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# DAYLIGHT, SUNLIGHT AND SHADOW ASSESSMENT

for the

## PROPOSED DEVELOPMENT

at

## NUTGROVE AVENUE
## DUBLIN 14

for

SIRIO HOMES

**La Vallee House**
**Upper Dargle Road**
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## 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 residential development at the former filling station, Nutgrove Avenue, Rathfarnham, Dublin 14. 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 access in closest residential receptors, Sunlight on amenity spaces closest residential receptors and shadowing;
- The Daylight levels that would be achieved by the proposed development on the Ground -First floor and the Sunlight on the surrounding Communal Amenity areas.

### 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 BR209, '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 Guidelines and Advisory Note

The numerical guidelines given in these documents are purely advisory. BRE BR209 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

After carrying out a comprehensive daylight, sunlight and shadowing 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 BRE Guide |
|---|---|---|---|
| **Daylight Assessment on <u>Neighbouring Buildings</u> – Vertical Sky Component (VSC) and Average Daylight Factor (ADF) Calculations**<br><br>**(Referring to nearby 3rd Party Residential)** | IES VE Radiance Daylight Simulation | **BRE Guide [2.2]**<br>• VSC ≥ 27%<br>(Or where that is not achieved)<br>• ≤ 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 neighbouring properties.<br><br>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]**<br>• 2% for Kitchens<br>• 1.5% for Living Rooms<br>• 1% for Bedrooms | Of the 44 rooms that were assessed for daylight, all achieved the BRE daylight guidelines.<br><br>Refer to Section 9.0 of this Report for a more in-depth commentary. |
| **Sunlight Assessment <u>Neighbouring Buildings</u> – Annual Probable Sunlight Hours (APSH)**<br><br>**(Referring to nearby 3rd Party Residential)** | IES VE SunCast Simulation | **BRE Guide [3.2.11]**<br>• Receives more than 25% of annual probable sunlight hours, and more than 5% of annual probable sunlight hours between 21st September and 21st March; (Or where that is not achieved)<br>• ≤ 20% reduction in APSH compared to its previous value before the proposed development (as simulated)<br>Has a reduction in sunlight received over the whole year less than 4% of annual probable sunlight hours. | ALL of the windows assessed for APSH achieved the BRE Guideline recommended values for safeguarding access to sunlight in existing dwellings. ALL of the windows assessed for APSH in the winter months achieved the BRE Guideline recommended values for safeguarding access to sunlight in existing dwellings.<br><br>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 their nature.<br><br>Where only a small number of windows, as is the case here with the proposed development in place, a classification of minor adverse |

| 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 BRE Guide |
|---|---|---|---|
| | | | impact is appropriate in-line with the BRE Guide.<br><br>Refer to Section 10.0 of this Report for a more in-depth commentary. |
| **Sunlight Assessment on <u>Proposed Buildings</u> – Annual Probable Sunlight Hours (APSH)**<br><br>**(Referring to Proposed Development)** | IES VE SunCast Simulation | **BRE Guide [3.1.15]**<br>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. The majority of dwellings achieve the BRE Guide recommend metric for Sunlight availability. Those that have not fully achieved the BRE metrics, these cases were only marginally short of the threshold values or are North/North-East facing where there is a low expectation for sunlight. |
| **Sunlight Assessment on <u>Amenity Space</u> – Sunlight Hours**<br><br>**(Referring to nearby 3rd Party Residential)** | IES VE SunCast Simulation | **BRE Guide [3.3.17]**<br>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.<br><br>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.<br><br>Refer to Section 12.0 of this Report for a more in-depth commentary. |
| **Sunlight Assessment on <u>Amenity Space on</u> – Sunlight Hours** | IES VE SunCast Simulation | **BRE Guide [3.3.17]**<br>It is recommended that for it to appear adequately sunlit throughout the year, at least | The BRE recommended criteria for sunlight in amenity spaces is achieved for the proposed development. |

| 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 BRE Guide |
|---|---|---|---|
| **(Referring to Proposed Development)** | | half of a garden or amenity area should receive at least two hours of sunlight on 21st March. | Refer to Section 13.0 of this Report for a more in-depth commentary. |
| **Site shadow Images**<br><br>**(Referring to nearby 3rd Party Residential)** | IES VE SunCast Simulation | **BRE Guide [3.3.17]**<br>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<br><br>Refer to Section 14.0 of this Report for a more in-depth commentary and Appendix E 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 residential development at the former filling station, Nutgrove Avenue, Rathfarnham, Dublin 14. 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 access in closest residential receptors, Sunlight on amenity spaces closest residential receptors and shadowing;
- The Daylight levels that would be achieved by the proposed development on the Ground -First floor and the Sunlight on the surrounding Communal Amenity areas.

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 for all dwellings.**

## 2.0 SITE DEVELOPMENT DESCRIPTION & PLAN

Sirio Homes intend to apply to South Dublin County Council for permission for residential development comprising a total of 28 no. apartments, in a building up to 4-storeys in height located at the former filling Station site, Nutgrove Avenue, Rathfarnham, Dublin 14. The cumulative gross floor area is proposed to be 2,640sq.m on the 0.3157 hectare site.

The application area includes the site of the former filling station (0.2821 ha – under Applicant ownership) and a portion of land (0.0336ha) located to the north of the filling station site, where the existing traffic lights and pedestrian crossing are located along Nutgrove Avenue. To accommodate access to the Site, it is proposed to relocate the existing traffic lights and pedestrian crossing which traverses both South Dublin County Council and Dun Laoghaire-Rathdown County Council boundaries.

The development will consist of:

**i.** The development proposes a development with a maximum height of c.11.7m and a total gross floor area of 2,640 sq.m consisting of 28 no. residential units comprising:

- 8 x 1-bedroom apartments
- 17 x 2-bedroom apartments
- 3 x 3-bedroom apartments;

**ii.** Communal amenity space (433 sq.m) and public open space (286 sq.m) located to the rear and western side of the Site;

**iii.** At grade car parking is proposed to the rear of the site which will provide 16 no. residents' car parking spaces (including 2 no. electric vehicles spaces and 1 no. accessible spaces) and 2 no. motorcycle parking spaces;

**iv.** Two (2) resident waste bin storage areas are proposed along the north-western and north-eastern corner of the Site, fronting Nutgrove Avenue (Total 25 sq.m);

**v.** A new vehicular entrance from Nutgrove Avenue;

**vi.** A total of 62 no. surface level bicycle parking spaces comprising 48 no. spaces located at the rear of the Site and 14 no. spaces within the residents' communal area, located along the north-western portion of the Site;

**vii.** Relocation of the existing traffic lights and pedestrian crossing located on Nutgrove Avenue 11m to the west of its existing position to accommodate access to the Site; and

**viii.** All ancillary site development works including installation of drainage and water supply infrastructure, lighting and provision of an ESB substation and switch room.


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.

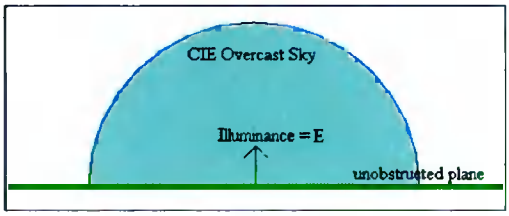
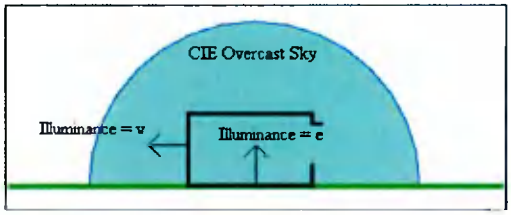
| | |
|---|---|
| **BRE** | Building Research Establishment. |
| **Average Daylight Factor (ADF)** | The ratio of total daylight flux incident on a reference area to total area of reference area, expressed as a percentage of outdoor illuminance on a horizontal plane due to an unobstructed hemisphere 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.<br>  <br>E= illuminance on an unobstructed plane.<br>  <br>e= illuminance at point in interior<br><br>Sky Component =e/E (often expressed as a percentage)<br>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;<br>$L_y = L_z \frac{(1 + 2\sin y)}{3}$<br>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.

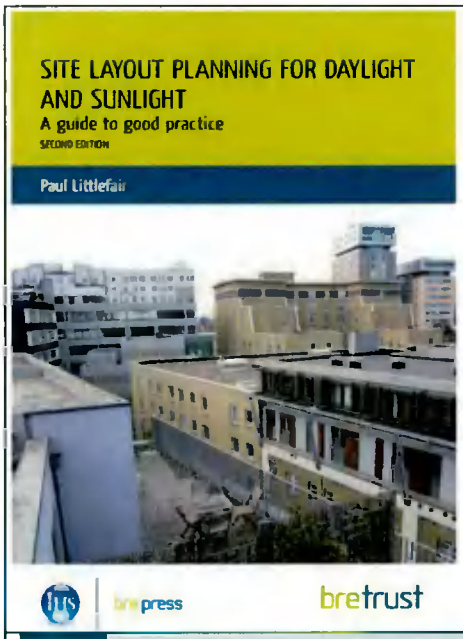
| | |
|---|---|
|  | This document gives advice on site layout planning to achieve good sun lighting and daylighting, both within buildings and in the open spaces between them. This authoritative document is widely used to provide advice during the planning and design stages of building development in the UK and Ireland.<br><br>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 Shadowing 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 use. That is 1% for a bedroom, 1.5% for a combined Kitchen/Living/dining area.

### Annual Probable Sunlight Hours (APSH)

The BRE Guide recognises that good sun light availability is unachievable for rooms that face significantly north of due east or west. 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. These orientations may be analysed and included for information purposes, however when interpreting the results, it should be recognised that generally good sun light availability is unachievable for these orientations.

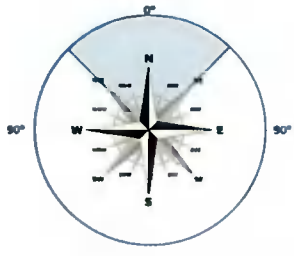



Figure 5.0.1 – Orientations analysed for APSH.

## 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

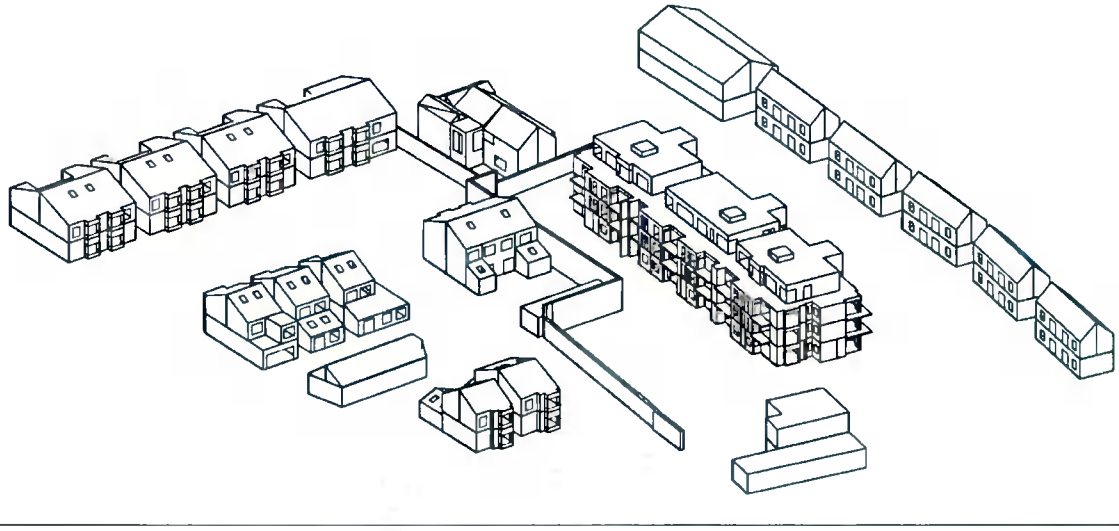


Figure 7.0.1 View from the South East.

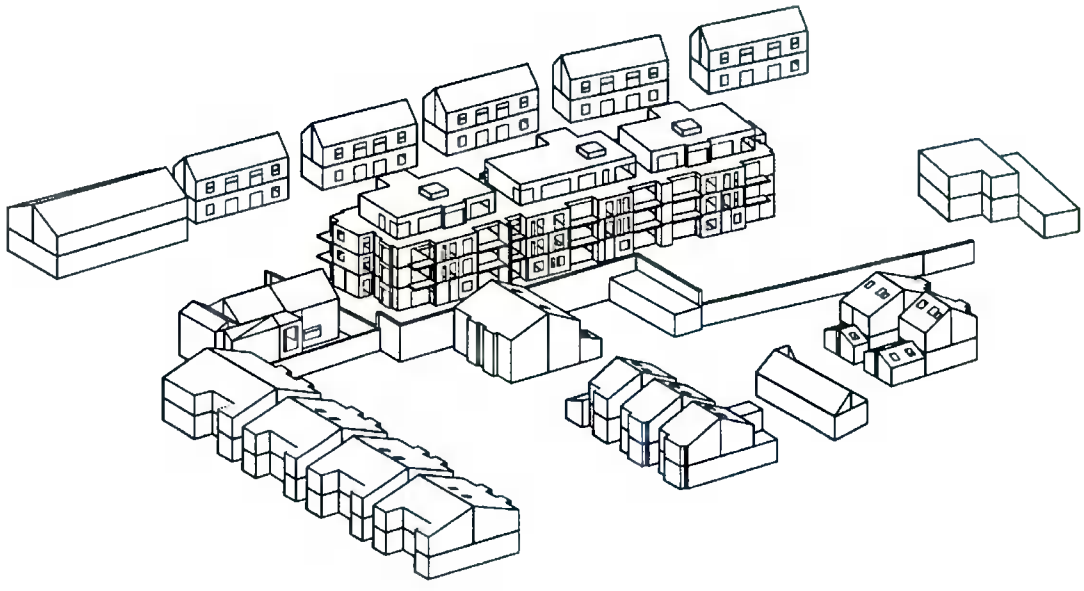


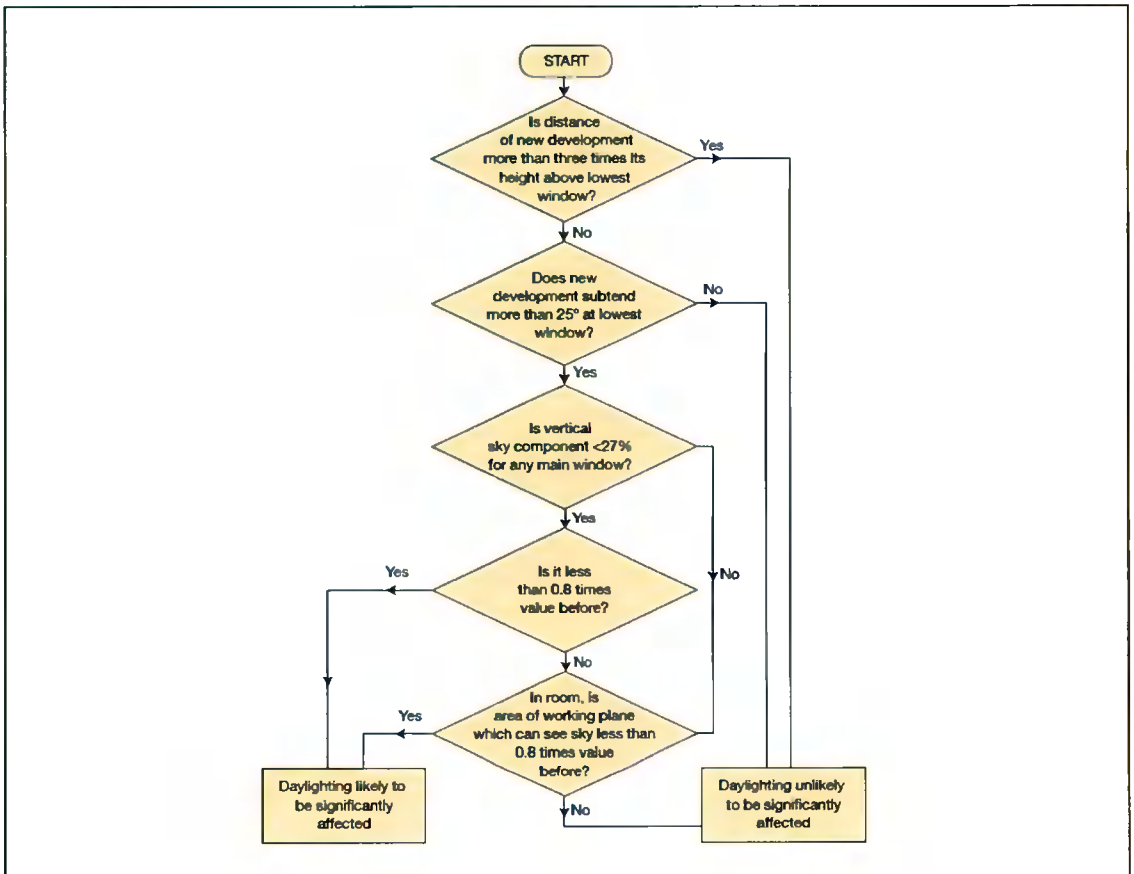
Figure 7.0.2 View from the West.

## 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 Nutgrove Avenue 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 12). 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.

**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 living room 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 and result images are in Appendix D on page 45 and 46.


Figure 8.0.2 – Assessed Surrounding Dwellings

**Simulation Results**

| Dwelling Reference | VSC with Proposed Development (%) | Compliant with BRE Guideline for Safeguarding Daylight |
|---|---|---|
| 1 | Ground Floor Main Window - 32.34<br>First Floor Main Window - 35.34 | Yes |
| 2 | Ground Floor Main Window - 32.45<br>First Floor Main Window - 35.21 | Yes |
| 3 | Ground Floor Main Window - 30.44<br>First Floor Main Window - 33.98 | Yes |
| 4 | Ground Floor Main Window - 30.48<br>First Floor Main Window - 33.61 | Yes |
| 5 | Ground Floor Main Window - 30.97<br>First Floor Main Window - 33.78 | Yes |
| 6 | Ground Floor Main Window - 31.22<br>First Floor Main Window - 33.85 | Yes |
| 7 | Ground Floor Main Window - 33.32<br>First Floor Main Window - 35.44 | Yes |
| 8 | Ground Floor Main Window - 33.80<br>First Floor Main Window - 36.00 | Yes |
| 9 | Ground Floor Main Window - 36.77<br>First Floor Main Window - 38.08 | Yes |
| 10 | Ground Floor Main Window - 37.13<br>First Floor Main Window - 38.45 | Yes |
| 11 | Ground Floor Main Window - 38.89<br>First Floor Main Window - 39.69 | Yes |
| 12 | Ground Floor Main Window - 39.44<br>First Floor Main Window - 39.77 | Yes |
| 13 | Ground Floor Main Window - 34.97 | Yes |
| 14 | Ground Floor Main Window - 38.41<br>First Floor Main Window - 34.63 | Yes |
| 15 | Ground Floor Main Window - 33.39<br>First Floor Main Window - 37.60 | Yes |
| 16 | Ground Floor Main Window - 35.33<br>First Floor Main Window - 37.66 | Yes |
| 17 | Ground Floor Window 1 - 23.95<br>(Current VSC = 24.14)<br>Ground Floor Window 2 - 25.81<br>(Current VSC = 25.77)<br>First Floor Window 1 - 37.17<br>First Floor Window 2 - 37.08<br>First Floor Window 3 - 36.74<br>First Floor Window 4 - 35.83 | Yes<br>VSC is greater than 80% of former value |
| 18 | Ground Floor Window 1 - 30.67<br>Ground Floor Window 2 - 31.28<br>First Floor Window 1 - 27.33<br>First Floor Window 2 - 36.68 | Yes |
| 19 | Ground Floor Main Window - 34.46<br>First Floor Main Window - 37.02 | Yes |

| | | |
|---|---|---|
| 20 | Ground Floor Main Window - 35.24<br>First Floor Main Window - 37.15 | Yes |
| 21 | Ground Floor Main Window - 36.20<br>First Floor Main Window - 37.20 | Yes |
| 22 | Ground Floor Main Window - 36.42<br>First Floor Main Window - 38.14 | Yes |
| 23 | Ground Floor Main Window - 36.56<br>First Floor Main Window - 38.32 | Yes |
| 24 | Ground Floor Main Window - 36.67<br>First Floor Main Window - 38.23 | Yes |
| 25 | Ground Floor Main Window - 37.20<br>First Floor Main Window - 38.61 | Yes |
| 26 | Ground Floor Main Window - 37.43<br>First Floor Main Window - 38.66 | Yes |
| 27 | Ground Floor Main Window – 32.76 | Yes |

Table 8.0.1 – VSC Results for Surrounding Assessment Dwellings

**The results confirm that the access to daylight for existing surrounding dwellings, when compared with their existing baseline experience, will not be compromised as a result of the proposed development because the VSC in all cases is ≥ 27% or failing that ≥0.8 times its existing value prior to the proposed development.**

The simulation model used confirms that the BRE Guide Metrics for safeguarding diffuse skylight to existing buildings adjacent to the proposed development have been achieved. This was demonstrated in accordance with the BRE Guide by calculating the VSC of the windows adjacent to the proposed development. **All calculated VSCs achieve the recommended metrics for maintaining daylight.**

## 9.0 DAYLIGHT ASSESSMENT – PROPOSED DEVELOPMENT

**Daylight Assessment**

All ground floor rooms and first floor Bedrooms and Kitchen/living/dining spaces in the apartments were assessed for daylight. 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.

Of the 44 rooms that were assessed for daylight, **ALL** achieved the BRE daylight guidelines.

**Appendix A presents the daylight results for the dwellings within the proposed development.**

**Appendix B presents daylight distribution images.**

**Appendix C 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 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 are not expected to achieve good APSH values because the BRE Guide recognises that good sun light availability is unachievable for these orientations, however results for all windows facing the proposed development have been included for information. Results are presented overleaf.

