metec
CONSULTING ENGINEERS

DAYLIGHT, SUNLIGHT AND SHADOW ASSESSMENT

for the

PROPOSED DEVELOPMENT

at

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TALLAGHT
DUBLIN 24

for

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CONTENTS

EXECUTIVE SUMMARY

METEC Consulting Engineers have been instructed by our client, to carry out an assessment of the Daylight, Sunlight and shadowing for the proposed Greenhills Road development. The scope of the assessment was to determine:

- The impact, if any, that the proposed development would have on the existing surrounding properties in terms of Daylight, Sunlight and shadowing;
- The Daylight and Sunlight levels that would be achieved by the proposed development.

Overall Methodology

The assessment of the proposed development was prepared using the methodology's set out in the British Standard: Lighting for Buildings – Part 2: Code for Practice for Daylighting, BRE 209, 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice', Second Edition 2011, by P. J. Littlefair and the Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018).

BRE Guide and Advisory Note

The numerical guidelines given in these documents are purely advisory. The BRE Guide states that:

"The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design." "It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location".

Overall Conclusion

Overall Conclusion

In our opinion, after carrying out a comprehensive daylight, sunlight and overshadowing assessment of the proposed development using simulation modelling and comparing results achieved against the BRE guidelines, the results presented within this report demonstrate that overall, the proposed development achieves the guidance given in BRE BR209 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice'.

Executive Summary Results Table

Design Parameters which have been reviewed as part of this study	Methodology	Recommended Guidelines (note these are not mandatory values)	Compliance achieved in line with the BRE Guide
Daylight Assessment on <u>Neighbouring Buildings</u> – Vertical Sky Component (VSC) and Average Daylight Factor (ADF) Calculations (Referring to nearby 3rd Party Residential)	IES VE Radiance Daylight Simulation	**BRE Guide [2.2]** • VSC ≥ 27% (Or where that is not achieved) • ≤ 20% reduction in VSC compared to its previous value before the proposed development (as simulated)	The VSC and daylight results demonstrate that the proposed development will not result in any significant loss of daylight received by the existing neighbouring properties. Refer to Section 8.0 of this Report for a more in-depth commentary.
Average Daylight Factor (ADF) (Referring to the Proposed Development)	IES VE Radiance Daylight Simulation	**BRE Guide [2.1.8]** • 2% for Kitchens • 1.5% for Living Rooms • 1% for Bedrooms	Of the 20 Ground and First floor rooms that were assessed for daylight, ALL Assessed rooms achieved the BRE daylight guidelines. Refer to Section 9.0 of this Report for a more in-depth commentary.
Sunlight Assessment on <u>Adjacent Neighbouring Buildings</u> – Annual Probable Sunlight Hours (APSH) (Referring to nearby 3rd Party Residential)	IES VE SunCast Simulation	**BRE Guide [3.2.]** • Receives more than 25% of annual probable sunlight hours, or more than 5% of annual probable sunlight hours between 21st September and 21st March; (Or where that is not achieved) • ≤ 20% reduction in APSH compared to its previous value before the proposed development (as simulated) • Has a reduction in sunlight received over the whole year less than 4% of annual probable sunlight hours.	All calculated Annual Probable Sunlight Hours achieve the BRE recommended values for safeguarding access to sunlight in existing dwellings. Therefore 3rd party residential amenity in terms of access to sunlight when compared with their existing baseline experience shall not be compromised as a result of this proposed development. It is important to note that the assessment windows are worst case scenario ground floor windows which face the proposed development, some are north facing and therefore have reduced sunlight access by

Design Parameters which have been reviewed as part of this study	Methodology	Recommended Guidelines (note these are not mandatory values)	Compliance achieved in line with the BRE Guide
			their nature. Where only a small number of windows, as is the case here with the proposed development in place, a classification of minor adverse impact is appropriate in-line with the BRE Guide. Refer to Section 10.0 of this Report for a more in-depth commentary.
Sunlight Assessment on <u>Proposed Buildings</u> – Annual Probable Sunlight Assessment on Proposed Buildings – Annual Probable Sunlight Hours (APSH) (Referring to Proposed Development)	IES VE SunCast Simulation	**BRE Guide [3.1.15]** 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 21st of September and 21st March.	Based on the results presented within Section 11.0 of this report it can be seen that the elevations / facades of proposed development will receive very good levels of Sunlight. **All** of dwellings achieve the BRE Guide recommend metric for Sunlight availability.
Sunlight Assessment on Amenity Space – Sunlight Hours **(Referring to nearby 3rd Party Residential)**	IES VE SunCast Simulation	BRE Guide [3.3.17] 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 a new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on March 21st is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.	All assessed neighbouring amenity areas achieve the BRE Guideline recommended values for safeguarding access to sunlight. Refer to Section 12.0 of this Report for a more in-depth commentary.
Sunlight	IES VE	**BRE Guide [3.3]**	The BRE recommended criteria for

Design Parameters which have been reviewed as part of this study	Methodology	Recommended Guidelines (note these are not mandatory values)	Compliance achieved in line with the BRE Guide
Assessment on <u>Amenity Space</u> (Referring to Proposed Development)	SunCast Simulation	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.	sunlight in amenity spaces is achieved for the proposed development.. Refer to Section 13.0 of this Report for a more in-depth commentary.
Solar Shading (Referring to nearby 3rd Party Residential)	IES VE SunCast Simulation	**BRE Guide [3.3.17]** Where a large building is proposed which may affect a number of gardens or open spaces it is often illustrative to plot a shadow plan showing the location of shadows at different times of the day and year.	Existing and proposed solar shading images have been presented to illustrate the shadows that will occur on March 21st, June 21st and December 21st, however it should be noted that in December, even low buildings will cast long shadows. It should be borne in mind when interpreting the shadowing images that nearly all structures will create areas of new shadows, and some degree of shadow a space is to be expected Refer to Section 14.0 of this Report for a more in-depth commentary and Appendix F for images.

1.0 INTRODUCTION

METEC Consulting Engineers have been instructed by our client, to carry out an assessment of the Daylight, Sunlight and shadowing for the proposed Greenhills Road development.

- The impact, if any, that the proposed development would have on the existing surrounding properties in terms of Daylight, Sunlight and Overshadowing;
- The Daylight and Sunlight levels that would be achieved by the proposed development.

Daylight and Sunlight calculations have been carried out in accordance with BRE's 'Site Layout Planning for Sunlight and Daylight: A Guide to Good Practice' (2011) (herein referred to as the "BRE Guide") by P J Littlefair, which is accepted as good practice by Planning Authorities. The Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018) were also considered as part of this study.

The BRE Guide gives advice on site layout to achieve provision of daylight and sunlight both within buildings, and in the open spaces between them. In general, it aims to aid designers in considering the relationship between new and existing buildings to ensure that each retains the potential to achieve good daylighting and sunlight levels.

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

It is therefore important that the guidelines that exist in relation to daylight and sunlight are read in the correct context and are not viewed as mandatory requirements.

2.0 SITE DESCRIPTION AND DEVELOPMENT OVERVIEW

The application site is generally bounded to the north by St. Basil's Training Centre, to the east by Greenhills Road, to the west by Old Greenhills Road, and at the southeastern corner by Main Street. The subject site is currently partly developed with an existing residential scheme known as Greenhill's Court comprising 17 no. apartment units in 4 no. apartment blocks ranging in height from 2 to 4 storeys, including basement car park.

The development will consist of: the demolition of 3 no. existing apartment units (c. 239 sqm) and bin store (c. 18 sq m) and the construction of a residential development arranged in 2 no. building blocks, (Block A and Block B) ranging from 3 to 6 no. storeys in height over basement level (c. 3728 sq m, including basement). Block A comprises 11 no. residential apartments (c. 1256 sq m) in a 5 to 6 storey building, and including a ground floor level café (c. 93 sq m) at the building's southeastern corner. Block B comprises 15 no. residential apartments (c. 1393 sq m) in a 3 to 5 storey building. The proposed development will comprise 26 no. new residential units (5 no. studio apartments, 6 no. 1-bedroom apartments, 7 no. 2-bedroom apartments and 8 no. 3-bedroom apartments), with associated balconies and terraces. The proposed development will comprise a total of 40 no. apartment units derived from 26 no. new apartments and 14 no. existing apartments.

The development will also consist of: Relocation of existing basement access on Old Greenhills Road and the upgrade and extension of the existing basement level; provision of internal footpaths; landscaped communal open space (including outdoor gym equipment, children's play area and 'working from home' area); public open space; 13 no. car parking spaces and 74 no. long-stay bicycle parking spaces and 1 no. motorcycle parking spaces at basement level; 2 no. shared car parking spaces and 20 no. short-stay bicycle parking spaces at surface level (15 no. car parking spaces, 94 no. cycle parking spaces and 1 no. motorcycle parking in total); all piped infrastructure and ducting; elevation treatments; plant room; lift access and stair cores; hard and soft landscaping and boundary treatments; changes in level; waste management areas; attenuation tank; backup generator; solar photovoltaic panels; lighting; and all associated site development and excavation works above and below ground.

Figure 2.0.1 – Proposed Development Site Layout Plan

3.0 DEFINITIONS

The technical definitions that are referred to in this report are explained below.

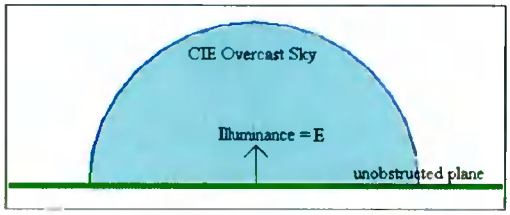
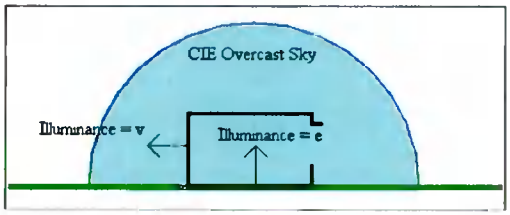
BRE	Building Research Establishment.
Average Daylight Factor (ADF)	The ratio of total daylight flux incident on a reference area to total area of reference area, expressed as a percentage of outdoor illuminance on a horizontal plane due to an unobstructed hemisphere of sky of assumed or known luminance distribution.
Vertical Sky Component (VSC)	The Vertical Sky Component (VSC) is the "Ratio of that part of illuminance, at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the "given vertical plane" is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.  E= illuminance on an unobstructed plane.  e= illuminance at point in interior Sky Component =e/E (often expressed as a percentage) Vertical Sky Component = v/E
CIE Standard Overcast Sky	A completely overcast sky for which the ratio of its luminance Ly at an angle of elevation y above the horizontal to the luminance Lz at the zenith is given by; $L_y = L_z \frac{(1 + 2\sin y)}{3}$ The CIE standard overcast sky is darkest at the horizon and brightest at the zenith (vertically overhead).
Annual Probable Sunlight Hours	The long-term average of the total number of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account).

Table 3.0.1 – Definitions of key terms referenced in this study

4.0 GUIDANCE DOCUMENTS REFERENCED DURING THIS STUDY

This Daylight, Sunlight and Overshadowing Assessment, has been carried out in accordance with the methodology outlined in the BRE Guide.

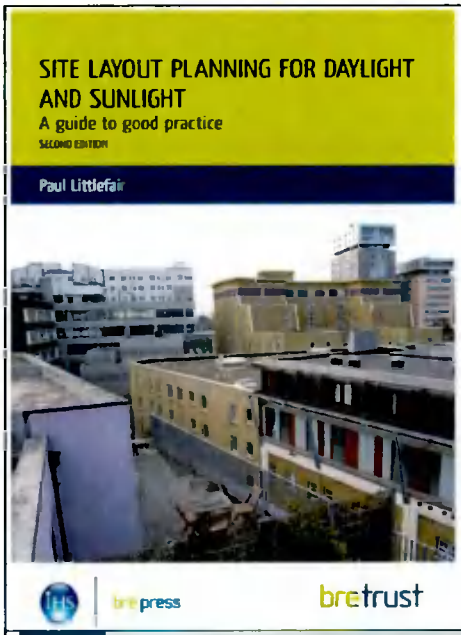
	This document gives advice on site layout planning to achieve good sun lighting and daylighting, both within buildings and in the open spaces between them. This authoritative document is widely used to provide advice during the planning and design stages of building development in the UK and Ireland. Guidance is given on site layout for good sun lighting and daylighting; safeguarding of daylight and sunlight within existing buildings nearby; and the protection of daylighting of adjoining land for future development.
	Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018).

Table 4.0.1 – Guidance Documents Referenced for this Study

5.0 ASSESSMENT METHODOLOGY

This Daylight, Sunlight and Overshadowing Assessment was carried out using the simulation software IES VE. The simulation results were then compared against metrics referenced in the BRE Guide. It is important to note that the BRE Guide does not contain mandatory requirements and the guide should not be seen as an instrument of planning policy. Section 1.6 of the BRE Guide states that: *"Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values"*

Average Daylight Factor (ADF)

ADF is a measure of the adequacy of diffuse daylight within a room, and accounts for factors such as the size of a window in relation to the size of the room; the reflectance of the walls; and, the nature of the glazing and number of windows.

BRE guidelines confirm that the recommended minimum ADF target value depends on the room uses. That is 1% for a bedroom, 1.5% for a living room and 2% for a kitchen. Where applicable within this assessment, kitchen spaces that measure less than 6.5m^2 (and therefore not deemed to be a habitable space) are omitted from the scope of the daylight calculation. The BRE Guide also states – "If the layout means that a small internal galley-type kitchen is inevitable, it should be directly linked to a well daylight living room"

Annual Probable Sunlight Hours (APSH)

Paragraph 3.1.11 of the BRE Guide states that if a room faces significantly north of due east or west it is unlikely to meet the recommended sunlight levels. Therefore, these orientations were not analysed for APSH because the BRE Guide recognises that good sun light availability is unachievable for these orientations.

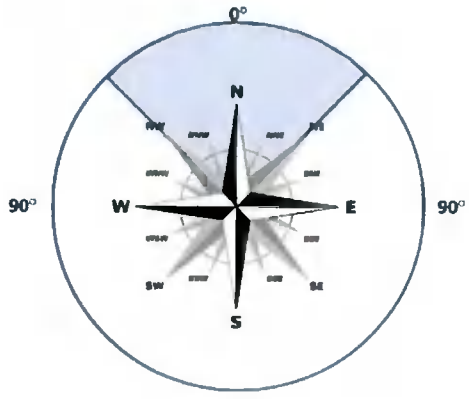


Figure 5.0.1 – Orientations analysed for APSH.

6.0 SIMULATION SOFTWARE DESCRIPTION

IES VIRTUAL ENVIRONMENT

IES Virtual Environment is the world's leading building performance analysis tool. The software provides an in-depth suite of integrated analysis tools which allow an integrated design approach and highly detailed results.

IES VIRTUAL ENVIRONMENT - RADIANCE

Radiance is a software package developed by the Lighting Systems Research group at the Lawrence Berkeley Laboratory in California, USA. Radiance was developed as a research tool for predicting the distribution of visible radiation in illuminated spaces.

IES VIRTUAL ENVIRONMENT - SUNCAST

SunCast enables engineers to perform shading and solar insolation analysis studies and can generate images and animations. SunCast generates shadows and internal solar insolation from any sun position defined by date, time, orientation, site latitude and longitude. SunCast can be used at any stage of the design process from a model created by the IES Model Builder.

7.0 SIMULATION MODEL IMAGES

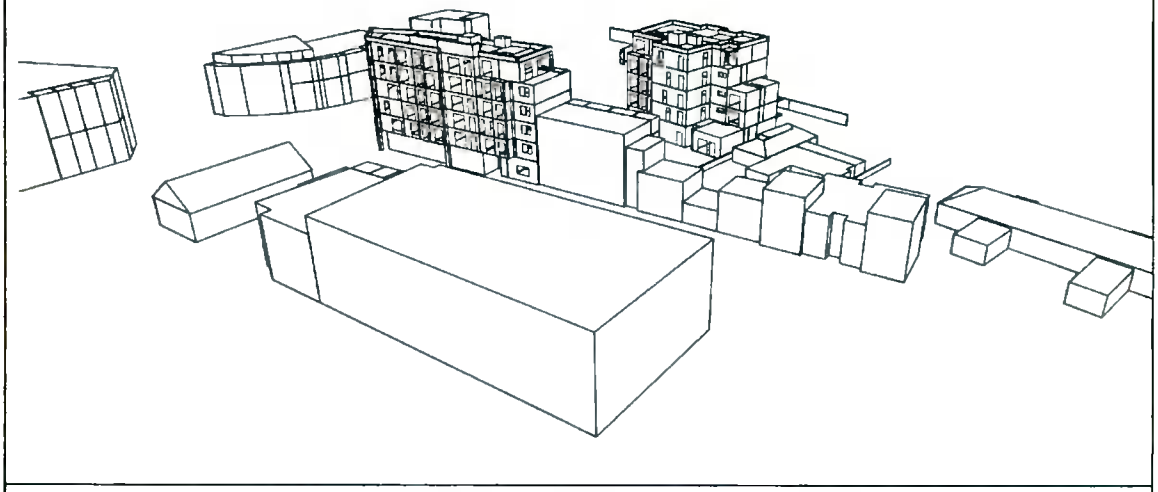


Figure 7.0.1 View from the North-East.

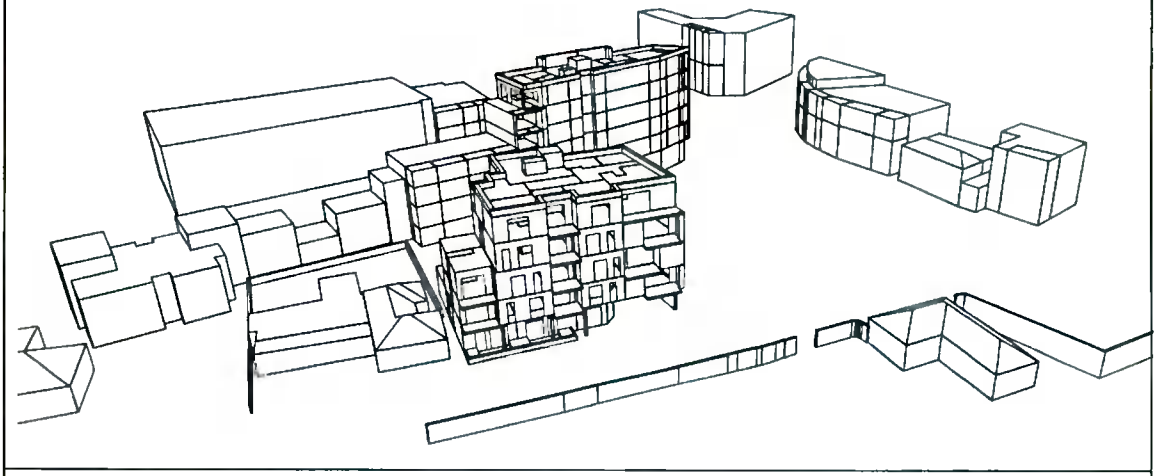


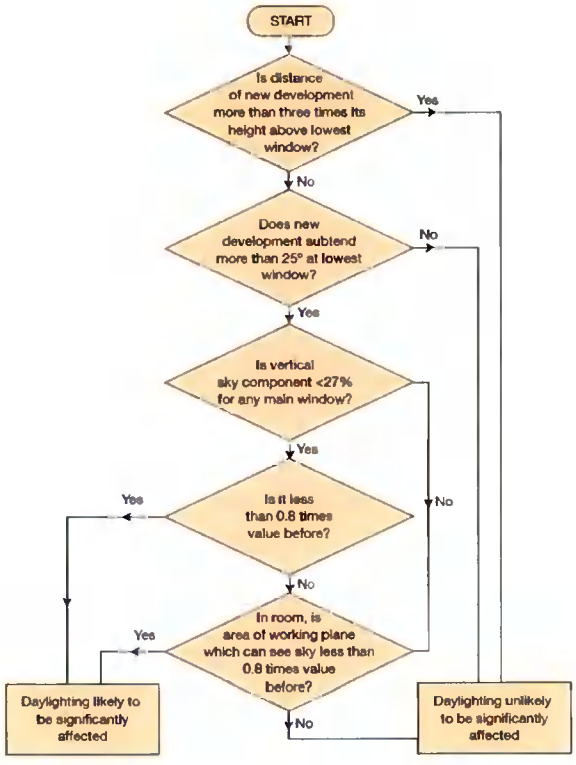
Figure 7.0.2 View from the North-East.

8.0 DAYLIGHT ASSESSMENT – NEIGHBOURING PROPERTIES

The guidelines given within the BRE Guide are intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed.

To analyse the effects of the proposed development on the adjacent dwellings in the immediate surrounding area of the Main Road Site, a Vertical Sky Component (VSC) simulation was carried out using the IES Radiance software package. For the VSC definition refer to Section 3.0 of this report (page 16). The VSC was calculated with the proposed development in place using a simulation model. In accordance with Section 2.2 of the BRE Guide, where a VSC of 27% or greater is achieved, "enough skylight should still be reaching the existing building" and therefore daylighting will not be significantly affected. The BRE Methodology is summarised below. Where a VSC less than 27% is achieved further analysis is required to determine the likely daylight levels that will be achieved in affected spaces.

