May 2021

Proposed Strategic Housing Development

Charlestown Place, Dublin 11

Applicant: Puddenhill Property Limited

Daylight and Sunlight Assessment Report

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3D DESIGN BUREAU

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1.0 Executive Summary

3D Design Bureau were commissioned to carry out a comprehensive BRE daylight and sunlight assessment, along with an accompanying shadow study for the proposed SHD development located at Charlestown Place, Dublin 11.

The assessment has been broken down into the following two main categories, of which there are sub categories summarised further below.

- Impact assessment on the surrounding environment and properties (baseline v proposed).
- Internal assessment of the proposed development; sunlighting to the proposed amenity spaces and internal daylight study (ADF) for habitable rooms (LKDs and bedrooms of the units within the buildings).

The impact assessment carried out has studied the potential levels of effect the proposed development will have on the surrounding existing environment & properties when compared to the baseline (existing) state. The surrounding properties assessed were carefully considered to ensure all potential properties that may experience a level of change were included. As can be seen from the summary of results below, the scheme is performing very well in this regard. This impact assessment covered the following categories:

- Effect on daylight (VSC) to surrounding properties. This was measured on the windows of the neighbouring selected properties.
- Effect on sunlight (APSH) to surrounding properties. This was measured on the windows of the neighbouring selected properties.

For the internal assessment of the proposed development, the levels of sunlight to the proposed amenity spaces and access to daylight (Average Daylight Factor - ADF) in the habitable rooms of the proposed units within the development, were all assessed. This study has assessed the (ADF) received in all habitable rooms across ground floor and first floor of the proposed Blocks 1, 2, 3 & 4. Where a room did not meet the guidelines on the first floor we have assessed the same room configuration on the upper floors until they met the target values. For Blocks 1 & 2 all rooms will meet the applied target value from the fourth floor upwards whilst for Block 3 & 4 all rooms will meet the guidelines from the second floor upwards. 3DDB worked in close collaboration with the project architects to advise and implement design interventions in order to achieve acceptable levels of compliance across the scheme. Considering the size and density of this development, (1575 No. habitable rooms across 4x blocks), the circa compliance rate of 97% for ADF can be considered very favourable.

Note: Typically, ADF values increase in rooms located on higher floor levels, due to a lesser obstruction from adjacent obstructions. Where a room meets the guidelines for ADF, it was assumed that similar rooms on subsequent floors will also meet the guidelines.

Finally, should the development be built as per the proposed design, which this assessment has been based on The following is a summary of results, and levels of effect, that will be experienced by the surrounding neighbours and future occupants of the building.

Effect to Vertical Sky Component (VSC) on neighbouring properties:

- Windows Assessed: 86 No.
  - Imperceptible: 86 No. (100%)

Effect to Annual Probable Sunlight Hours (APSH) Annual Study:

- Windows Assessed: 45 No.
  - Imperceptible: 45 No. (100%)

Effect to Annual Probable Sunlight Hours (APSH) Winter Study:

- Windows Assessed: 45 No.
  - Imperceptible: 45 No. (100%)

Sunlighting to proposed amenity area:

- Areas Assessed: 11 No.
  - Meeting the guidelines: 10 No. (91%)
  - Not Meeting the guidelines: 1 No. (9%)

Average Daylight Factor (ADF) of internal proposed development:

- Rooms assessed: 450 No.
  - Rooms meeting the guidelines: 396 No. This gives a circa compliance rate of 97% across the entire scheme of 1575 rooms. See ADF summary above for explanation.
  - Rooms not meeting the guidelines: 54 No. This gives a circa failure compliance rate of 3% across the entire scheme of 1575 rooms. See ADF summary above for explanation.

2.0 Introduction

The proposed development is a Strategic Housing Development (SHD), located at Charlestown Place, Dublin 11.

The proposed development will consist of 590 No. 1, 2 and 3 bed apartment units arranged in 4 No. 2 to 10 storey blocks known as Blocks 1 to 4. Permission is also sought for non residential uses at ground floor level within Blocks 1 and 2 comprising 2 No. retail/ commercial units, a creche, 4 No. office suites and a health centre and all associated streets and public open spaces. The development is described in full within the enclosed Planning Statement by BMA Planning.