## Annual Probable Sunlight Hours Simulation Results

| Dwelling Reference | APSH for Current Scenario (%) (Recommended Value ≥25%) | APSH Proposed Development (%) (Recommended Value ≥25%) | % of Former Value (target value ≥80%) If 25% APSH not Achieved | Compliant with BRE Guide for Safeguarding Access to Sunlight | Comments |
|---|---|---|---|---|---|
| 1 | 70.57 | 60.45 | N/A | Yes | |
| 2 | 72.66 | 61.43 | N/A | Yes | |
| 3 | 77.99 | 61.82 | N/A | Yes | |
| 4 | 78.16 | 62.05 | N/A | Yes | |
| 5 | 76.61 | 62.65 | N/A | Yes | |
| 6 | 77.05 | 62.87 | N/A | Yes | |
| 7 | 75.69 | 63.66 | N/A | Yes | |
| 8 | 75.70 | 65.36 | N/A | Yes | |
| 9 | 75.27 | 70.81 | N/A | Yes | |
| 10 | 75.27 | 71.95 | N/A | Yes | |
| 11 | 51.84 | 51.84 | N/A | Yes | |
| 12 | 53.47 | 53.47 | N/A | Yes | |
| 13 | 9.40 | 9.40 | 100% | Yes | |
| 14 | 44.29 | 44.29 | N/A | Yes | |
| 15 | 42.70 | 42.70 | N/A | Yes | |
| 16 | 51.74 | 51.54 | N/A | Yes | |
| 17 | 36.75 | 36.75 | N/A | Yes | |
| 18 | 52.85 | 50.82 | N/A | Yes | |
| 19 | 42.27 | 41.51 | N/A | Yes | |
| 20 | 46.33 | 45.36 | N/A | Yes | |
| 21 | 47.59 | 45.25 | N/A | Yes | |
| 22 | 47.14 | 45.96 | N/A | Yes | |
| 23 | 47.12 | 45.89 | N/A | Yes | |
| 24 | 47.23 | 47.23 | N/A | Yes | |
| 25 | 48.59 | 48.59 | N/A | Yes | |
| 26 | 49.99 | 49.54 | N/A | Yes | |
| 27 | 49.77 | 49.77 | N/A | Yes | |

Table 10.0.2

**Winter Probable Sunlight Hours Simulation Results**

| Dwelling Reference | APSH Between 21st September and 21st March for Current Scenario (%) (Recommended Value ≥5%) | APSH Between 21st September and 21st March with Proposed Development (%) (Recommended Value ≥5%) | % of Former Value (target value ≥80%) If 5% WPSH not Achieved | Compliant with BRE Guide for Safeguarding Access to Sunlight | Comments |
|---|---|---|---|---|---|
| 1 | 34.26 | 24.15 | N/A | Yes | |
| 2 | 33.87 | 22.64 | N/A | Yes | |
| 3 | 34.94 | 18.76 | N/A | Yes | |
| 4 | 35.11 | 19.00 | N/A | Yes | |
| 5 | 34.25 | 20.29 | 100% | Yes | |
| 6 | 34.64 | 20.46 | N/A | Yes | |
| 7 | 34.72 | 23.38 | N/A | Yes | |
| 8 | 34.72 | 25.01 | N/A | Yes | |
| 9 | 34.72 | 31.00 | N/A | Yes | |
| 10 | 34.70 | 32.21 | N/A | Yes | |
| 11 | 22.22 | 22.22 | N/A | Yes | |
| 12 | 22.22 | 22.22 | N/A | Yes | |
| 13 | 0.00 | 0.00 | 100% | Yes | |
| 14 | 20.34 | 20.34 | N/A | Yes | |
| 15 | 15.13 | 15.13 | N/A | Yes | |
| 16 | 17.21 | 17.21 | N/A | Yes | |
| 17 | 12.81 | 12.81 | N/A | Yes | |
| 18 | 22.03 | 22.03 | N/A | Yes | |
| 19 | 18.74 | 18.11 | N/A | Yes | |
| 20 | 18.75 | 18.75 | N/A | Yes | |
| 21 | 18.33 | 18.33 | N/A | Yes | |
| 22 | 18.77 | 18.77 | N/A | Yes | |
| 23 | 18.59 | 18.59 | N/A | Yes | |
| 24 | 18.76 | 18.76 | N/A | Yes | |
| 25 | 19.79 | 19.79 | N/A | Yes | |
| 26 | 21.07 | 21.07 | N/A | Yes | |
| 27 | 21.53 | 21.53 | N/A | Yes | |

Table 10.0.3

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

**It is important to note that the assessment windows are worst case scenario ground floor windows, which face the proposed development.**

**Appendix I of the BRE Guide suggests that sunlight impacts can be assessed as minor, moderate or major adverse. Where the loss of sunlight affects only a small number of windows, as is the case here with the proposed development in place, a classification of negligible/minor impact is appropriate.**

## 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**

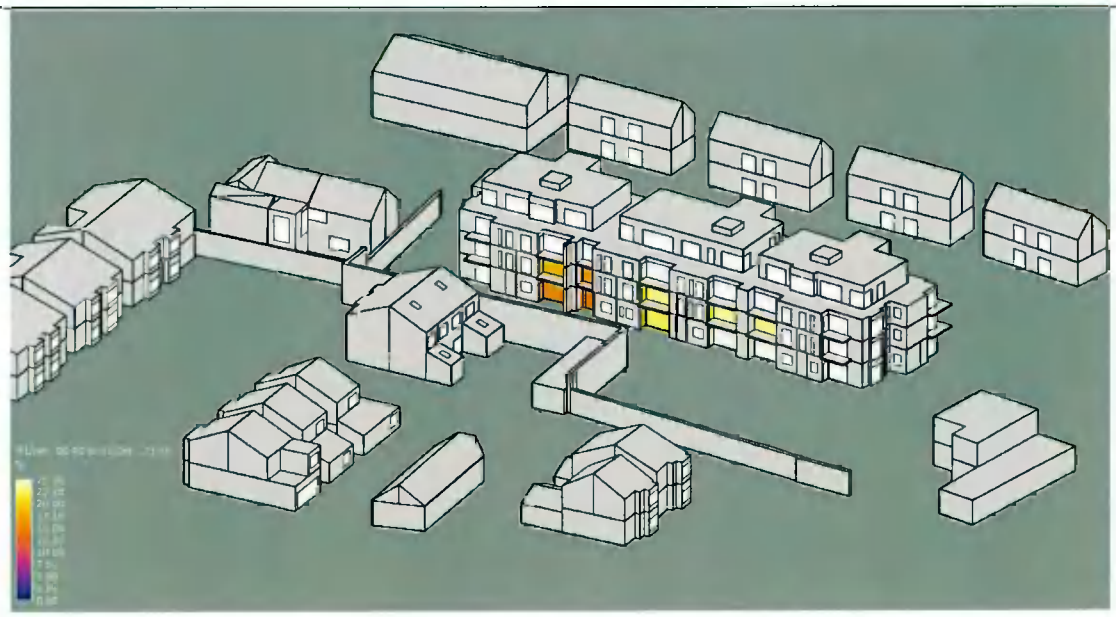
**It is important that the guidelines that exist in relation to sunlight are read in the correct context and are not viewed as mandatory requirements for all dwellings.**

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.

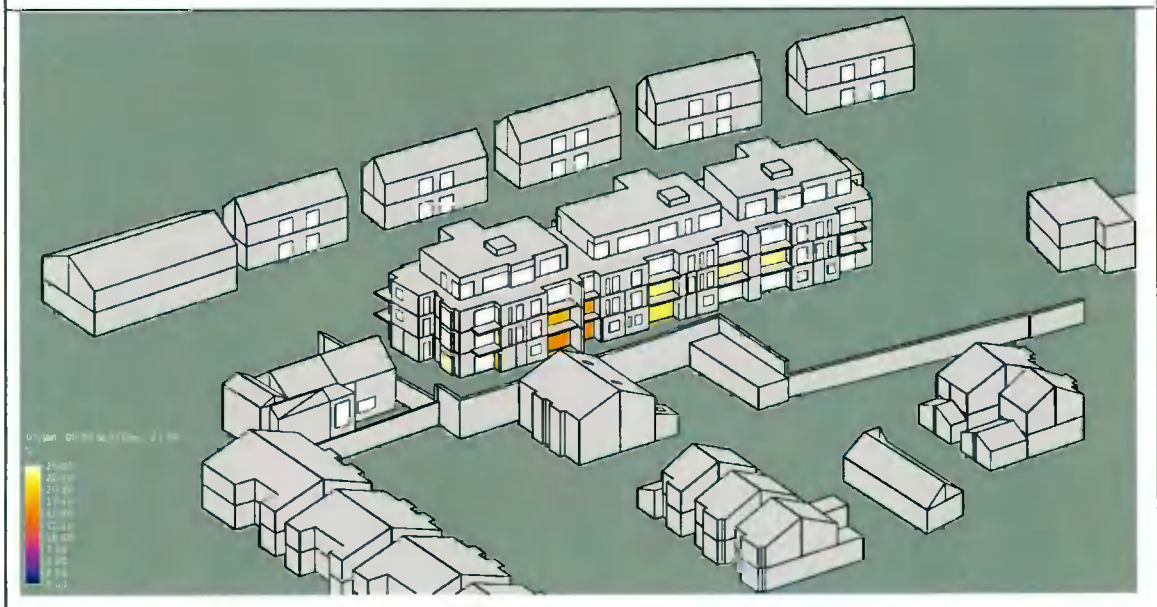
2. Paragraph 3.1.11 of the BRE Guide states that if a room faces significantly north of due east or west it is unlikely to meet the recommended levels. Therefore taking this BRE statement into account, only windows that face significantly south of due east and west were assessed as part of this study.

3. It is also important to note that BS 8206-2 suggests that sunlight satisfaction is related to expectation. The BS document states that:
*"The degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".*

**Simulation Results – Full Year**



**South East View of Proposed Development**

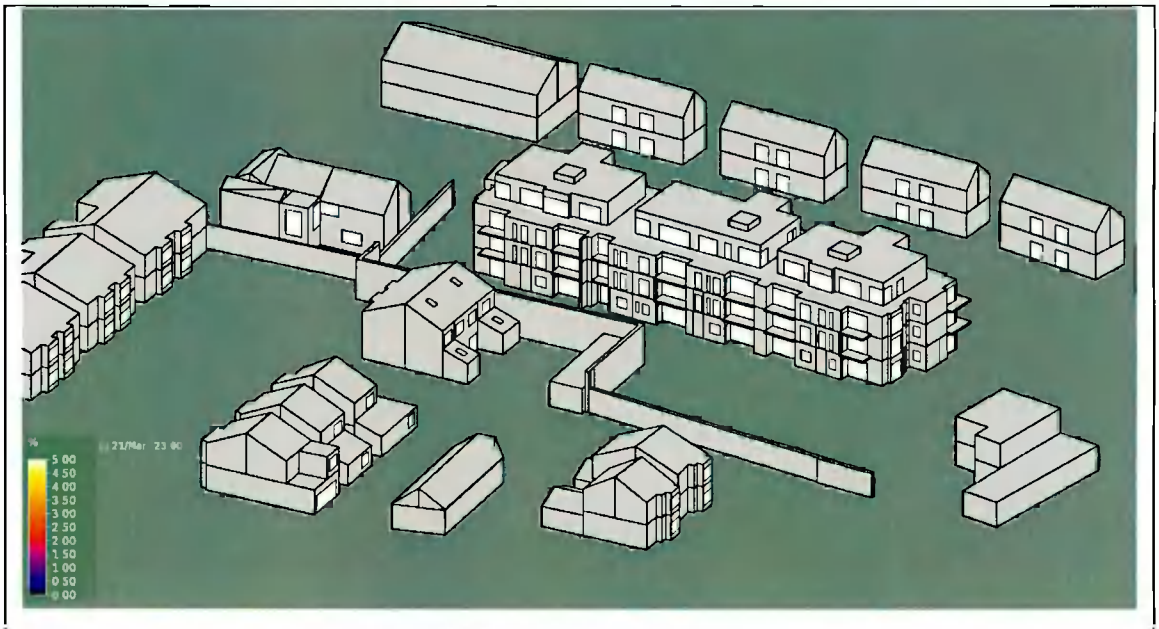


**South West View of Proposed Development**

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

**Note:** The APSH achieved is shown for all windows on the images above, however the BRE Guide APSH target is only applicable to main living room windows. The results demonstrate that the majority of windows achieve the target sunlight values. Generally, where the sunlight targets are not achieved it is at the lower levels where typically there is a lower expectation of sunlight.

## Simulation Results – Winter Months




**South East View of Proposed Development**


**South West View of Proposed Development**

The Sunlight target is 5% APSH (refer to legend). Windows shown in white achieve the BRE targets as the APSH is greater than 5%. Using the legend the specific APSH can be determined for windows that do not exceed the target value.

**Note:** The APSH achieved is shown for all windows on the images above, however the BRE Guide APSH target is only applicable to main living room windows.

**Results Summary**

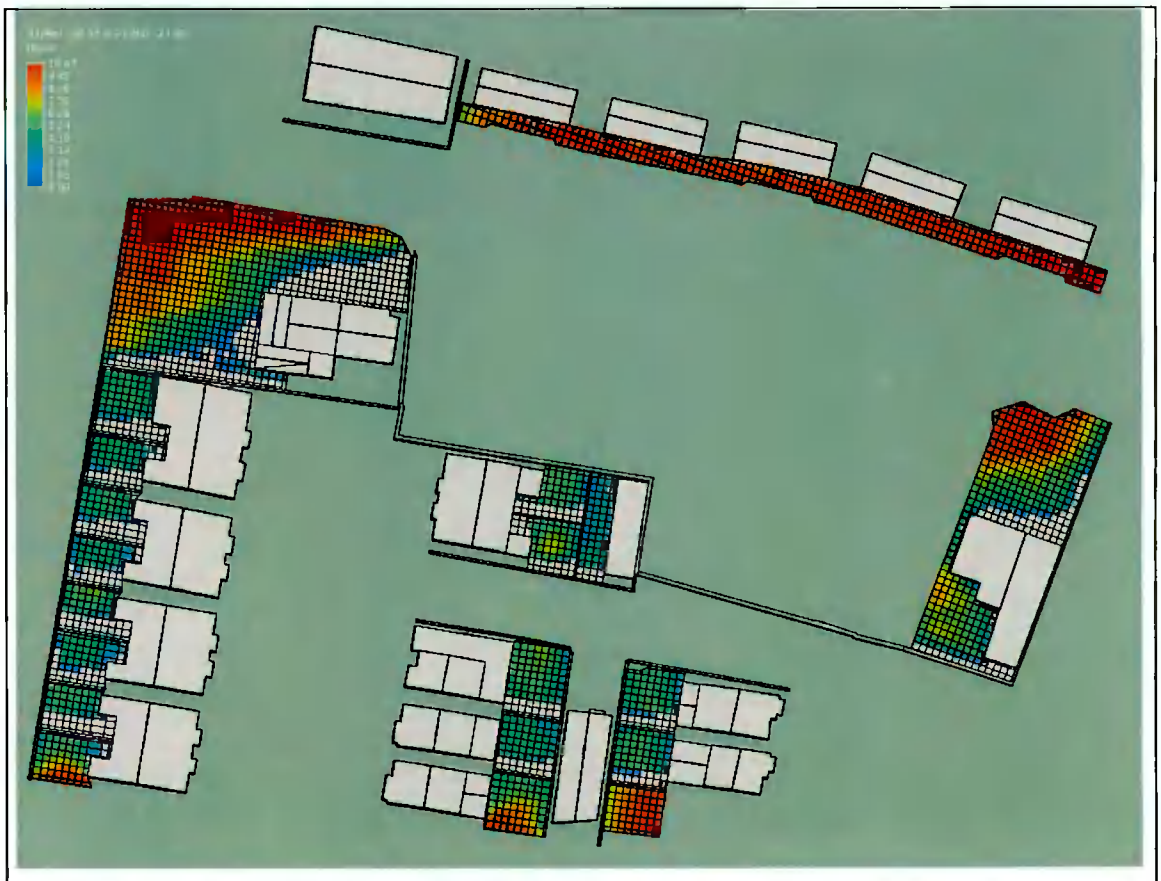
The results demonstrate that dwellings of the proposed development achieve good APSH on main windows. The majority of the assessed living rooms achieve the BRE Guides criteria for Sunlight availability.

## 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.

Presented overleaf are the current and proposed scenario sunlight exposure images for the rear gardens of the assessment dwellings.

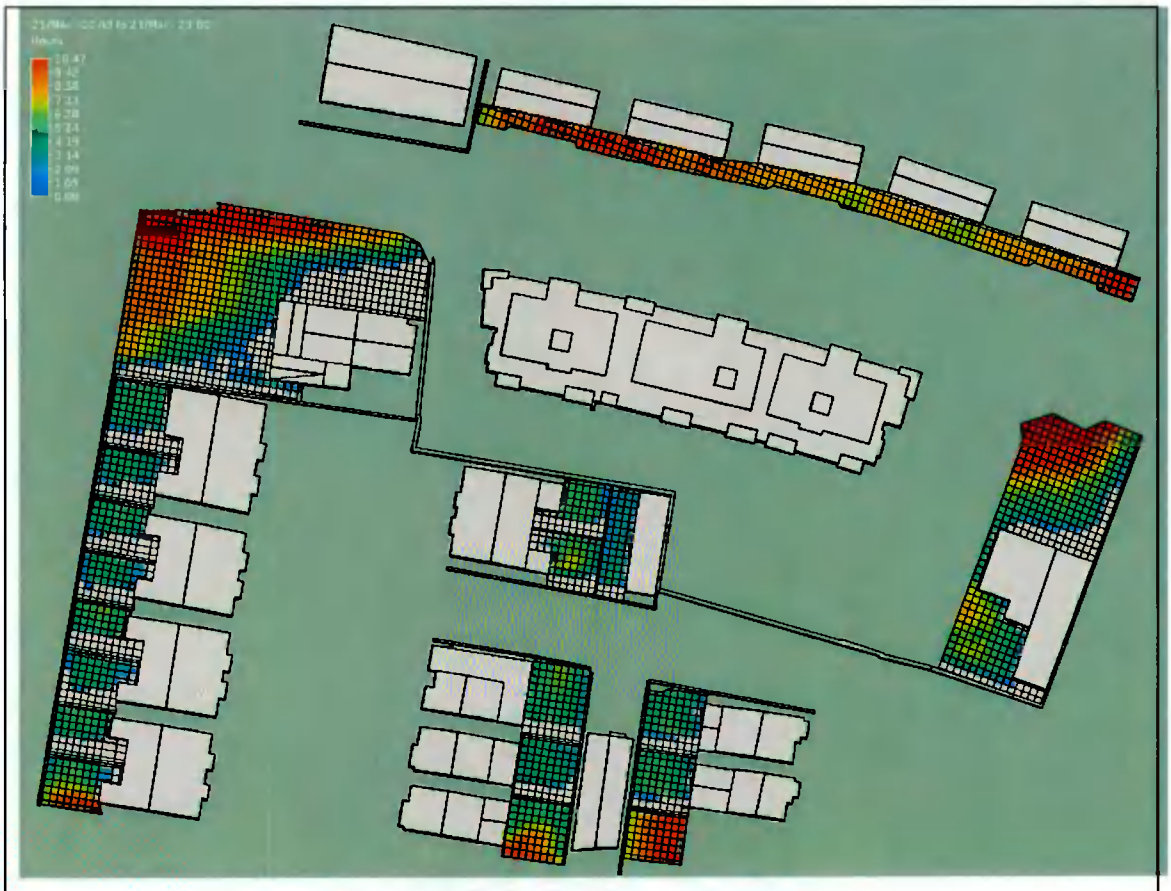
## Simulation Results



**Current Scenario – March 21st**

**Sunlight exposure (hours)**

Figure 10.0.1



**Proposed Scenario – March 21st**

**Sunlight exposure (hours)**

Figure 10.0.2

## Simulation Results


**Current Scenario – March 21st**

**Cells coloured red if they receive ≥2 hours of sunlight**

Figure 10.0.3


**Proposed Scenario – March 21st**

**Cells coloured red if they receive ≥2 hours of sunlight**

Figure 10.0.4

**Simulation Results Table**

| Garden Ref No. | Current Scenario % of Garden receiving ≥2 hours of sunlight on March 21 | Proposed Scenario % of Garden receiving ≥2 hours of sunlight on March 21 | % of Former Value (target value ≥80%) | Compliant with BRE Guideline for safeguarding access to sunlight |
|---|---|---|---|---|
| 1 | 100% | 100% | 100% | Yes |
| 2 | 100% | 100% | 100% | Yes |
| 3 | 100% | 100% | 100% | Yes |
| 4 | 100% | 100% | 100% | Yes |
| 5 | 100% | 100% | 100% | Yes |
| 6 | 100% | 100% | 100% | Yes |
| 7 | 100% | 100% | 100% | Yes |
| 8 | 100% | 100% | 100% | Yes |
| 9 | 100% | 100% | 100% | Yes |
| 10 | 100% | 100% | 100% | Yes |
| 11 | 82% | 82% | 100% | Yes |
| 12 | 83% | 83% | 100% | Yes |
| 13 | 100% | 100% | 100% | Yes |
| 14 | 75% | 75% | 100% | Yes |
| 15 | 72% | 72% | 100% | Yes |
| 16 | 74% | 74% | 100% | Yes |
| 17 | 78% | 77% | 99% | Yes |
| 18 | 70% | 70% | 100% | Yes |
| 19 | 64% | 64% | 100% | Yes |
| 20 | 63% | 63% | 100% | Yes |
| 21 | 64% | 64% | 100% | Yes |
| 22 | 54% | 54% | 100% | Yes |
| 23 | 66% | 66% | 100% | Yes |
| 24 | 55% | 55% | 100% | Yes |
| 25 | 94% | 94% | 100% | Yes |

Table 10.0.1

**Results Summary**

25 of the 25 assessed neighbouring amenity areas achieve the BRE Guideline recommended values for safeguarding access to sunlight 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, Communal Open Spaces, 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 11.0.1 – BRE methodology for safeguarding sunlight in amenity spaces

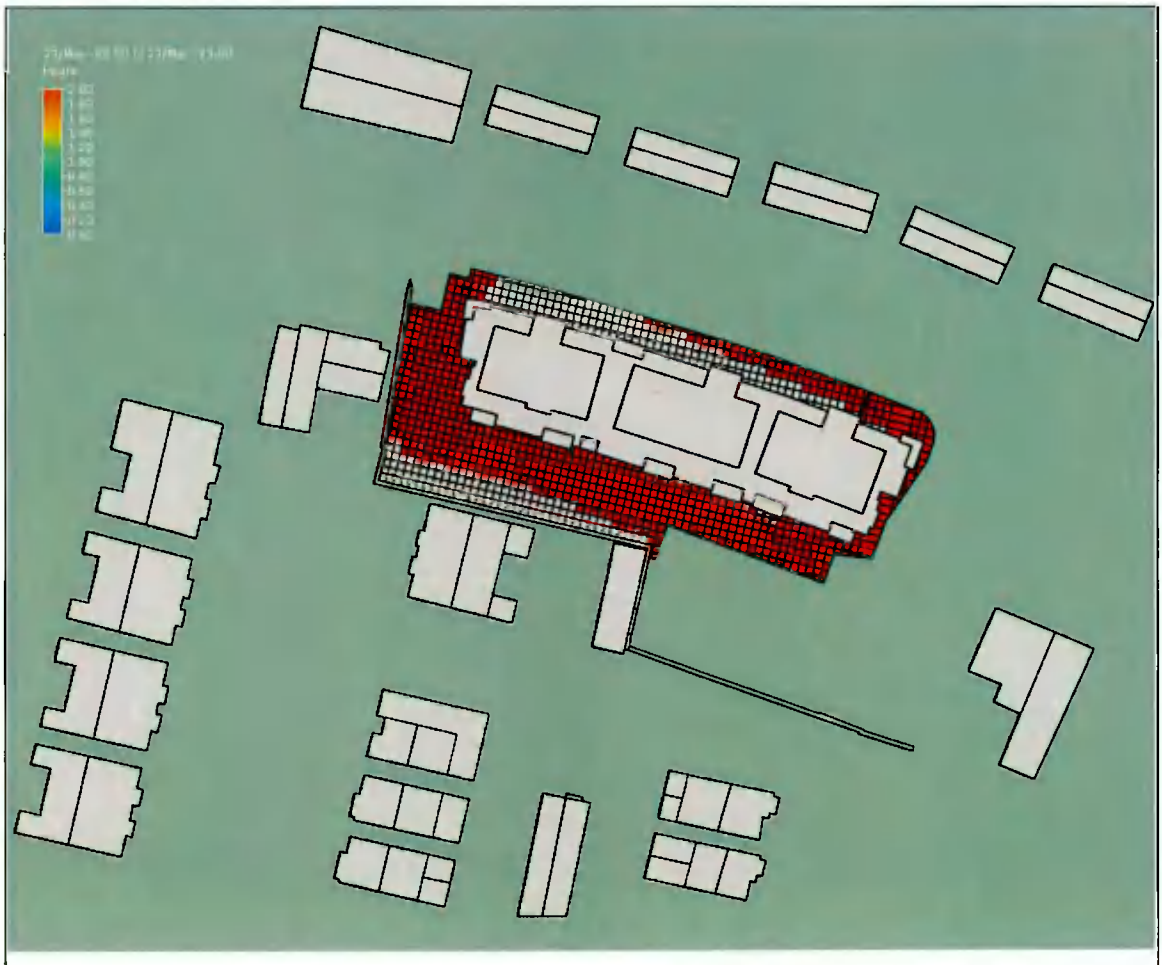
The massing of the proposed development has been designed so that the amenity areas exceed the BRE Guides recommended criteria for sunlight. This will ensure that a positive appearance and ambiance will be achieved by development. This is demonstrated by the images overleaf where the amenity areas exceed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

## Simulation Results

**Proposed Development Amenity Areas – March 21st**

**Sunlight exposure (hours)**

Figure 11.0.1



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

Figure 11.0.2

**Results Summary**

The BRE recommended criteria for sunlight in amenity spaces is achieved for the proposed development and exceeded with 72 % of the amenity space receiving ≥2 hours of sunlight.