Methodology (as referenced in Section 2.2 of the BRE Guide)



Decision chart / methodology used to quantify the impact of a new development on daylight levels of nearby buildings / dwellings.

Figure 8.0.1 – BRE Guide VSC Decision Chart

The VSC has been calculated for all main windows of surrounding dwellings which face the proposed development. Figure 8.0.2 below identifies the dwellings that were analysed as part of this assessment. The results of this VSC analysis are presented overleaf.

Figure 8.0.2 – Assessed Surrounding Dwellings

Greenhills Court LHS

Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	35.32	Yes
2	35.25	Yes
3	35.02	Yes
4	35.34	Yes
5	33.48	Yes
6	32.86	Yes
7	32.57	Yes
8	33.35	Yes
9	31.15	Yes
10	30.57	Yes
11	30.73	Yes
12	31.41	Yes
13	28.79	Yes
14	28.43	Yes
15	28.57	Yes
16	28.49	Yes

Table 8.0.3 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the windows referenced W1 – W16 will not be compromised as a result of the proposed development because the VSC in all cases is ≥ 27%.

Greenhills Court RHS

Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	30.42	Yes
2	29.32	Yes
3	28.67	Yes
4	27.66	Yes
5	26.21	As VSC is below 27%, further analysis is required, see overleaf.
6	25.39	As VSC is below 27%, further analysis is required, see overleaf.
7	23.80	As VSC is below 27%, further analysis is required, see overleaf.
8	23.04	As VSC is below 27%, further analysis is required, see overleaf.

Table 8.0.4 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the windows referenced W1 – W4 will not be compromised as a result of the proposed development because the VSC in all cases is ≥ 27%.

For the windows identified as having a VSC below 27% and less than 0.8 times the value before, with the proposed development in place an Average Daylight Factor (ADF) Calculation was undertaken to determine the level of daylight that would be achieved in the rooms these windows serve, and whether the BRE guideline ADF would are achieved with the proposed development in place. The rooms have been assumed to be kitchen spaces, and therefore have a target ADF of 2%, which represents a high level of daylight. Default surface properties were applied to these rooms, the model inputs applicable to these spaces are outlined in table 8.0.13 below. Table 8.0.14 below presents the calculated ADF values with the proposed development in place.

Parameter	Value
Surface Reflectance's	
1. Internal ceilings	70% - default value
2. Internal walls	50% - default value
3. Internal floors	20% - default value
Glazing Transmittance	70%
Frame	0.1m frame width
Working Plane	0.85m

Table 8.0.13 – Daylight Model Inputs

Window Ref.	Room Type	Target ADF (%)	ADF Achieved (%)	Target ADF Achieved
5	Bedroom	1.0	1.0	Yes
6	Bedroom	1.0	1.83	Yes
7	Kitchen Living Dining	1.5	1.98	Yes
8	Bedroom	1.0	1.14	Yes

Table 8.0.14 – Average Daylight Factor Results

The ADF results demonstrate that with the proposed development in place the BRE Guideline ADF values are achieved for the assessment Windows 5, 6, 7 and 8. This demonstrates good daylight access will be safeguarded to these dwellings with the proposed development in place.

Presented in Appendix A of this report are the daylight distribution images for these assessment rooms.

Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	35.50	Yes
2	35.46	Yes
3	35.14	Yes
4	35.57	Yes
5	35.31	Yes
6	33.99	Yes
7	34.05	Yes
8	33.92	Yes
9	32.94	Yes
10	31.00	Yes
11	30.72	Yes
12	29.37	Yes
13	33.04	Yes
14	32.61	Yes
15	32.50	Yes
16	33.23	Yes
17	32.75	Yes
18	31.35	Yes
19	28.09	Yes
20	27.70	Yes
21	26.83	Yes

Table 8.0.5 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the windows referenced W1 – W21 will not be compromised as a result of the proposed development because the VSC in all cases W1 - W20 is ≥ 27% and for W21 ≥ .8 times previous VSC value.

New Bancroft Hall

Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	36.56	Yes
2	35.96	Yes
3	35.32	Yes
4	34.85	Yes
5	36.04	Yes
6	36.62	Yes
7	37.10	Yes
8	34.65	Yes
9	35.67	Yes
10	36.03	Yes

Table 8.0.6 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the windows referenced W1 – W10 will not be compromised as a result of the proposed development because the VSC in all cases is ≥ 27%.

Priors Gate

Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	38.75	Yes
2	38.64	Yes
3	38.47	Yes
4	38.54	Yes
5	38.29	Yes
6	37.93	Yes
7	37.99	Yes
8	37.77	Yes

Table 8.0.8 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the windows referenced W1 – W8 will not be compromised as a result of the proposed development because the VSC in all cases is ≥ 27%.

The Laurels

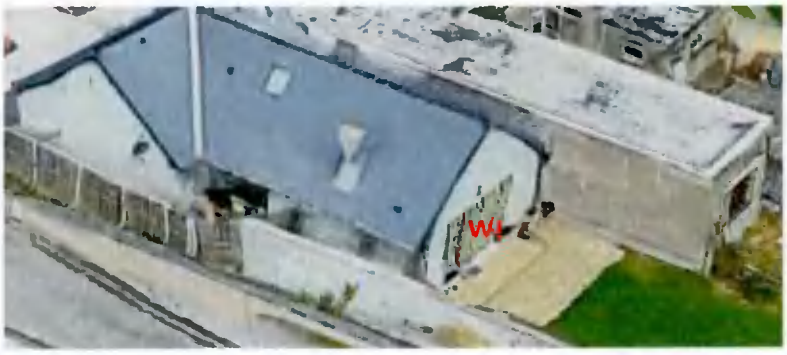
Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	37.52	Yes

Table 8.0.9 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the window referenced W1 will not be compromised as a result of the proposed development because the VSC is ≥ 27%.

Court cottage



Simulation Results

Window Reference	VSC with Proposed Development (%)	Compliant with BRE Guideline for Safeguarding Daylight
1	28.65	Yes

Table 8.0.9 – VSC Results for Surrounding Assessment Dwellings

The results confirm that the access to daylight of the window referenced W1 will not be compromised as a result of the proposed development because the VSC is ≥ 27%.

9.0 DAYLIGHT ASSESSMENT – PROPOSED DEVELOPMENT

Daylight Assessment

A selection of Ground and First Floor apartments were selected for a detailed daylight assessment. The apartments selected were identified on the basis of being worst case scenario in terms of daylight. Generally, when upper floors are assessed for daylight, they will achieve better daylight results as they receive less obstructions and have greater access to the sky.

Of the 20 rooms that were assessed for daylight, **All** assessed rooms achieve the BRE daylight guidelines.

Appendix B presents the daylight results for the dwellings within the proposed development.

Appendix C presents daylight distribution images.

Appendix D presents the software inputs that were specified within the daylight modelling software for the calculation of average daylight factors.

10.0 SUNLIGHT ASSESSMENT – NEIGHBOURING PROPERTIES

In designing a new development or extension to a building, it is important to safeguard the access to sunlight where there is a particular requirement for sunlight. To assess the sunlight impact to existing buildings the BRE Guide has been followed. A summary of the BRE Guide for safeguarding sunlight is provided in the table below.

Methodology (as referenced in Section 3.2 of the BRE Guide)

Design Issue	BRE Recommended Criteria – Section 3.2
Safeguarding Sunlight to Neighbouring Properties	If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends at an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sun lighting of the window 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 21st September and 21st 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?

Table 10.0.1 – BRE Guide methodology for safeguarding sunlight

The previously identified surrounding assessment dwellings, Figure 8.0.2 page 18, have been assessed for sunlight impact. In accordance with the BRE Guidelines main living room windows which face the proposed development have been assessed, as identified in the methodology section of this report windows which face significantly north of due east or west have not been analysed for APSH because the BRE Guide recognises that good sun light availability is unachievable for these orientations. Results are presented overleaf.

It should be noted that the Main living room windows of Greenhills LHS are facing out onto Greenhills Road and as such, will not be affected by the proposed development. On that basis, sunlighting analysis on these areas has not been carried out.

Greenhills Court LHS

Simulation Results

Window Reference	APSH with Proposed Development (%) (Recommended Value ≥25%)	APSH Between 21st September and 21st March with Proposed Development (%) (Recommended Value ≥5%)	Compliant with BRE Guide for Safeguarding Access to Sunlight
1	47.28	15.56	Yes
4	46.82	18.18	Yes
5	40.67	14.58	Yes
8	41.52	18.18	Yes
9	33.20	14.17	Yes
12	37.85	18.18	Yes
13	28.67	14.16	Yes
16	34.85	16.80	Yes

Table 10.0.2 – APSH Results for Surrounding Assessment Dwellings

8 of the 8 assessed neighbouring main living room windows achieve the BRE Guideline recommended values for safeguarding annual access to sunlight, and achieve the BRE Guideline recommended values for safeguarding winter assess to access to sunlight.

Greenhills Court RHS

Table 10.0.3 – APSH Results for Surrounding Assessment Dwellings

Simulation Results

Window Reference	APSH with Proposed Development (%) (Recommended Value ≥25%)	APSH Between 21st September and 21st March with Proposed Development (%) (Recommended Value ≥5%)	Compliant with BRE Guide for Safeguarding Access to Sunlight
W1	29.57	9.39	Yes
W4	26.18	9.72	Yes
W7	20.96	9.09	Yes

2 of the 3 assessed neighbouring main living room windows achieve both the BRE Guideline recommended values for safeguarding annual access to sunlight, and achieve the BRE Guideline recommended values for safeguarding winter assess to access to sunlight. Although W7 is marginally outside the recommended Annual APSH % it does achieve the recommended Winter APSH of >5% ensuring access to sunlight is safeguarded.

Table 10.0.4 – APSH Results for Surrounding Assessment Dwellings

Simulation Results

Window Reference	APSH with Proposed Development (%) (Recommended Value ≥25%)	APSH Between 21st September and 21st March with Proposed Development (%) (Recommended Value ≥5%)	Compliant with BRE Guide for Safeguarding Access to Sunlight
W1	35.80	9.01	Yes
W2	34.87	8.42	Yes
W3	35.42	8.50	Yes
W6	35.20	7.92	Yes
W10	30.49	7.69	Yes
W13	42.55	12.79	Yes
W14	41.88	12.20	Yes
W15	41.88	11.62	Yes
W18	38.84	9.28	Yes
W19	35.99	8.39	Yes

10 of the 10 assessed neighbouring main living room windows achieve the BRE Guideline recommended values for safeguarding annual access to sunlight, and achieve the BRE Guideline recommended values for safeguarding winter assess to access to sunlight.

Court cottage

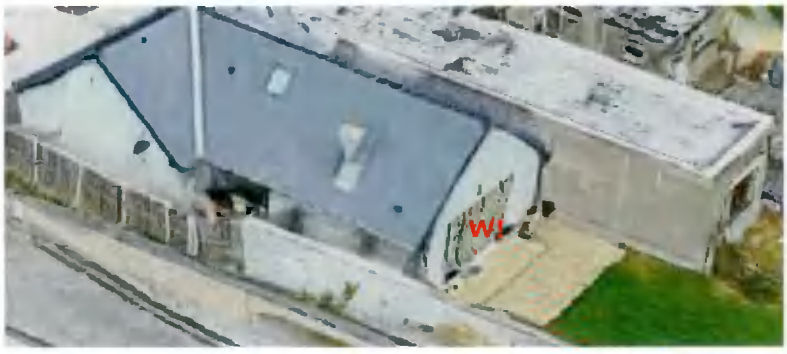


Table 10.0.2 – APSH Results for Surrounding Assessment Dwellings

Simulation Results

Window Reference	APSH with Proposed Development (%) (Recommended Value ≥25%)	APSH Between 21st September and 21st March with Proposed Development (%) (Recommended Value ≥5%)	Compliant with BRE Guide for Safeguarding Access to Sunlight
W1	32.29	8.00	Yes

The assessed neighbouring main living room window achieves the BRE Guideline recommended value for safeguarding annual access to sunlight, and achieve the BRE Guideline recommended value for safeguarding winter assess to access to sunlight.

11.0 SUNLIGHT ASSESSMENT – PROPOSED DEVELOPMENT

In general, a dwelling, or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided the following recommended BRE Guide metrics are achieved.

Methodology (as referenced in Section 3.1 of the BRE Guide)

Design Issue	BRE Recommended Criteria – Section 3.1
Sunlight	In general, a dwelling, of non-domestic building which has a particular requirement for sunlight will appear reasonably sunlit provided;
	(1) At least one main window wall faces within 90º of due south; and
	(2) 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 21st September and 21st March.

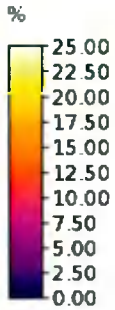
BRE Guidelines and Advisory Notes

It is important that the guidelines that exist in relation to sunlight are read in the correct context and are not viewed as mandatory requirements for all dwellings.

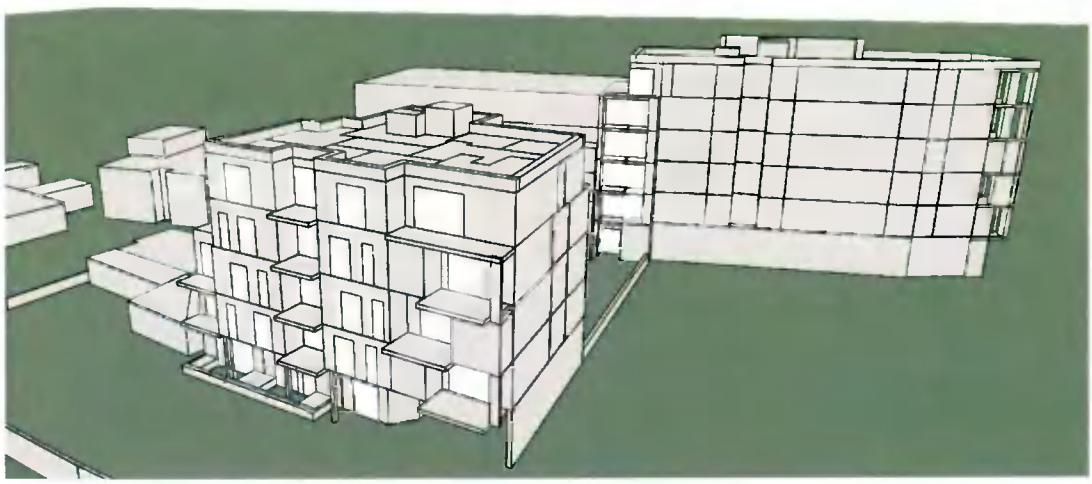
1. The BRE Guide states "Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations" (Section 3.1.16). In our opinion this outlines that there is not an expectation that all dwellings will achieve the guidelines for Sunlight, particularly in high density developments.

2. Paragraph 3.1.11 of the BRE Guide states that if a room faces significantly north of due east or west it is unlikely to meet the recommended levels. Therefore, taking this BRE statement into account, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Full Year



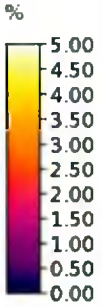
South-West View of Proposed Development



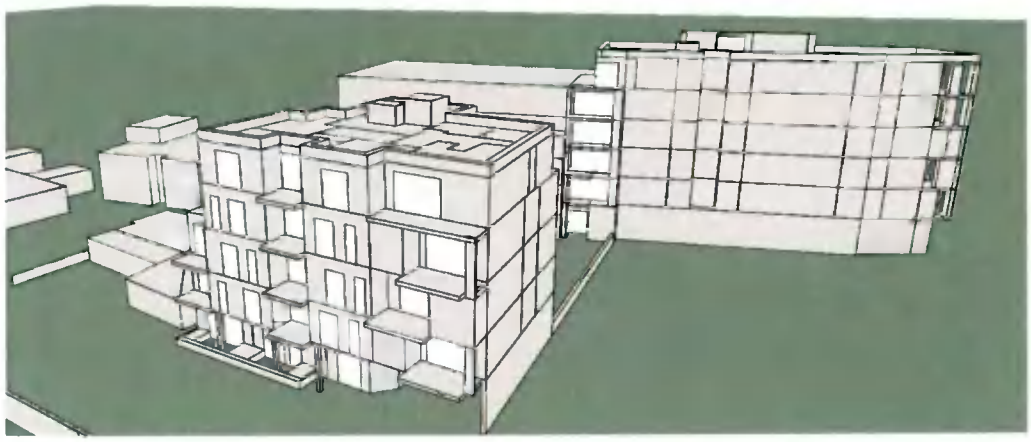
The Sunlight target is 25% annually (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. Using the legend, the specific sunlight hours can be determined for windows that do not exceed the target value.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Winter Months



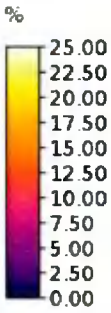
South-West View of Proposed Development



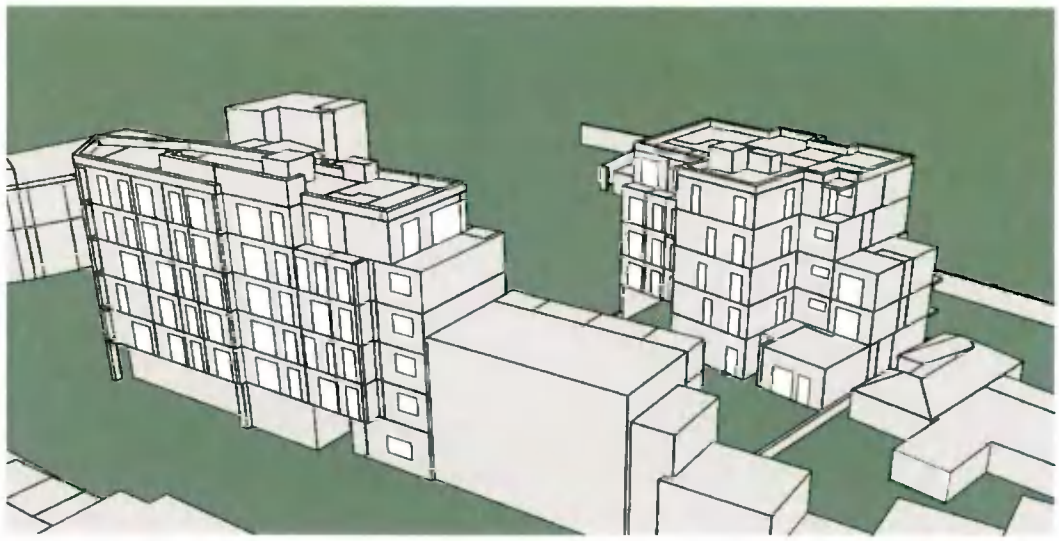
The Sunlight target is 5% for winter months (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. All rooms have a main window that achieves the BRE sunlight target.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Full Year



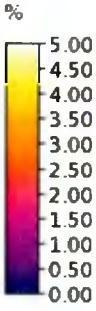
North-East West View of Proposed Development



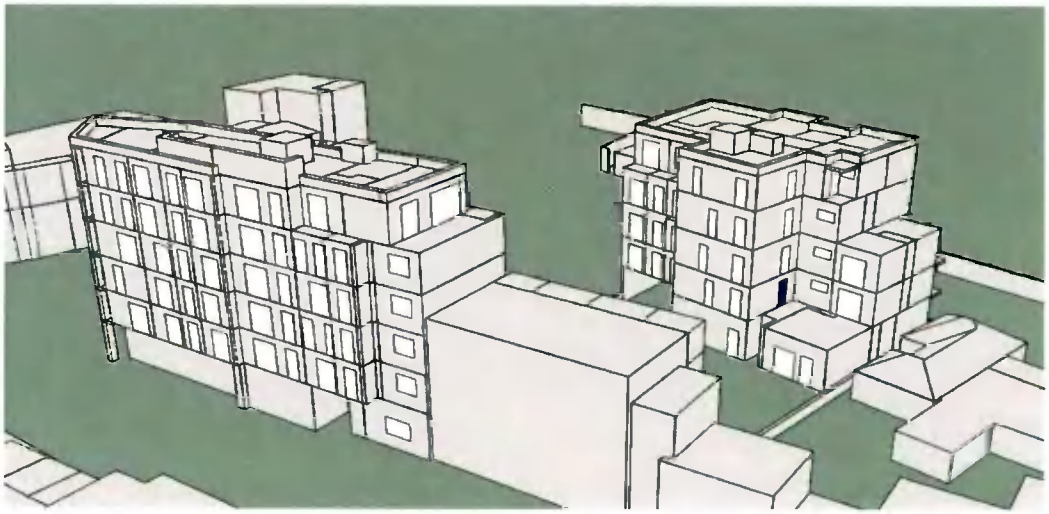
The Sunlight target is 25% annually (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. Using the legend, the specific sunlight hours can be determined for windows that do not exceed the target value.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Winter Months