As part of the planning application, 3D Design Bureau (3DDB) were commissioned to carry out a daylight assessment, sunlight assessment and shadow study.

The assessments carried out for the purposes of this report will study the effect the proposed development would have on the level of daylight received by the neighbouring residential properties that are in close proximity to the proposed development.

Assessments have also been carried out to determine the level of daylight in the proposed residential units, and the level of sunlight in the proposed amenity areas.

In December of 2020 the Department of Housing, Planning and Local Government published a guidance document for new apartments, *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities.* This document makes reference to the British Standard, *BS 8206-2:2008: Lighting for Buildings - Part 2: Code of Practice for Daylighting* (the British Standard) and to the Building Research Establishment's *Site Layout Planning for Daylight and Sunlight: a Guide to Good Practice* (the BRE Guidelines).

Prior the publication of the apartment guidelines in December 2020 a European Standard has been published *EN 17037 Daylight in Buildings*. EN 17037 is not referenced in the 2020 apartment guidelines and to the best of our knowledge is not referenced in any planning guidance document issued by Irish planning authorities. The BRE Guidelines have not been withdrawn. Until official guidance or instruction is published by a relevant authority on this matter, 3DDB will continue to reference the BRE Guidelines in our daylight and sunlight assessments.

Neither the European Standard, British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide is preceded by the following very clear warning 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."

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts, is of particular importance in the context of national and local policies for the consolidation and densification of urban areas or when assessing applications for highly constrained sites (e.g. lands in close proximity or immediately to the south of residential lands).

The neighbouring properties that were assessed:

- **Charlestown Place & Charlestown Place Tower- VSC/APSH**
- **42-68 Mckelvey Avenue- VSC**

Figure 2.1: Scope of surrounding properties and environment assessed.

3.0 Glossary

3.1 Terms and Definitions

Skylight
Non directional ambient light cast from the sky and environment.

Sunlight
Direct parallel rays of light emitted from the sun.

Daylight
Combined skylight and sunlight.

Overcast sky model
A completely overcast sky model, used for daylight calculation.

Existing Baseline Model State
The development site in its existing state. The proposed development has not been included. This model state has been used when generating the baseline results for all the existing neighbouring properties.

Proposed Development Model State
The proposed development has been modelled into the existing environment. This model state has been used when assessing the effect of the proposed development on the existing neighbouring properties, as well as assessments carried out within the proposed development itself.

Vertical Sky Component (VSC)
Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from an overcast sky model, 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.

Annual Probable Sunlight Hours (APSH)
Annual Probable Sunlight Hours (APSH) is a measure of sunlight that a given window may expect over a year period. It can be defined as the ratio between the annual sunlight hours in a specific location, and the hours of sunlight an assessment point on a window actually receives.

North facing windows may receive sunlight on only a handful of occasions in a year, and windows facing eastwards or westwards will receive sunlight only at certain times of the day. Taking this into account, the BRE Guidelines suggest that windows with an orientation within 90 degrees of due south should be assessed.

Average Daylight Factor (ADF)
Ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed overcast sky model.

Thus a 1% ADF would mean that the average indoor illuminance would be one hundredth the outdoor unobstructed illuminance.

Working plane
Horizontal, vertical or inclined plane in which a visual task lies. Normally the working plane may be taken to be horizontal, 850 mm above the floor in houses and factories, 700 mm above the floor in offices. The plane is offset 500 mm from the room boundaries.

BRE Target Value
When assessing the effect a proposed development would have on a neighbouring property, a target value will be applied. This applied target value is generated as per the criteria set out for each study in the BRE Guidelines.

Alternative Target Value
It could be appropriate to use alternative target values when conducting assessment of effect on existing properties. If such instances occur the rationale will be clearly explained and the instances where the alternative target values have been applied will be clearly identified.

Level of BRE Compliance
Each table in the study will have a column identified as "Level of BRE Compliance". This column identifies how an assessed instance performs in relation to the appropriate target value. If the instance is in compliance with the recommendations as made in the BRE Guidelines the value will be expressed as "BRE Compliant". If the instance does not meet the criteria as set out in the BRE Guidelines a percentage will be expressed to determine the level of compliance with the recommendation. This value determines the definition of effect.

