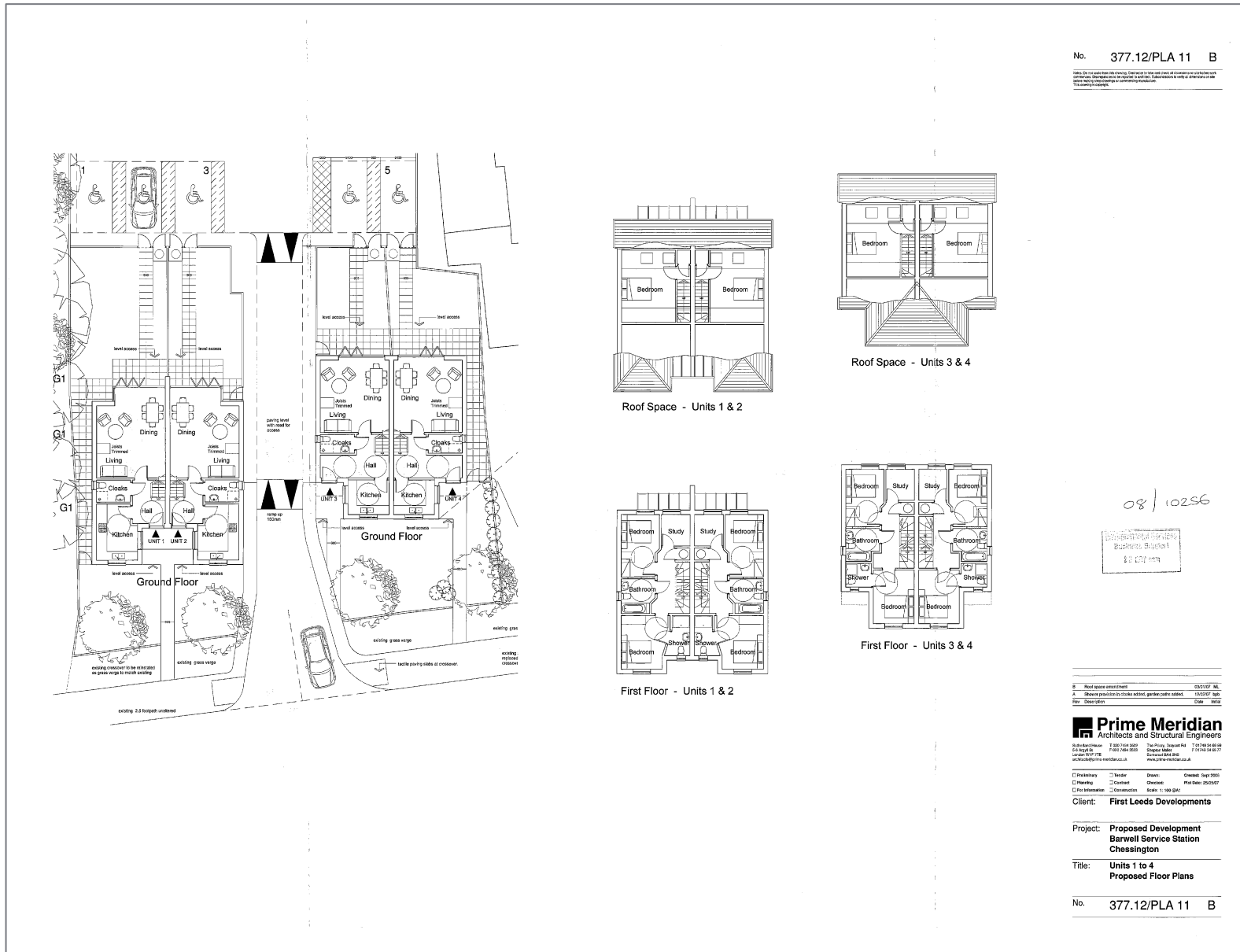


3D representation of the proposed site from the North

Appendix C – Drawings of the Neighbouring Properties from Desktop Study

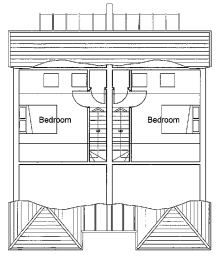
170 - 176 Leatherhead and 1-4 Kelsey Close