## 14.0 SHADOW IMAGES

Shadow Images from the IES SunCast simulation package are presented in Appendix E for both the current scenario and with the proposed development in place. These "before and after" shadow images are included for information rather than as a qualitative assessment. 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 shadow 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 shadow a space is to be expected.

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

Note: The times of day not shown are outside sun light hours.

## 15.0 CONCLUSION

The Daylight, Sunlight and shadow 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**
**Daylight/ Sunlight to Amenity areas**
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 E 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.

## APPENDIX A – DAYLIGHT RESULTS – PROPOSED DEVELOPMENT

### GROUND FLOOR

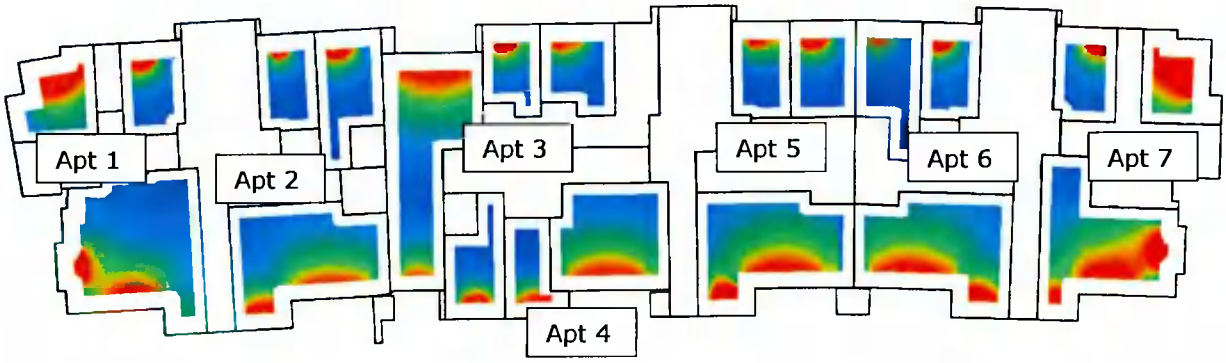
| Ref | Room | Target ADF (%) | ADF Achieved (%) | Target ADF Achieved |
|---|---|---|---|---|
| Apt 1 | Kitchen Living Dining | 1.5 | 2.04 | Yes |
| | Bedroom 1 | 1 | 3.86 | Yes |
| | Bedroom 2 | 1 | 1.86 | Yes |
| Apt 2 | Kitchen Living Dining | 1.5 | 2.2 | Yes |
| | Bedroom 1 | 1 | 1.68 | Yes |
| | Bedroom 2 | 1 | 1.27 | Yes |
| Apt 3 | Kitchen Living Dining | 1.5 | 2.04 | Yes |
| | Bedroom 1 | 1 | 1.47 | Yes |
| | Bedroom 2 | 1 | 2.53 | Yes |
| Apt 4 | Kitchen Living Dining | 1.5 | 2.46 | Yes |
| | Bedroom 1 | 1 | 1.62 | Yes |
| | Bedroom 2 | 1 | 1.68 | Yes |
| Apt 5 | Kitchen Living Dining | 1.5 | 2.58 | Yes |
| | Bedroom 1 | 1 | 1.72 | Yes |
| | Bedroom 2 | 1 | 1.68 | Yes |
| Apt 6 | Kitchen Living Dining | 1.5 | 2.83 | Yes |
| | Bedroom 1 | 1 | 1.08 | Yes |
| | Bedroom 2 | 1 | 1.85 | Yes |
| Apt 7 | Kitchen Living Dining | 1.5 | 3.14 | Yes |
| | Bedroom 1 | 1 | 6.03 | Yes |
| | Bedroom 2 | 1 | 1.89 | Yes |

**FIRST FLOOR**

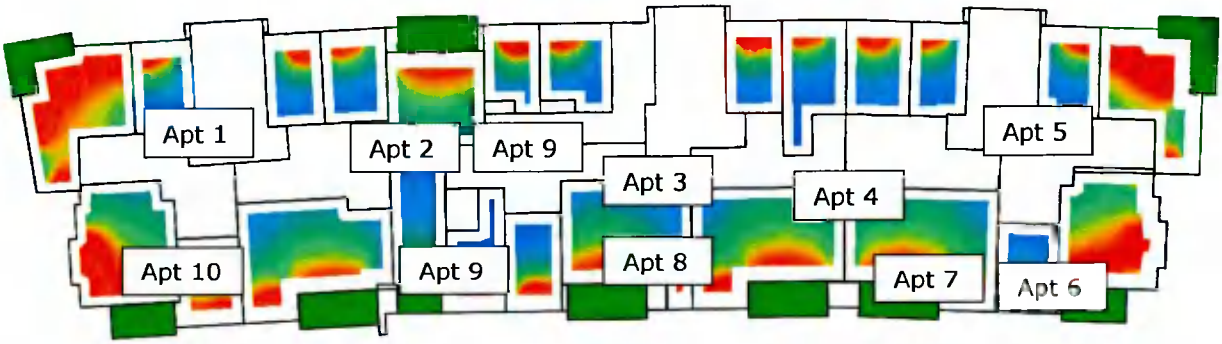
| Ref | Room | Target ADF (%) | ADF Achieved (%) | Target ADF Achieved |
|---|---|---|---|---|
| Apt 1 | Kitchen Living Dining | 1.5 | 5.37 | Yes |
| | Bedroom 1 | 1 | 2.04 | Yes |
| Apt 2 | Kitchen Living Dining | 1.5 | 4.19 | Yes |
| | Bedroom 1 | 1 | 2.52 | Yes |
| Apt 3 | Kitchen Living Dining | 1.5 | 2.86 | Yes |
| | Bedroom 1 | 1 | 2.17 | Yes |
| | Bedroom 2 | 1 | 2.34 | Yes |
| Apt 4 | Kitchen Living Dining | 1.5 | 2.46 | Yes |
| | Bedroom 1 | 1 | 2.01 | Yes |
| | Bedroom 2 | 1 | 3.5 | Yes |
| Apt 5 | Kitchen Living Dining | 1.5 | 2.42 | Yes |
| | Bedroom 1 | 1 | 2.4 | Yes |
| | Bedroom 2 | 1 | 2.61 | Yes |
| Apt 6 | Kitchen Living Dining | 1.5 | 2.83 | Yes |
| | Bedroom 1 | 1 | 1.99 | Yes |
| | Bedroom 2 | 1 | 2.74 | Yes |
| Apt 7 | Kitchen Living Dining | 1.5 | 3.21 | Yes |
| | Bedroom 1 | 1 | 2.73 | Yes |
| | Bedroom 2 | 1 | 2.11 | Yes |
| Apt 8 | Kitchen Living Dining | 1.5 | 5.36 | Yes |
| | Bedroom 1 | 1 | 2.1 | Yes |
| Apt 9 | Kitchen Living Dining | 1.5 | 4.18 | Yes |
| | Bedroom 1 | 1 | 1.97 | Yes |

## APPENDIX B – DAYLIGHT DISTRIBUTION IMAGES – PROPOSED DEVELOPMENT

### GROUND FLOOR




### FIRST FLOOR

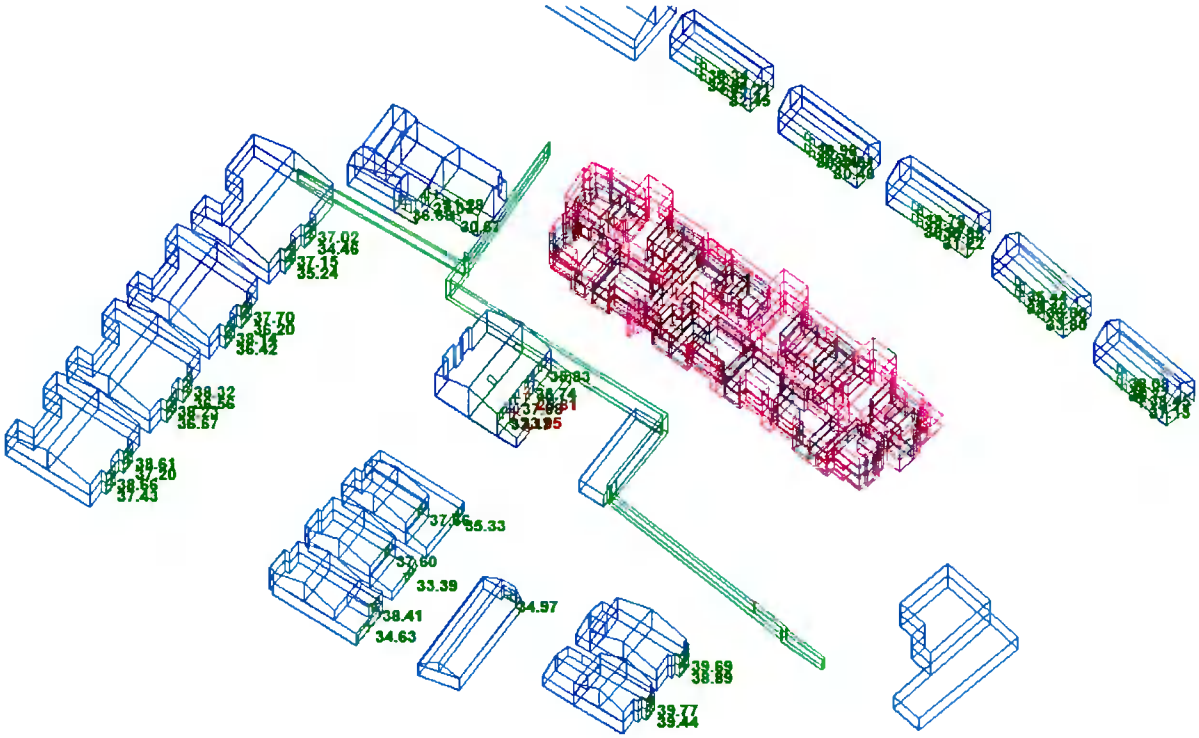


## APPENDIX C – DAYLIGHT MODEL INPUTS – PROPOSED DEVELOPMENT

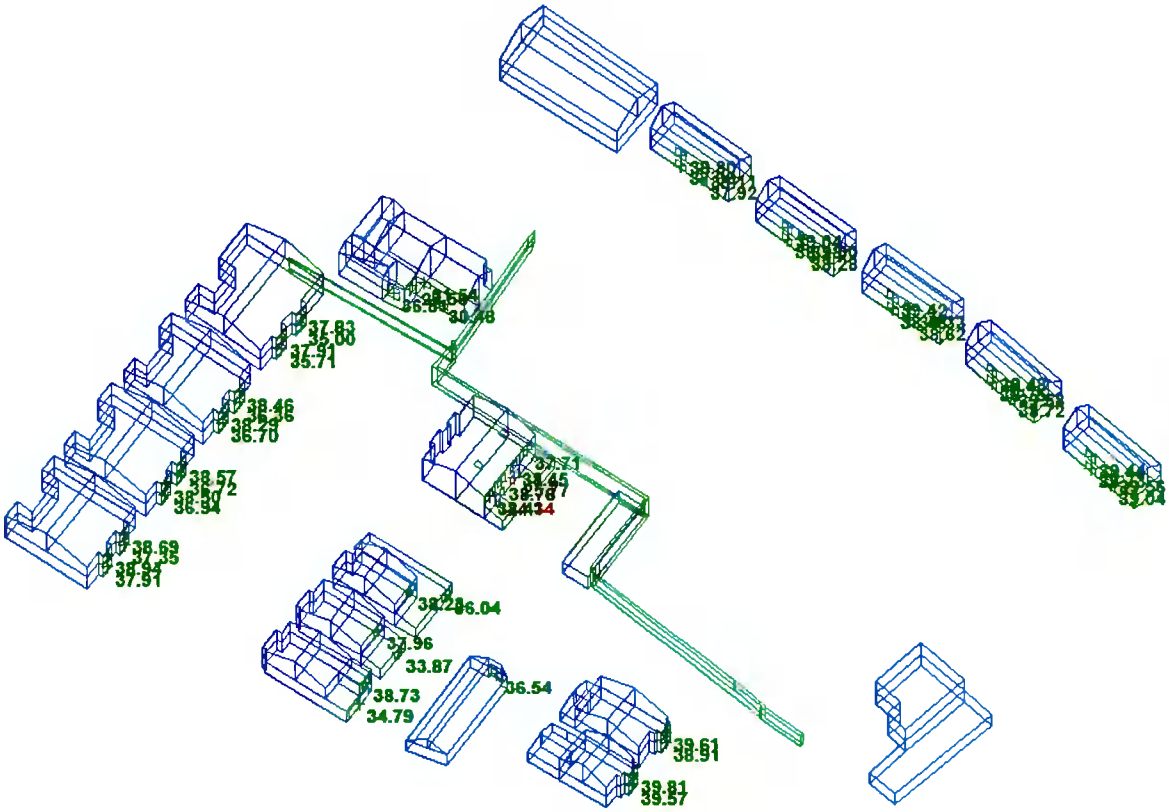
| Parameter | Value |
|---|---|
| **Surface Reflectance's** | |
| • Internal ceilings | 70% e.g. light coloured ceiling |
| • Internal walls | 50% e.g. light coloured walls |
| • Internal floors | 20% e.g. light coloured timber floor |
| **Surface Maintenance Factor** | 90% |
| **Glazing Transmittance** | 70% |
| **Frame** | 0.05m frame width |
| **Working Plane** | 0.85m |
| **Area of Interest (AOI)** | 0.5m inset from perimeter |
| **Simulation Settings** | Radiance custom settings:<br>Ambient bounces – 12<br>Ambient accuracy – 0<br>Ambient resolution – 1024<br>Ambient divisions – 32768<br>Ambient super samples – 0<br>Limit reflection – 0 |

## APPENDIX D – VSC RESULTS IMAGES

### PROPOSED SCENARIO

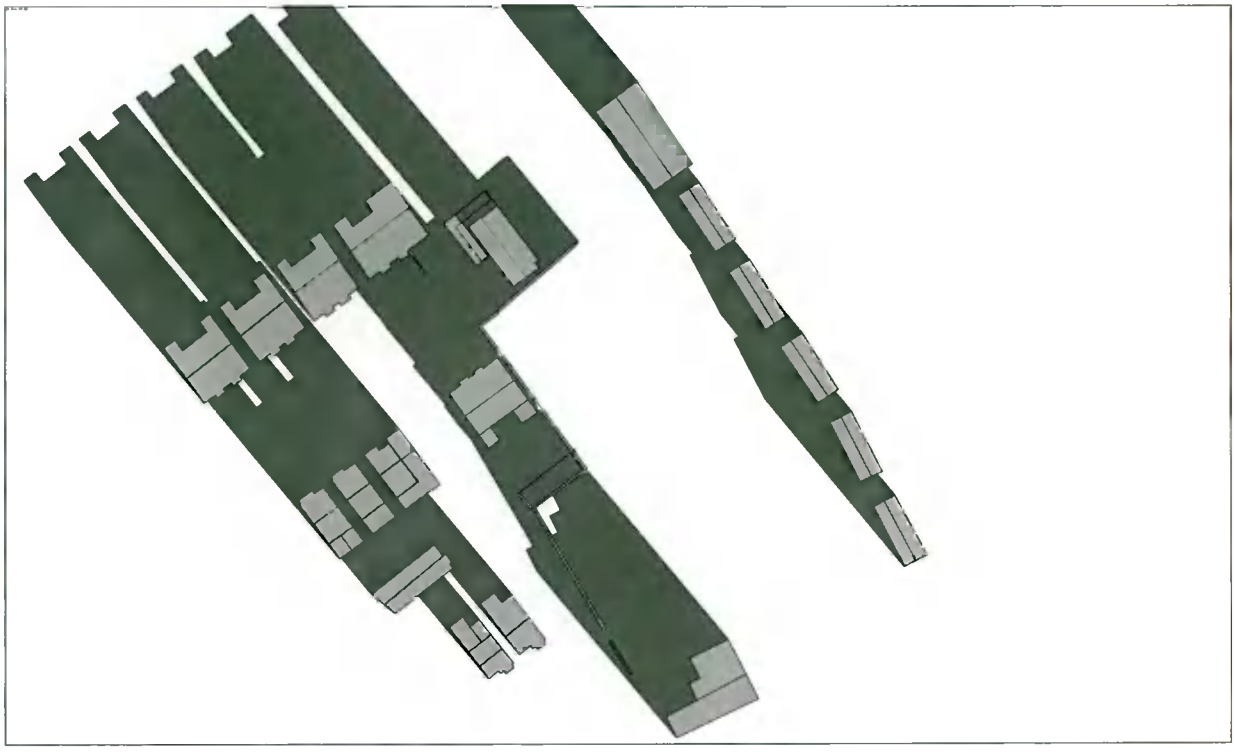


## CURRENT SCENARIO

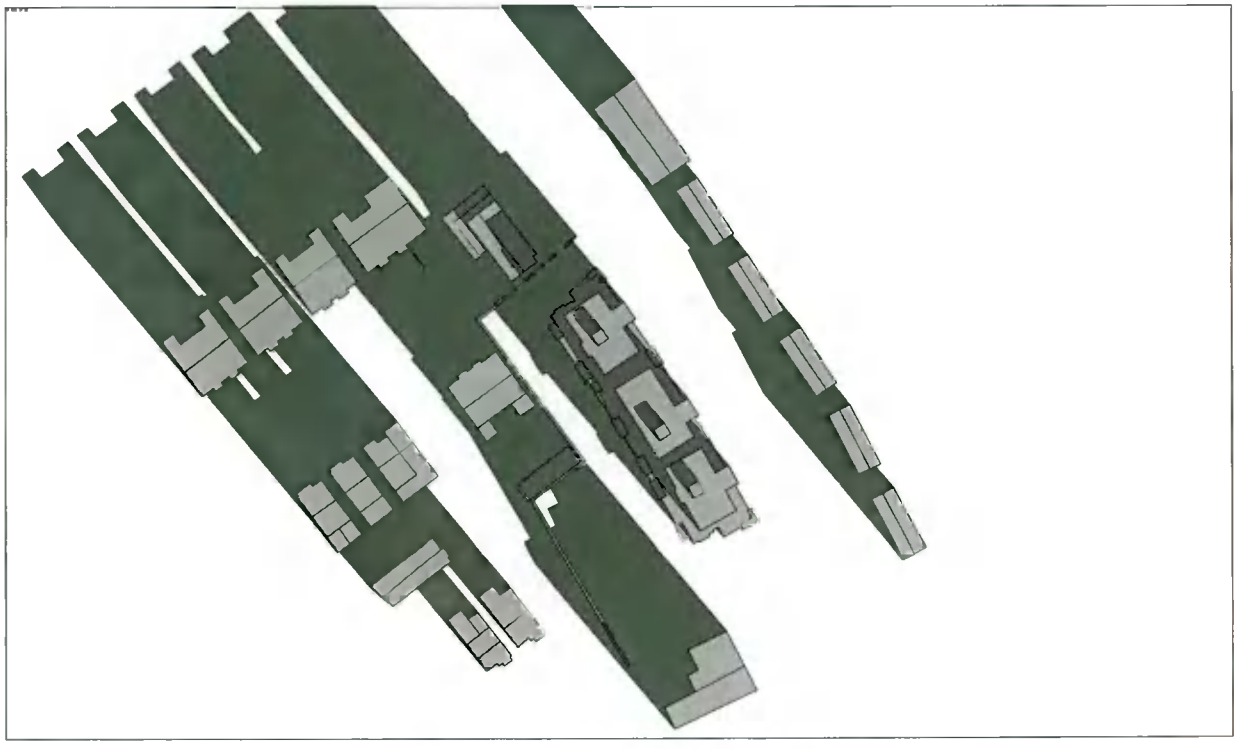


## APPENDIX E – SHADOW IMAGES

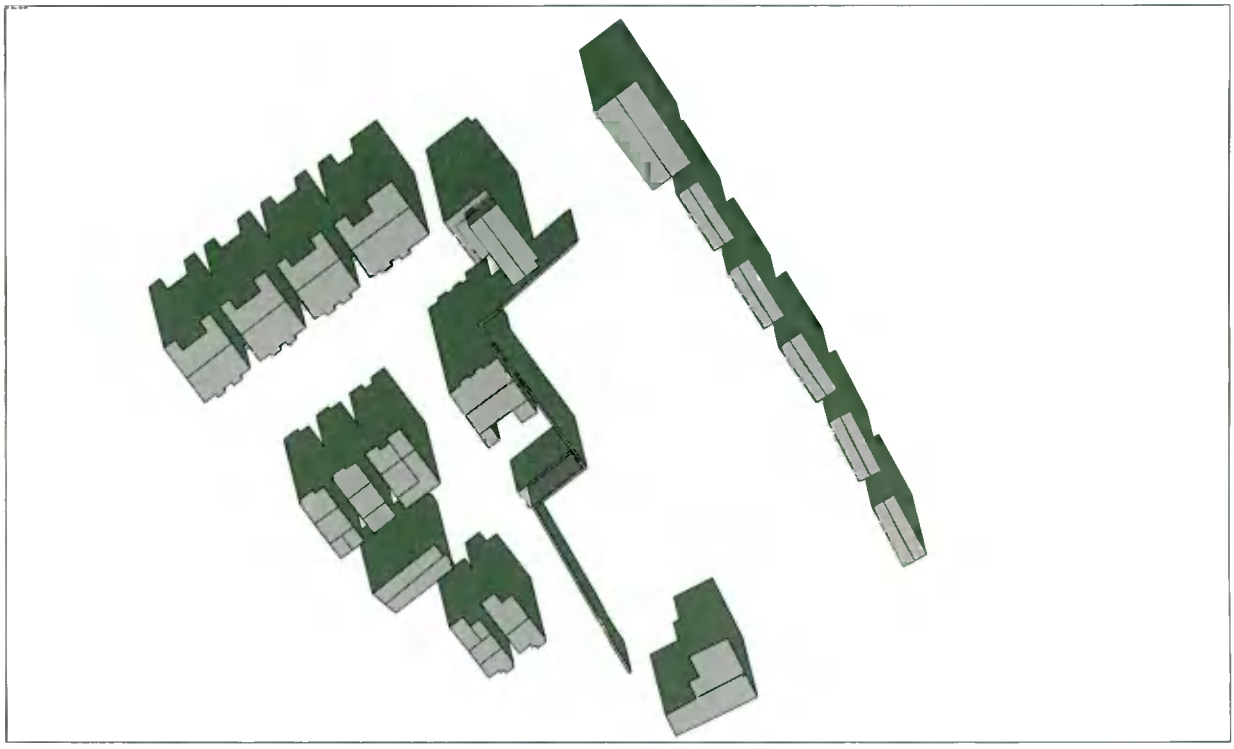
**21st March**
**7am – Current Scenario**