3.2 Definition of Effects

In order to categorise the varying degrees of compliance with the BRE Guidelines when assessing the effect a proposed development would have on the daylight and sunlight of an existing property, 3DDB have assigned numerical values to the levels of effect as listed in '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' prepared by the Environmental Protection Agency (Draft of 2017), and to *Directive 2011/92/EU (as amended by Directive 2014/52/EU).*

The list of definitions given below is taken from Table 3.3: Descriptions of Effects contained in the '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' prepared by the Environmental Protection Agency. Some comment is also given below on what these definitions might imply in the case of sunlight access.

Note: There are many factors to be taken into consideration when determining levels of effect. We have included typical numerical values that we have used when assigning levels of effect. These values are not applied rigidly, but rather as a guide. Circumstances may occur that lead to a rationale being taken to interpret these guidelines differently. Such cases are always explained in the Analysis of Results section, if and when they occur.

Imperceptible

An effect capable of measurement but without significant consequences. For the purposes of this Sunlight and Daylight Assessment Report an "imperceptible" level of effect will be stated if the level of effect is within the criteria as recommended in the BRE Guidelines and the applied target value has been achieved.

Not Significant

An effect which causes noticeable changes in the character of the environment but without significant consequences. For the purposes of this Sunlight and Daylight Assessment Report, a "not significant" level of effect will be stated if the level of effect is marginally outside of the criteria as stated in the BRE Guidelines. Typically a "not significant" level of effect will be applied if the level of daylight or sunlight is reduced to between 90-99% of the applied target value.

Slight

An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. For the purposes of this Sunlight and Daylight Assessment Report, a "slight" level of effect will be stated if the level of daylight or sunlight is reduced to between 75-90% of the applied target value.

Moderate

An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends. For the purposes of this Sunlight and Daylight Assessment Report, a "moderate" level of effect will be stated if the level of daylight or sunlight is reduced to between 50-75% of the applied target value. A "moderate" level of effect would be quite typical in instances where a proposed development is planned on an under-developed plot of land. The level of daylight and/or sunlight of an assessed property is reduced in a manner that is consistent with similar properties in the immediate surrounding area.

Significant

An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. For the purposes of this Sunlight and Daylight Assessment Report a "significant" level of effect will be stated if the proposed development reduces the availability of daylight or sunlight of a neighbouring property to a low level. Typically a "significant" level of effect will be stated if the level of daylight or sunlight is reduced to between 30-50% of the applied target value.

Very Significant

An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. For the purposes of this Sunlight and Daylight Assessment Report a "very significant" level of effect will be stated if the proposed development reduces the availability of daylight or sunlight of a neighbouring property to a very low level. Typically a "'very significant" level of effect will be stated if the level of daylight or sunlight is reduced to between 10-30% of the applied target value.

Profound

An effect which obliterates sensitive characteristics. For the purposes of this Sunlight and Daylight Assessment Report, a "profound" level of effect will only be stated if the proposed development reduces the availability of daylight or sunlight of a neighbouring property to a level that is less than 10% of the applied target value.

Positive Effect

In relation to sunlight or daylight access, it is conceivable that there could be positive effects, but this implies that a development would involve a reduction of the size or scale of built form (e.g. such as the demolition of a building, which might result in an increase in sunlight access). Though that is possible, it is usually unlikely as most development involves the construction of new obstructions to sunlight access.

3.3 Index of Tables

3.3.1 Vertical Sky Component

Below is an example of the table used to describe the effect on VSC.

Table No. 3.1: Example of VSC Table						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended Minimum VSC	Level of Compliance with BRE Guidelines	Effect of Proposed Development
House Number/Floor						
A	**B**	**C**	**D**	**E**	**F**	**G**

A: Window Number

The number in this column will identify the assessed window. All windows are represented visually in the corresponding figure.

B: Baseline VSC Value

The *Baseline VSC Value* represents the VSC value of the assessed window is calculated in the existing baseline model state (as explained in the "Glossary" on page 6).

C: Proposed VSC Value

The *Proposed VSC Value* represents the VSC value of the assessed window calculated in the proposed model state (as explained in the "Glossary" on page 6).