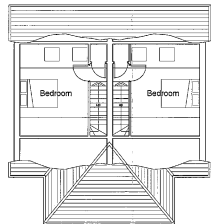


No. 377.12/PLA 11 B

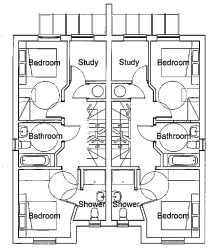
Notes: Do not build until the correct Certificate to build and check all construction and construction conditions. Responsibility for the correct Certificate is the responsibility of the applicant and the applicant's solicitor. The applicant is responsible for ensuring that the correct Certificate is obtained.



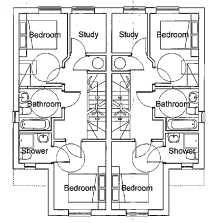
Roof Space - Units 1 & 2



Roof Space - Units 3 & 4



First Floor - Units 1 & 2



First Floor - Units 3 & 4

08/10256
 BUILDING CONTROL
 Building Approval
 8/10/2016

B	Roof space structure	03/11/07	ML
A	Roofing structure in blocks, stairs, garden, path, etc.	15/03/07	MLP
Rev	Description	Date	By

Prime Meridian
 Architects and Structural Engineers

Preliminary Tender Design Contract As Built
 Working Contract Design Contract As Built
 Construction Construction Design Contract As Built