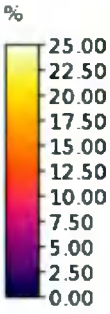
North-West View of Proposed Development



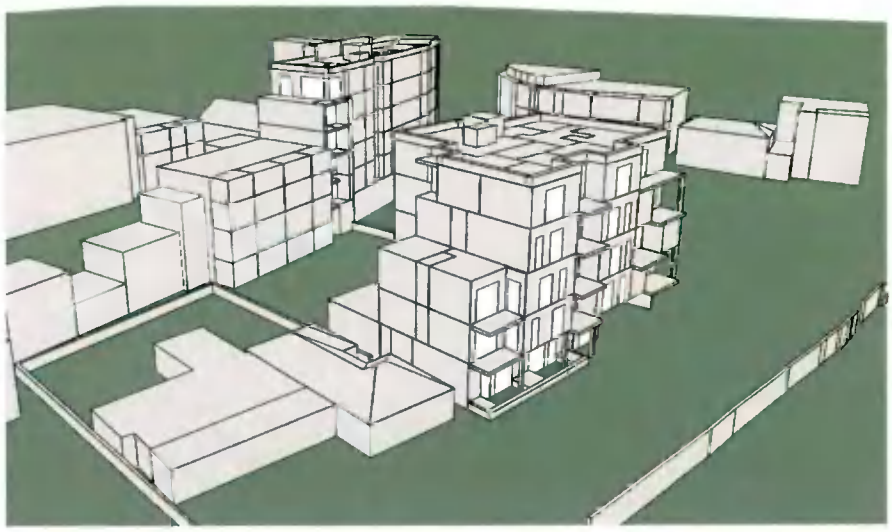
The Sunlight target is 5% for winter months (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. All rooms have a main window that achieves the BRE sunlight target.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Full Year



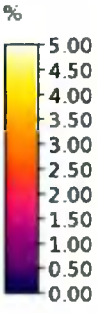
North-West View of Proposed Development



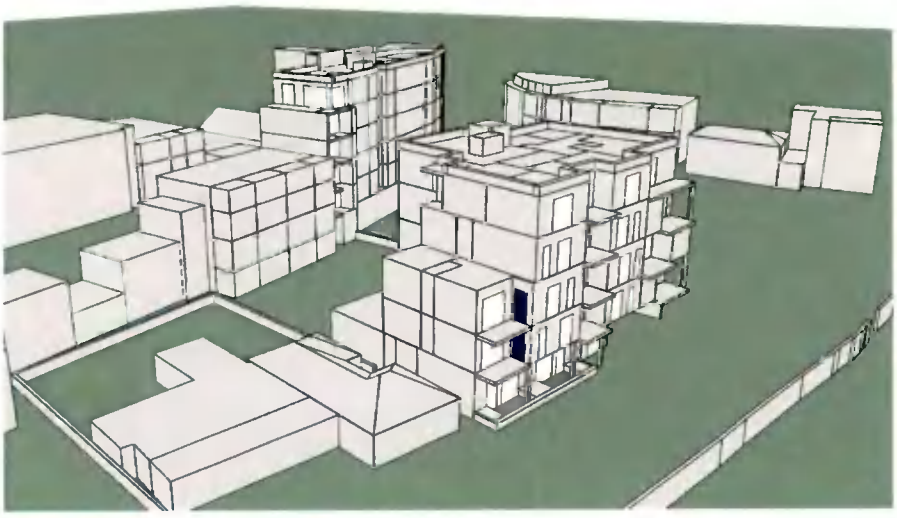
The Sunlight target is 25% annually (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. Using the legend, the specific sunlight hours can be determined for windows that do not exceed the target value.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Winter Months



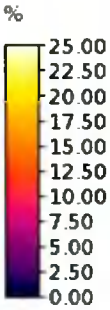
North-West View of Proposed Development



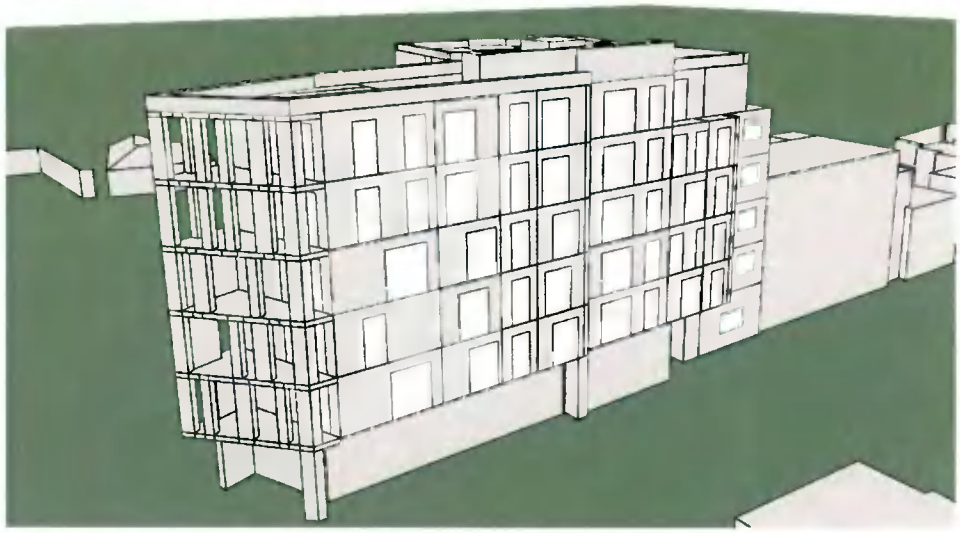
The Sunlight target is 5% for winter months (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. All rooms have a main window that achieves the BRE sunlight target.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Full Year



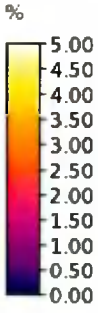
South-East View of Proposed Development



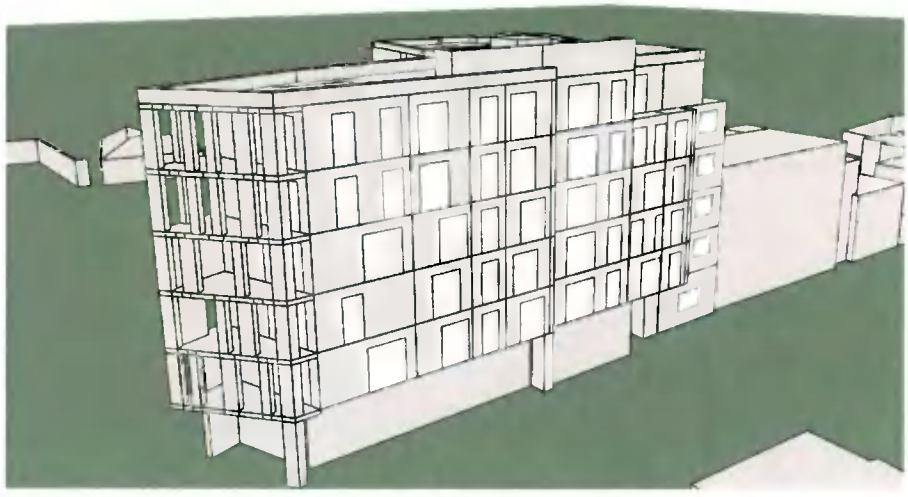
The Sunlight target is 25% annually (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. Using the legend, the specific sunlight hours can be determined for windows that do not exceed the target value.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Simulation Results – Winter Months



South-East View of Proposed Development



The Sunlight target is 5% for winter months (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than the target value. All rooms have a main window that achieves the BRE sunlight target.

Note: As outlined in the methodology, only windows that face significantly south of due east and west were assessed as part of this study.

Results Summary

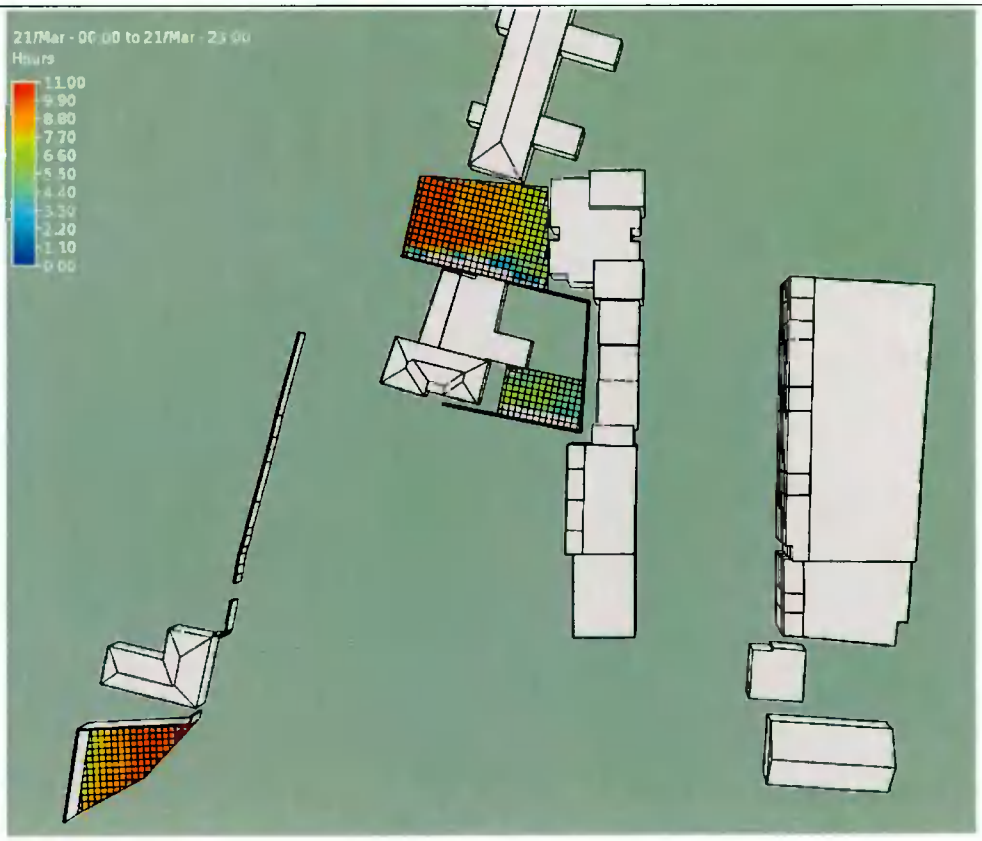
The results demonstrate that dwellings of the proposed development achieve good APSH on main windows. All of the assessed living rooms achieve the BRE Guides criteria for Sunlight availability.

12.0 SUNLIGHT ASSESSMENT – NEIGHBOURING AMENITY SPACE

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

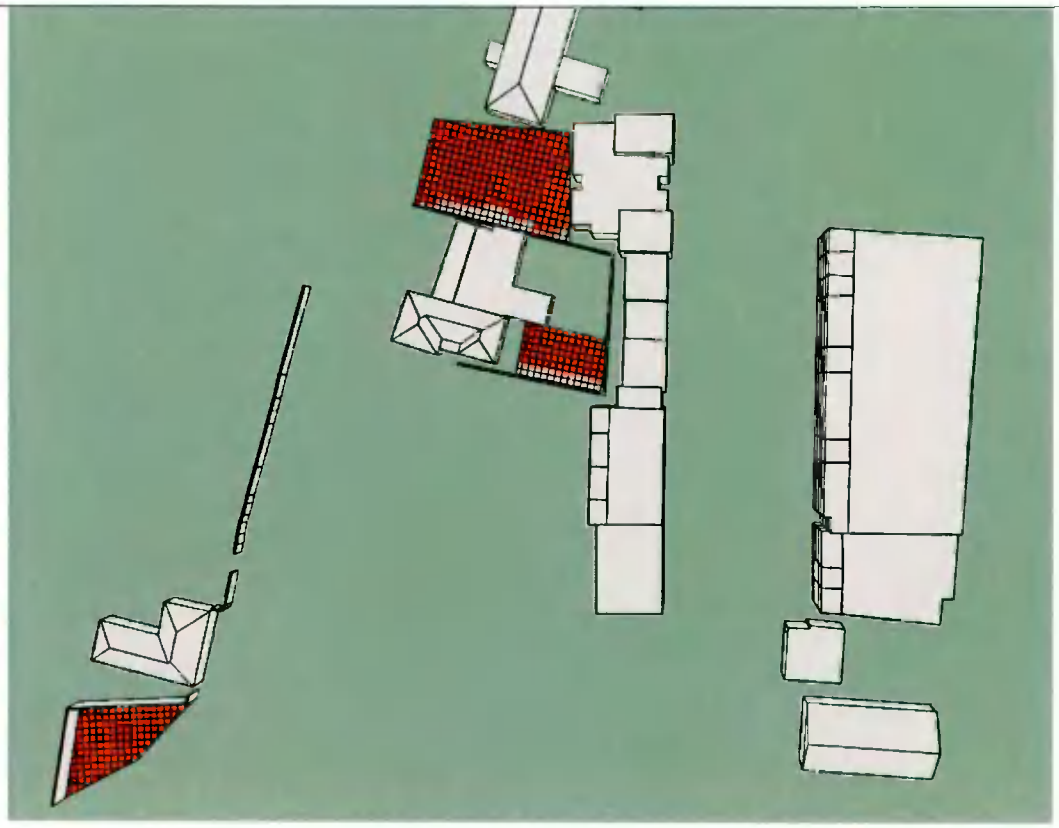
The assessed spaces memorial Plot on the corner of Main street and Old Greenhills Road and given their proximity to the proposed development, it was deemed prudent to analyse the sunlight characteristics of these areas and to establish if the proposed development would affect them. Presented overleaf are the current and proposed scenario sunlight exposure images for the surrounding rooftop amenity spaces.

Roof top Amenity Areas Sunlight Simulation Results



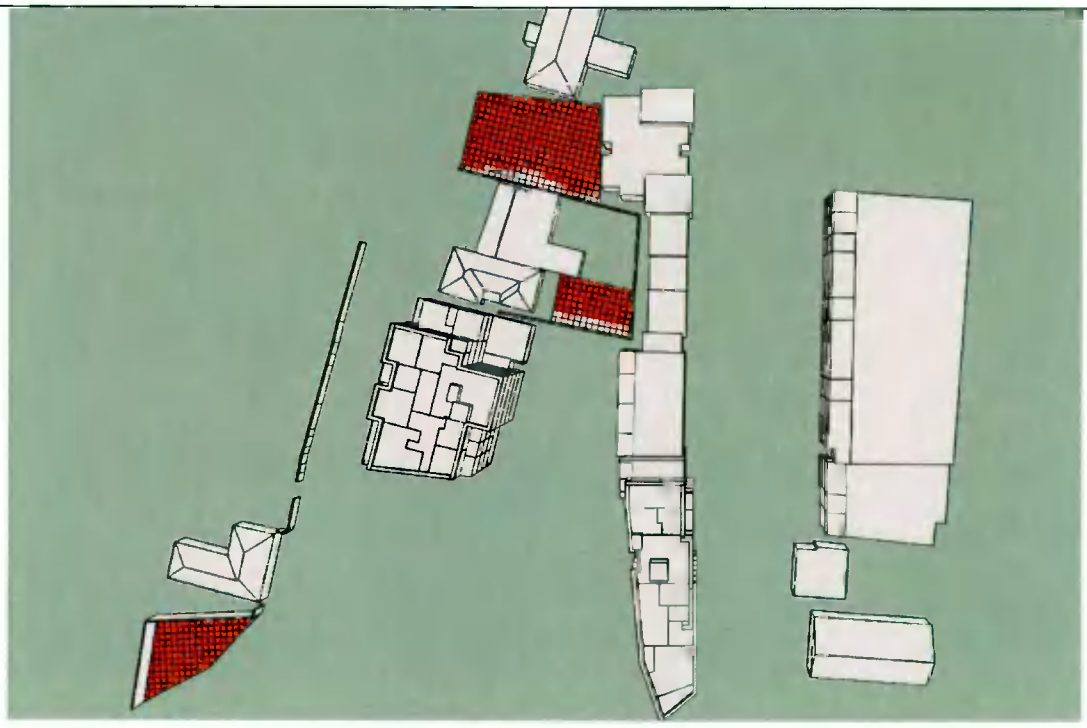
Current Scenario – March 21st Sunlight exposure (hours)

Proposed Scenario – March 21st Sunlight exposure (hours)



Current Scenario – March 21st

Cells coloured red if they receive ≥2 hours of sunlight



Proposed Scenario – March 21st

Cells coloured red if they receive ≥2 hours of sunlight

Results Summary

The results demonstrate that the BRE Guidelines for safeguarding access to sunlight for the assessed spaces is achieved with the proposed development in place.

100% of the memorial plot receives at least two hours of sunlight on the design day, March 21st whereas for Old Greenhills Road, the area receiving at least two hours of sunlight on the design day, March 21st is same for the existing scenario (73.87%, 87%) as well as with the proposed development in place.

13.0 SUNLIGHT ASSESSMENT – PROPOSED DEVELOPMENT AMENITY SPACE

The BRE Guide recommends that for an amenity space to appear adequately sunlit throughout the year, at least half of the amenity space should receive at least two hours of sunlight on the design day, March 21st.

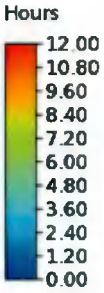
Methodology (as referenced in Section 3.3 of the BRE Guide)

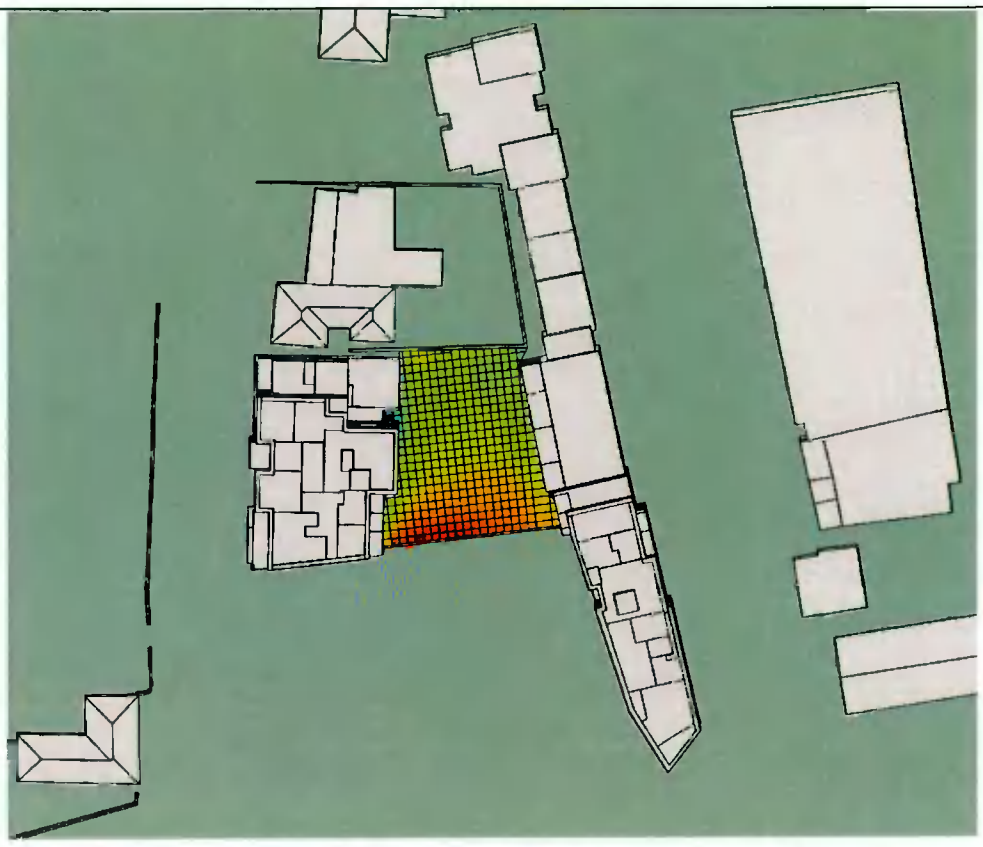
Design Issue	BRE Recommended Criteria – Section 3.3.7
Sunlight in Gardens, Private Communal Courtyard, Play Areas etc.	It is recommended that at least half (≥50%) of the amenity areas should receive at least two hours of sunlight on 21st March.

Table 13.0.1 – BRE methodology for safeguarding sunlight in amenity spaces

The massing of the proposed development has been designed so that the amenity areas exceed the BRE Guides recommended criteria for sunlight. This will ensure that a positive appearance and ambiance will be achieved by development. This is demonstrated by the images overleaf where the amenity areas exceed the BRE Guides recommended criteria.

Simulation Results





Proposed Development Amenity Areas – March 21st

Sunlight exposure (hours)

Proposed Development Amenity Areas – March 21st
Cells coloured red if they receive ≥2 hours of sunlight
The BRE Guideline is Achieved

Results Summary

The BRE recommended criteria for sunlight in amenity spaces is achieved for the proposed development and exceeded with 100% of the amenity space receiving ≥2 hours of sunlight.