D: Ratio of Proposed VSC to Baseline VSC

This column expressed the ratio of change between the baseline VSC value and the proposed VSC value. The BRE Guidelines recommend that if the proposed value is less than 0.8 times the baseline value, then the reduction in daylight is more likely to be perceptible.

E: Recommended minimum VSC

The *BRE Target Value* for each window has been set according to the BRE Guidelines. The Guidelines state that a proposed development could possibly have a noticeable effect on the daylight received by an existing window, if the VSC value **both** drops below the guideline value of 27% **and** the VSC value is less than 0.8 times the baseline value.

Therefore, to determine the *recommended minimum Value*, 80% of the *Baseline VSC value* has been calculated. If this value is above the 27% threshold, a target value of 27% will be applied. If 80% of the baseline value is below 27%, then 80% of the baseline value is the appropriate target value.

F: Level of Compliance with the BRE Guidelines

This column states the compliance of the *Proposed VSC Value* with the *recommended minimum VSC* as per the BRE Guidelines. In essence, it shows whether or not the assessed window would experience a perceptible level of impact. If the window complies with the BRE Guidelines this cell will state "*BRE Compliant*". If the window does not meet the criteria as set out in the BRE Guidelines, a percentage of compliance with the *recommended minimum* will be stated.

G: Effect of Proposed Development

The levels of effect in this column describe the effect an assessed window will experience, based on its compliance with the *BRE Target Value*. The levels of effect used in this report have regard to the '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' prepared by the Environmental Protection Agency (Draft of 2017), and to *Directive 2011/92/EU (as amended by Directive 2014/52/EU)* and a full list can be found in "*Definition of Effects*" on page 7.

3.3.2 Annual Probable Sunlight Hours

Below is an example of the table used to describe the effect on APSH.

Table No. 3.2: Example of APSH Table						
Window Number	Baseline Annual/ Winter APSH	Proposed Annual/ Winter APSH	Ratio of Proposed APSH to Baseline APSH	Recommended Minimum APSH	Level of Compliance with BRE Guidelines	Effect of Proposed Development
House Number/Floor						
A	**B**	**C**	**D**	**E**	**F**	**G**

A: Window Number

The number in this column will identify the assessed window. All windows are represented visually in the corresponding figure.

B: Baseline Annual/Winter APSH

The *Baseline Annual/Winter APSH Value* represents percentage of the probable sunlight hours that the assessed window can receive, calculated in the existing baseline model state (as explained in the "Glossary" on page 6). The annual and winter assessments will be represented in separate tables.

C: Proposed Annual APSH

The *Proposed Annual APSH Value* represents the percentage of probable sunlight hours that the assessed window can receive, calculated in the proposed model state (as explained in the "Glossary" on page 6).

D: Ratio of Proposed APSH to Baseline APSH

This column expressed the ratio of change between the baseline APSH value and the proposed VSC value. The BRE Guidelines recommend that if the proposed value is less than 0.8 times the baseline value, then the reduction to sunlight is more likely to be perceptible.

E: Recommended Minimum APSH

The *BRE Target Value* for each window has been set according to the BRE Guidelines. The Guidelines state that a proposed development could possibly have a noticeable effect on the sunlight received by an existing window, if the APSH value **both** drops below the annual (25%) or winter (5%) guidelines; **and** the APSH value is less than 0.8 times the baseline value; **and** there is a reduction of more than 4% to the annual APSH.

Therefore, to determine the *recommended minimum APSH Value* for the annual study, 80% of the *Baseline APSH value* has been calculated. If this value is above the 25% threshold, a target value of 25% will be applied. If 80% of the baseline value is below 25%, then 80% of the baseline value is the appropriate target value.

To determine the *recommended minimum APSH Value* for the winter study, 80% of the *Baseline winter APSH value* has been calculated. If this value is above the 5% threshold, a target value of 5% will be applied. If 80% of the baseline value is below 5%, then 80% of the baseline value is the appropriate target value.

F: Level of Compliance with BRE Guidelines

This column states the compliance of the *Proposed Annual APSH Value* with the *recommended minimum APSH* as per the BRE Guidelines. In essence, it shows whether or not the assessed window would experience a perceptible level of impact. If the window complies with the BRE Guidelines this cell will state "*BRE Compliant*". If the window does not meet the criteria as set out in the BRE Guidelines, a percentage of compliance with the *recommended minimum* will be stated.