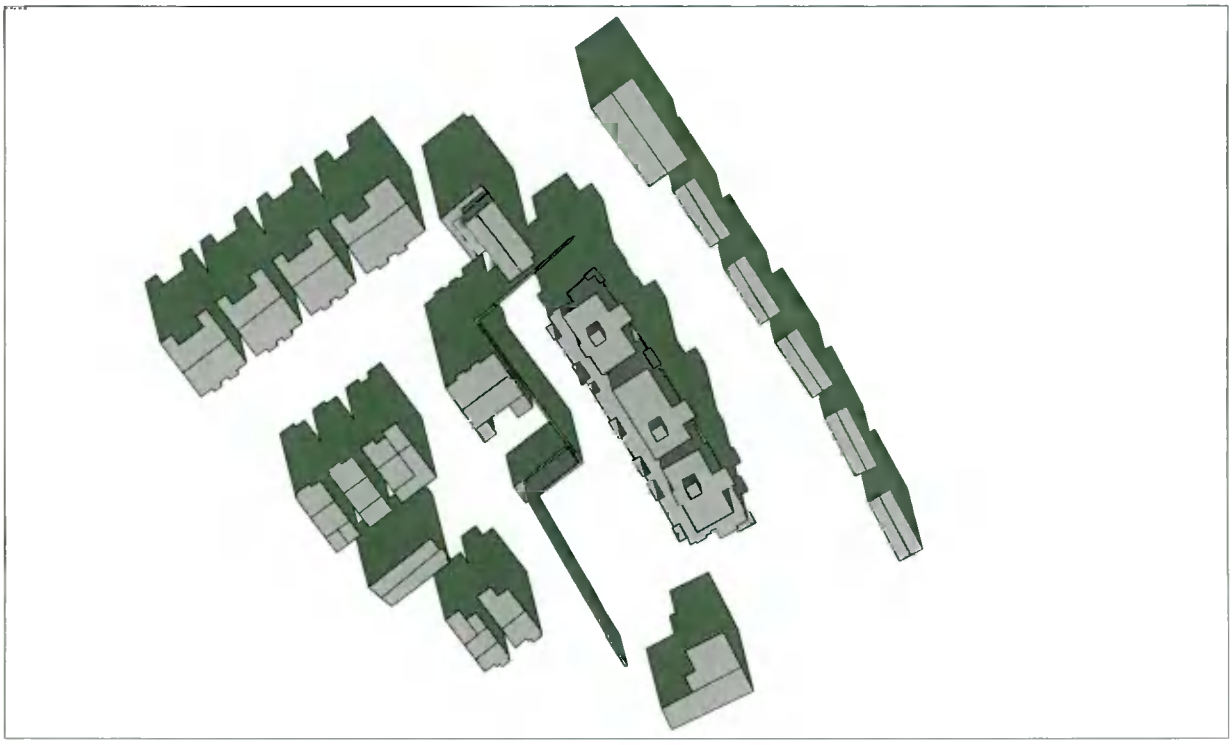
**21st March**
**7am – With Proposed Development**



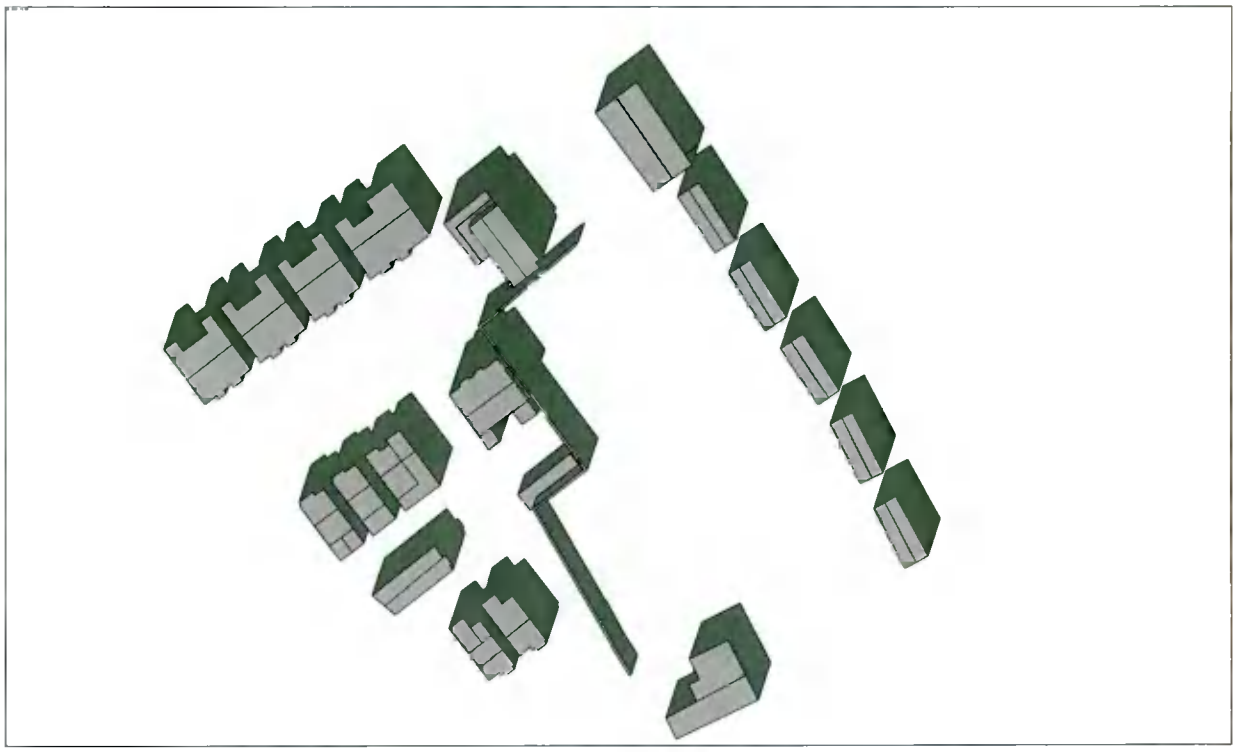
**21st March**
**9am – Current Scenario**



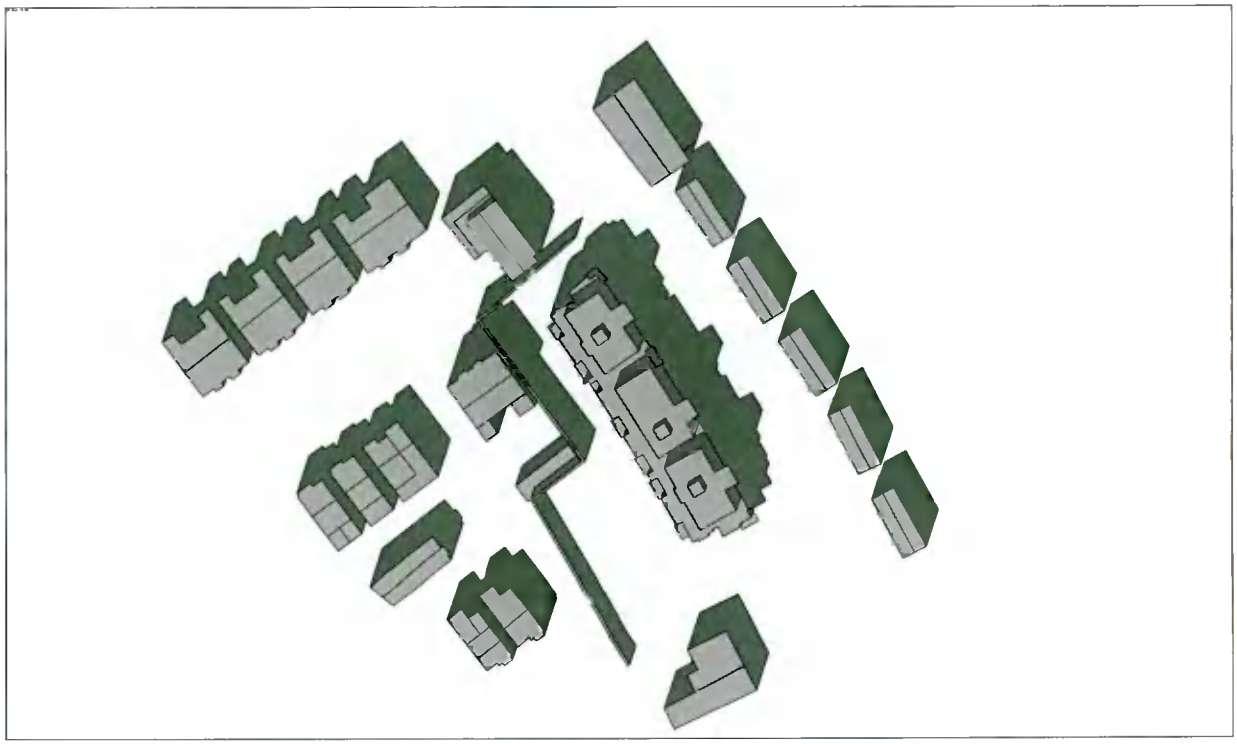
**21st March**
**9am – With Proposed Development**



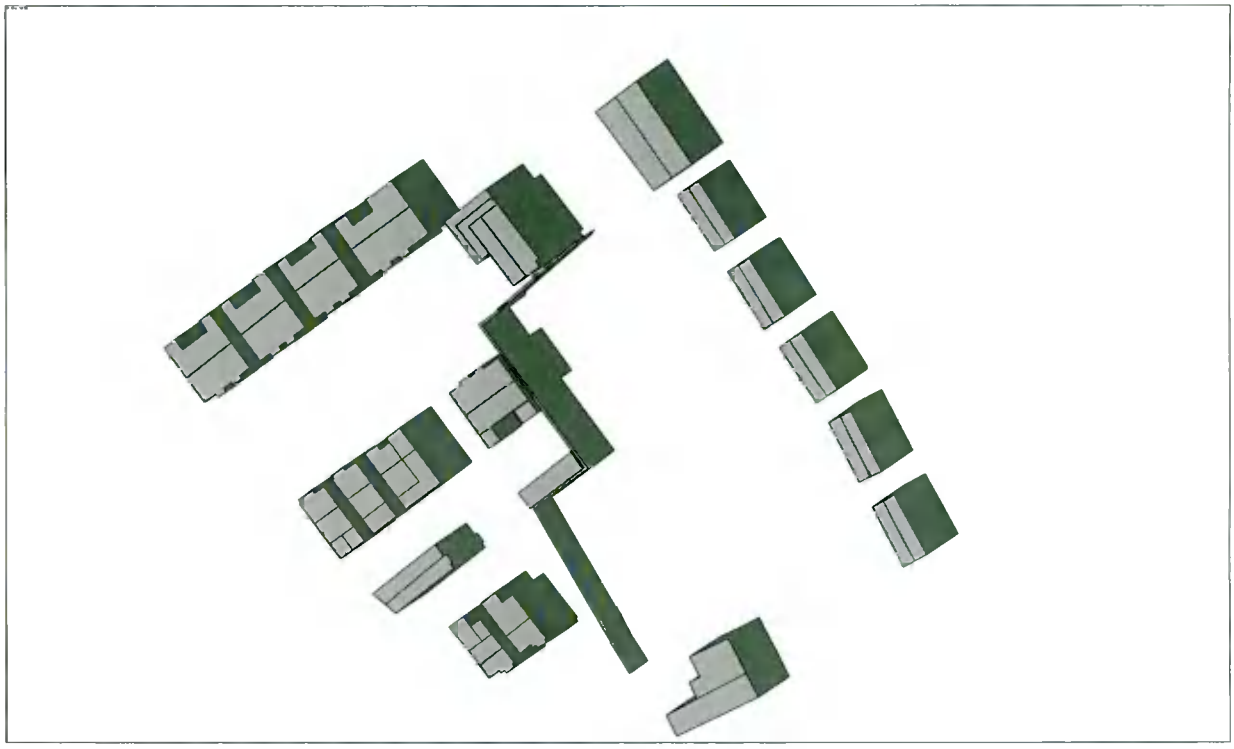
**21st March**
**11am – Current Scenario**



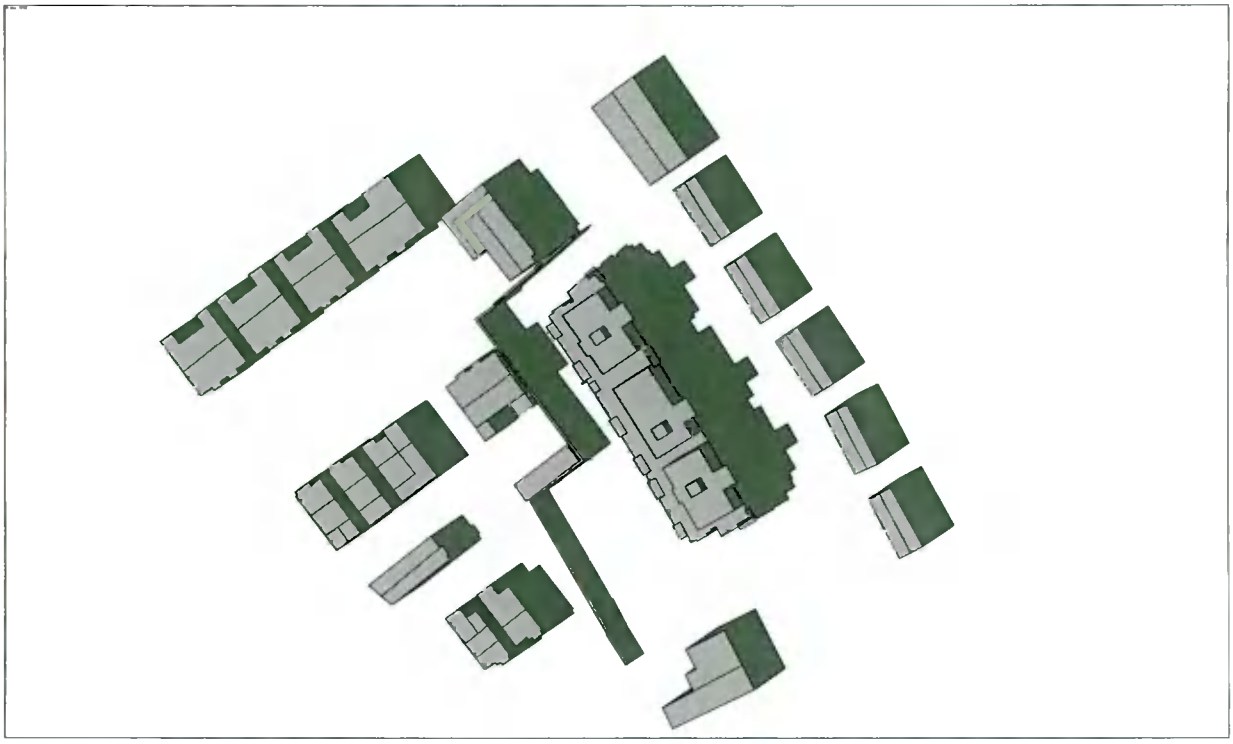
**21st March**
**11am – With Proposed Development**



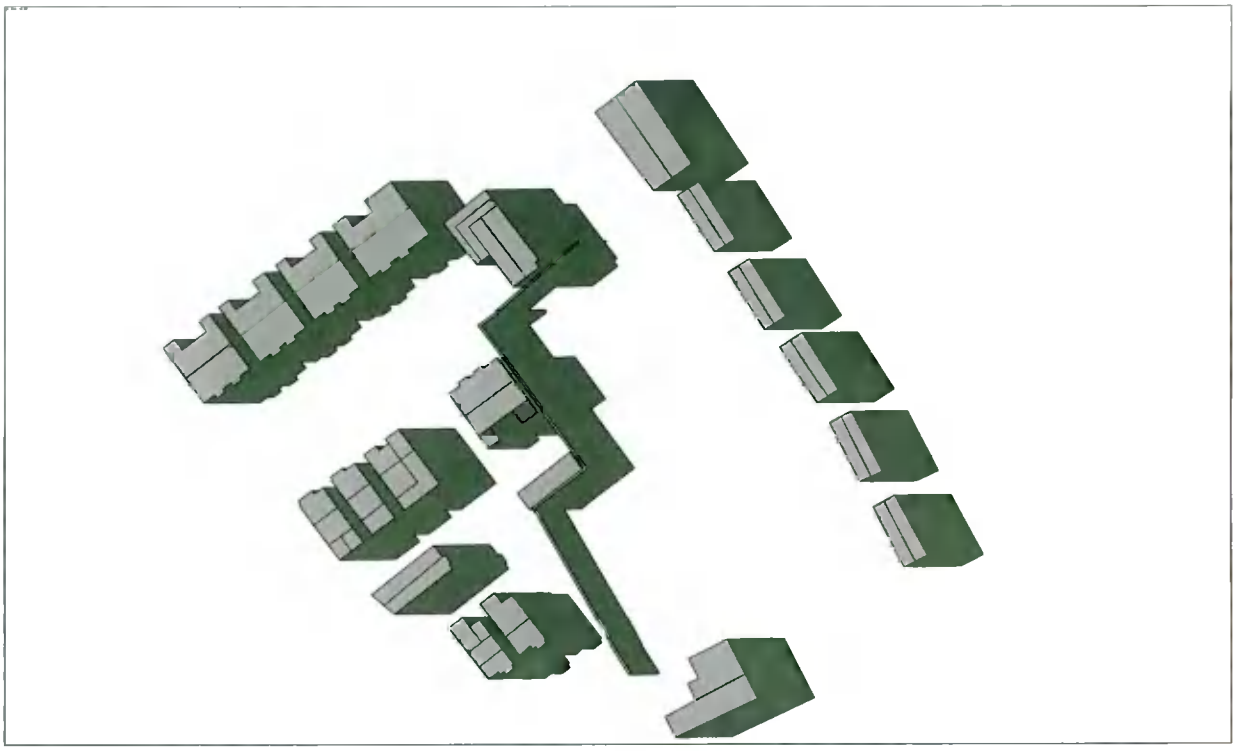
**21st March**
**1pm – Current Scenario**



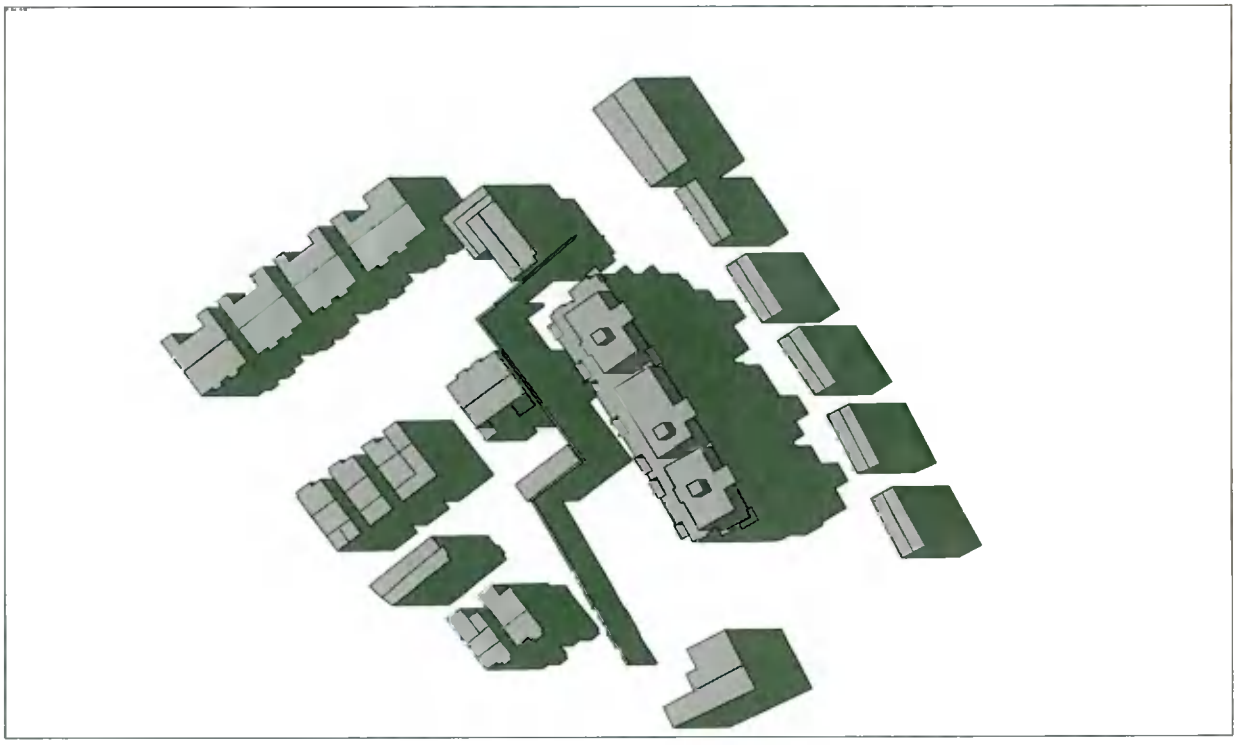
**21st March**
**1pm – With Proposed Development**