14.0 SHADOW ASSESSMENT

Shadow Images from the IES SunCast simulation package are presented in Appendix F for both the current scenario and with the proposed development in place. Images are presented for the design days of March 21st and June 21st as recommended by the BRE Guide. These design days generally provide the best dates for shadow images, March 21st gives an average overshadowing day while June 21st represents the best-case minimum shadow scenario. Also presented are images for December 21st, however it should be noted that in December, even low buildings will cast long shadows. It should be borne in mind when interpreting the shadowing images that nearly all structures will create areas of new shadows, and some degree of overshadowing of a space is to be expected.

Appendix E presents the Site shadow images results for existing and proposed development.

15.0 CONCLUSION

The Daylight, Sunlight and Overshadowing assessment of the proposed development was prepared using the methodology's set out in the British Standard: Lighting for Buildings – Part 2: Code for Practice for Daylighting, BRE 209, 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice', Second Edition 2011, by P. J. Littlefair and the Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018).

Neither the British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide is preceded by the following very clear statement as to how the design advice contained therein should be used.

"The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."

Our conclusions with respect to daylight & sunlight are summarised as follows;

Existing 3rd Party Neighbouring Properties

A comprehensive study on the neighbouring properties was carried out based on the BRE Guide methodology. The Daylight and Sunlight to Amenity areas assessment results demonstrate that the proposed development will not result in any significant loss of daylight or sunlight received by the existing neighbouring properties. As only a small number of windows are minimally affected with the proposed development in place, a classification of negligible / minor adverse impact is appropriate.

Proposed Development

Daylight

All ground floor and first floor Bedrooms and Kitchen/Dining/Living rooms of the apartment block were selected for a detailed daylight assessment, all achieved the BRE daylight guidelines. This represents the worst-case scenario in terms of daylight, this is because generally when upper floors are assessed for daylight they will achieve better daylight results as they receive less obstructions and have greater access to the sky.

Sunlight to Dwellings

The sunlight assessment demonstrates that the proposed development achieves very good levels of APSH as the vast majority of dwellings have a main window that achieves the BRE guide criteria for sunlight availability.

Sunlight to Amenity Areas

The proposed development achieves the BRE criteria for sunlight in amenity spaces.

Site shadow Images

Shadow images are presented in Appendix F for both the current scenario and with the proposed development in place. Images are presented for the design days of March 21st and June 21st as recommended by the BRE Guide. Also presented are images for December 21st, however it should be noted that in December, even low buildings will cast long shadows. It should be borne in mind when interpreting the shadowing images that nearly all structures will create areas of new shadows, and some degree of shadow a space is to be expected.

It should be borne in mind when interpreting the shadowing images that nearly all structures will create areas of new shadows, and some degree of shadow of a space is to be expected.

While additional shadows are identified, it is important to note that the results of the daylight and sunlight impact assessment demonstrated that the proposed development would not result in any significant loss of light received by neighbouring properties.

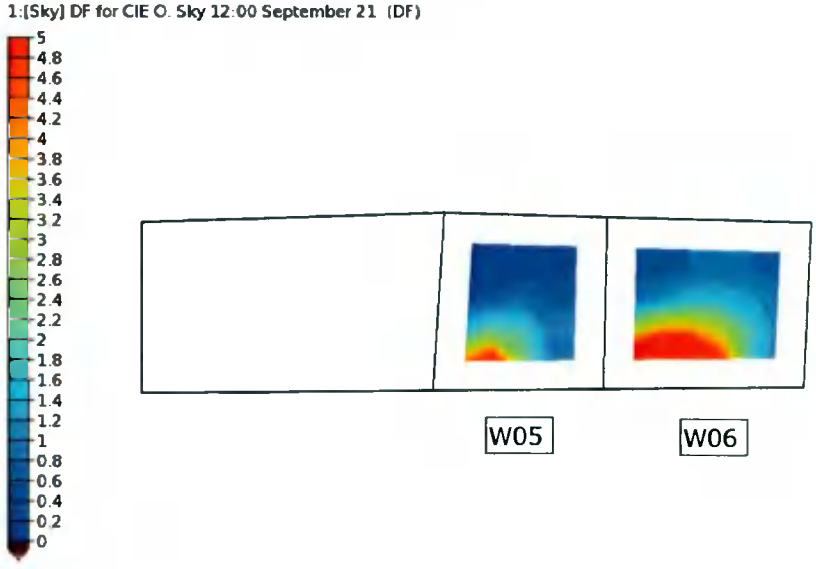
Overall Conclusion.

After carrying out a comprehensive daylight, sunlight and overshadowing assessment of the proposed development using simulation modelling and comparing results achieved against the BRE guidelines, the results presented within this report demonstrate that overall, the proposed development achieves the guidance given in BRE BR209 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice'

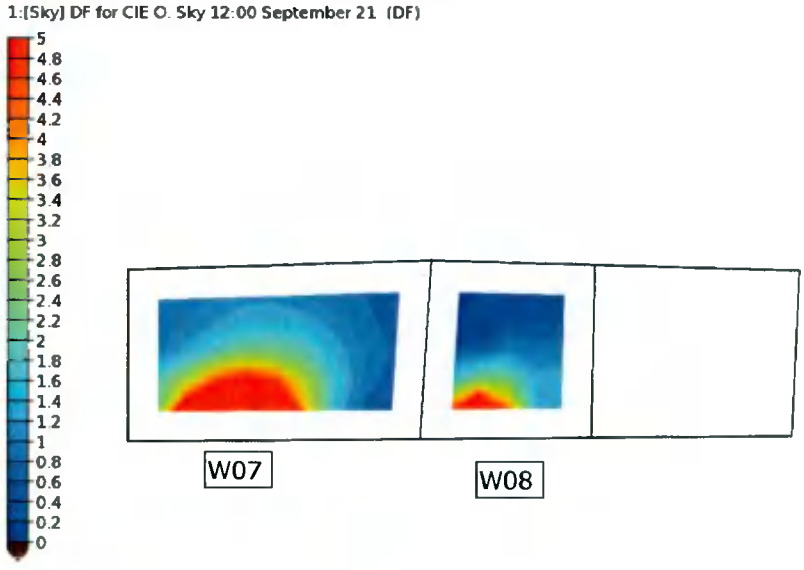
APPENDIX A – DAYLIGHT DISTRIBUTION IMAGES – NEIGHBOURING BUILDINGS

Room no.	Room Type	Target ADF (%)	ADF Achieved (%)	Target ADF Achieved
5	Bedroom	1.0	1.0	Yes
6	Bedroom	1.0	1.83	Yes
7	Kitchen Living Dining	1.5	1.98	Yes
8	Bedroom	1.0	1.14	Yes

Greenhills Court RHS –Second floor



Greenhills Court RHS –First floor



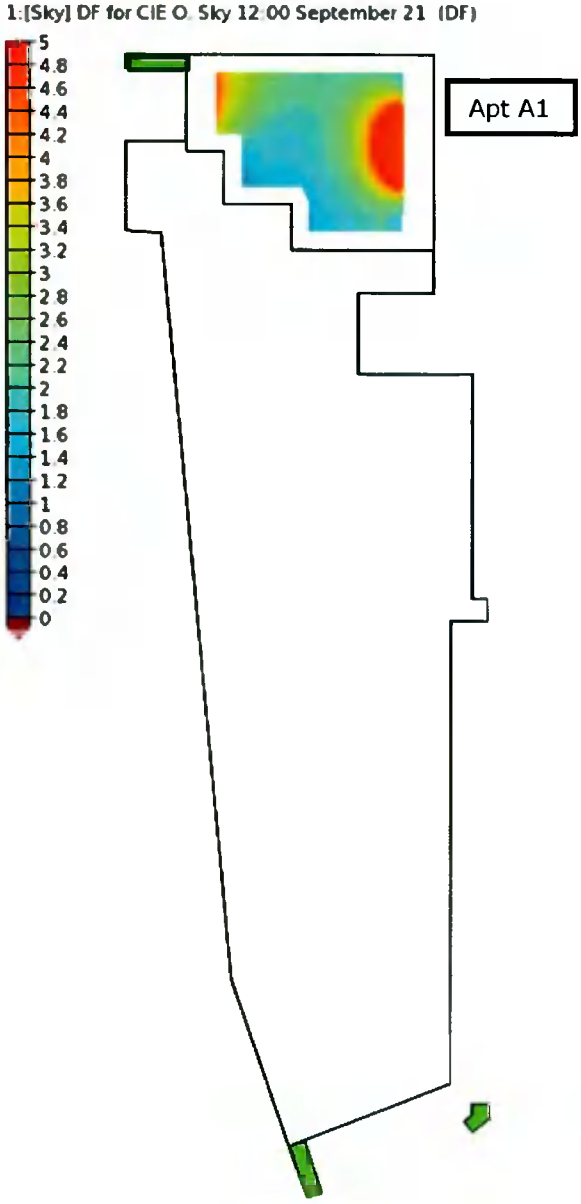
APPENDIX B – DAYLIGHT RESULTS – PROPOSED DEVELOPMENT

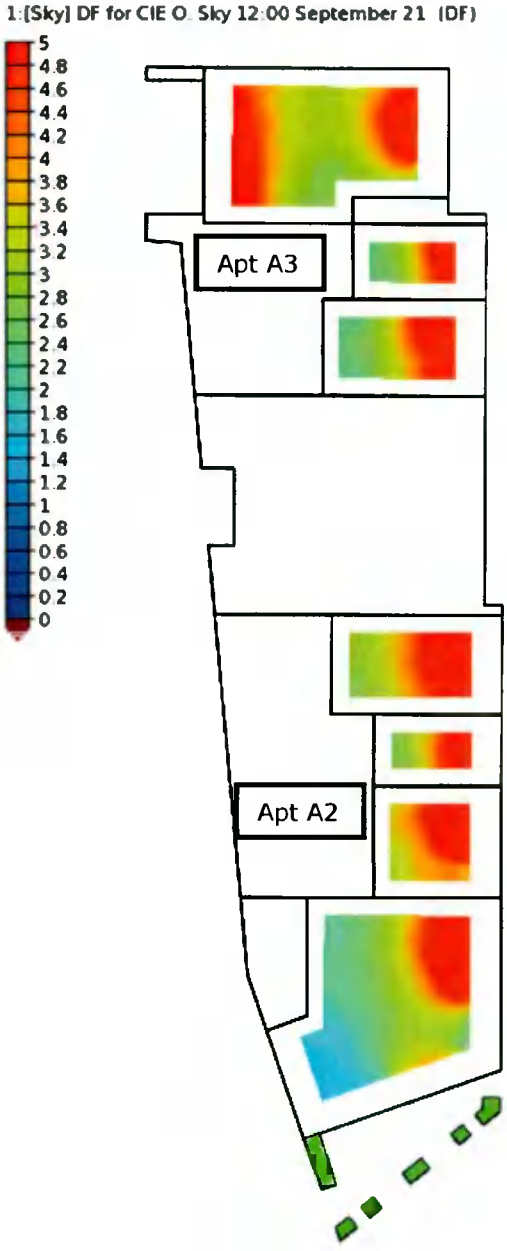
Block A	Room type	BRE Guidelines Target ADF (%)	ADF with Proposed Development (%)	Target ADF Achieved
Ground Floor				
Apt A1	Studio Apartment	1.5	2.83	Yes
First Floor				
Apt A2	Bedroom 1	1	4.72	Yes
Apt A2	Bedroom 2	1	5.06	Yes
Apt A2	Bedroom 3	1	5.62	Yes
Apt A2	Kitchen/living/dining	1.5	3.12	Yes
Apt A3	Bedroom 1	1	4.54	Yes
Apt A3	Bedroom 2	1	4.2	Yes
Apt A3	Kitchen/living/dining	1.5	4.27	Yes

Block B	Room type	BRE Guidelines Target ADF (%)	ADF with Proposed Development (%)	Target ADF Achieved
Ground Floor				
Apt B1	Studio Apartment	1.5	3.00	Yes
Apt B2	Studio Apartment	1.5	2.88	Yes
Apt B3	Studio Apartment	1.5	3.00	Yes
First Floor				
Apt B3	Bedroom 1	1	2.48	Yes
Apt B3	Bedroom 2	1	3.41	Yes
Apt B3	Kitchen/living/dining	1.5	2.01	Yes
Apt B4	Bedroom 1	1	2.73	Yes
Apt B4	Kitchen/living/dining	1.5	3.36	Yes
Apt B5	Bedroom 1	1	2.94	Yes
Apt B5	Bedroom 2	1	2.68	Yes
Apt B5	Bedroom 3	1	5.56	Yes
Apt B5	Kitchen/living/dining	1.5	2.02	Yes

APPENDIX C – DAYLIGHT DISTRIBUTION IMAGES – PROPOSED DEVELOPMENT

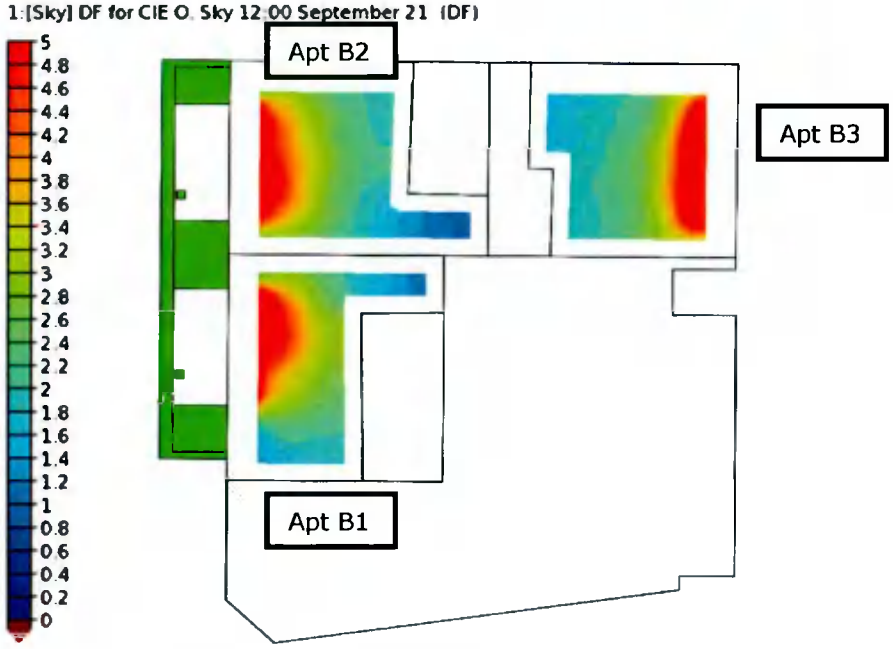
BLOCK A



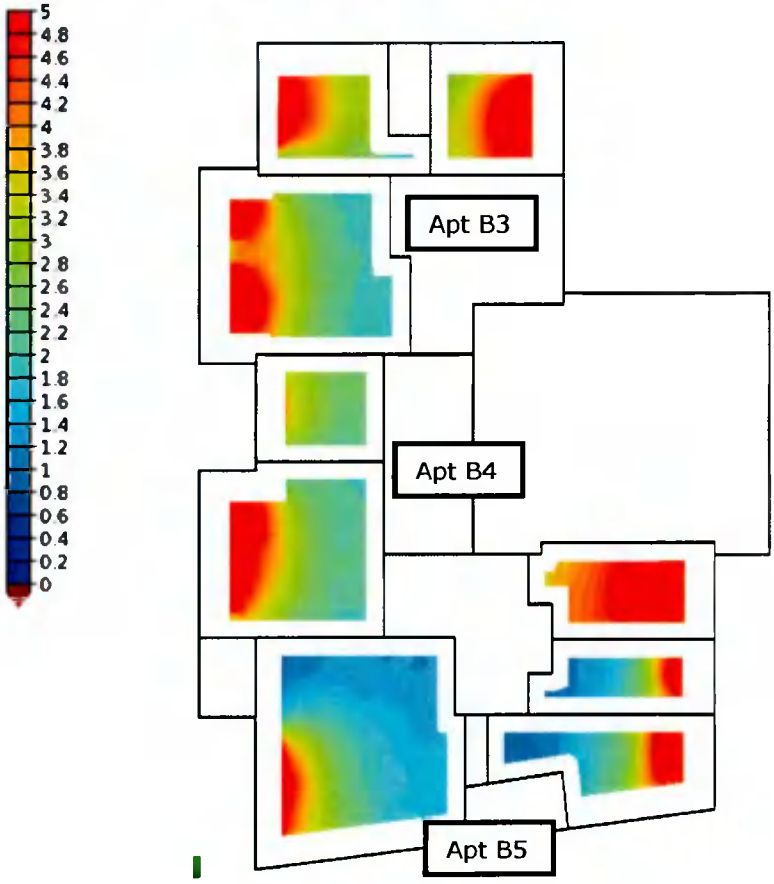


BLOCK B

1:[Sky] DF for CIE O. Sky 12:00 September 21 (DF)



1:[Sky] DF for CIE O. Sky 12:00 September 21 (DF)

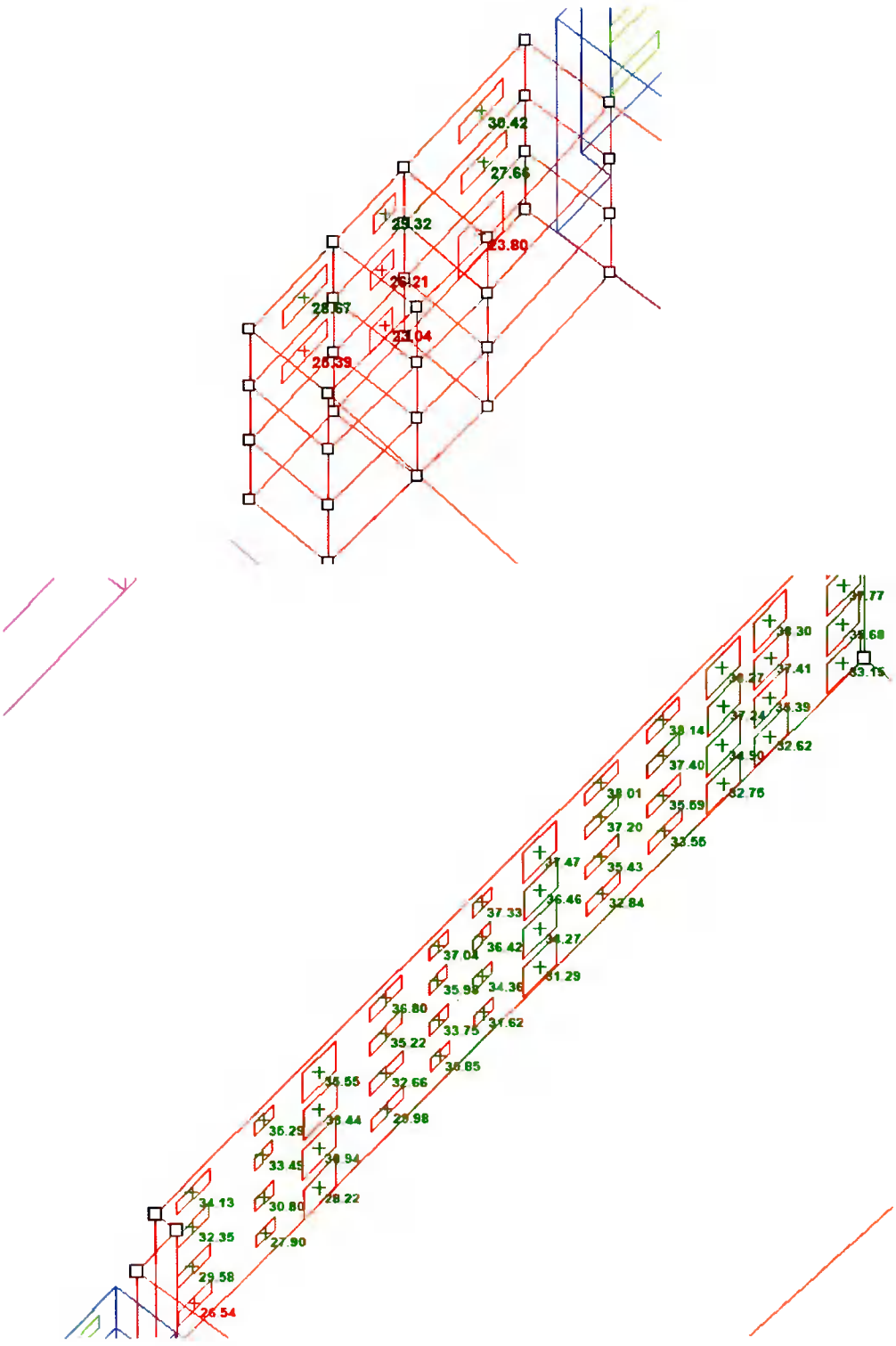


APPENDIX D – DAYLIGHT MODEL INPUTS – PROPOSED DEVELOPMENT

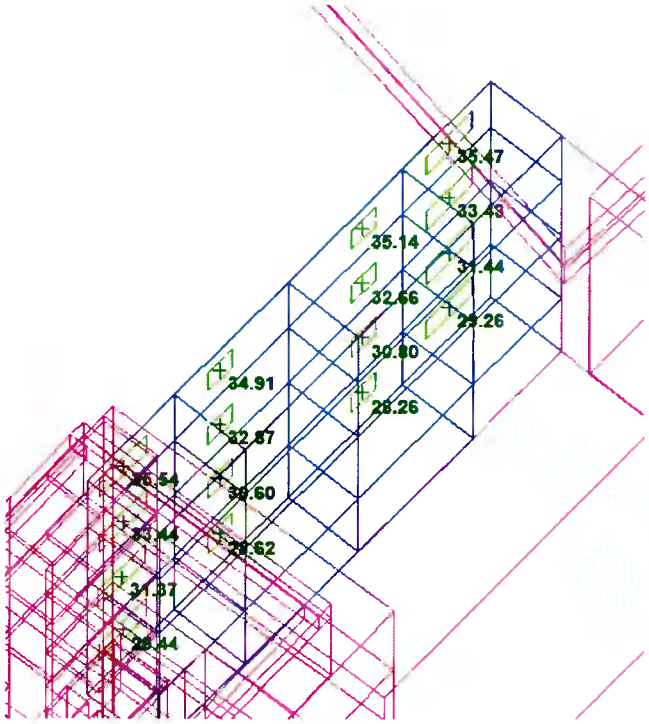
Parameter	Value
Surface Reflectance's	
• Internal ceilings	85% e.g. light-coloured ceiling
• Internal walls	80% e.g. light-coloured walls
• Internal floors	40% e.g. light-coloured timber floor
Surface Maintenance Factor	100%
Glazing Maintenance Factor	100%
Glazing Transmittance	70%
Frame	0.05m frame width
Working Plane	0.85m
Area of Interest (AOI)	0.5m inset from perimeter
Simulation Settings	Radiance custom settings: Ambient bounces – 12 Ambient accuracy – 0 Ambient resolution – 1024 Ambient divisions – 32768 Ambient super samples – 0 Limit reflection – 0