G: Effect of Proposed Development

The levels of effect in this column describe the effect an assessed window will experience, based on its compliance with the *BRE Target Value*. The levels of effect used in this report have regard to the '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' prepared by the Environmental Protection Agency (Draft of 2017), and to *Directive 2011/92/EU (as amended by Directive 2014/52/EU)* and a full list can be found in "*Definition of Effects*" on page 7.

3.3.3 Proposed Gardens and Amenity Spaces

Below is an example of the table used to describe sunlighting in proposed gardens and amenity spaces.

Table No. 3.3: Example of Sunlighting Table for Proposed Gardens/Amenity Spaces			
Assessed Area	Area Capable of Receiving 2 Hours of Sunlight on March 21st	Recommended Minimum	Level of Compliance with BRE Guidelines
A	**B**	**C**	**D**

A: Assessed Area

This column identifies the assessed garden/amenity area.

B: Area Capable of Receiving 2 Hours of Sunlight on March 21st

The percentage of the proposed area that can receive more than 2 hours of sunlight on March 21st.

C: Recommended Minimum

The BRE Guidelines state that the percentage of a garden/amenity area that can receive more than 2 hours of sunlight on March 21st should be 50%. The target value for all spaces is set to 50%.

D: Level of Compliance with BRE Guidelines

This column states the compliance of the assessed space with the *BRE Target Value*. If the assessed garden or amenity area complies with the BRE Guidelines this cell will state "*BRE Compliant*". If the garden or amenity area does not meet the criteria as set out in the BRE Guidelines, a percentage of compliance with the *recommended minimum* will be stated.

3.3.4 Average Daylight Factor

Below is an example of the table used to describe the daylight factor in proposed units.

Table No. 3.4: Example of ADF Results Table				
Unit Number	Room Description	Recommended Minimum ADF	ADF	Level of Compliance
A	**B**	**C**	**D**	**E**

A: Unit Number

This column identifies the assessed unit. All unit numbers are determined by the architect's drawings, unless otherwise stated.

B: Room Description

Room Description details which room of the unit has been assessed, e.g. bedroom, living room, etc.

C: Recommended Minimum ADF

The recommended minimum ADF value, is determined by the room type, as indicated in column B. Typically kitchens will have a recommended minimum ADF of 2.0%, living spaces 1.5%, LKDs 1.5% and bedrooms 1.0%. For more information on the target values applied in the ADF study, please refer to the methodology section under the title "Recommended Minimum ADF" on page 14.

D: ADF

The average daylight factor calculated for an assessed room.

E: Level of Compliance

This column states the compliance of the assessed space with the *recommended minimum ADF*. If the assessed room complies with the assigned target value this cell will state "*Compliant*". If the room does not achieve the recommended level of daylight, the percentage of compliance with the *recommended minimum ADF Value* will be stated.

4.0 Assessment Categories

4.1 Effect on Vertical Sky Component (VSC)

A proposed development could potentially have a negative effect on the level of daylight that a neighbouring property receives, if the obstructing building is large in relation to their distance from the existing dwelling.

To ensure a neighbouring property is not adversely affected, the Vertical Sky Component (also referred to as VSC) is calculated and assessed. VSC can be defined as the amount of skylight that falls on a vertical wall or window.

This report assesses the percentage of direct sky illuminance that falls on the centre point of all relevant windows.

The BRE Guidelines state that if the VSC is:

- At least 27%, then conventional window design will usually give reasonable results;
- Between 15% and 27%, then special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight;
- Between 5% and 15%, then it is very difficult to provide adequate daylight unless very large windows are used;
- Less than 5%, then it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.

In this assessment, the VSC of the centre point on each of the assessed windows will be calculated, both in the 'baseline state' and in the 'proposed state'. The baseline state reflects the current VSC of the window, the proposed state will determine what the VSC of the window would be if the proposed development is built as planned.

A comparison between these values will determine the level of effect.

A proposed development could possibly have a noticeable effect on the daylight received by an existing window, if the following occurs:

- The VSC value drops below the guideline value of 27%; **and**
- The VSC value is less than 0.8 times the existing value.