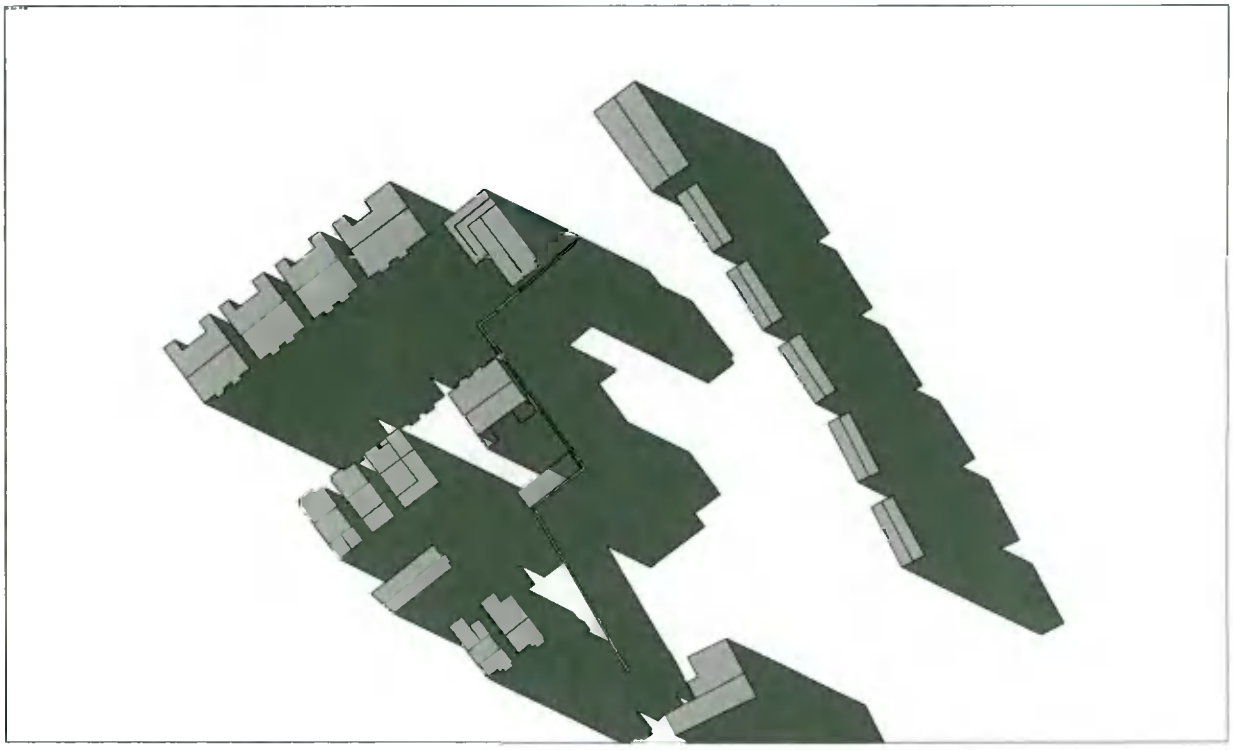
**21st March**
**3pm – Current Scenario**



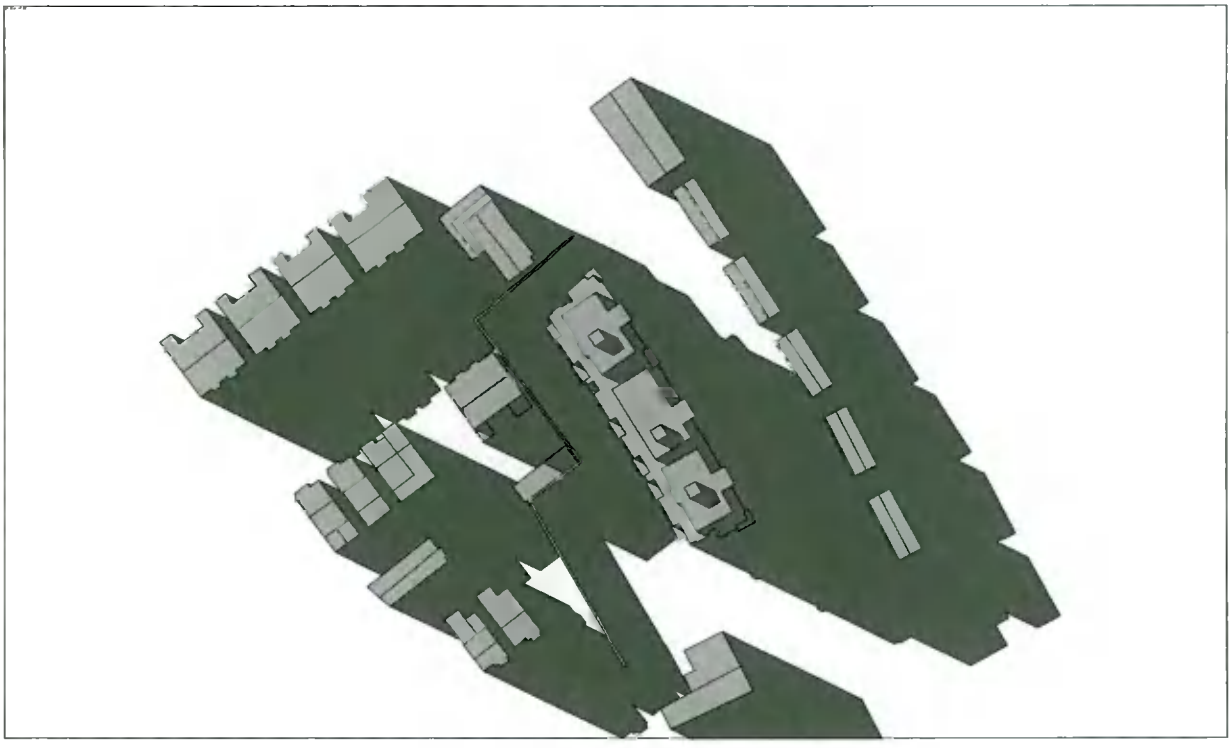
**21st March**
**3pm – With Proposed Development**



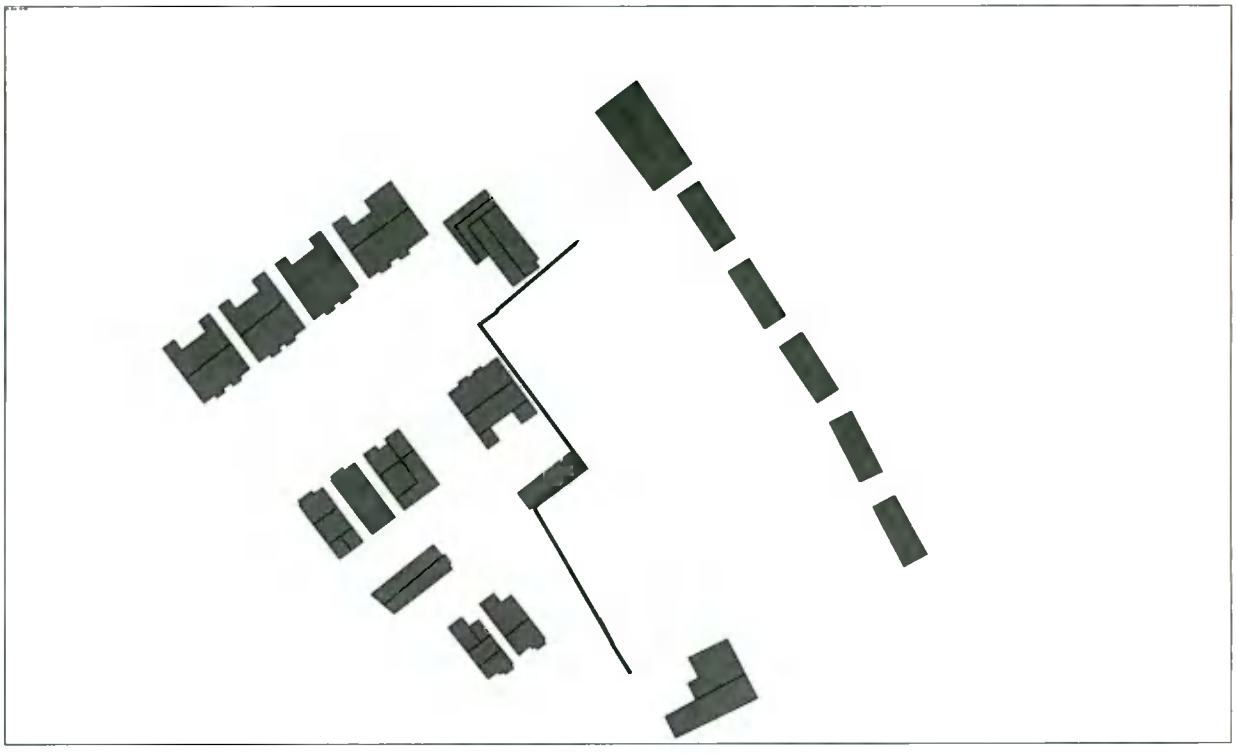
**21st March**
**5pm – Current Scenario**



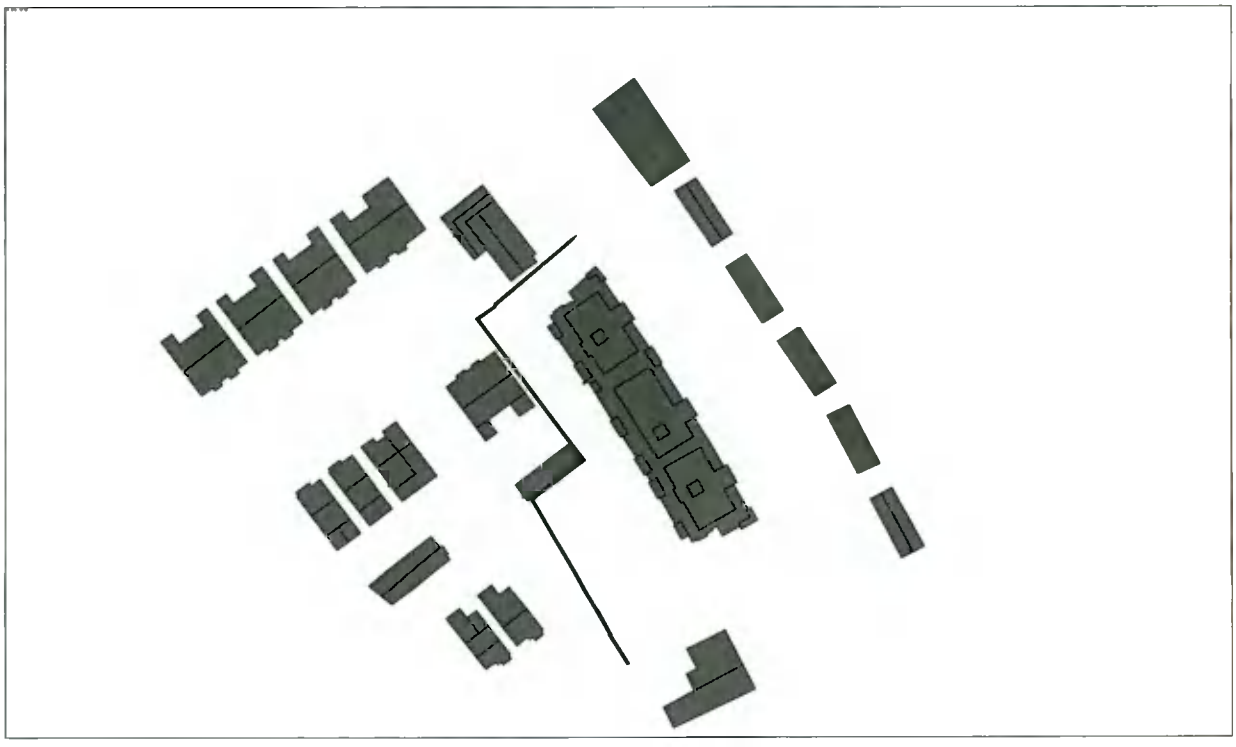
**21st March**
**5pm – With Proposed Development**



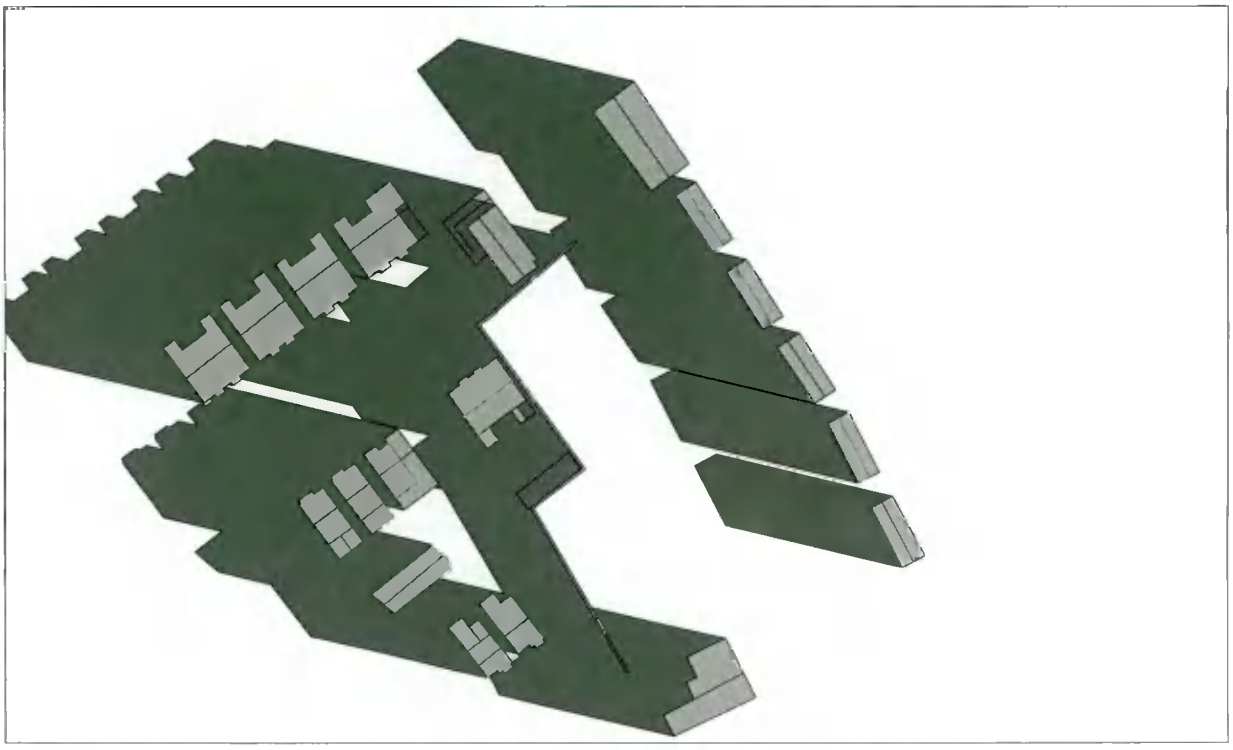
**21st March**
**7pm – Current Scenario**



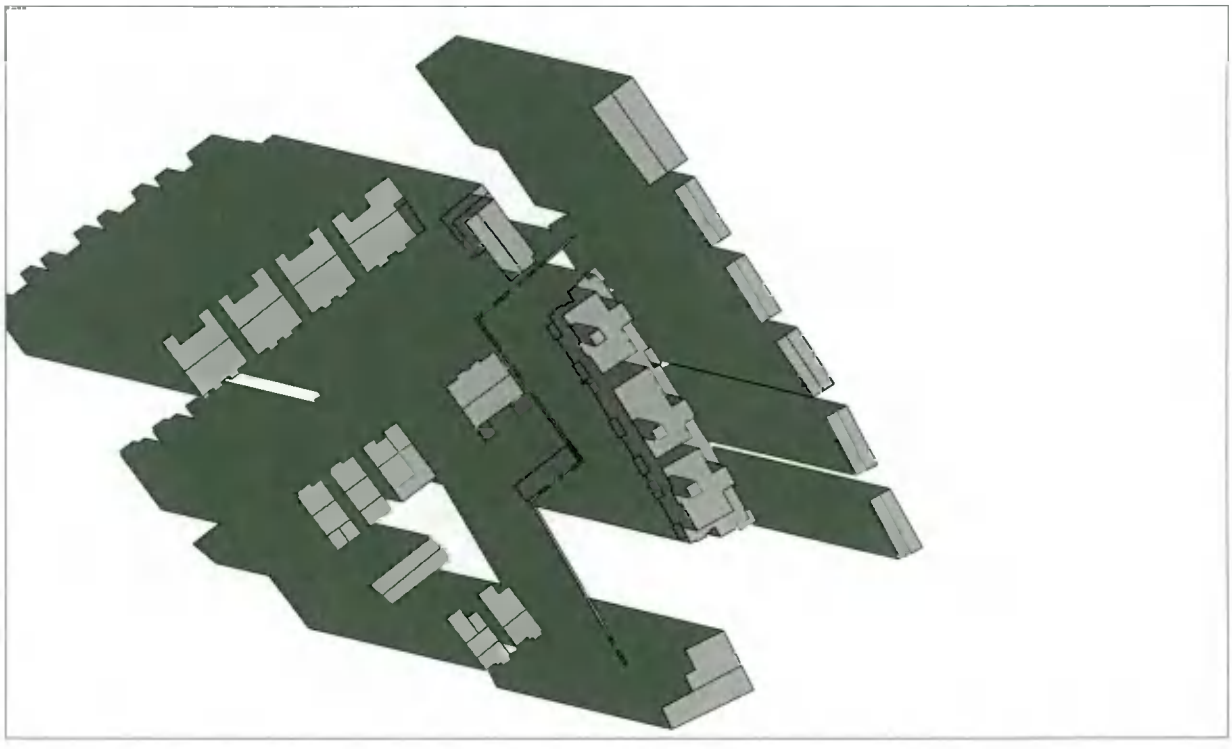
**21st March**
**7pm – With Proposed Development**



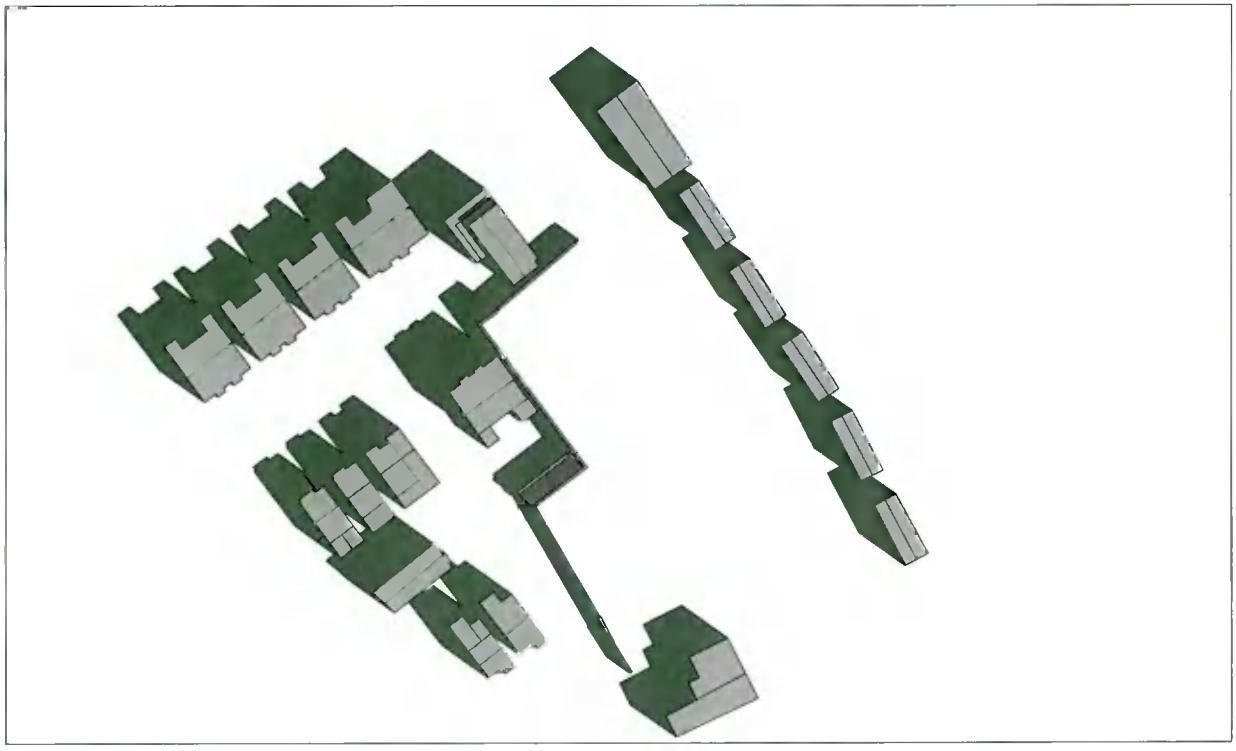
**21st June**
**5am – Current Scenario**