APPENDIX E – VSC RESULTS IMAGES - PROPOSED SCENARIO

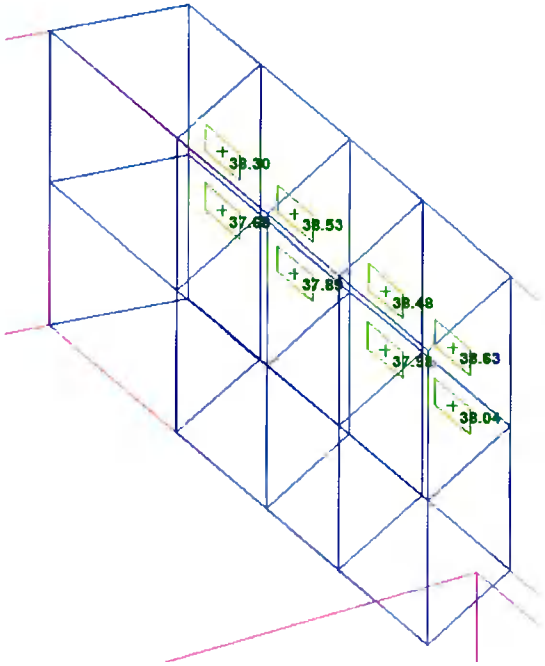
Greenhills RHS



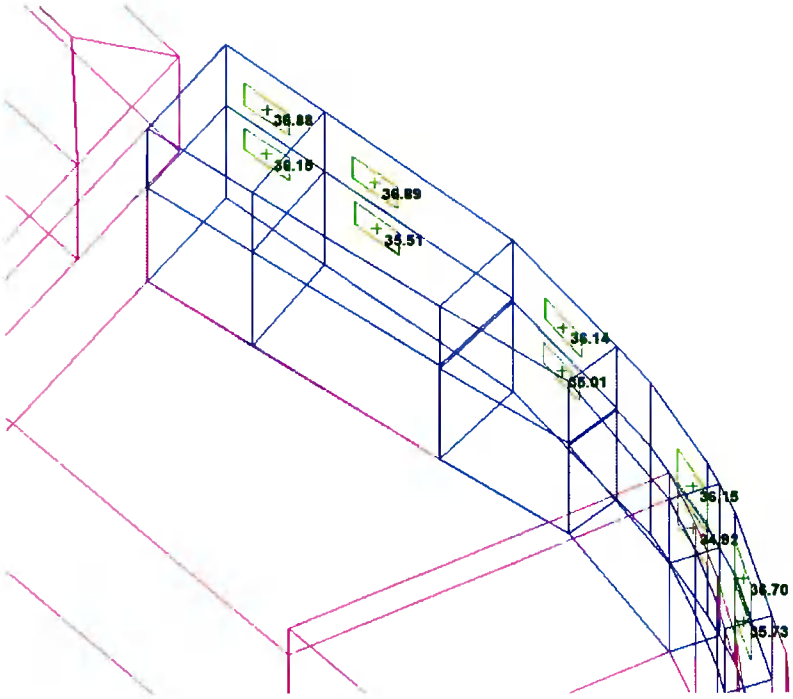
Greenhills LHS



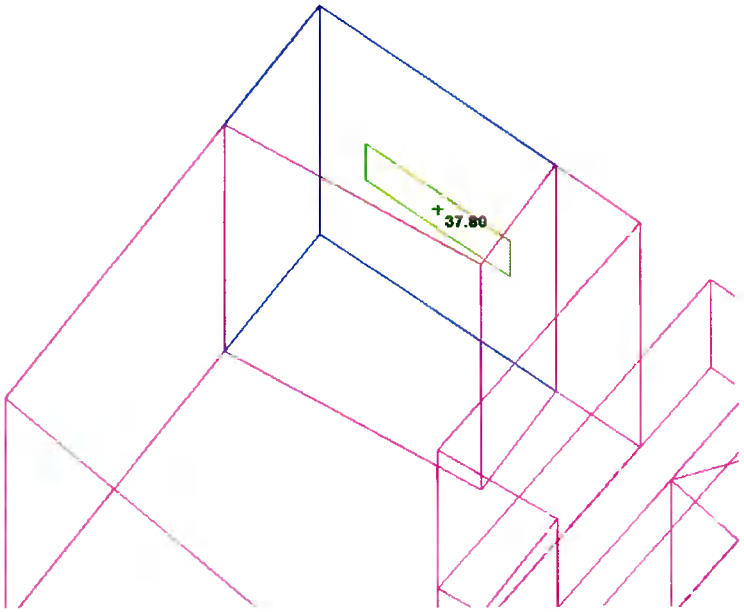
Priors Gate



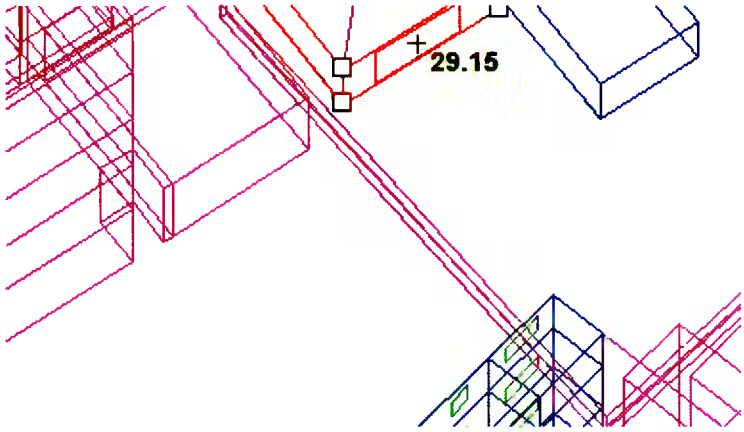
New Bancroft Hall



The Laurels



Courtyard Cottage

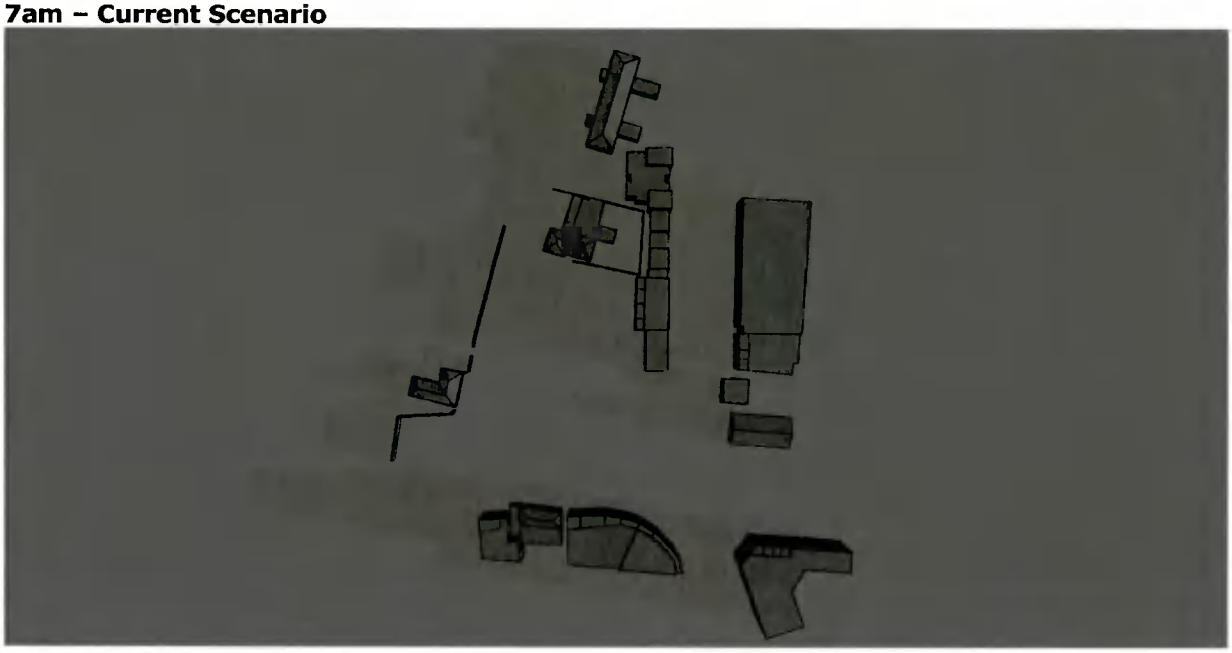


APPENDIX F – SHADOW IMAGES

21st March
6am – Current Scenario

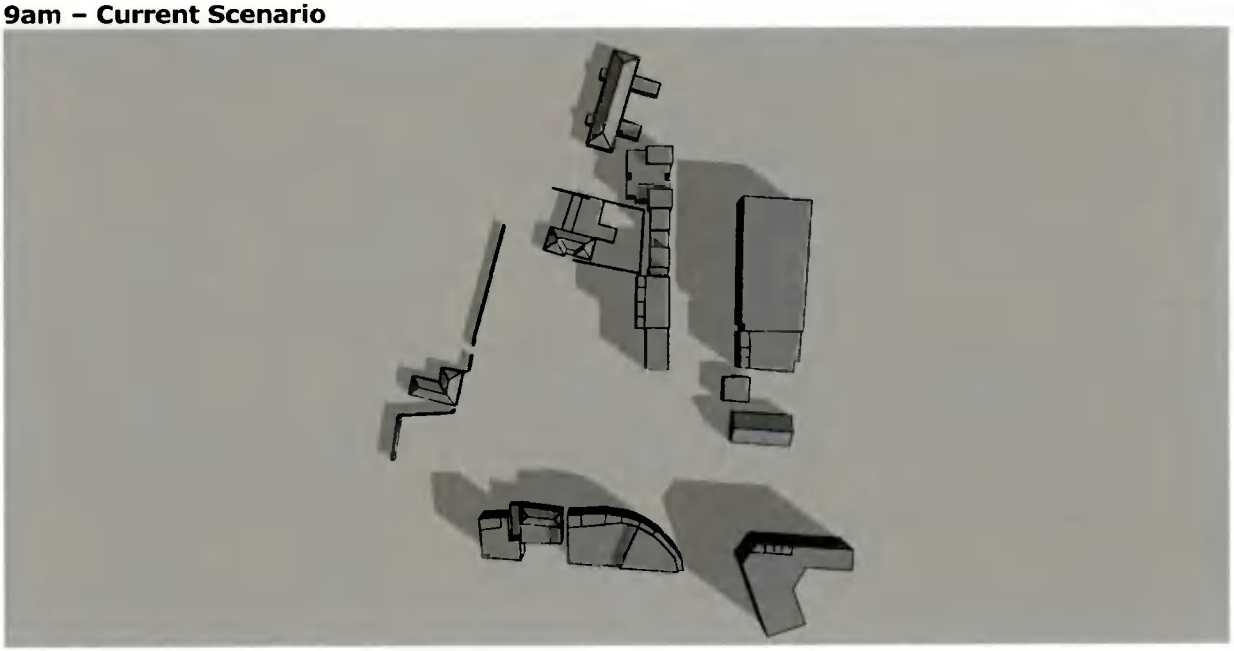
21st March
6am – With Proposed Development

21st March
7am – Current Scenario

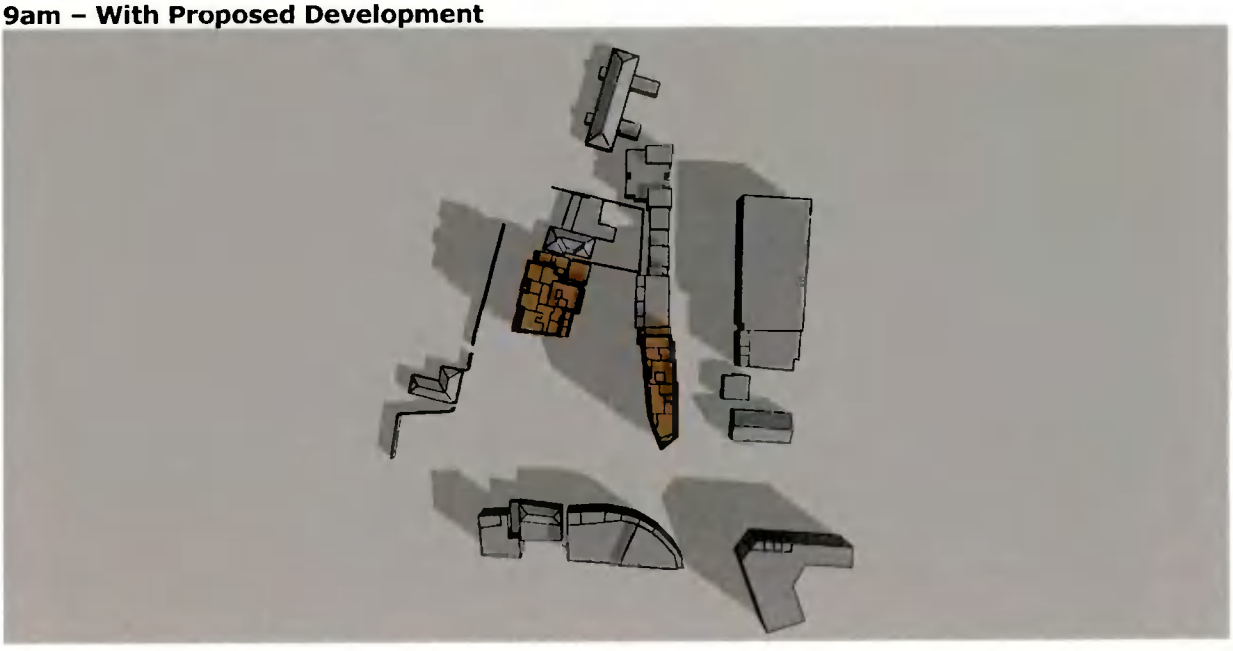


21st March
7am – With Proposed Development

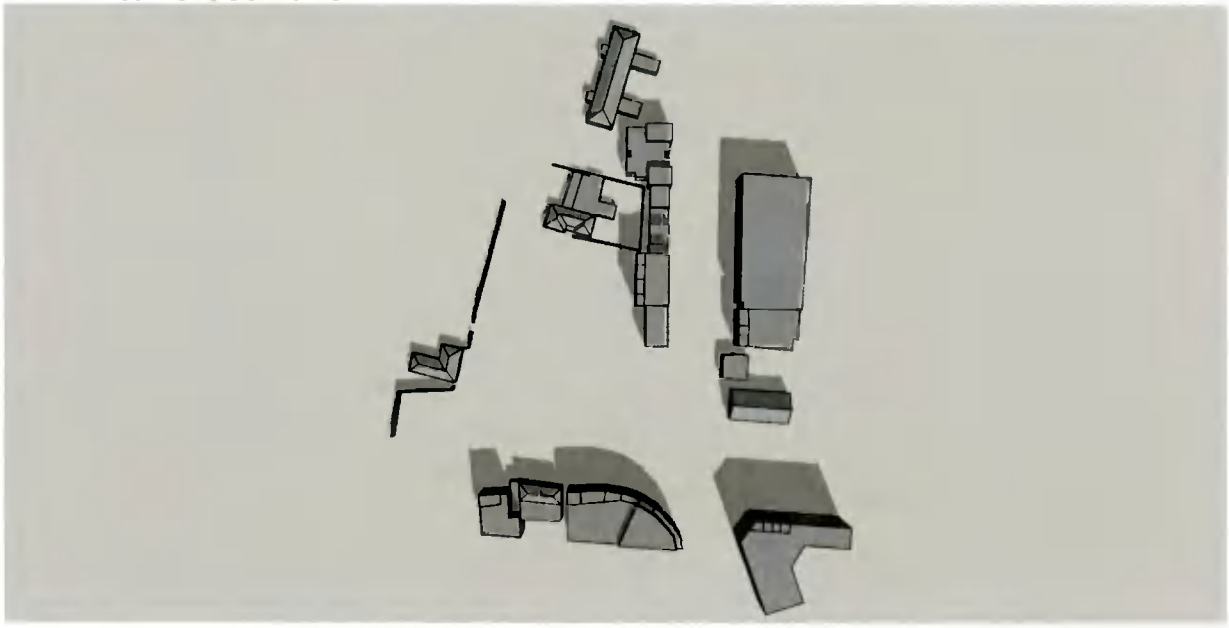
21st March
9am – Current Scenario



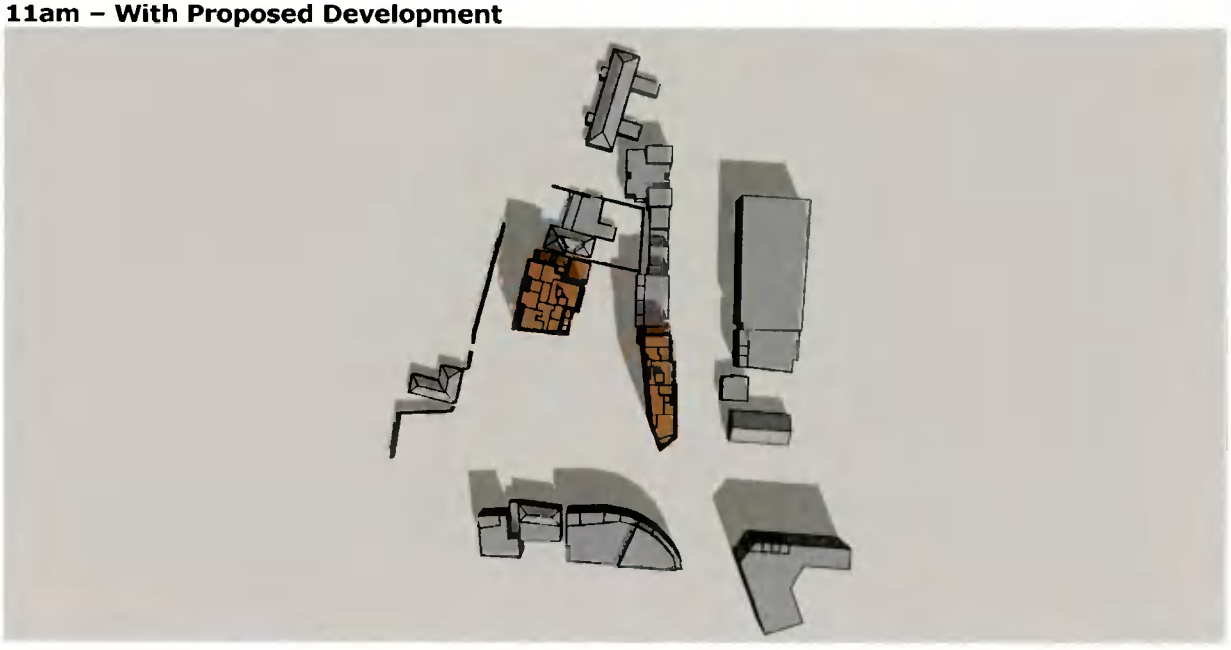
21st March
9am – With Proposed Development