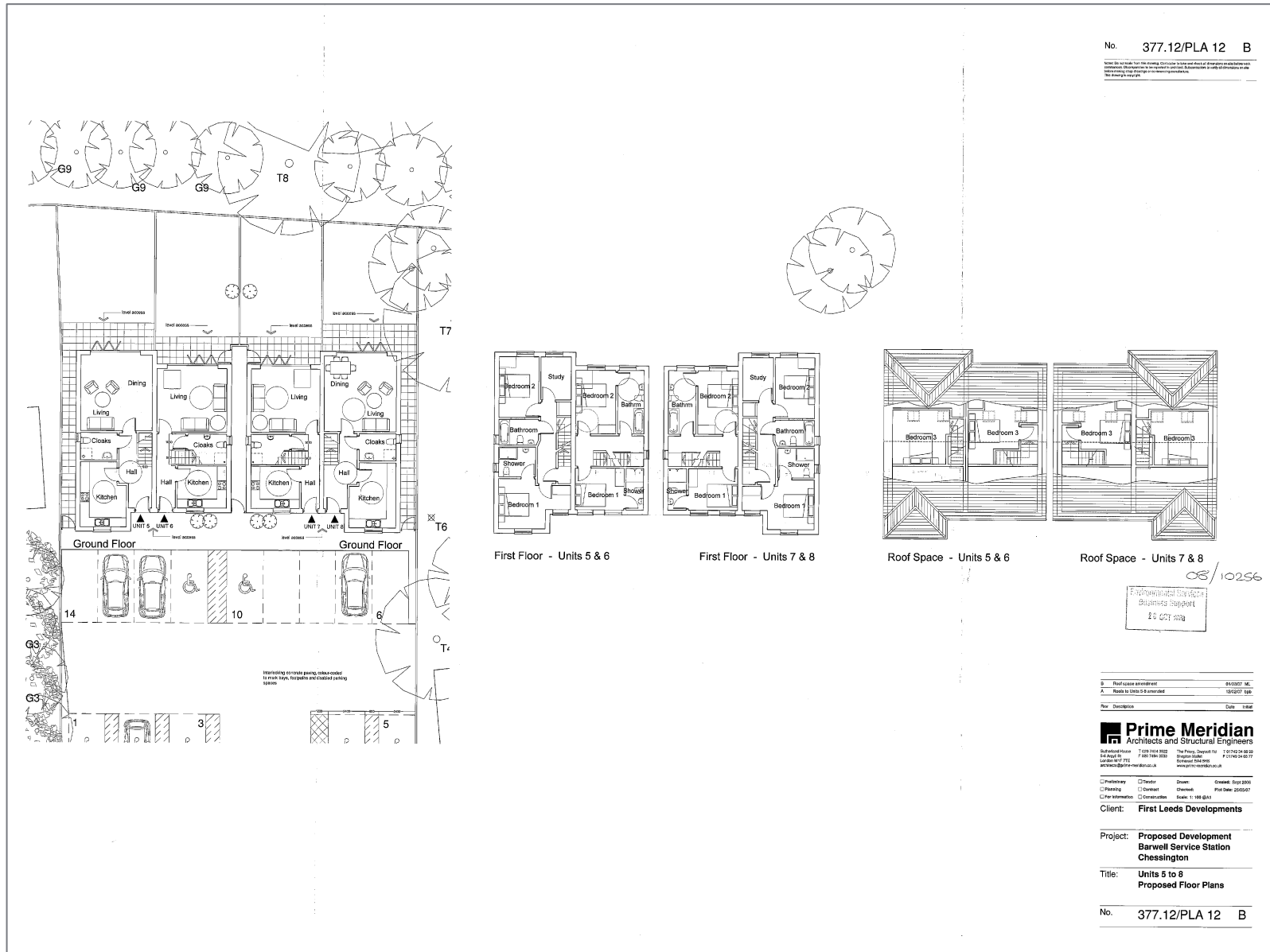
Client: **First Leeds Developments**

Project: **Proposed Development
 Barwell Service Station
 Chessington**

Title: **Units 1 to 4
 Proposed Floor Plans**

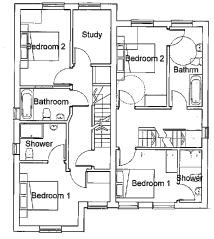
No. 377.12/PLA 11 B



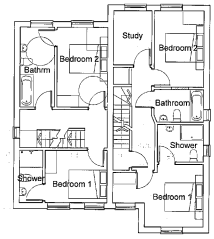


No. 377.12/PLA 12 B

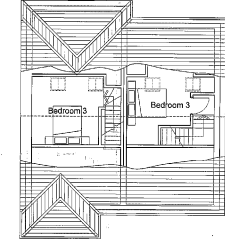
Notes: See also: Part 1 of the Building Code of Practice and Part 2 of the Building Code of Practice. This document is for the use of the client. It is not to be used for any other purpose. It is not to be used for any other purpose. It is not to be used for any other purpose.



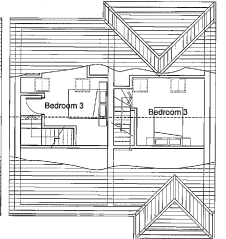
First Floor - Units 5 & 6



First Floor - Units 7 & 8



Roof Space - Units 5 & 6



Roof Space - Units 7 & 8

CE/10256
 Environmental Statement
 Chessington Development
 20 OCT 2012

B	Roof space structural	04/03/07	ME
A	Roofs to Units 5 & 6 structural	18/02/07	EBB
Rev	Description	Date	Initial

Prime Meridian
 Architects and Structural Engineers
 1209 High Street, The Priory, Chessington, Surrey, Surrey, Surrey, Surrey
 Tel: 0181 871 1000 Fax: 0181 871 1001
 www.primemerdian.co.uk

Client: **First Leeds Developments**

Project: **Proposed Development
 Barwell Service Station
 Chessington**

Title: **Units 5 to 8
 Proposed Floor Plans**

No. 377.12/PLA 12 B







Appendix D - Neighbouring Properties VSC, ADF & APSH Results

Vertical Sky Component (VSC) - with Overhangs

The table below summaries the results of the VSC analysis on the assessed windows of the surrounding properties.