The results for the study on the effect on VSC caused by the proposed development can be seen in section 6.1 on page 16.

4.2 Effect on Annual Probable Sunlight Hours (APSH)

Annual Probable Sunlight Hours (APSH) is a measure of sunlight that a given window may expect to receive over the period of a year. The percentage of APSH that windows in existing properties receive might be affected by a proposed development.

Whether a window is considered for APSH assessment is based on its orientation. A south-facing window will, in general, receive the most sunlight. North facing windows may receive sunlight on only a handful of occasions in a year, and windows facing eastwards or westwards will receive sunlight only at certain times of the day. Taking this into account, the BRE Guidelines suggest that windows with an orientation within 90 degrees of due south should be assessed.

If the assessment point of a window can receive more than 25% of APSH, including at least 5% of the winter probable sunlight hours, then the room should receive enough sunlight.

As with the VSC study, the APSH will be calculated in the baseline state and the proposed state. A comparison of the results will determine the level of effect.

A proposed development could possibly have a noticeable effect on the sunlight received by an existing window, if the following occurs:

- The APSH value drops below the annual (25%) or winter (5%) guidelines; **and**
- The APSH value is less than 0.8 times the baseline value; **and**
- There is a reduction of more than 4% to the annual APSH.

The results of the study on APSH can be found in Section 6.2 on page 22.

4.3 Sunlighting in Proposed Outdoor Amenity Areas

The BRE Guidelines recommend that for a garden or amenity area to appear adequately sunlit throughout the year, at least half of it should receive at least two hours of sunlight on March 21st.

March 21st, also known as the spring equinox, is chosen as the assessment date as daytime and nighttime are of approximately equal duration on this date.

The portion of each space capable of receiving 2 hours of direct sunlight on March 21st will be calculated individually, these figures will then be combined to give the development average.

The results for the study on sunlighting in the proposed outdoor amenity areas (including a visual representation in the form of 2-hour false colour plans) can be found in section 6.4 on page 28.

4.4 Shadow Study

A shadow study has been carried out on the baseline existing model state and the proposed model state. This visual representation of the shadows cast by the proposed development can be found in the hourly shadow diagrams in section 6.5 on page 29.

Hourly renderings have been shown from sunrise to sunset on the following dates:

- Spring equinox: March 21st Sunrise 6:25 | Sunset 18:40.
- Summer solstice: June 21st. Sunrise 4:57 | Sunset 21:57.
- Winter solstice: December 21st Sunrise 8:38 | Sunset 16:08.

Note: Considering the spring equinox (March 21st) and autumn equinox (22nd September) yield similar results, only the spring equinox was generated.

4.5 Average Daylight Factor (ADF)

The BRE Guidelines define the Average Daylight Factor as the average illuminance on the working plane in a room, divided by the illuminance on an unobstructed horizontal surface outdoors.

In housing, the working plane is considered to be 850 mm above the finished floor level and offset 500 mm from the room boundaries.

BS 8206-2:2008 Code of Practice for Daylighting recommends an ADF of 5% for a well day lit space where no additional electric lighting is available, and 2% for a partly daylight space with supplementary electric lighting.

In terms of housing, *BS 8206-2:2008* also gives minimum values of ADF. These recommendations are considered to be the minimum value of ADF required for the following habitable spaces:

- 2% for kitchens;
- 1.5% for living rooms;
- 1% for bedrooms.

This study has assessed the Average Daylight Factor (ADF) received in all residential rooms across ground floor and first floor of the proposed Blocks 1 & 2, where a room did not meet the guidelines on the first floor we have assessed the same room configuration on the upper floors until they met the applied target value. The study has also assessed the ground and first floor of Blocks 3 & 4. No assessment has been carried out on subsequent floors as the levels of daylight naturally increase as the floor level increases and the lowest floor is deemed to be the worst case scenario.

Note: non-habitable rooms and circulation spaces (e.g. bathrooms and corridors) do not require ADF assessment according to the BRE Guidelines.

For definition of spaces and target values applied, please see the methodology section of this report in section 5.2 on page 13.

The results for the study on ADF can be seen in section 6.5 on page 38.