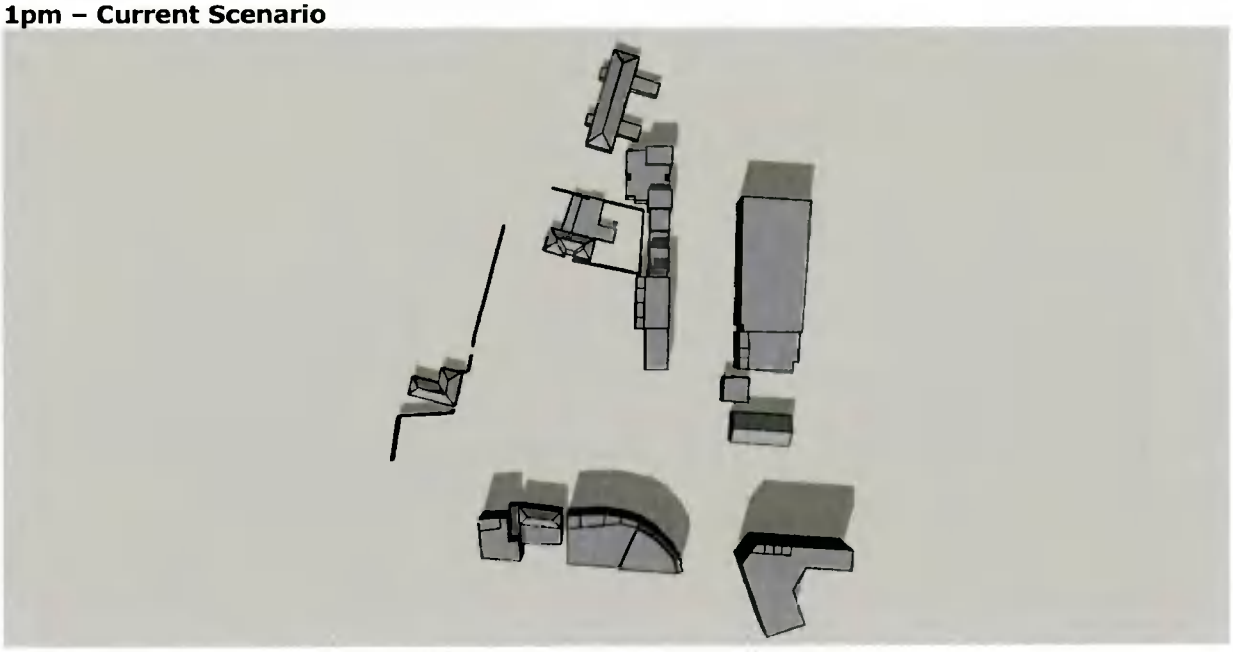
21st March
11am – Current Scenario



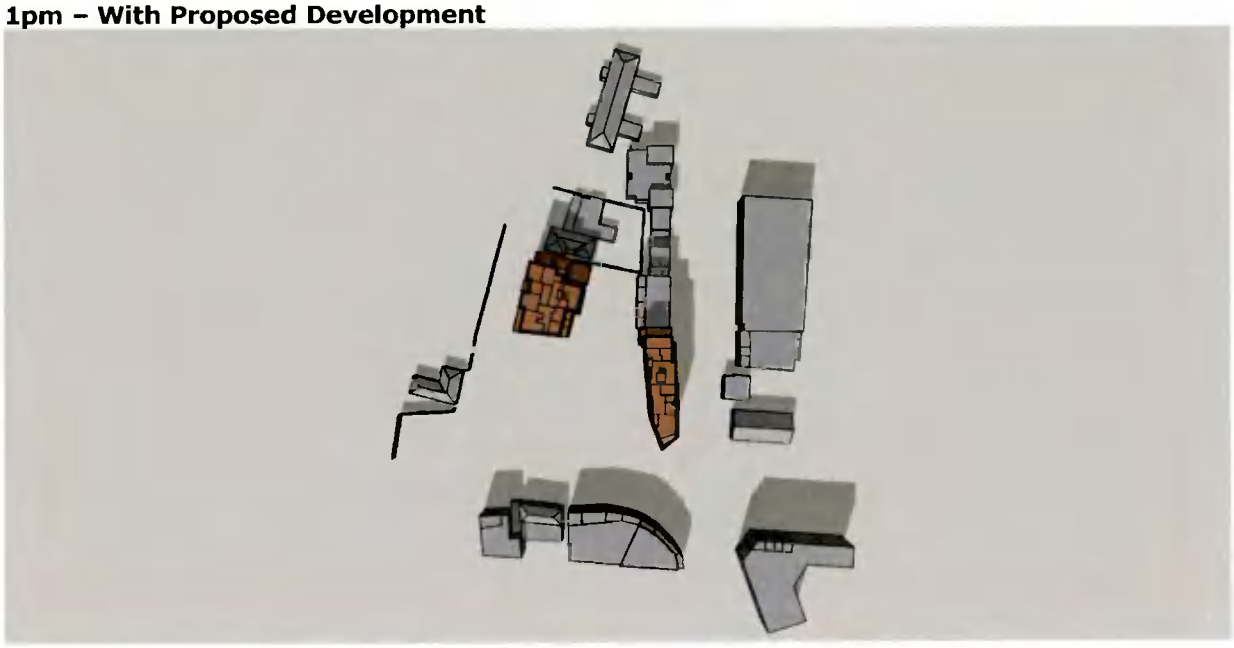
21st March
11am – With Proposed Development



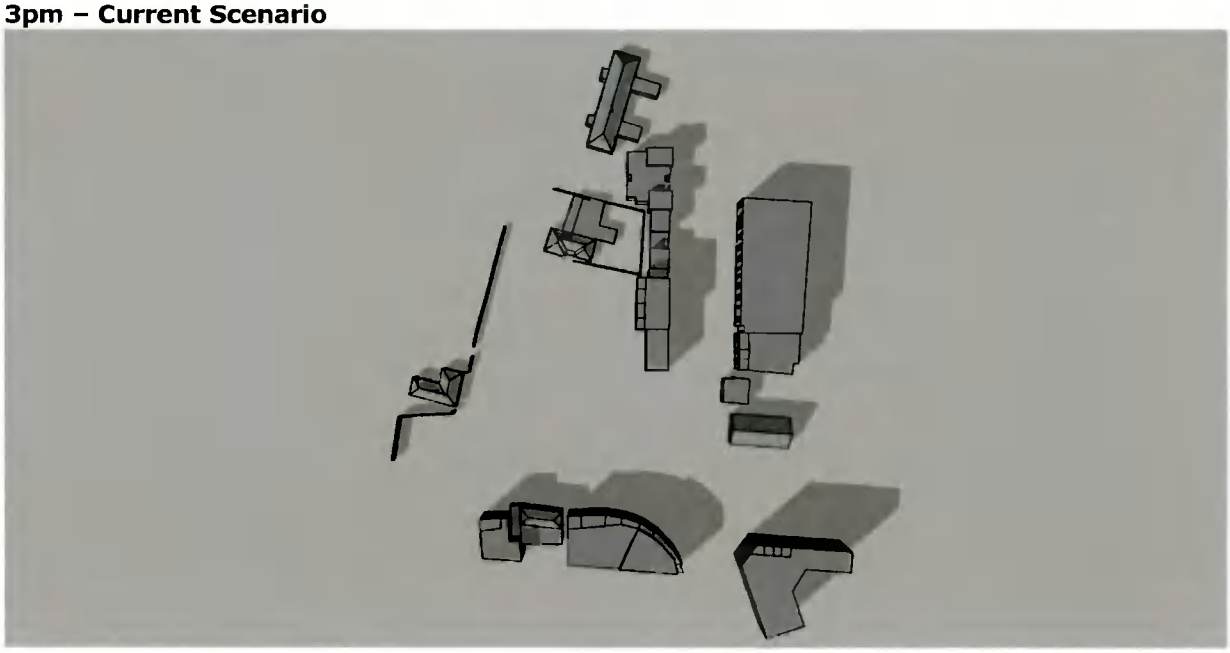
21st March
1pm – Current Scenario



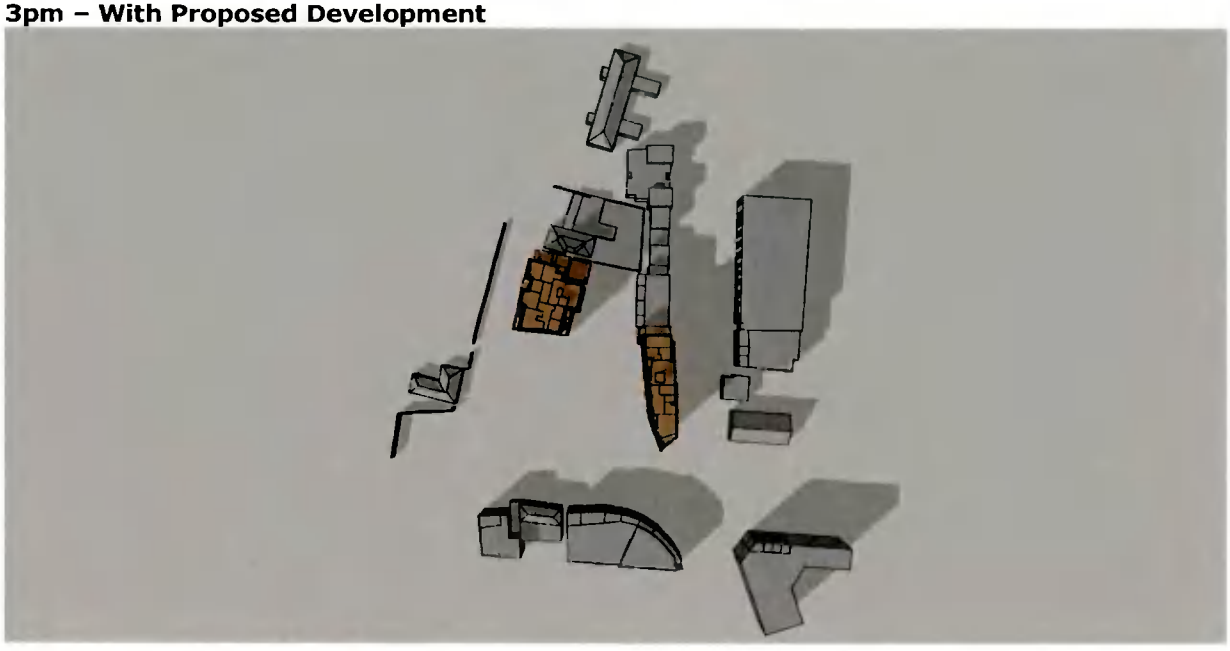
21st March
1pm – With Proposed Development



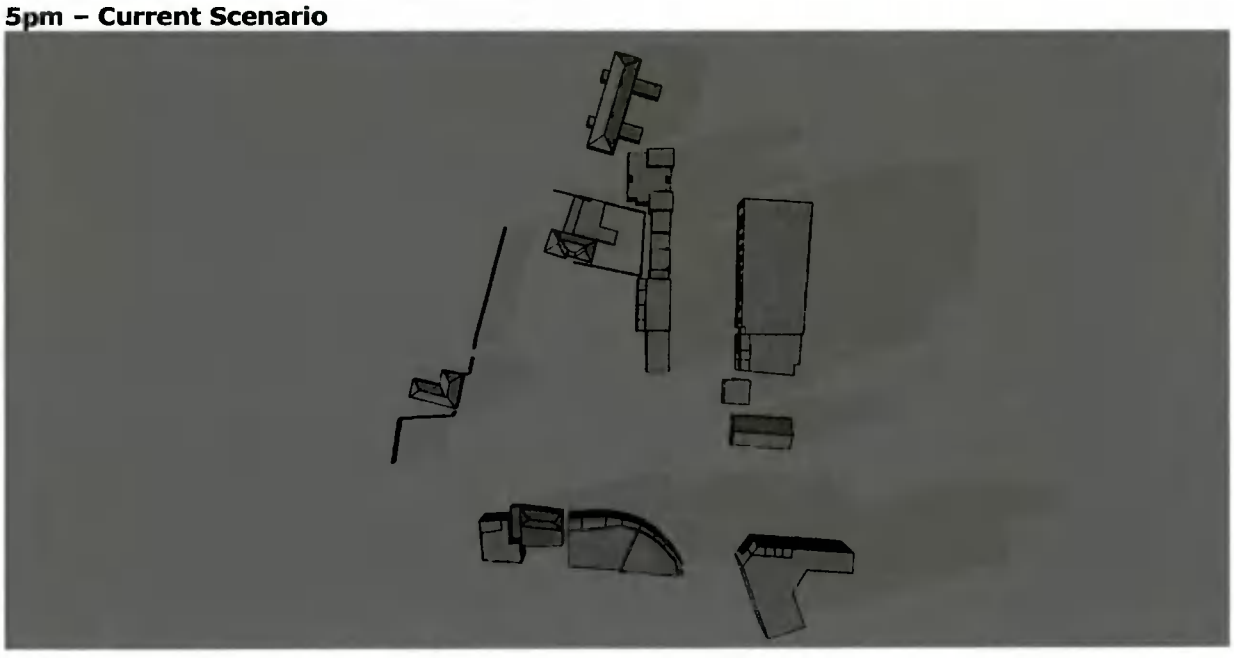
21st March
3pm – Current Scenario



21st March
3pm – With Proposed Development

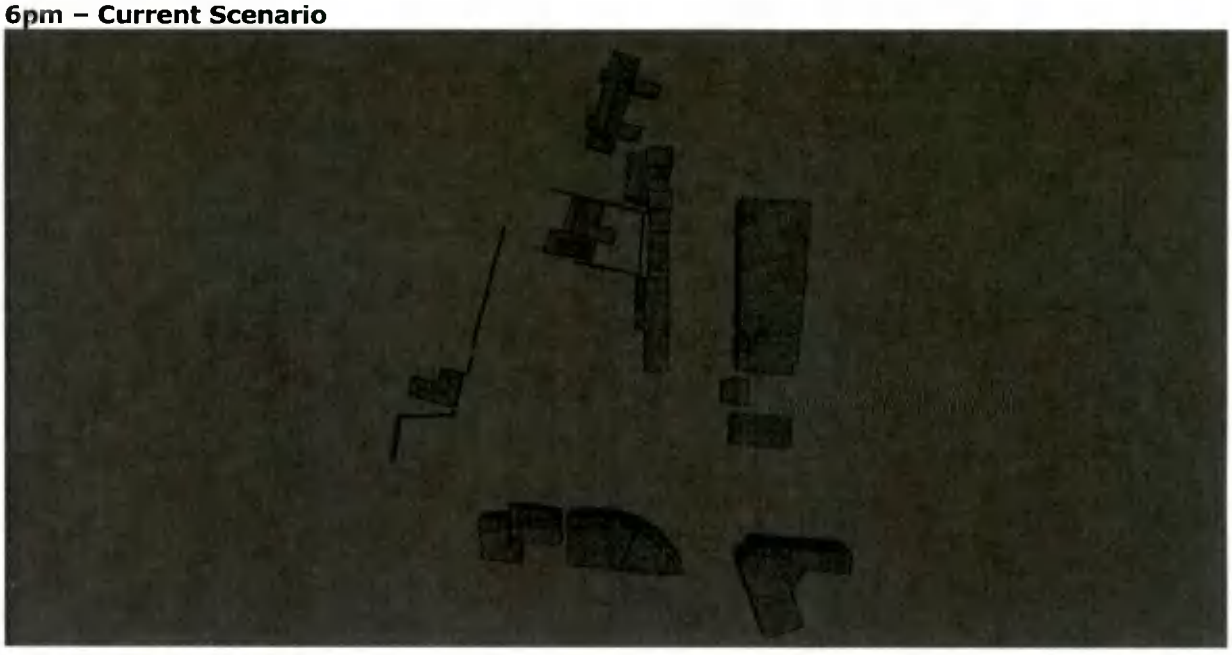


21st March
5pm – Current Scenario

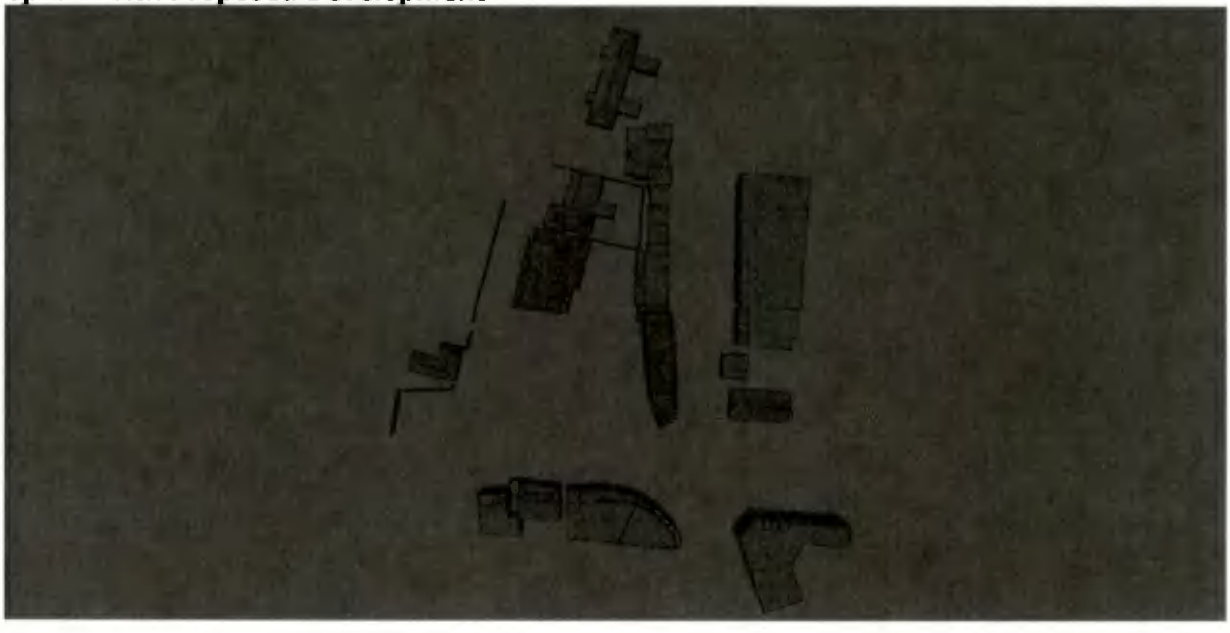


21st March
5pm – With Proposed Development

21st March
6pm – Current Scenario



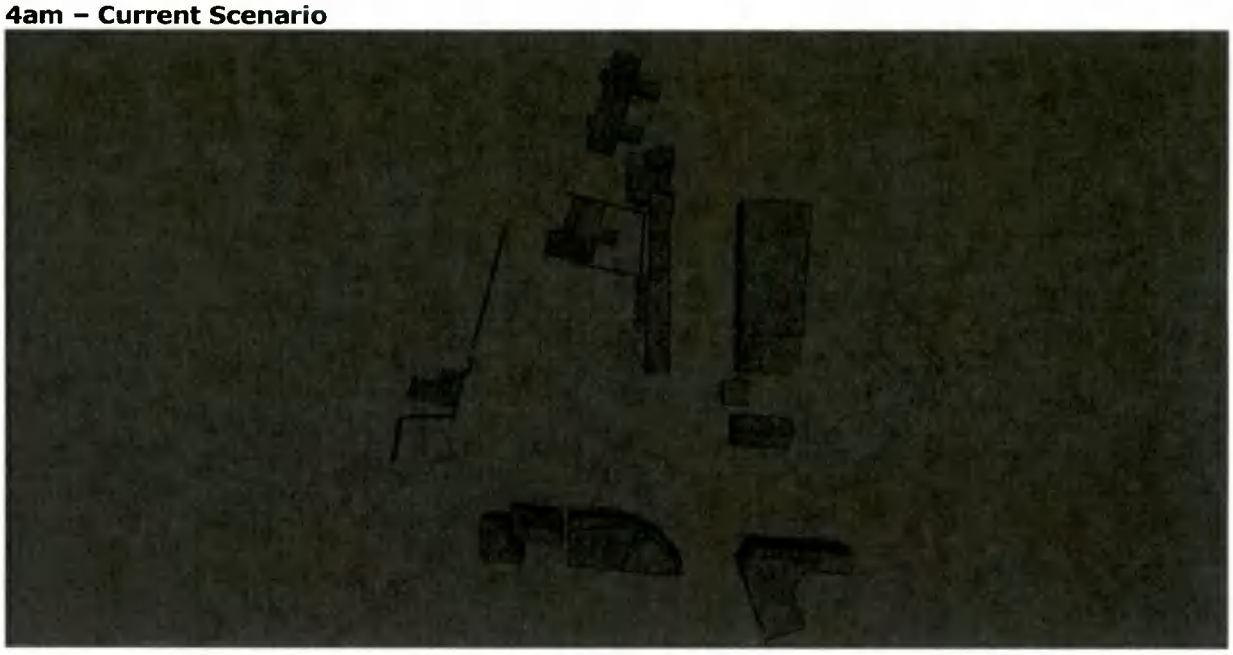
21st March
6pm – With Proposed Development