Address	Windows Numbers	VSC Results - Proposed	Proposed VSC < 27 %	VSC Results - Existing	VSC Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
162-164 Leatherhead Rd	W1	26.65	Yes	30.76	13.55	0.86	No	Negligible
	W2							
	W3							
	W4	16.02	Yes	22.3	28.16	0.72	Yes	Minor
	W5	21.41	Yes	21.86	2.06	0.98	No	Negligible
	W6	4.98	Yes	2.6	91.54	1.92	No	Negligible
	W7	17.59	Yes	24.44	28.03	0.72	Yes	Minor
	W8	19.37	Yes	23.72	18.34	0.82	No	Negligible
170-172 Leatherhead Rd	W9	32.84	No	34.2	3.98	0.96	No	Negligible
	W10	35.54	No	37.1	4.2	0.96	No	Negligible
	W11	35.6	No	37.14	4.15	0.96	No	Negligible
	W12	80.78	No	81.22	0.54	0.99	No	Negligible
	W13	80.82	No	81.25	0.53	0.99	No	Negligible
	W14	33.04	No	34.89	5.3	0.95	No	Negligible
	W15	35.64	No	37.08	3.88	0.96	No	Negligible
	W16	35.69	No	37.01	3.57	0.96	No	Negligible
	W17	80.8	No	81.23	0.53	0.99	No	Negligible
	W18	80.84	No	81.19	0.43	1	No	Negligible
174-176 Leatherhead Rd	W19	33.48	No	34.46	2.84	0.97	No	Negligible
	W20	36.03	No	36.77	2.01	0.98	No	Negligible
	W21	36.29	No	36.95	1.79	0.98	No	Negligible
	W22	80.8	No	81.02	0.27	1	No	Negligible
	W23	80.93	No	81.12	0.23	1	No	Negligible
	W24	34.22	No	34.92	2	0.98	No	Negligible
	W25	36.49	No	37.08	1.59	0.98	No	Negligible
	W26	36.63	No	37.14	1.37	0.99	No	Negligible
	W27	81.01	No	81.2	0.23	1	No	Negligible
	W28	81.08	No	81.22	0.17	1	No	Negligible
1-2 Kelsey Cl	W29	36.09	No	36.31	0.61	0.99	No	Negligible
	W30	37.4	No	37.48	0.21	1	No	Negligible
	W31	31.92	No	32.16	0.75	0.99	No	Negligible
	W32	36.46	No	36.68	0.6	0.99	No	Negligible
	W33	8.52	Yes	8.95	4.8	0.95	No	Negligible

Address	Windows Numbers	VSC Results - Proposed	Proposed VSC < 27 %	VSC Results - Existing	VSC Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
	W34	36.87	No	37.18	0.83	0.99	No	Negligible
3-4 Kelsey Cl	W35	8.26	Yes	8.85	6.67	0.93	No	Negligible
	W36	36.24	No	37.12	2.37	0.98	No	Negligible
	W37	35.57	No	36.56	2.71	0.97	No	Negligible
	W38	31.88	No	32.18	0.93	0.99	No	Negligible
	W39	28.7	No	35.17	18.4	0.82	No	Negligible
	W40	32.16	No	36.92	12.89	0.87	No	Negligible
2-8 Nigel Fisher way	W41	33.17	No	34.14	2.84	0.97	No	Negligible
	W42	36.97	No	37.65	1.81	0.98	No	Negligible
	W43	36.99	No	37.68	1.83	0.98	No	Negligible
	W44	23.53	Yes	24.08	2.28	0.98	No	Negligible
	W45	23.48	Yes	24.3	3.37	0.97	No	Negligible
	W46	37.16	No	37.79	1.67	0.98	No	Negligible
	W47	37.27	No	37.87	1.58	0.98	No	Negligible
	W48	23.65	Yes	24.36	2.91	0.97	No	Negligible
	W49	26.87	Yes	27.6	2.64	0.97	No	Negligible
	W50	34.66	No	35.76	3.08	0.97	No	Negligible
	W51	36.83	No	37.59	2.02	0.98	No	Negligible
	W52	37.02	No	37.74	1.91	0.98	No	Negligible
1-2 Bailey Cres	W53	37.01	No	37.3	0.78	0.99	No	Negligible
	W54	37.06	No	37.31	0.67	0.99	No	Negligible
	W55	37.1	No	37.63	1.41	0.99	No	Negligible