5.0 Methodology

5.1 Building the Baseline and Proposed Models

In order to obtain the results of this assessments, 3D Design Bureau (3DDB) constructed a series of architectural 3D digital models using Revit 2019, a BIM software application made available by Autodesk.

The proposed model states were produced from architectural 3D models supplied by the project architects, McCrossan O'Rourke Manning. The models have fully developed exterior envelopes as per the supplied design and all internal layouts of the units being assessed for ADF were included. The models were optimised as part of the process by 3DDB. The site layout was also modelled to reflect the outdoor amenity spaces being proposed in the development.

Note: These models have been modified to reflect mitigation measures that occurred during the design process to improve the performance of the scheme in relation to the daylight and sunlight.

A combination of survey information, aerial photography, available online photography and/or ordnance survey information were used to model the surrounding context and assessed buildings.

Note: as the information gathered from online sources is not as accurate as surveyed information, some tolerance should be allowed to the results generated.

Trees

Normally trees and shrubs do not need to be included in the studies carried out in this report, partly because their shapes are almost impossible to predict, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees). Where a dense belt or group of evergreens is specifically planned as a windbreak or for privacy purposes, it is better to include their shadow in the calculation of shaded area.

5.2 Generating Results

The 3D models as stated above were brought into specialist software packages using state of the art daylight and sunlight analysis methods developed by 3DDB.

The results are generated and analysed considering the BRE Guidelines, as expanded on below.

5.2.1 VSC

Assessment Criteria

Under BRE Guidelines, only habitable rooms need to be assessed for effect on daylight and sunlight. In the absence of design layouts or floor plans, or information pertaining to the internal 'as-built' layouts, assumptions have been made regarding the function of the windows of the existing surrounding properties (i.e. what room type is served by the window being assessed).

Typically, the effect on ground floor windows is greater than the effect on windows of subsequent floors. However, floors above ground floor level have been included in this study to give a more comprehensive assessment.

Assessment Points

The assessment points for measuring VSC or APSH are taken from the centre point of a standard window.

If the window being assessed is a full height window, the assessment point is taken at 1600 mm above the finished floor level.

If it can be determined that multiple windows are servicing the same room, each window will be assessed and the average value will be taken.

5.2.2 APSH

Effect on Annual Probable Sunlight Hours (APSH) has been calculated on the windows assessed in the VSC study. The BRE Guidelines suggest that windows with an orientation within 90 degrees of due south should be assessed. Therefore, the APSH of windows that do not have an orientation within 90° of due south have not been assessed for the purposes of this report.

The assessment points for APSH are equivalent to the VSC study.

5.2.3 Sunlighting

Assessment Criteria

The levels of sunlighting to proposed amenity areas, as indicated by the architect, have been assessed. However, it should be noted that the numbering of these spaces in the Daylight and Sunlight Assessment Report has been assigned by 3DDB specifically for the purposes of this report. If other consultants are referencing these spaces in their own reports, it is unlikely they will be numbered the same.

5.2.4 ADF

Recommended Minimum ADF

The recommended minimum for Average Daylight Factor is based on the function of the room being assessed.

The recommendations as per the BS 8206-2:2008 are as follows: 2% for kitchens; 1.5% for living rooms; and 1% for bedrooms.

BS 8206-2:2008 also recommends that where one room serves more than one purpose, the minimum average daylight factor should be taken for the room with the highest value. Notwithstanding this advice a target value of 1.5% has been applied to LKDs. The rationale for this departure from the recommended target value, is in recognition that the primary function of LKDs within apartment development is typically that of a living space. Should a higher target value be sought, design changes would be needed, such as the removal of balconies or a reduction of unit sizes. These possible mitigation measures could be said to reduce the quality of living within the proposed units to a greater degree than the improvements gained by higher ADF values. The appropriate ADF target value for LKDs is at the discretion of the planning authority, for which there is precedence in applying the 1.5% that we have applied in this study.

In new developments, some internal spaces (e.g. studio apartments, shared communal areas etc.) can possibly be of a nature that do not have a predefined target value in the *BS 8206-2:2008*. In such instances, 3DDB have applied a target value they deem to be appropriate.