21st March
7pm – Current Scenario

21st March
7pm – With Proposed Development

21st June
4am – Current Scenario

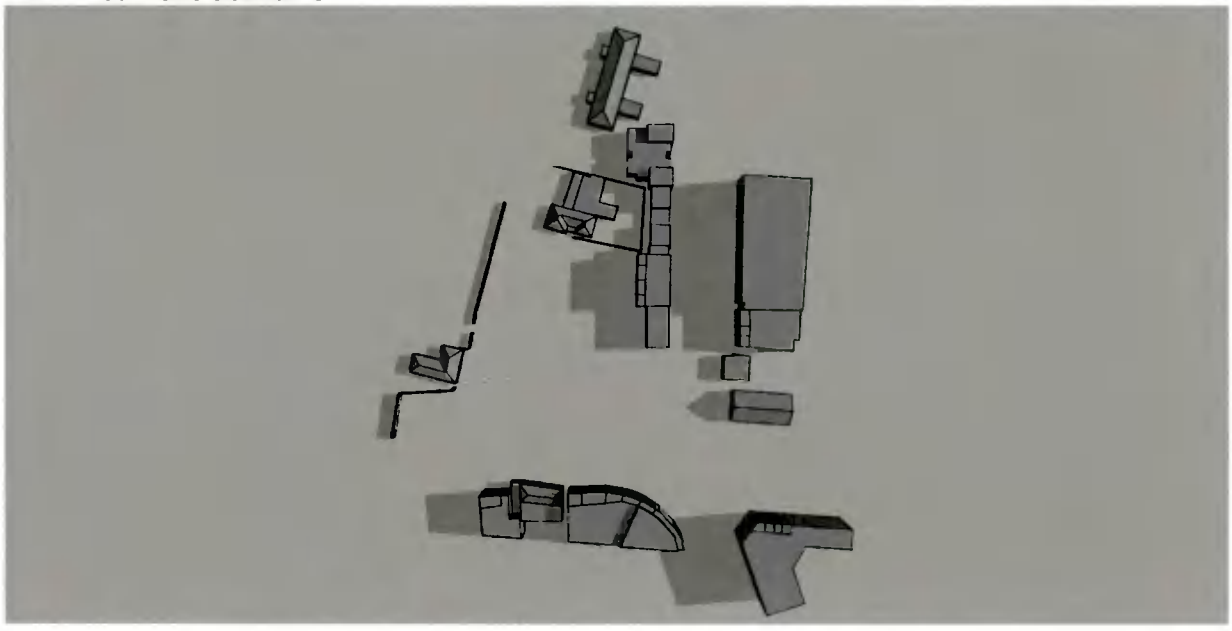


21st June
4am – With Proposed Development

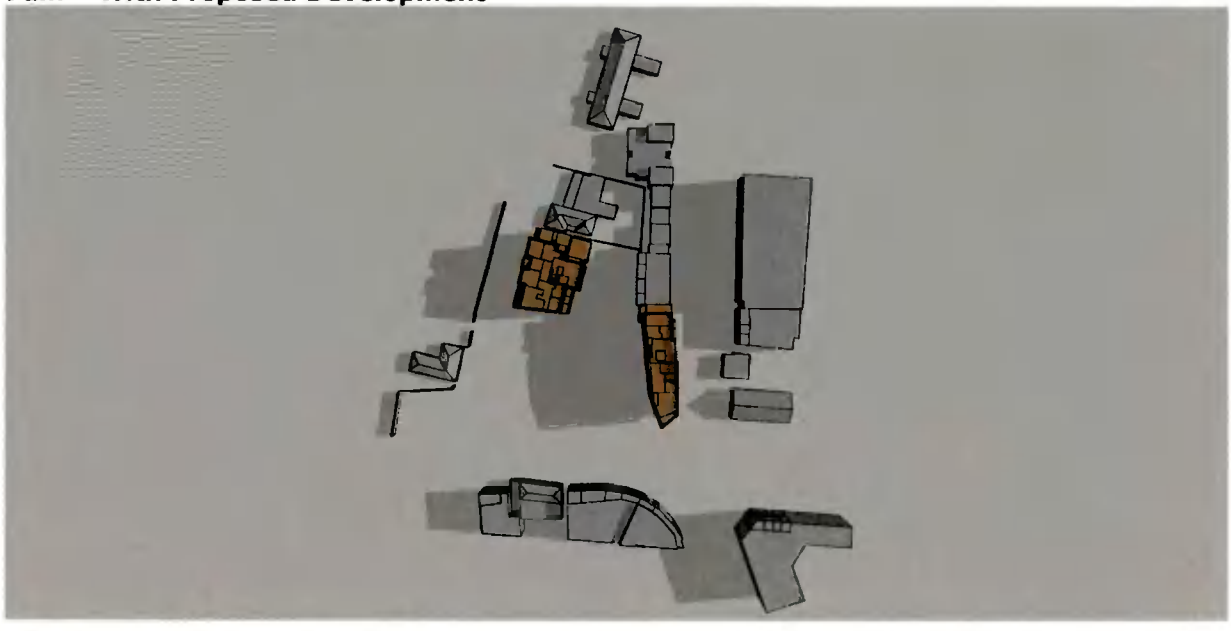
21st June
5am – Current Scenario

21st June
5am – With Proposed Development

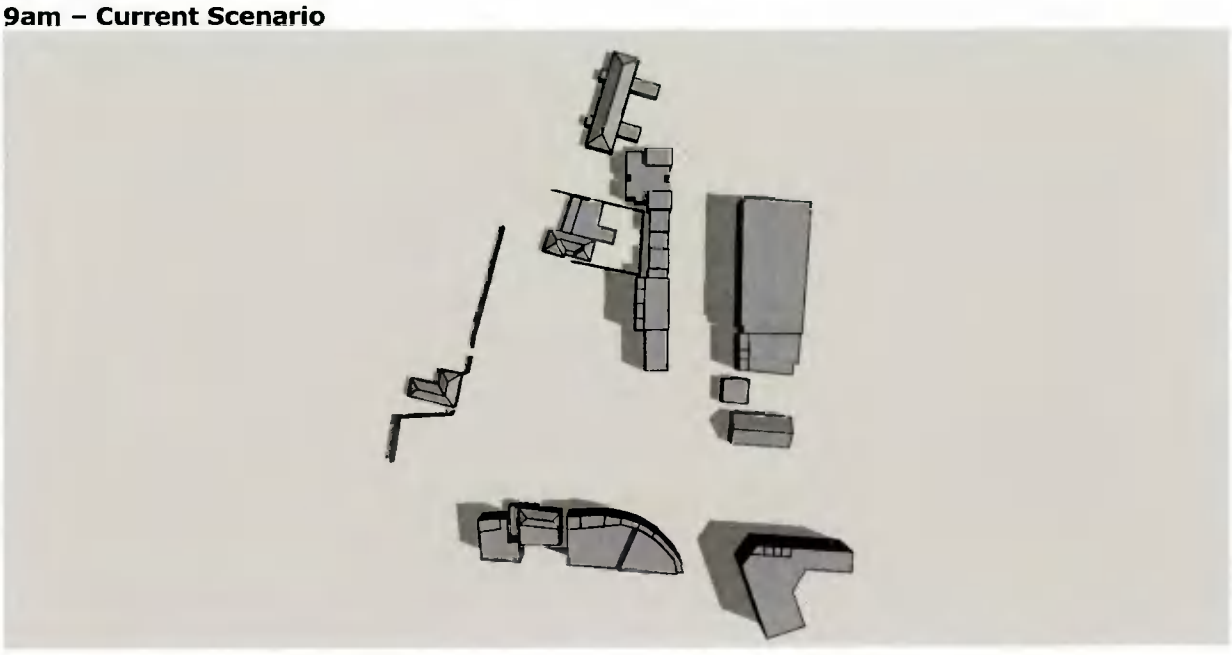
21st June
7am – Current Scenario



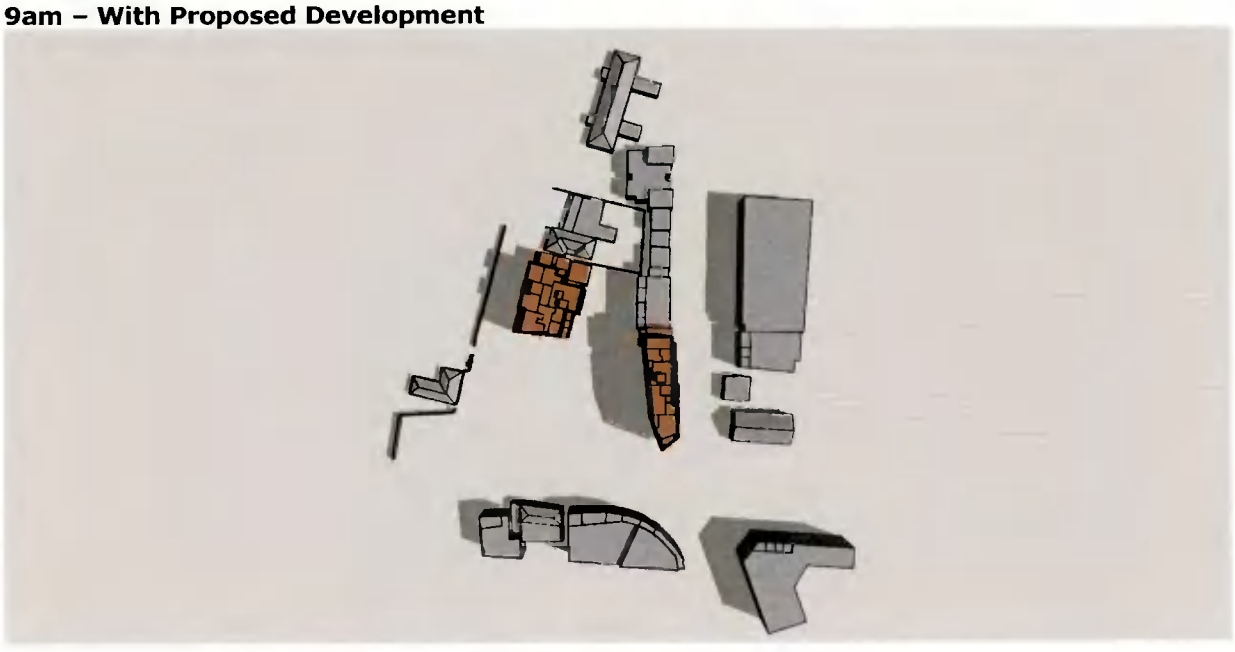
21st June
7am – With Proposed Development



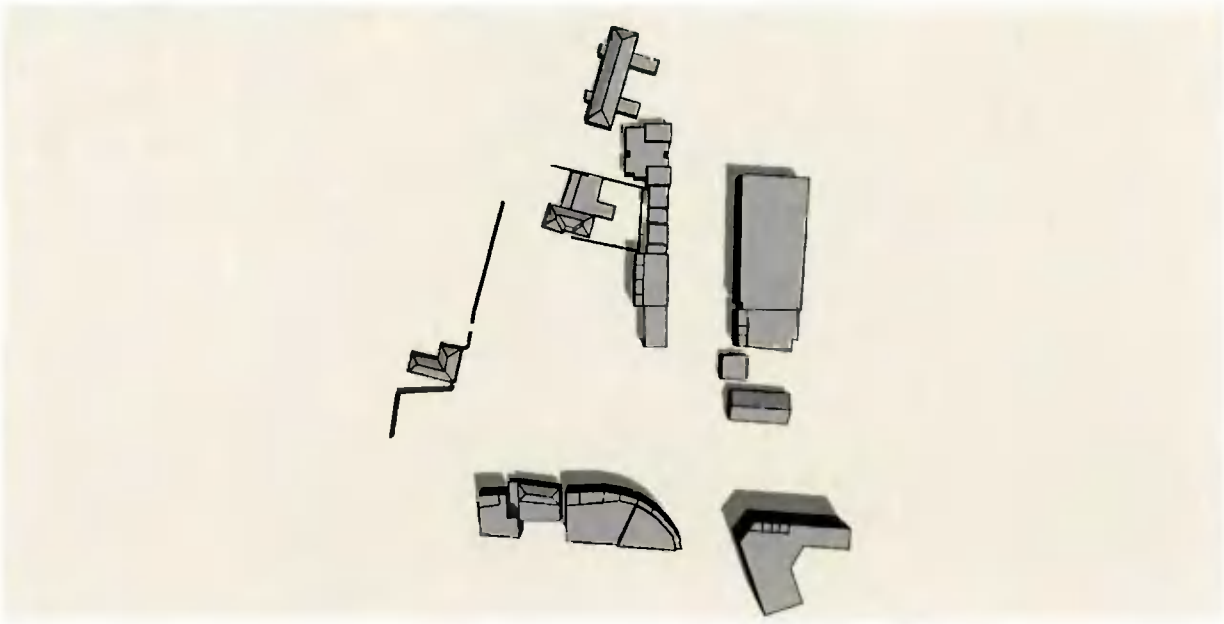
21st June
9am – Current Scenario



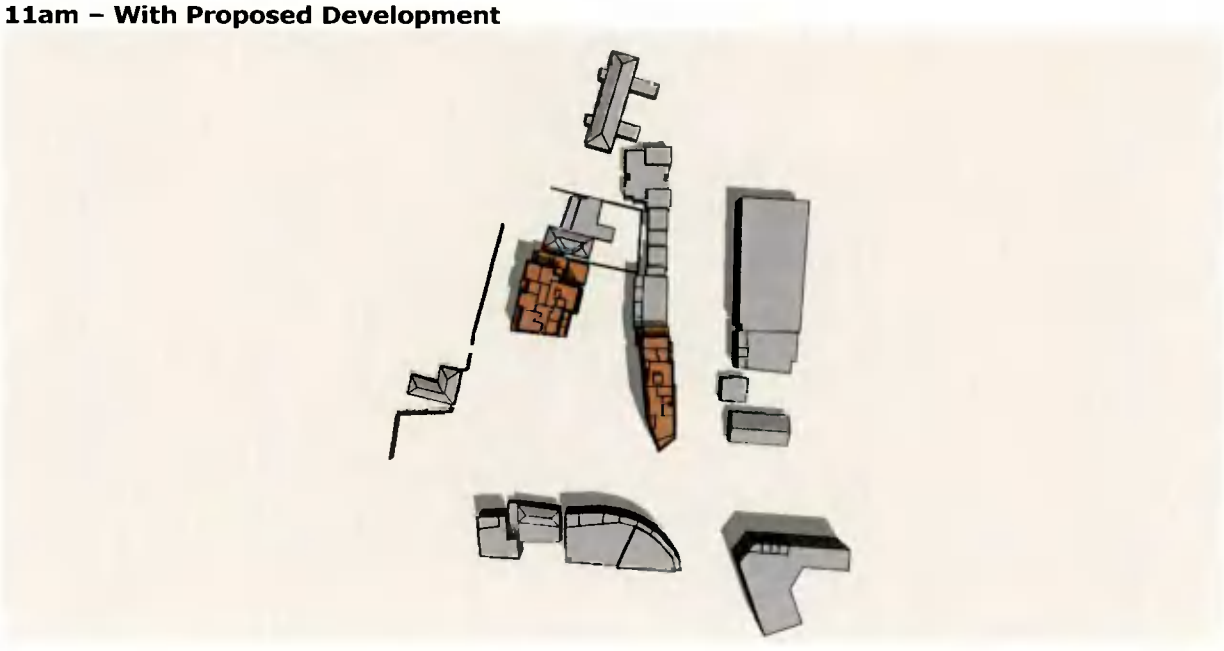
21st June
9am – With Proposed Development



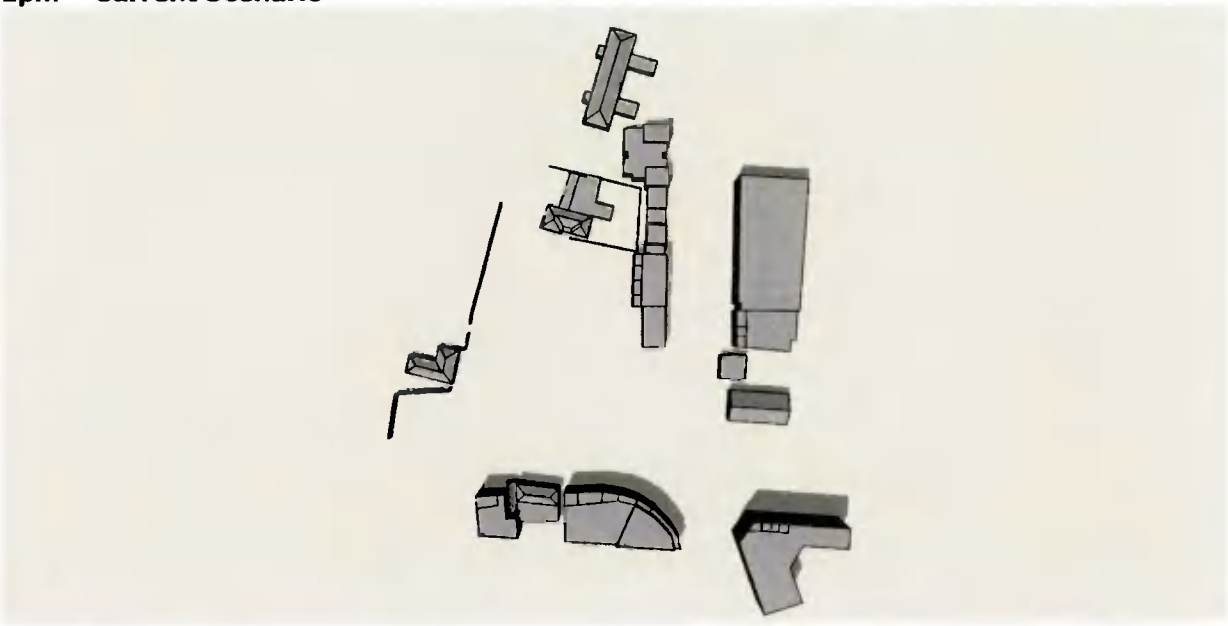
21st June
11am – Current Scenario



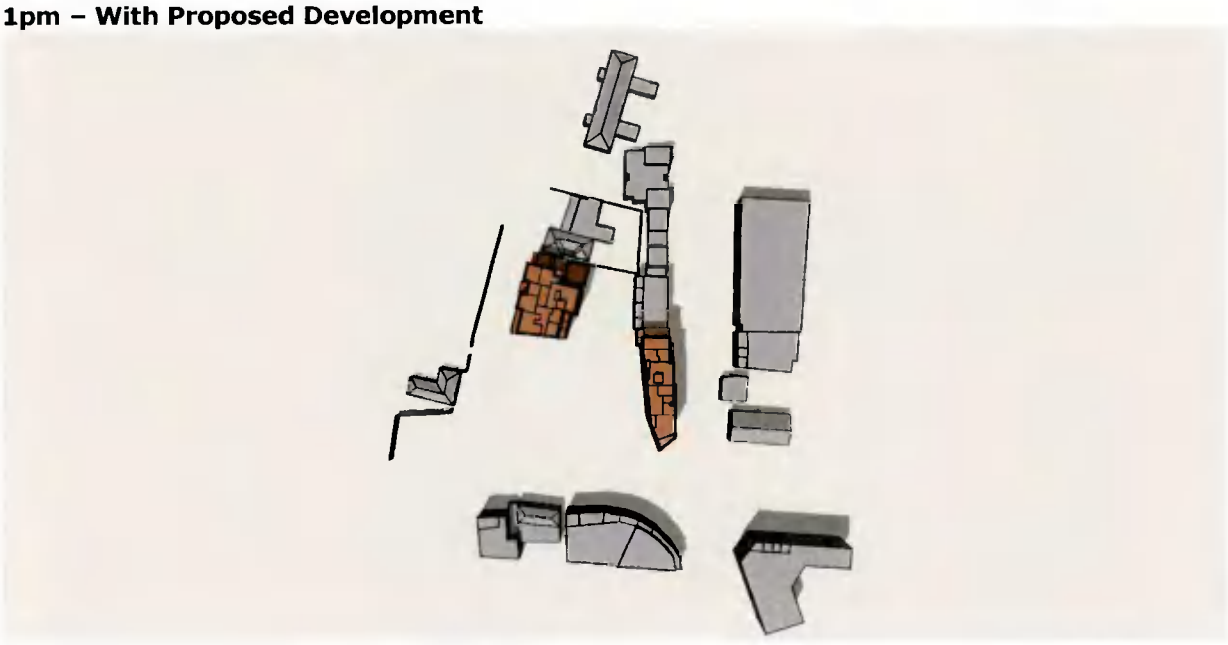
21st June
11am – With Proposed Development