Vertical Sky Component (VSC) - without Overhangs

Address	Windows Numbers	VSC Results - Proposed	Proposed VSC < 27 %	VSC Results - Existing	VSC Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
162-164 Leatherhead Rd	W1	26.66	Yes	30.76	13.34	0.87	No	Negligible
	W2							
	W3							
	W4	24.47	Yes	30.75	20.42	0.8	Yes	Negligible
	W5	30.48	No	31.06	1.87	0.98	No	Negligible
	W6	28.98	No	27	7.33	1.07	No	Negligible
	W7	26.2	Yes	33.08	20.8	0.8	No	Negligible
	W8	27.98	No	32.38	13.59	0.86	No	Negligible
1-2 Kelsey Cl	W29	36.08	No	36.28	0.55	0.99	No	Negligible
	W30	37.45	No	37.49	0.11	1	No	Negligible
	W31	31.94	No	32.16	0.68	0.99	No	Negligible
	W32	36.43	No	36.72	0.79	0.99	No	Negligible
	W33	35.11	No	35.68	1.6	0.98	No	Negligible
	W34	36.86	No	37.2	0.91	0.99	No	Negligible
3-4 Kelsey Cl	W35	34.14	No	35.53	3.91	0.96	No	Negligible
	W36	36.19	No	37.1	2.45	0.98	No	Negligible
	W37	35.6	No	36.52	2.52	0.97	No	Negligible
	W38	31.84	No	32.15	0.96	0.99	No	Negligible
	W39	28.72	No	35.2	18.41	0.82	No	Negligible
	W40	32.13	No	36.88	12.88	0.87	No	Negligible

Average Daylight Factor (ADF) - with Overhangs

The table below summaries the results of the ADF analysis on the relevant windows of the surrounding properties.

Address	Windows Numbers	ADF Results - Proposed	ADF Results - Existing	ADF Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
162-164 Leatherhead Rd	W1	0.65	0.66	2.8	0.97	No	Negligible
	W2	1.27	1.41	9.92	0.9	No	Negligible
	W3	0.53	0.64	16.81	0.83	No	Negligible
	W4	0.84	1.03	18.4	0.82	No	Negligible
	W5	0.93	0.94	1.48	0.99	No	Negligible
	W6	0.85	0.61	38.89	1.39	No	Negligible
	W7	0.77	0.95	18.71	0.81	No	Negligible
	W8	0.82	0.93	12.06	0.88	No	Negligible
170-172 Leatherhead Rd	W9	3.1	3.24	4.2	0.96	No	Negligible
	W10	1.38	1.43	3.2	0.97	No	Negligible
	W11	1.38	1.43	3	0.97	No	Negligible
	W12	0.94	0.94	0	1	No	Negligible
	W13	0.94	0.94	0	1	No	Negligible
	W14	3.12	3.31	5.88	0.94	No	Negligible
	W15	1.38	1.43	3	0.97	No	Negligible
	W16	1.39	1.42	2.6	0.97	No	Negligible
	W17	0.94	0.94	0	1	No	Negligible
	W18	0.94	0.94	0	1	No	Negligible
174-176 Leatherhead Rd	W19	3.17	3.27	3.17	0.97	No	Negligible
	W20	1.39	1.42	1.61	0.98	No	Negligible
	W21	1.4	1.42	1.4	0.99	No	Negligible
	W22	0.94	0.94	0	1	No	Negligible
	W23	0.94	0.94	0	1	No	Negligible
	W24	3.24	3.31	2.19	0.98	No	Negligible
	W25	1.41	1.43	1.2	0.99	No	Negligible
	W26	1.41	1.43	1	0.99	No	Negligible
	W27	0.94	0.94	0	1	No	Negligible
	W28	0.94	0.94	0	1	No	Negligible
1-2 Kelsey Cl	W29	1.4	1.4	0.41	1	No	Negligible
	W30	1.43	1.44	0.2	1	No	Negligible
	W31	1.09	1.1	0.68	0.99	No	Negligible
	W32	1.23	1.24	0.4	1	No	Negligible
	W33	0.49	0.51	2.5	0.97	No	Negligible
	W34	1.42	1.43	0.6	0.99	No	Negligible
3-4 Kelsey Cl	W35	0.49	0.5	2.53	0.97	No	Negligible