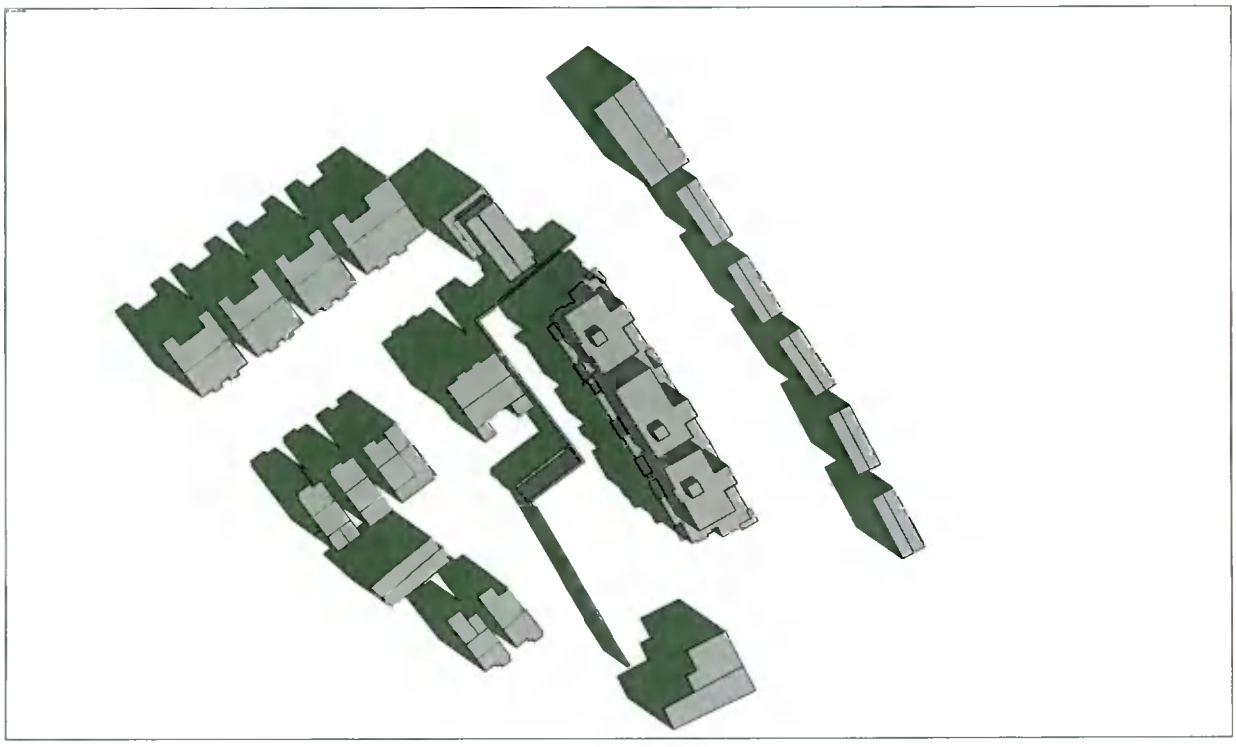
**21st June**
**5am – With Proposed Development**



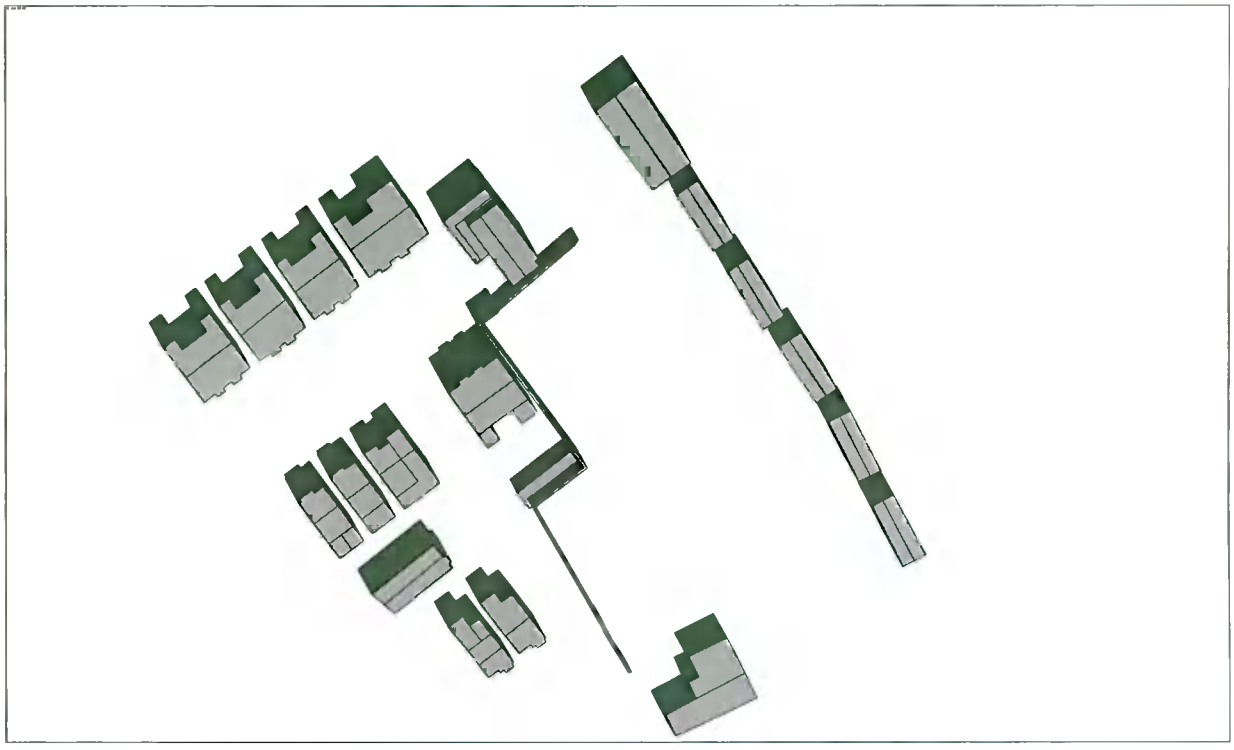
**21st June**
**7am – Current Scenario**



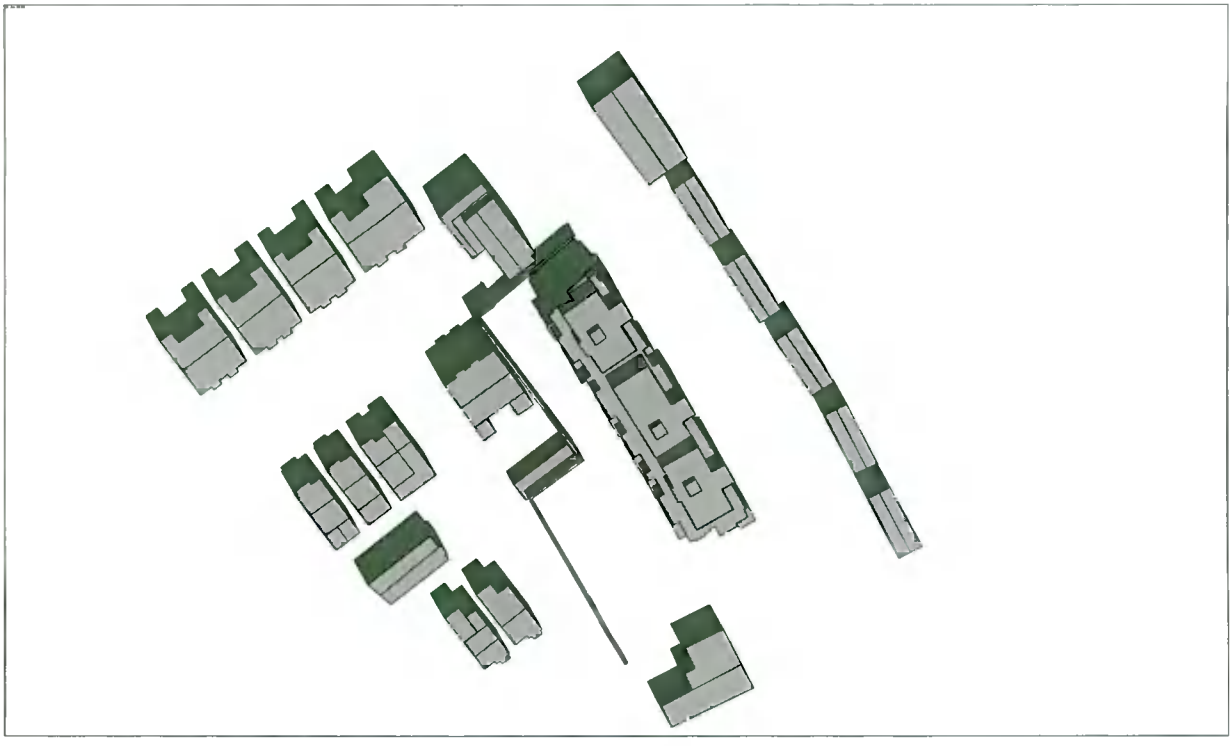
**21st June**
**7am – With Proposed Development**



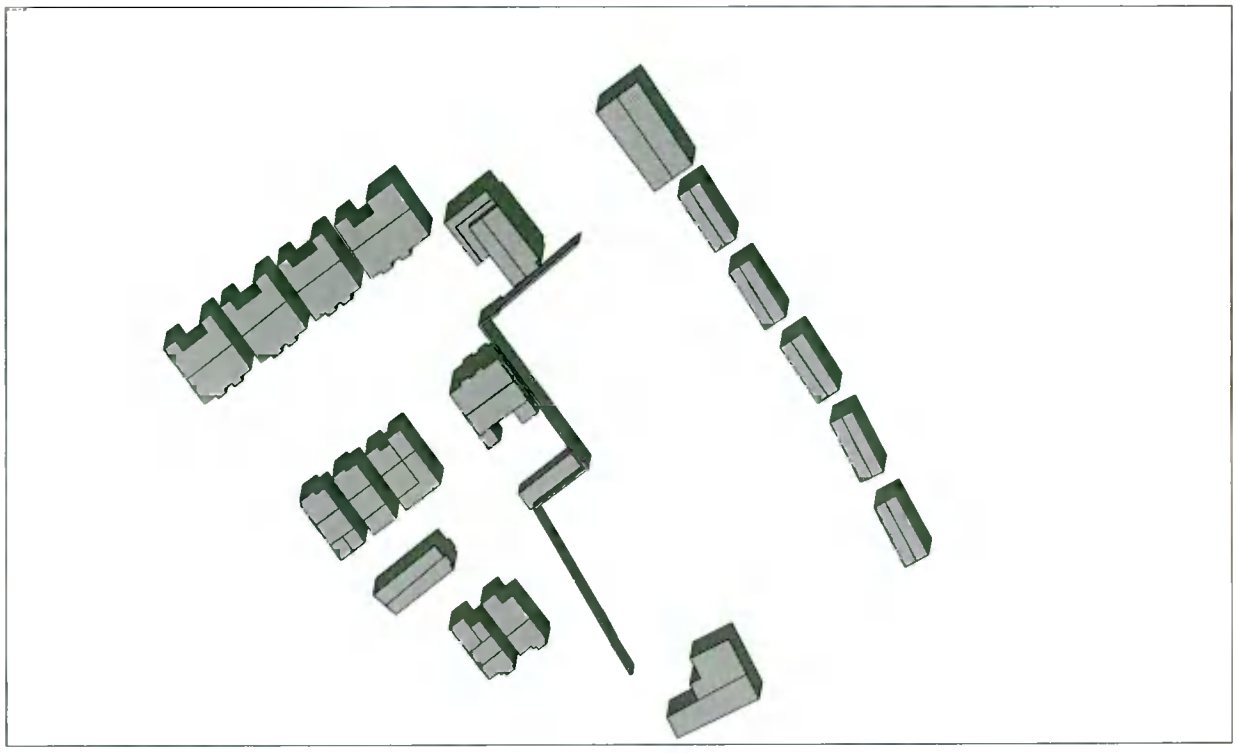
**21st June**
**9am – Current Scenario**



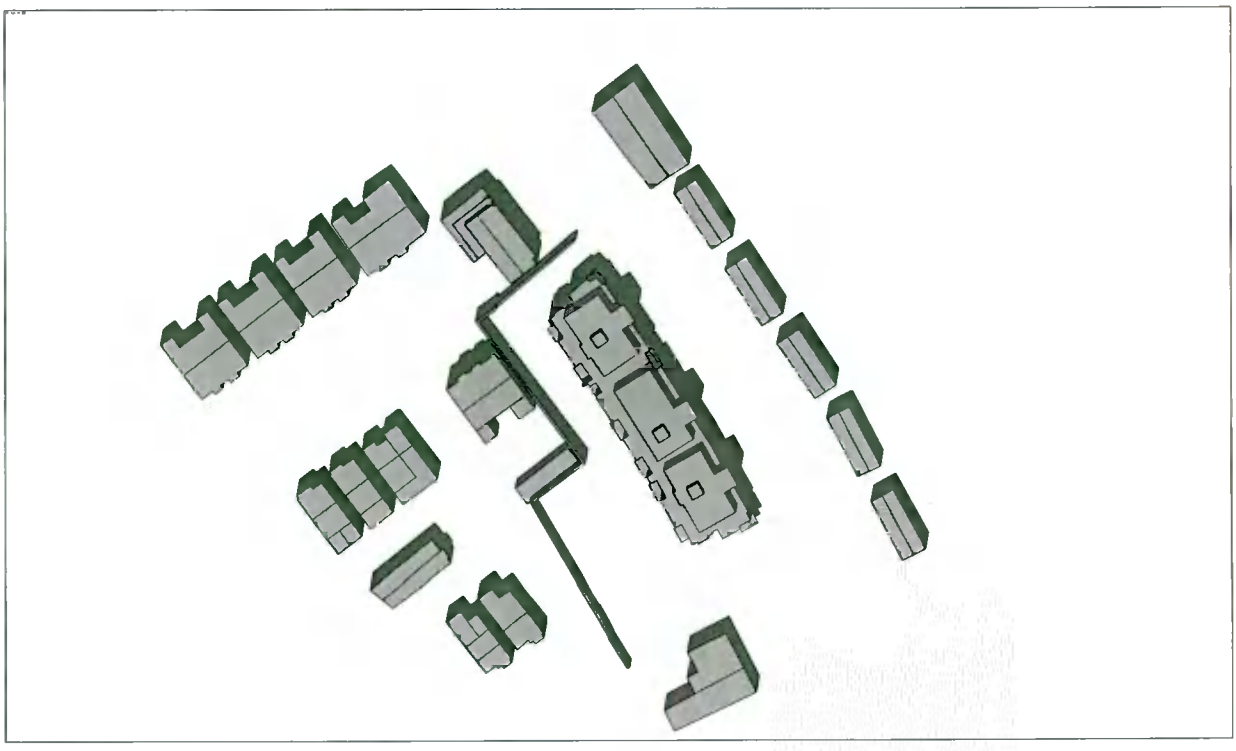
**21st June**
**9am – With Proposed Development**



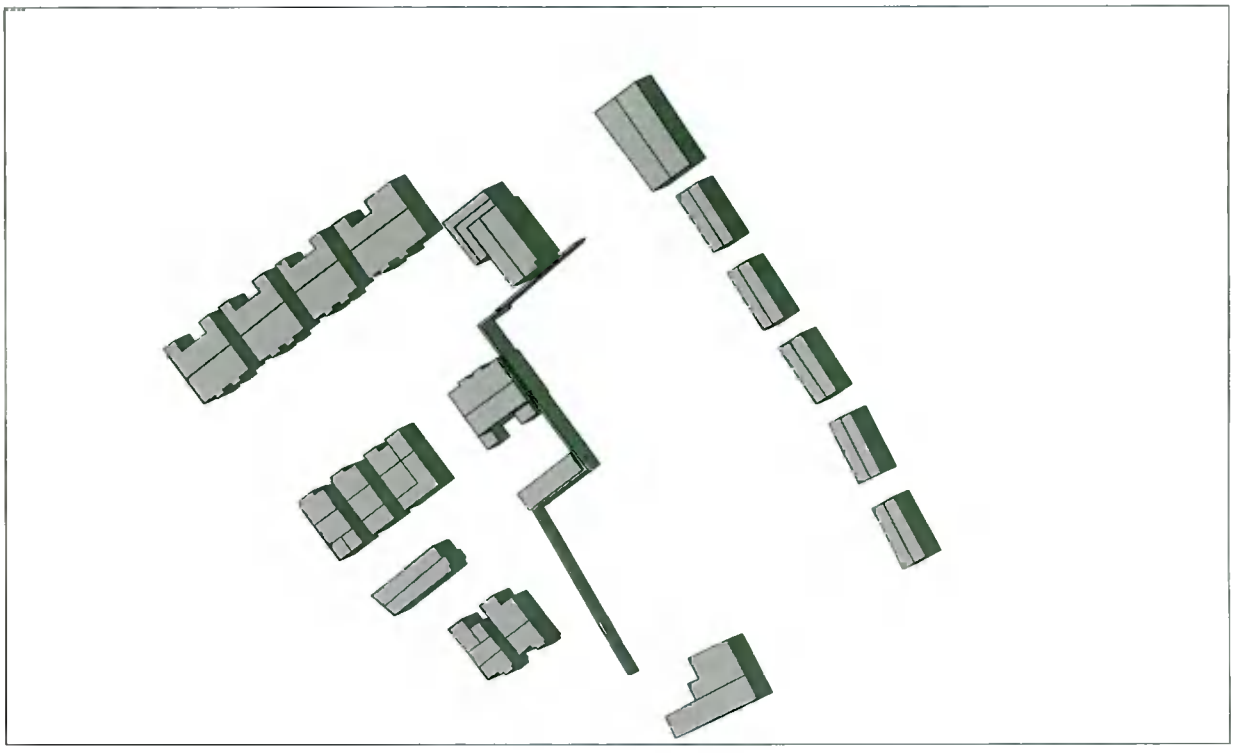
**21st June**
**11am – Current Scenario**



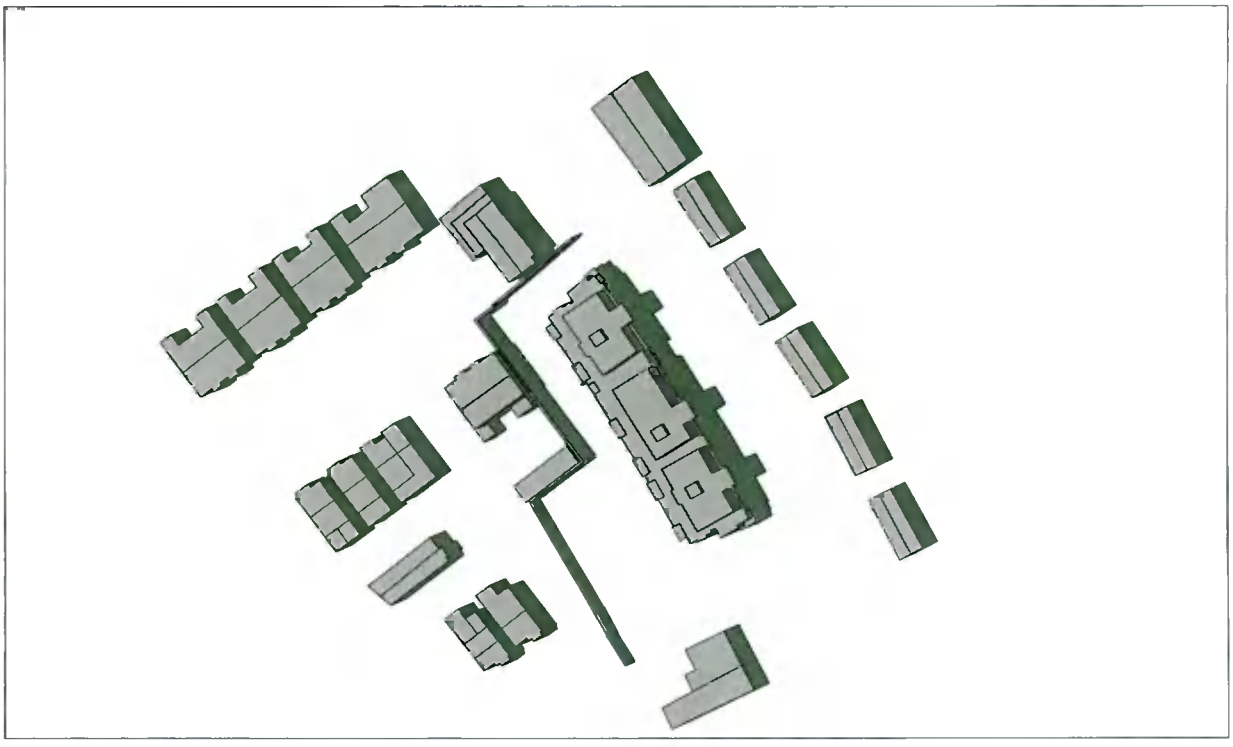
**21st June**
**11am – With Proposed Development**



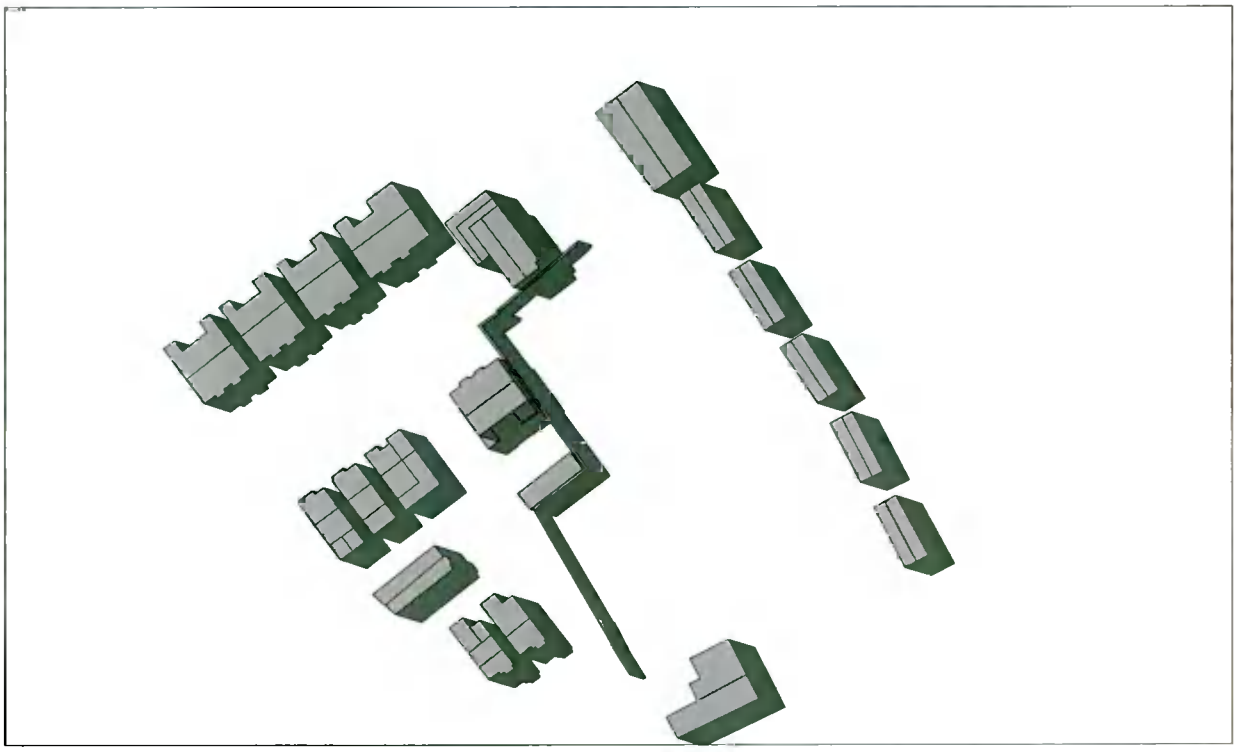
**21st June**
**1pm – Current Scenario**