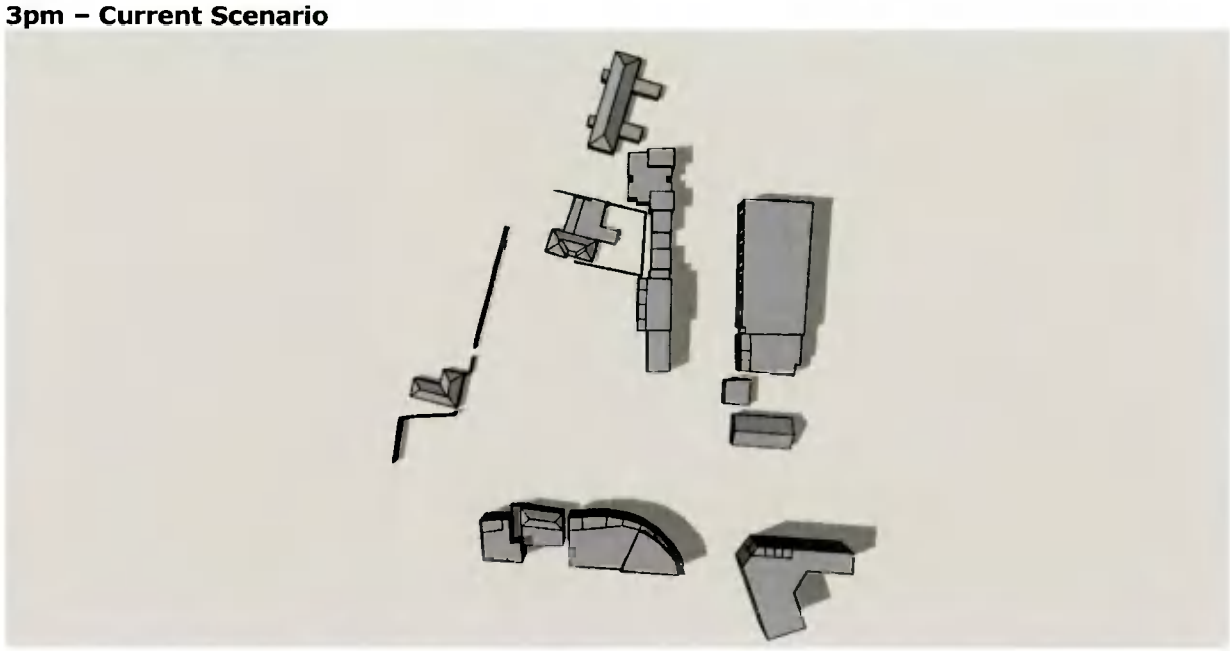
21st June
1pm – Current Scenario



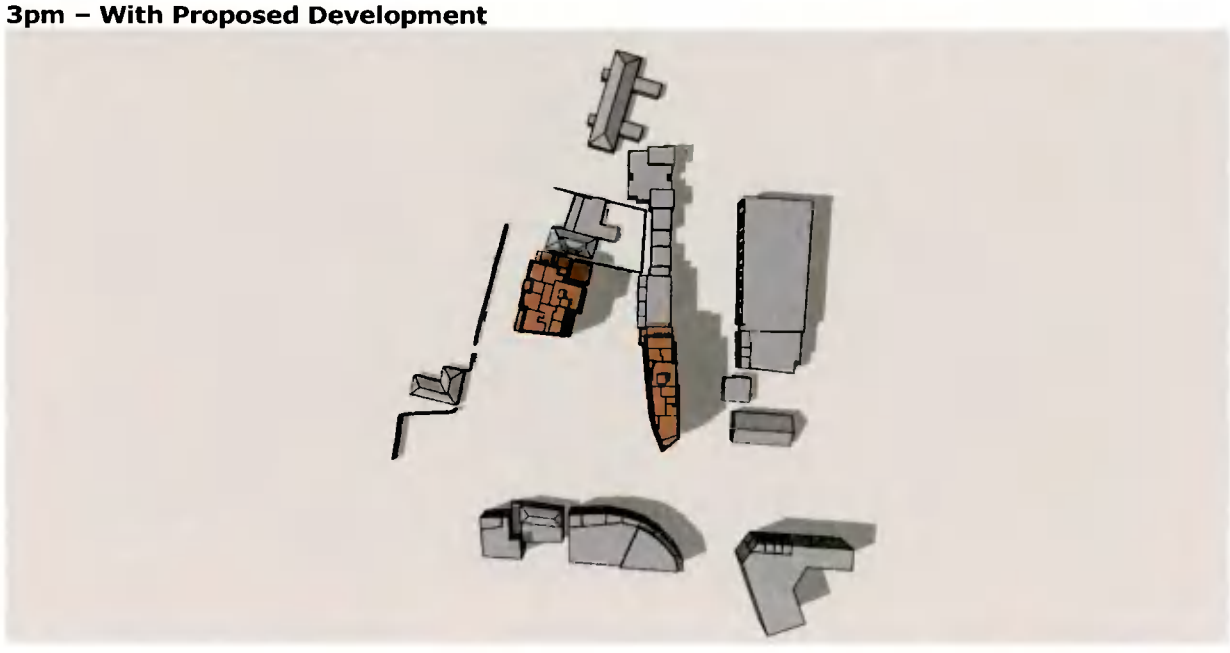
21st June
1pm – With Proposed Development



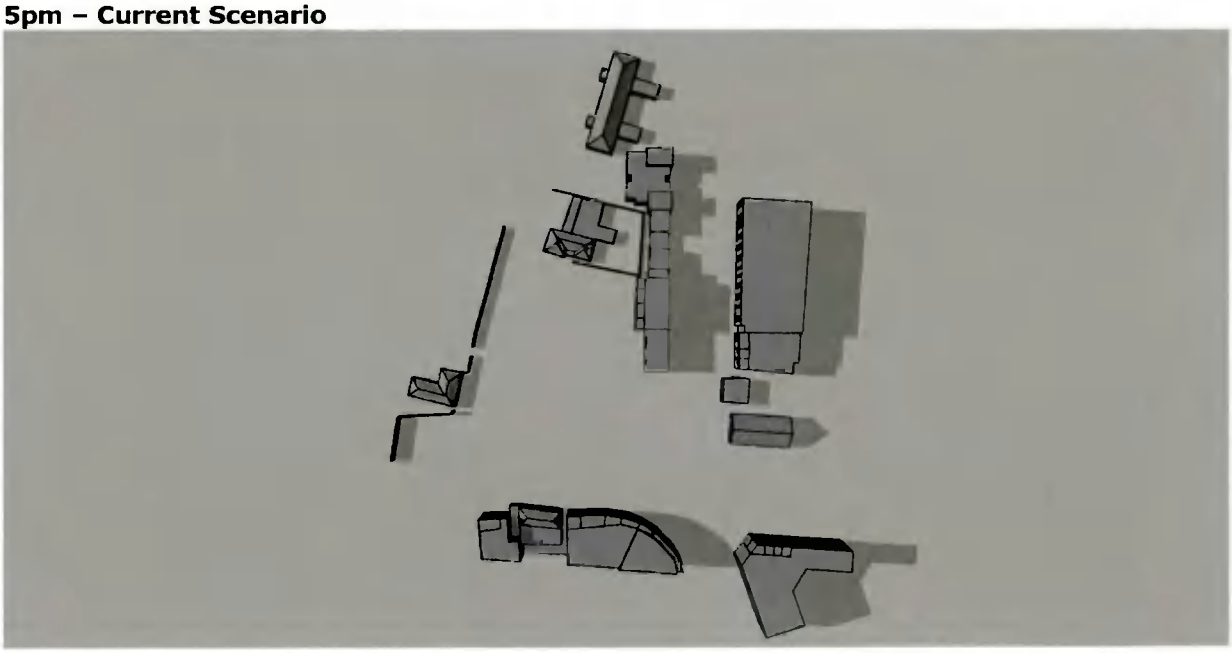
21st June
3pm – Current Scenario



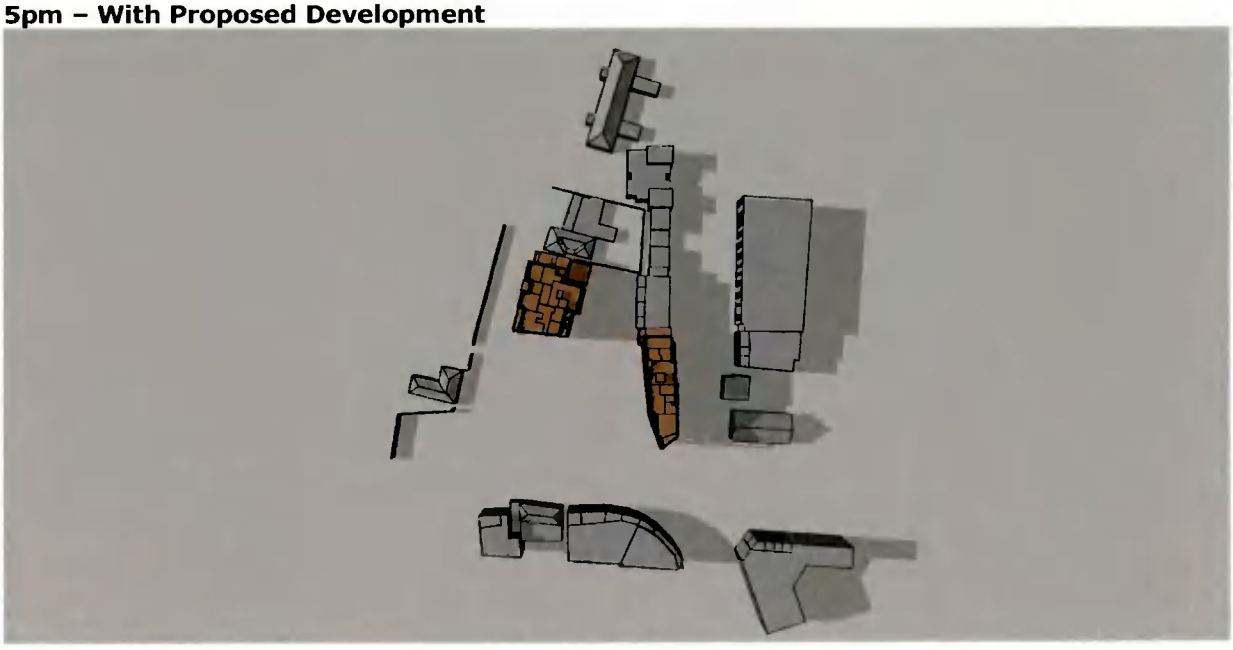
21st June
3pm – With Proposed Development



21st June
5pm – Current Scenario



21st June
5pm – With Proposed Development

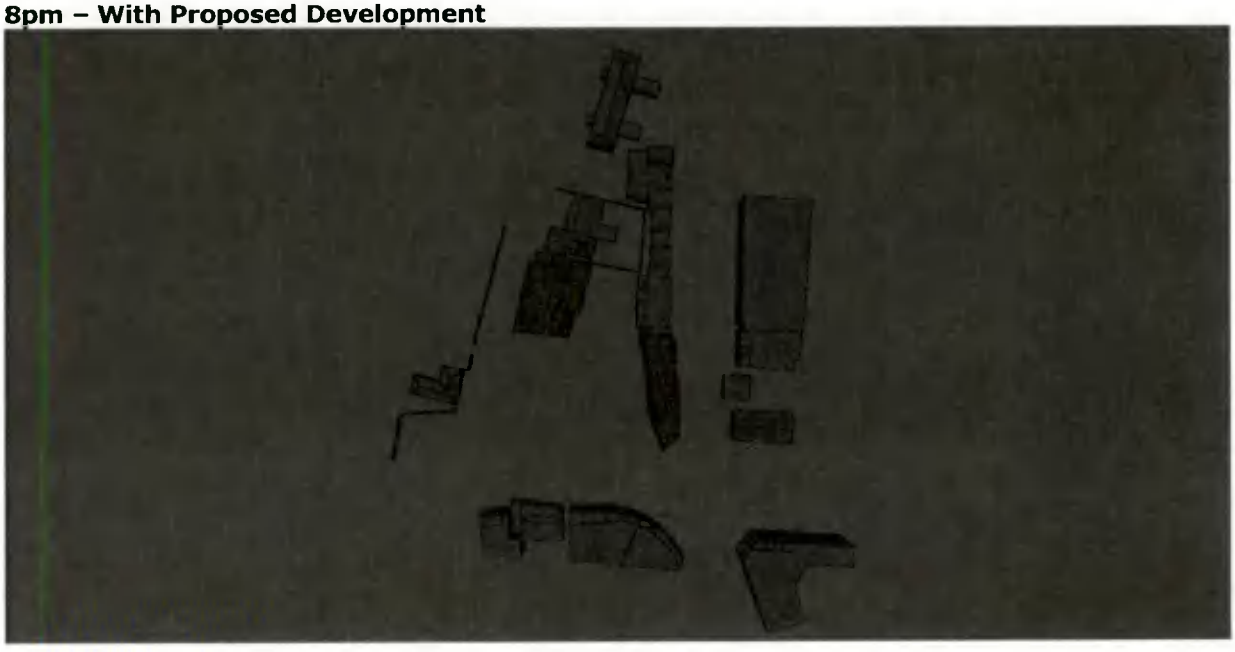


21st June
7pm – Current Scenario

21st June
7pm – With Proposed Development

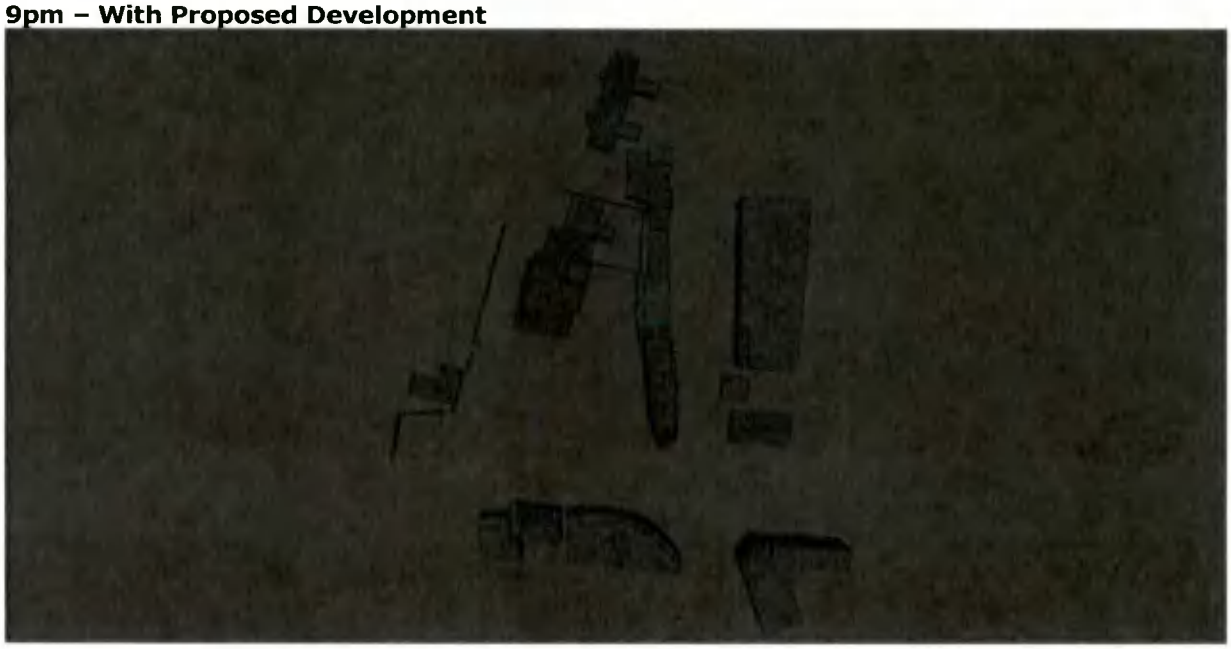
21st June
8pm – Current Scenario

21st June
8pm – With Proposed Development



21st June
9pm – Current Scenario

21st June
9pm – With Proposed Development



21st December
8am – Current Scenario

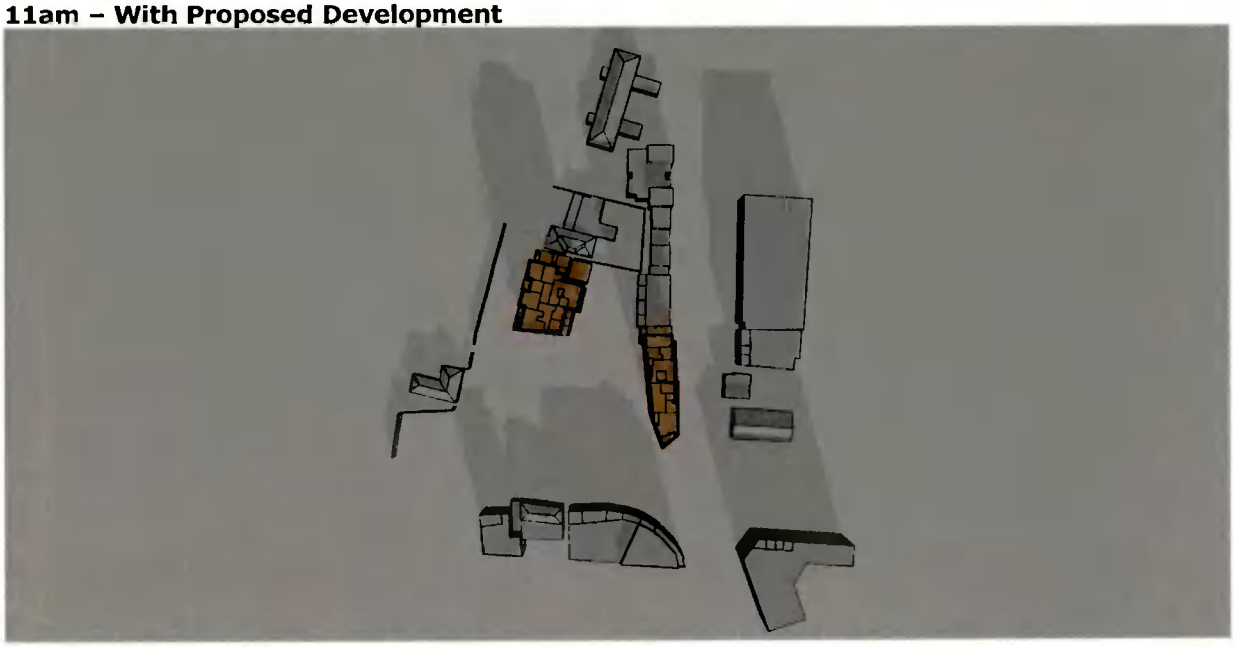
21st December
8am – With Proposed Development

21st December
9am – Current Scenario

21st December
9am – With Proposed Development

21st December
11am – Current Scenario

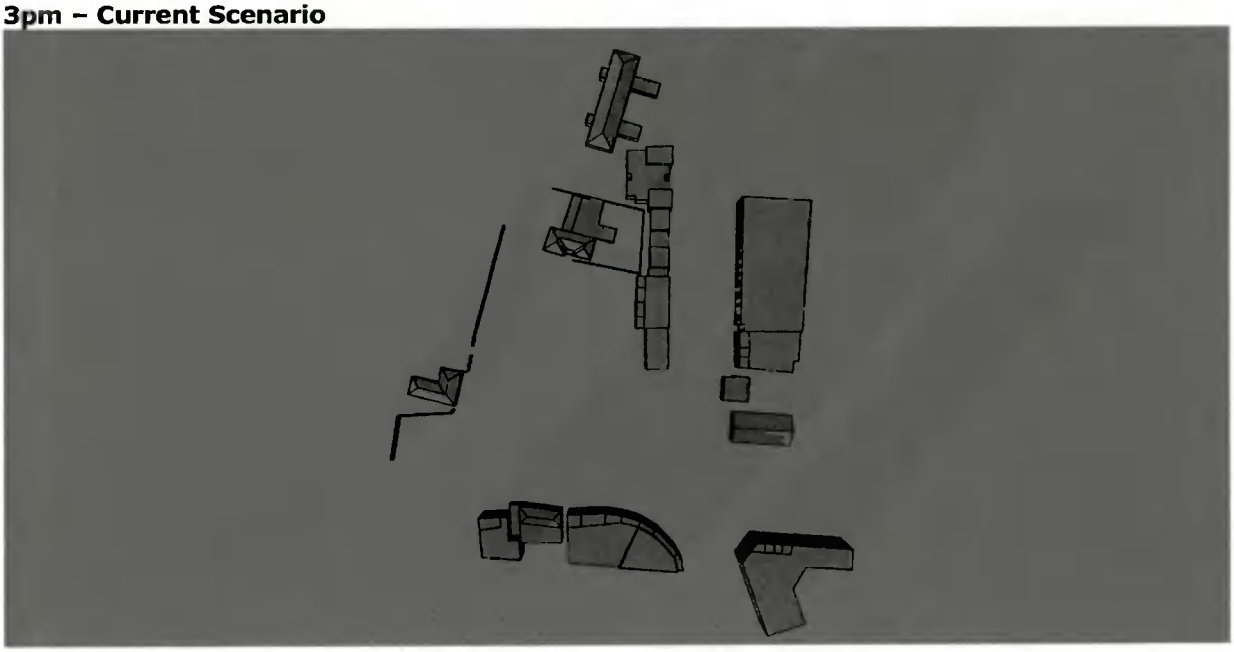
21st December
11am – With Proposed Development



21st December
1pm – Current Scenario

21st December
1pm – With Proposed Development

21st December
3pm – Current Scenario



21st December
3pm – With Proposed Development

21st December
4pm – Current Scenario

21st December
4pm – With Proposed Development

21st December
5pm – Current Scenario

21st December
5pm – With Proposed Development