Address	Windows Numbers	ADF Results - Proposed	ADF Results - Existing	ADF Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
	W36	1.4	1.43	1.8	0.98	No	Negligible
	W37	1.21	1.24	2.02	0.98	No	Negligible
	W38	1.09	1.1	0.68	0.99	No	Negligible
	W39	1.16	1.37	15.5	0.84	No	Negligible
	W40	1.26	1.42	11.36	0.89	No	Negligible
2-8 Nigel Fisher way	W41	2.42	2.49	2.89	0.97	No	Negligible
	W42	1.25	1.26	1.19	0.99	No	Negligible
	W43	1.25	1.26	1.38	0.99	No	Negligible
	W44	0.57	0.58	1.66	0.98	No	Negligible
	W45	0.58	0.59	2.21	0.98	No	Negligible
	W46	1.25	1.26	1.18	0.99	No	Negligible
	W47	1.25	1.27	1.18	0.99	No	Negligible
	W48	0.56	0.57	2.2	0.98	No	Negligible
	W49	0.61	0.62	1.77	0.98	No	Negligible
	W50	2.54	2.6	2.56	0.97	No	Negligible
	W51	1.24	1.26	1.58	0.98	No	Negligible
1-2 Bailey Cres	W52	1.25	1.26	1.38	0.99	No	Negligible
	W53	1.92	1.93	0.6	0.99	No	Negligible
	W54	0.85	0.86	0.4	1	No	Negligible
	W55	0.62	0.63	0.99	0.99	No	Negligible

Average Daylight Factor (ADF) - without Overhangs

Address	Windows Numbers	ADF Results - Proposed	ADF Results - Existing	ADF Reduction = 1- Proposed/Existing (%)	Reduction Factor	Reduction beyond threshold 0.80	Impact
162-164 Leatherhead Rd	W1	0.65	0.66	2.8	0.97	No	Negligible
	W2	1.28	1.41	9.49	0.91	No	Negligible
	W3	0.53	0.64	16.81	0.83	No	Negligible
	W4	1.1	1.29	14.74	0.85	No	Negligible
	W5	1.18	1.2	1.39	0.99	No	Negligible
	W6	2.33	2.22	5.14	1.05	No	Negligible
	W7	1	1.18	15.34	0.85	No	Negligible
	W8	1.04	1.16	9.92	0.9	No	Negligible
1-2 Kelsey Cl	W29	1.4	1.4	0.41	1	No	Negligible
	W30	1.43	1.44	0.2	1	No	Negligible
	W31	1.09	1.1	0.68	0.99	No	Negligible
	W32	1.23	1.24	0.6	0.99	No	Negligible
	W33	1.22	1.24	1.23	0.99	No	Negligible
	W34	1.42	1.43	0.6	0.99	No	Negligible
3-4 Kelsey Cl	W35	1.18	1.23	3.82	0.96	No	Negligible
	W36	1.4	1.43	1.8	0.98	No	Negligible
	W37	1.21	1.23	1.82	0.98	No	Negligible
	W38	1.09	1.1	0.91	0.99	No	Negligible
	W39	1.16	1.37	15.5	0.84	No	Negligible
	W40	1.26	1.42	11.56	0.88	No	Negligible

Annual Probable Sunlight Hours (APSH) – with Overhangs

The table below summaries the results of the APSH analysis on the relevant windows of the surrounding properties. The assessed windows that face north are excluded from the APSH calculations⁷.