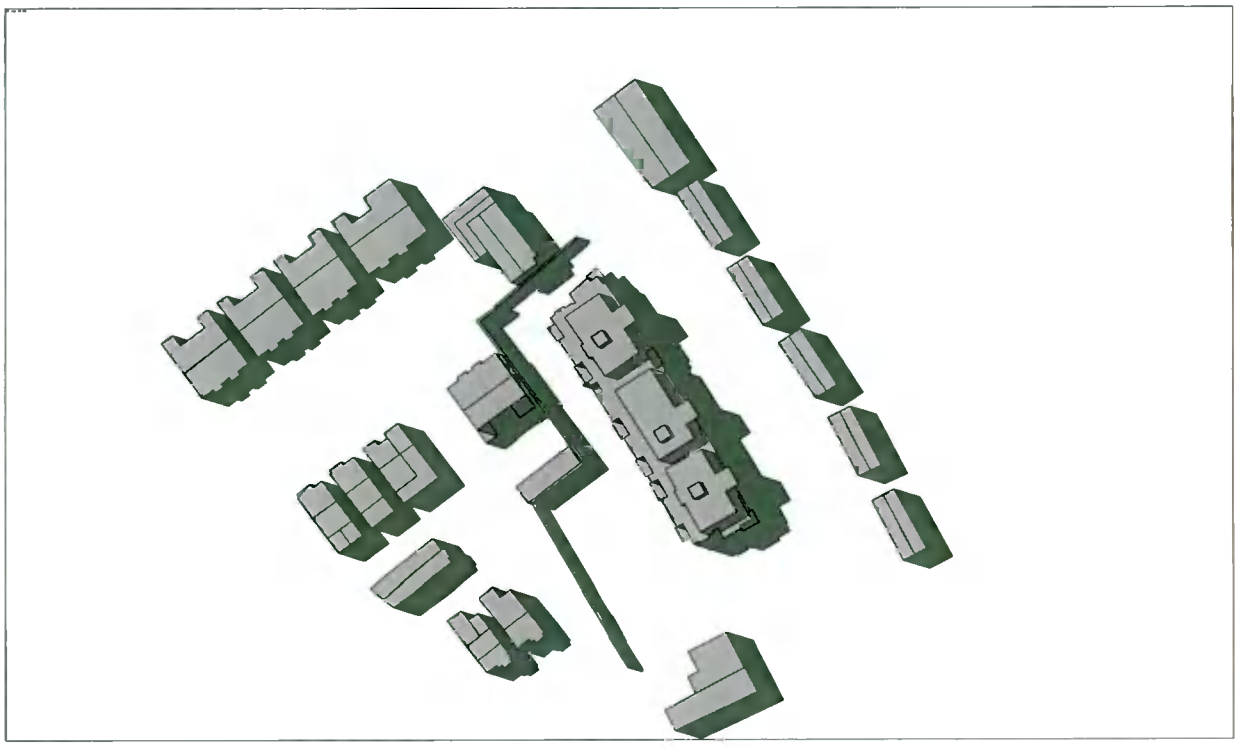
**21st June**
**1pm – With Proposed Development**



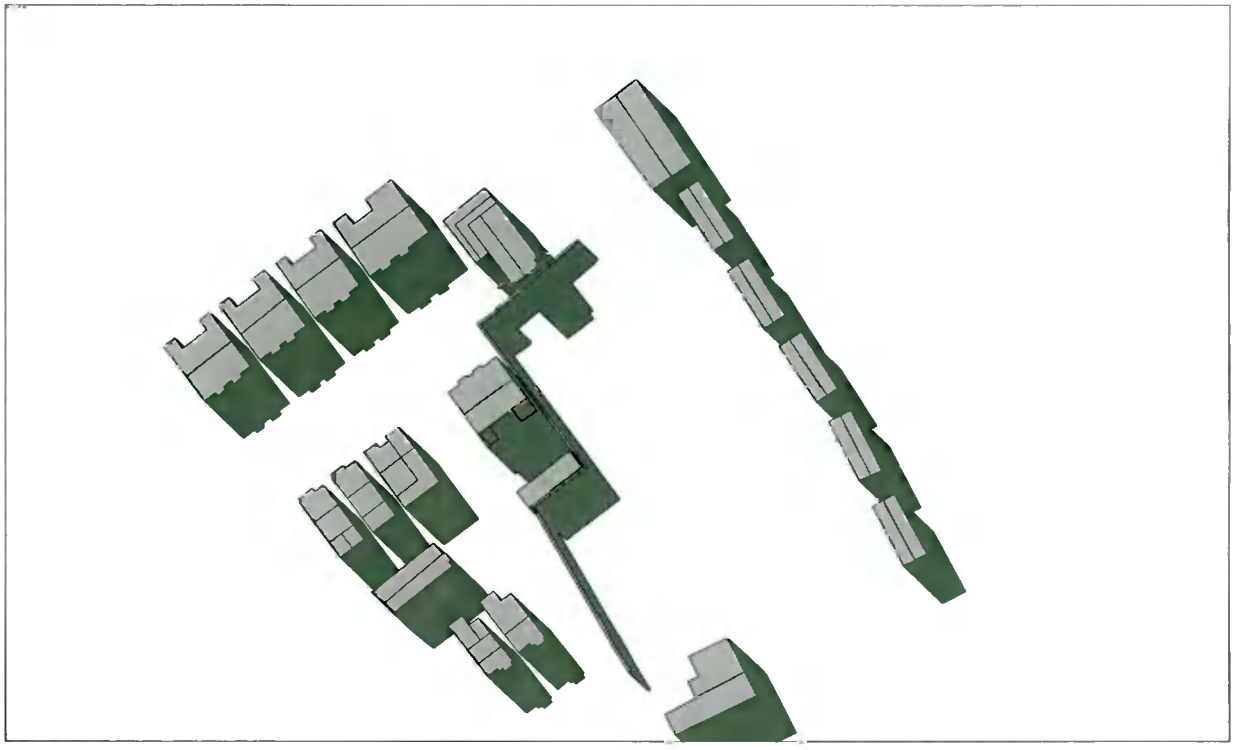
**21st June**
**3pm – Current Scenario**



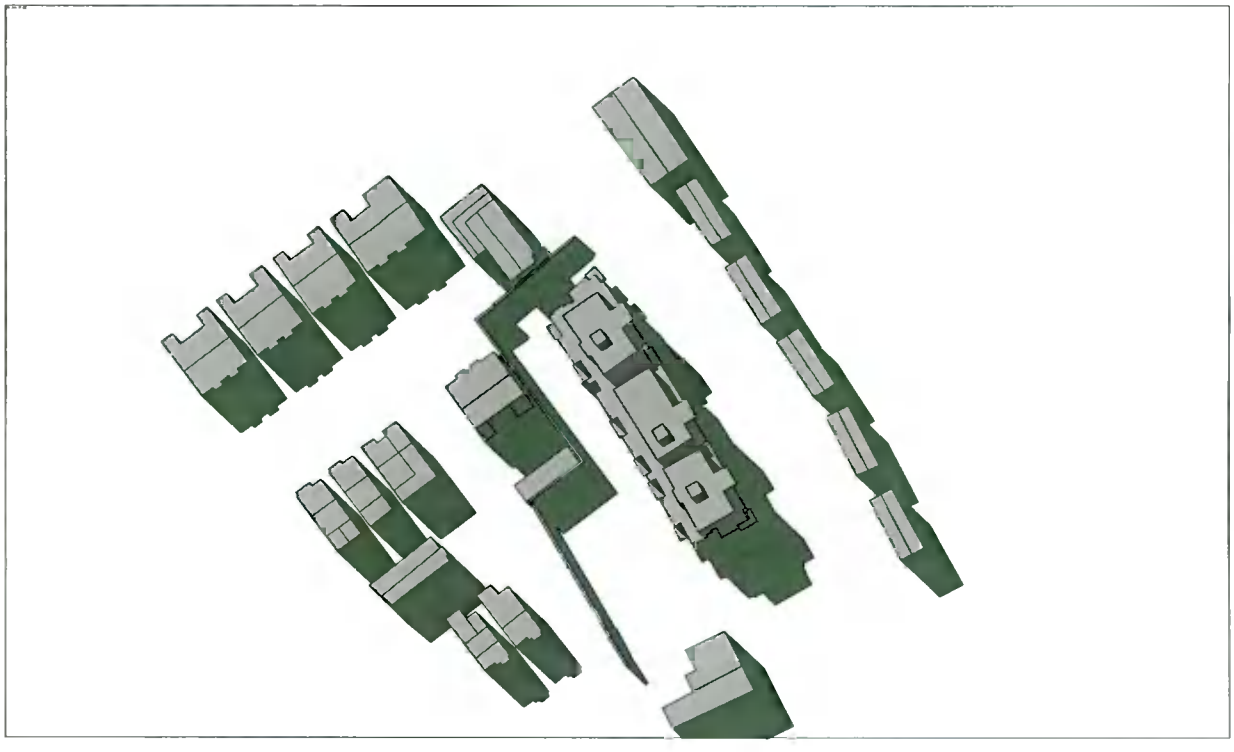
**21st June**
**3pm – With Proposed Development**



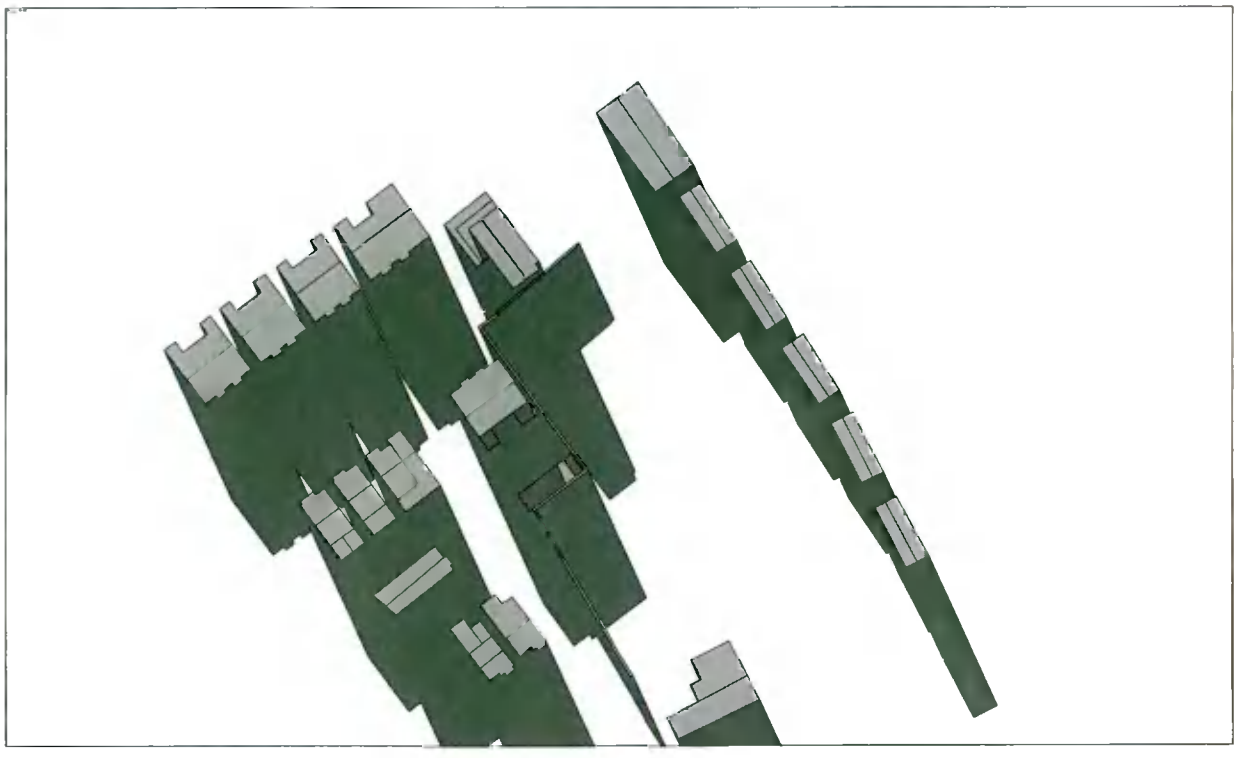
**21st June**
**5pm – Current Scenario**



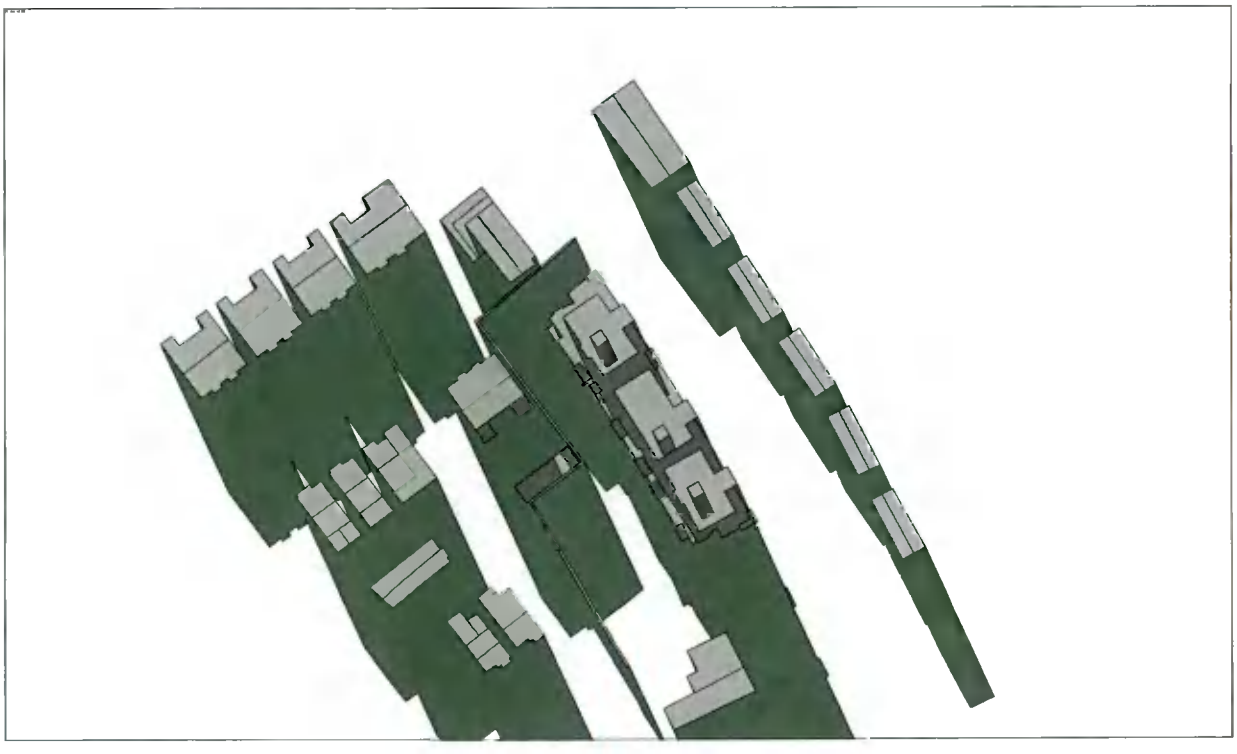
**21st June**
**5pm – With Proposed Development**



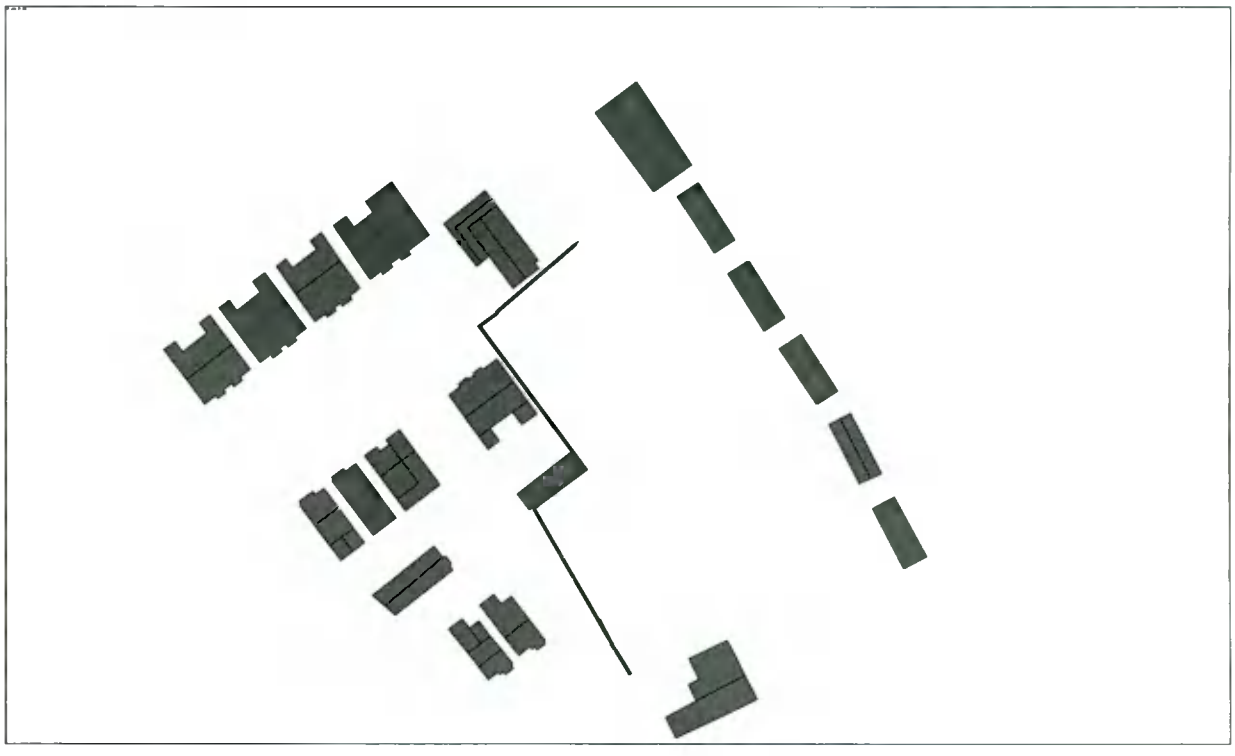
**21st June**
**7pm – Current Scenario**



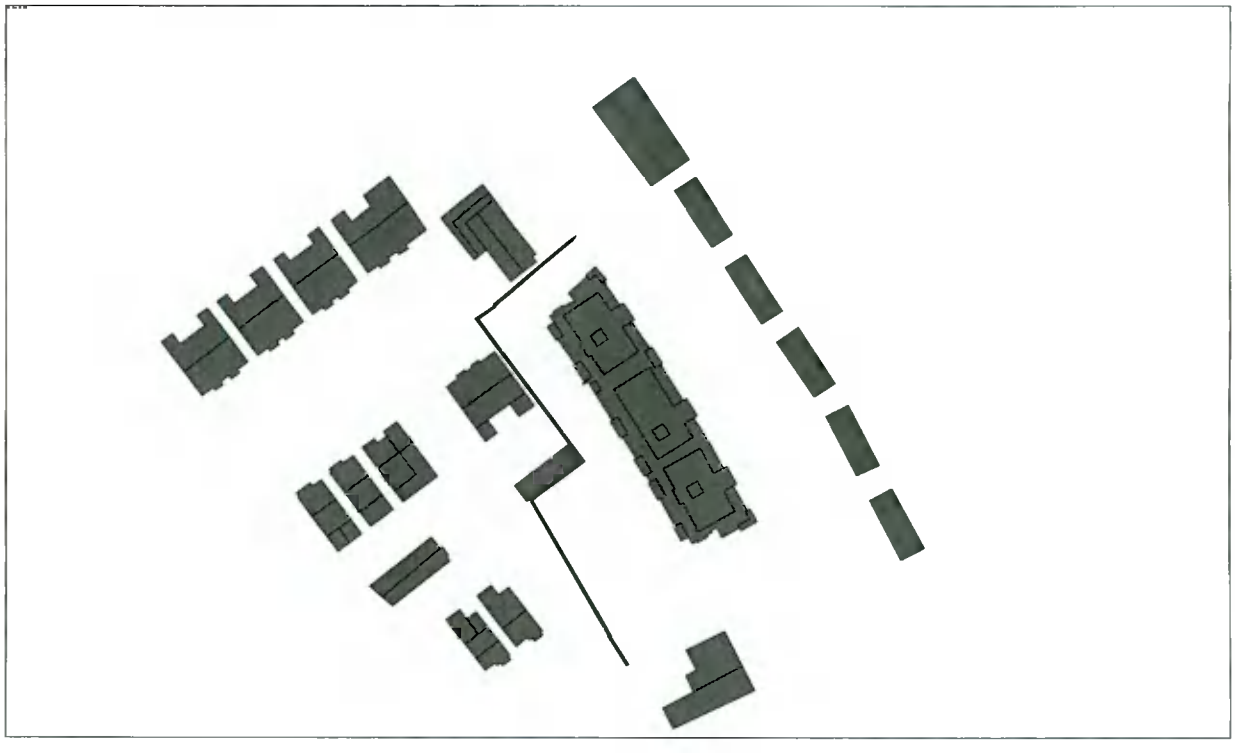
**21st June**
**7pm – With Proposed Development**