Address	Windows Numbers	Annual APSH (%) Proposed	Winter APSH (%) Proposed	Proposed Annual APSH < 25 %	Proposed Winter APSH < 5 %	Annual APSH (%) Existing	Winter APSH (%) Existing	Annual APSH Reduction Factor	Winter APSH Reduction Factor	Annual Impact	Winter Impact
162-164 Leatherhead Rd	W1	North Facing Window								Negligible	Negligible
	W2	North Facing Window								Negligible	Negligible
	W3	26.88	5.39	No	No	40.29	9.84	0.67	0.55	Negligible	Negligible
	W4	North Facing Window								Negligible	Negligible
	W5	38.53	16.48	No	No	43.3	17.73	0.89	0.93	Negligible	Negligible
	W6	7.27	7.27	Yes	No	5.89	5.89	1.23	1.23	Negligible	Negligible
	W7	24.19	2.38	Yes	Yes	36.65	12.41	0.66	0.19	Moderate	Major
	W8	27.63	4.39	No	Yes	36.9	13.66	0.75	0.32	Negligible	Major
170-172 Leatherhead Rd	W9	North Facing Window								Negligible	Negligible
	W10	North Facing Window								Negligible	Negligible
	W11	North Facing Window								Negligible	Negligible
	W12	North Facing Window								Negligible	Negligible
	W13	North Facing Window								Negligible	Negligible
	W14	North Facing Window								Negligible	Negligible
	W15	North Facing Window								Negligible	Negligible
	W16	North Facing Window								Negligible	Negligible
	W17	North Facing Window								Negligible	Negligible
	W18	North Facing Window								Negligible	Negligible
	W19	North Facing Window								Negligible	Negligible

⁷ Any windows that do not face within 90 degrees of due south can be ignored. Paul J Littlefair, BRE, 2022

Address	Windows Numbers	Annual APSH (%) Proposed	Winter APSH (%) Proposed	Proposed Annual APSH < 25 %	Proposed Winter APSH < 5 %	Annual APSH (%) Existing	Winter APSH (%) Existing	Annual APSH Reduction Factor	Winter APSH Reduction Factor	Annual Impact	Winter Impact
174-176 Leatherhead Rd	W20									Negligible	Negligible
	W21									Negligible	Negligible
	W22									Negligible	Negligible
	W23									Negligible	Negligible
	W24									Negligible	Negligible
	W25									Negligible	Negligible
	W26									Negligible	Negligible
	W27									Negligible	Negligible
	W28									Negligible	Negligible
1-2 Kelsey Cl	W29	50.81	17.23	No	No	50.81	17.23	1	1	Negligible	Negligible
	W30	53.45	17.36	No	No	53.45	17.36	1	1	Negligible	Negligible
	W31	39.72	5.01	No	No	39.72	5.01	1	1	Negligible	Negligible
	W32	51.38	14.04	No	No	51.38	14.04	1	1	Negligible	Negligible
	W33	12.91	6.83	Yes	No	15.41	6.83	0.84	1	Negligible	Negligible
	W34	52.51	16.48	No	No	53.38	16.48	0.98	1	Negligible	Negligible
3-4 Kelsey Cl	W35	15.48	8.96	Yes	No	16.54	8.96	0.94	1	Negligible	Negligible
	W36	52.13	16.92	No	No	53.63	16.92	0.97	1	Negligible	Negligible
	W37	52.32	17.17	No	No	53.7	17.17	0.97	1	Negligible	Negligible
	W38	51.38	16.6	No	No	52.32	16.6	0.98	1	Negligible	Negligible
	W39	48.5	15.04	No	No	49.19	15.04	0.99	1	Negligible	Negligible
	W40	51.13	15.91	No	No	53.51	15.91	0.96	1	Negligible	Negligible
2-8 Nigel Fisher way	W41	49	11.53	No	No	51.13	13.41	0.96	0.86	Negligible	Negligible
	W42	61.72	19.99	No	No	62.72	20.99	0.98	0.95	Negligible	Negligible
	W43	61.97	20.24	No	No	62.91	21.18	0.99	0.96	Negligible	Negligible
	W44	44.92	16.1	No	No	46.99	18.17	0.96	0.89	Negligible	Negligible
	W45	North Facing Window									Negligible