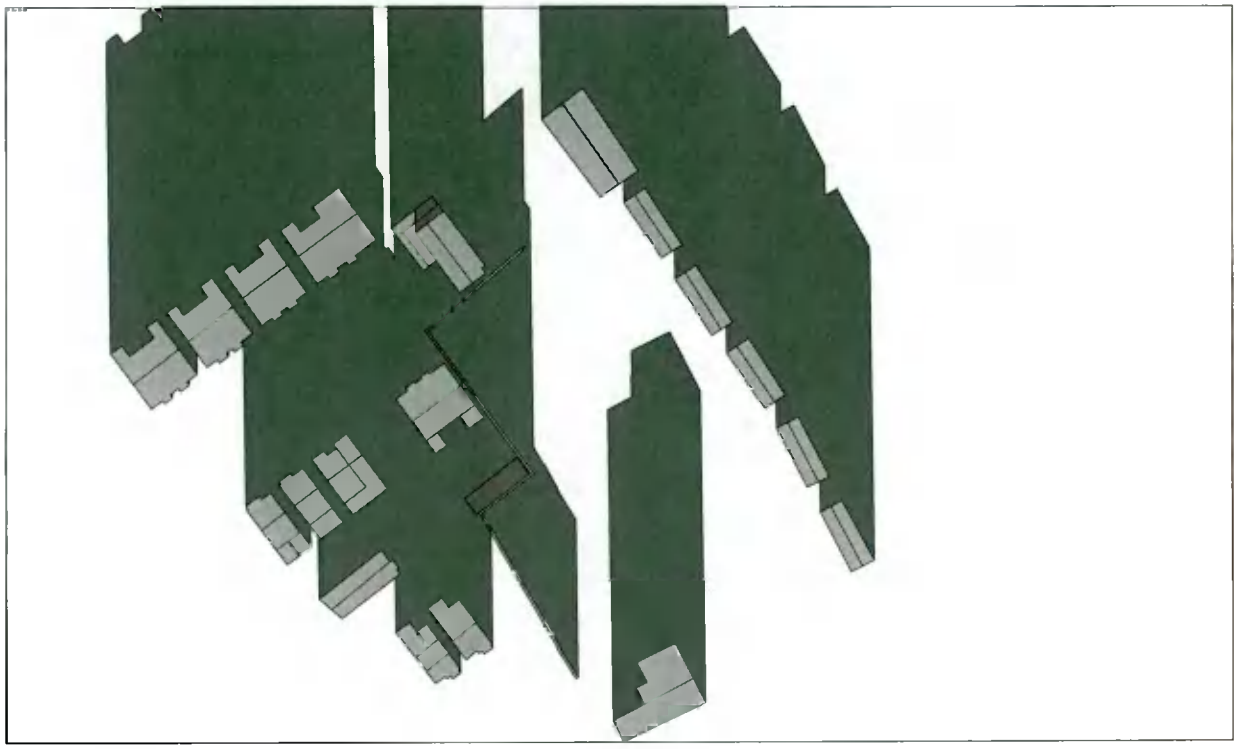
**21st June**
**9pm – Current Scenario**



**21st June**
**9pm – With Proposed Development**

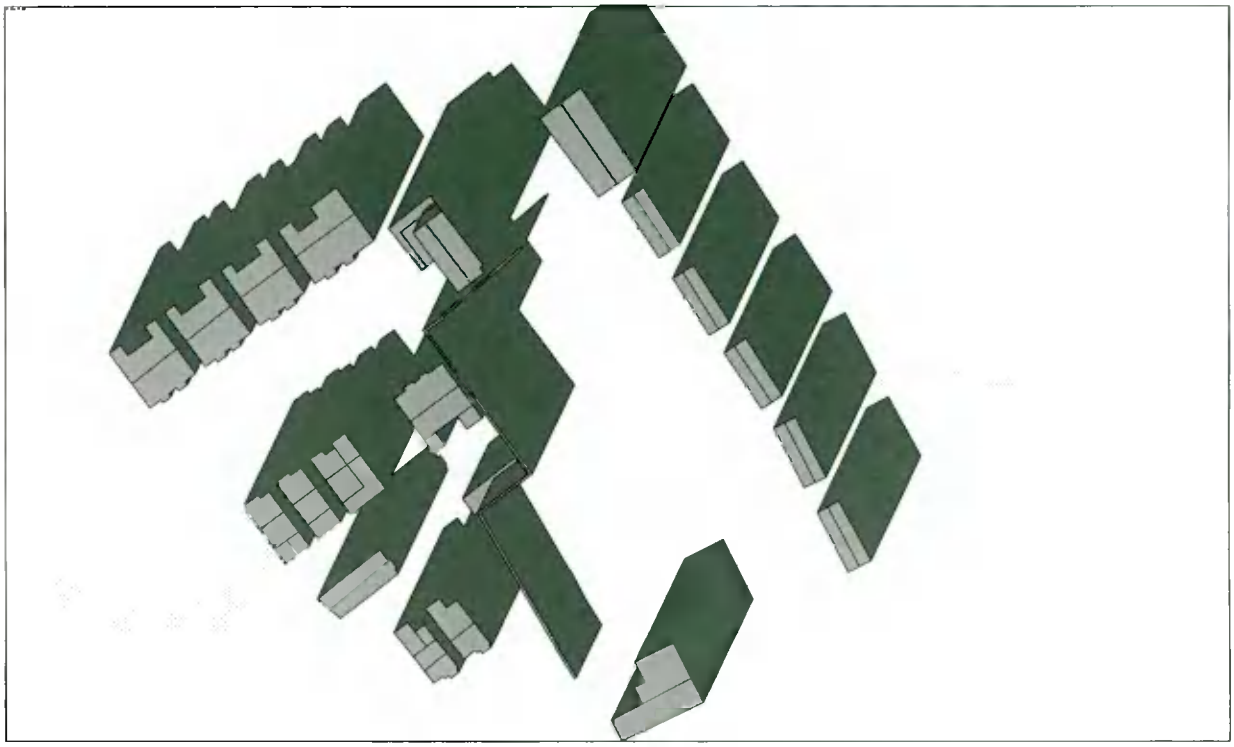


**21st December**
**9am – Current Scenario**

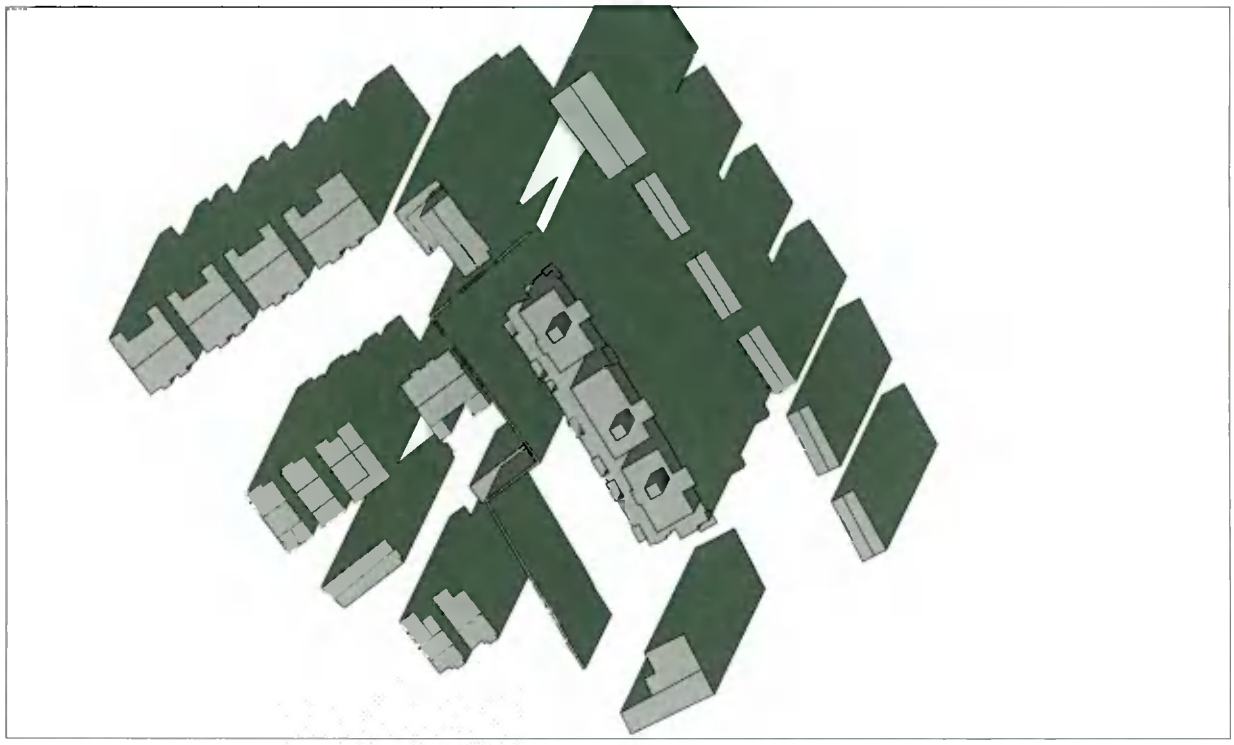


**21st December**
**9am – With Proposed Development**

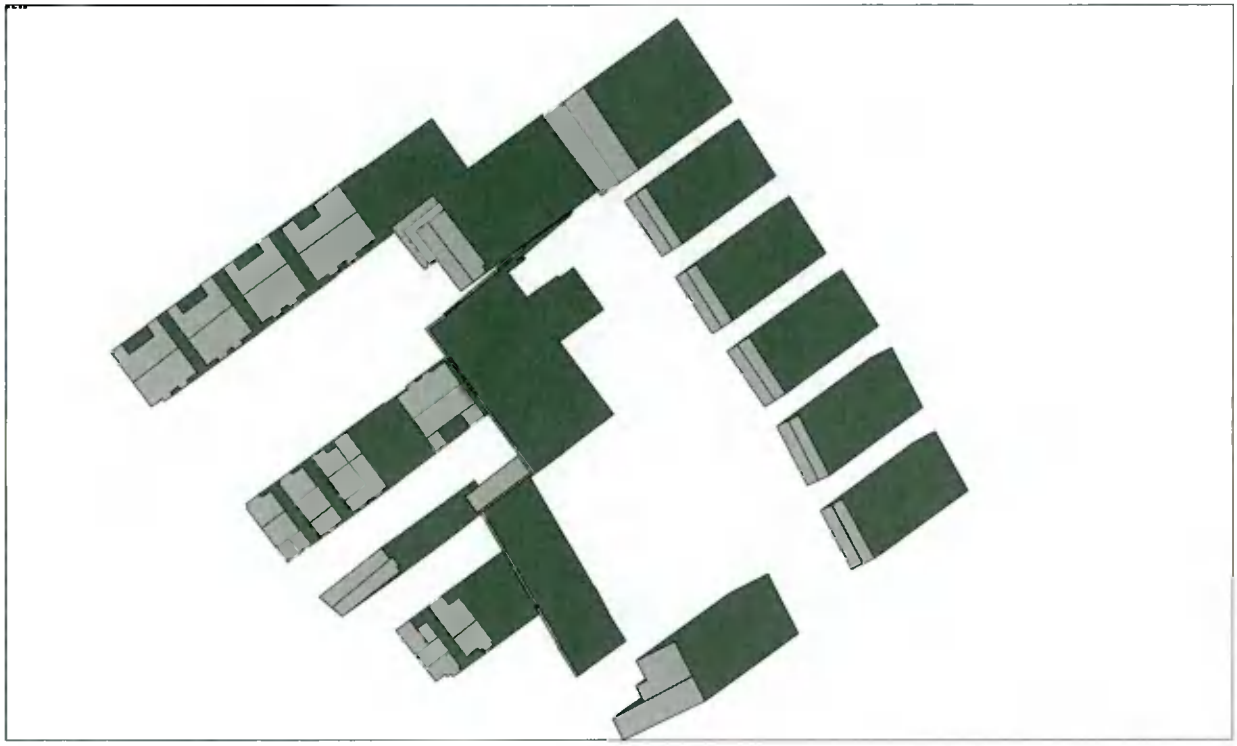
**21st December**
**11am – Current Scenario**



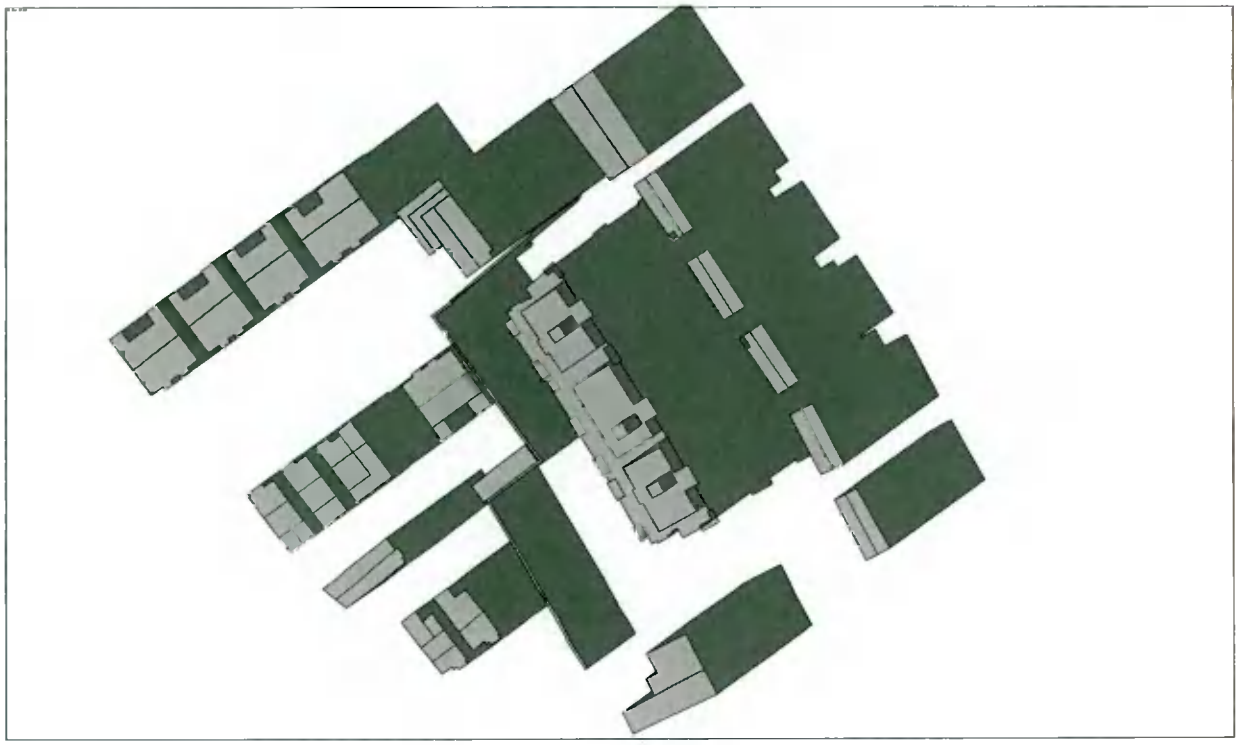
**21st December**
**11am – With Proposed Development**



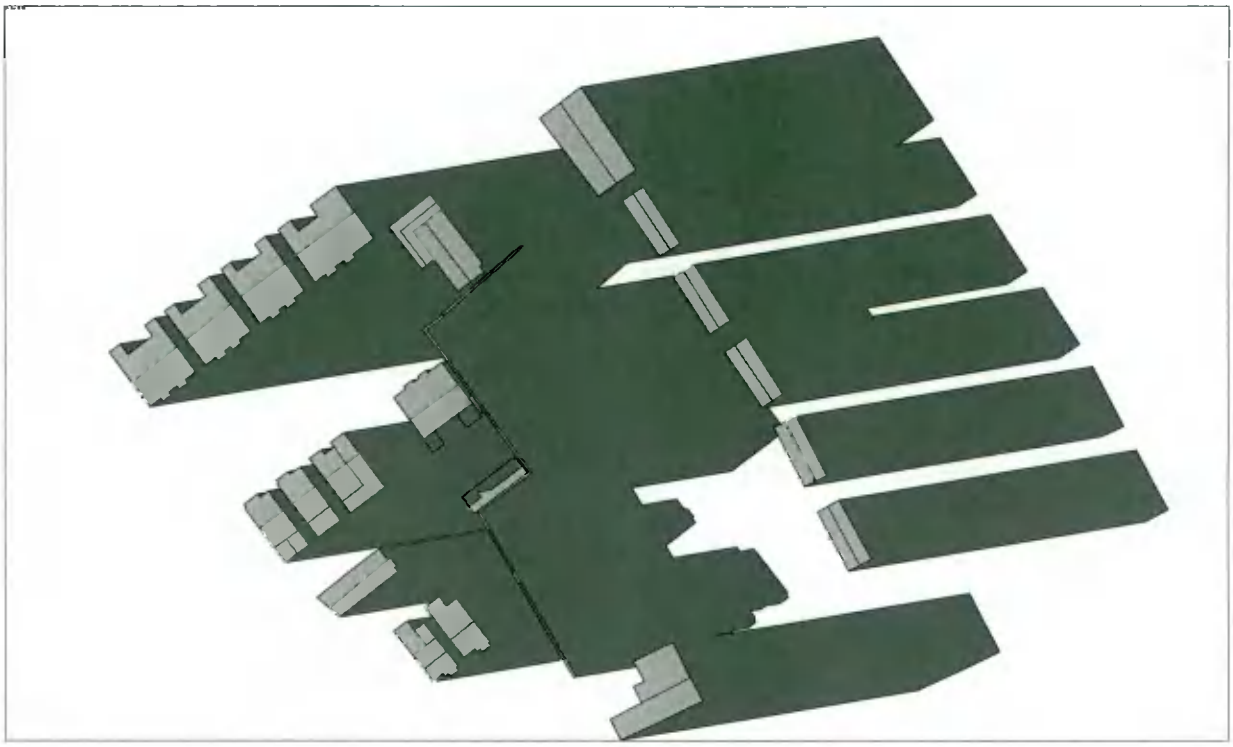
**21st December**
**1pm – Current Scenario**



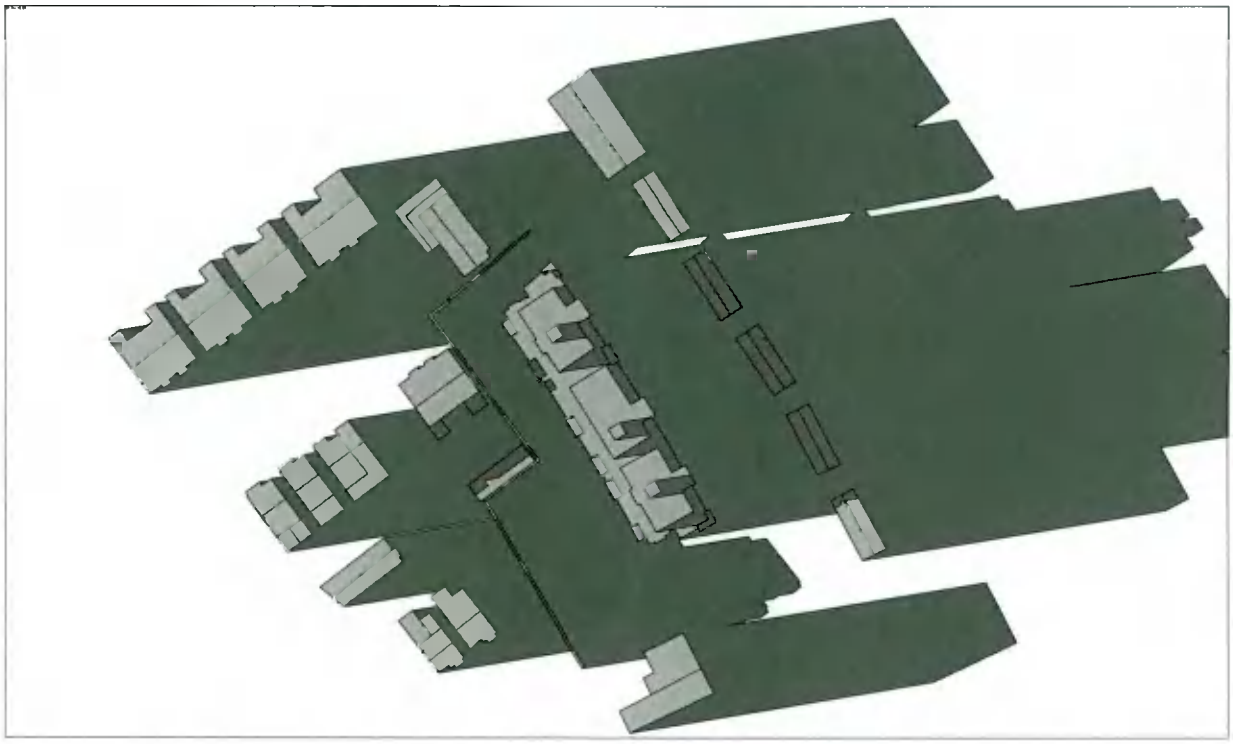
**21st December**
**1pm – With Proposed Development**



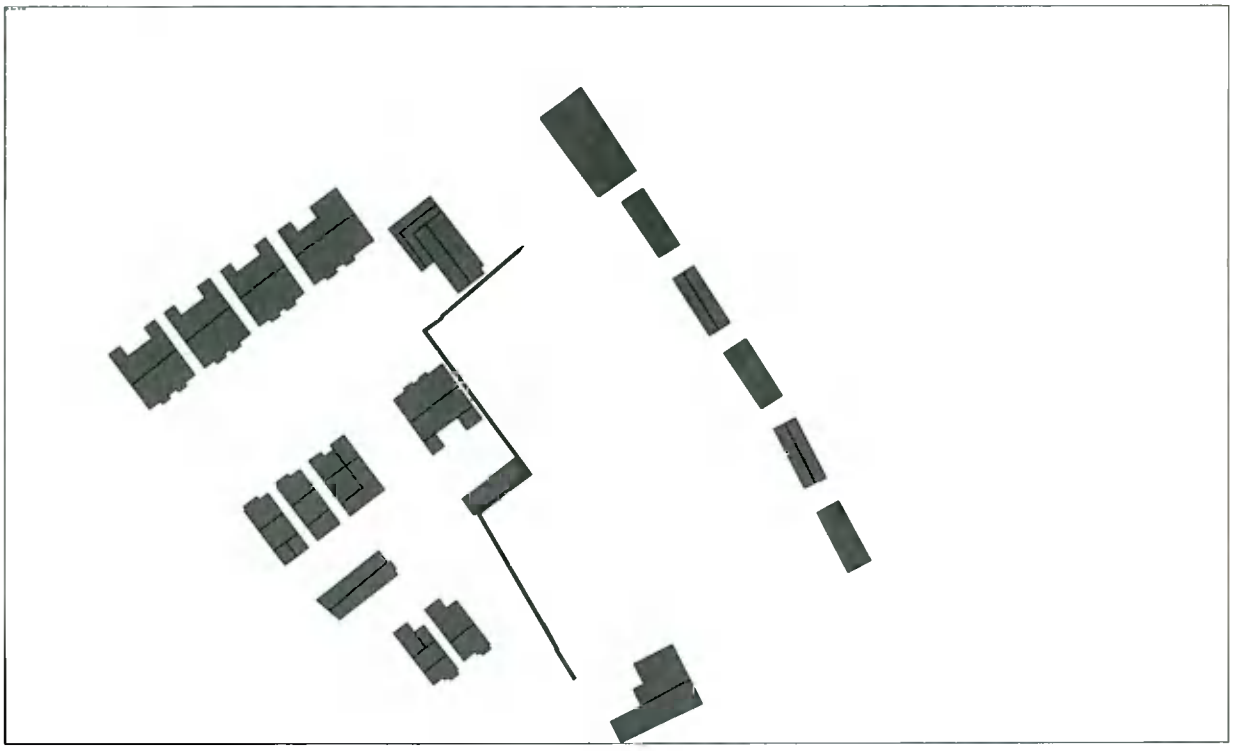
**21st December**
**3pm – Current Scenario**



**21st December**
**3pm – With Proposed Development**



**21st December**
**5pm – Current Scenario**



**21st December**
**5pm – With Proposed Development**