Address	Windows Numbers	Annual APSH (%) Proposed	Winter APSH (%) Proposed	Proposed Annual APSH < 25 %	Proposed Winter APSH < 5 %	Annual APSH (%) Existing	Winter APSH (%) Existing	Annual APSH Reduction Factor	Winter APSH Reduction Factor	Annual Impact	Winter Impact
	W46	61.84	20.43	No	No	62.91	21.49	0.98	0.95	Negligible	Negligible
	W47	62.28	20.74	No	No	63.28	21.74	0.98	0.95	Negligible	Negligible
	W48	46.24	17.29	No	No	48.12	19.17	0.96	0.9	Negligible	Negligible
	W49	North Facing Window								Negligible	Negligible
	W50	52.57	15.48	No	No	55.26	18.17	0.95	0.85	Negligible	Negligible
	W51	61.47	19.92	No	No	62.78	21.24	0.98	0.94	Negligible	Negligible
	W52	61.53	20.11	No	No	63.35	21.93	0.97	0.92	Negligible	Negligible
1-2 Bailey Cres	W53	76	25	No	No	77.07	26.07	0.99	0.96	Negligible	Negligible
	W54	74.81	24.69	No	No	75.88	25.75	0.99	0.96	Negligible	Negligible
	W55	57.46	19.74	No	No	57.58	19.86	1	0.99	Negligible	Negligible

Annual Probable Sunlight Hours (APSH) – without Overhangs

Address	Windows Numbers	Annual APSH (%) Proposed	Winter APSH (%) Proposed	Proposed Annual APSH < 25 %	Proposed Winter APSH < 5 %	Annual APSH (%) Existing	Winter APSH (%) Existing	Annual APSH Reduction Factor	Winter APSH Reduction Factor	Annual Impact	Winter Impact
162-164 Leatherhead Rd	W1	North Facing Window								Negligible	Negligible
	W2	North Facing Window								Negligible	Negligible
	W3	26.88	5.39	No	No	40.29	9.84	0.67	0.55	Negligible	Negligible
	W4	North Facing Window								Negligible	Negligible
	W5	65.6	16.54	No	No	71.3	18.61	0.92	0.89	Negligible	Negligible
	W6	60.03	14.97	No	No	63.85	14.54	0.94	1.03	Negligible	Negligible
	W7	36.15	5.01	No	No	47.18	13.41	0.77	0.37	Negligible	Negligible
	W8	39.79	7.02	No	No	48.5	15.73	0.82	0.45	Negligible	Negligible
1-2 Kelsey Cl	W29	50.81	17.23	No	No	50.81	17.23	1	1	Negligible	Negligible
	W30	53.45	17.36	No	No	53.45	17.36	1	1	Negligible	Negligible
	W31	39.72	5.01	No	No	39.72	5.01	1	1	Negligible	Negligible
	W32	51.38	14.04	No	No	51.38	14.04	1	1	Negligible	Negligible
	W33	45.86	13.22	No	No	48.37	13.22	0.95	1	Negligible	Negligible
	W34	52.51	16.48	No	No	53.38	16.48	0.98	1	Negligible	Negligible
3-4 Kelsey Cl	W35	49.69	16.54	No	No	50.75	16.54	0.98	1	Negligible	Negligible
	W36	52.13	16.92	No	No	53.63	16.92	0.97	1	Negligible	Negligible
	W37	52.32	17.17	No	No	53.7	17.17	0.97	1	Negligible	Negligible
	W38	51.38	16.6	No	No	52.32	16.6	0.98	1	Negligible	Negligible
	W39	48.5	15.04	No	No	49.19	15.04	0.99	1	Negligible	Negligible
	W40	51.13	15.91	No	No	53.51	15.91	0.96	1	Negligible	Negligible



SRE Registered Office

3 London Square | Cross Lanes

Guildford | Surrey | GU1 1UJ

T: +44 (0)1730 710044

E: info@sre.co.uk

SRE London Office | Parkshot House

5 Kew Road | Richmond

Surrey | TW9 2PR

T: +44 (0)20 8332 6633

W: www.sre.co.uk