Defining Areas

It is standard practice in apartment designs for LKDs to contain kitchens that are completely internal and not serviced by window on the external facade. These internal kitchens will often rely on supplementary electric lighting for periods of the day and can contribute to perceived lower ADF values in otherwise well lit spaces.

Where rooms include a winter garden, the winter garden is deemed to be an extension to the interior space and will be included in the assessed area of the room.

Circulation spaces, corridors, bathrooms etc. have not been assessed.

Work Plane

The calculation of ADF is carried out on a hypothetical work plane which lies 850 mm from the finished floor level in residential units and 700 mm in academic and office spaces. The work plane is offset 500 mm from the room boundaries. Room boundaries are taken from the inside face of the interior walls and the centre line of any main external windows.

The Daylight Factor (DF) percentage has been calculated on the work plane across a series of points on a grid of approximately 100 mm.

The average of these figures determines the Average Daylight Factor (ADF).

Material Palette

Unless a material palette is provided by the architect the following values will be assumed for ADF calculations.

Table No. 5.1: Material Palette for ADF Calculations

Object	Material	Reflectance	Object	Material	Reflectance / Transmittance
Exterior walls	Standard Brick	0.3	Interior Walls	Off white paint	0.75
	Light Brick	0.4	Interior Ceiling	White paint	0.8
	Dark Brick	0.15	Interior Floor	Light timber	0.35
	Render	0.6	Miscellaneous	Miscellaneous	0.5
	Concrete	0.4	Glass	Double glazing	0.8
Ground cover	Paving	0.4		Maintenance Factor	0.91
	Tarmac	0.2		Glass adjusted for maintenance	0.73
	Grass	0.2		Frosted glass	0.5

Assumed Values

Where room types are repeated across apartment blocks, similar ADF values will be assumed.

Typically, ADF values increase in rooms located on higher floor levels, due to a lesser obstruction from adjacent obstructions. Where a room meets the guidelines for ADF, it will be assumed that similar rooms on subsequent floors will also meet the guidelines. In an instance where a room does not achieve the recommended level of ADF, and is repeated on subsequent floors, calculations will be run on the upper floors to determine at what level that room type meets the guidelines.

A combination of the calculated results and reasonable inference made from these results will be used to give an approximated percentage compliance rate for the ADF for the proposed development as a whole.

5.2.5 Shadow Study

The shadow study renderings have been carried out in order to give a visual representation to the results set out in the sunlight assessment section of this report.

Hourly renderings have been shown from sunrise to sunset on the following dates:

- Spring equinox: March 21st Sunrise 6:25 | Sunset 18:40.
- Summer solstice: June 21st. Sunrise 4:57 | Sunset 21:57.
- Winter solstice: December 21st Sunrise 8:38 | Sunset 16:08.

Note: Considering the spring equinox (March 21st) and autumn equinox (22nd September) yield similar results, only the spring equinox was generated.

6.0 Results

6.1 Effect on Vertical Sky Component

6.1.1 Charlestown Place Tower

Table No. 6.1: VSC Results Charlestown Place Tower

Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
First Floor						
1a	39.96%	34.44%	0.86	27.00%	BRE Compliant	Imperceptible
1b	39.95%	35.33%	0.88	27.00%	BRE Compliant	Imperceptible
1c	39.69%	36.29%	0.91	27.00%	BRE Compliant	Imperceptible
Second Floor						
2a	39.97%	35.35%	0.88	27.00%	BRE Compliant	Imperceptible
2b	39.98%	36.11%	0.90	27.00%	BRE Compliant	Imperceptible
2c	39.75%	36.91%	0.93	27.00%	BRE Compliant	Imperceptible
Third Floor						
3a	39.98%	36.27%	0.91	27.00%	BRE Compliant	Imperceptible
3b	39.98%	36.88%	0.92	27.00%	BRE Compliant	Imperceptible
3c	39.76%	37.49%	0.94	27.00%	BRE Compliant	Imperceptible
Fourth Floor						
4a	39.98%	37.20%	0.93	27.00%	BRE Compliant	Imperceptible
4b	39.98%	37.66%	0.94	27.00%	BRE Compliant	Imperceptible
4c	39.76%	38.07%	0.96	27.00%	BRE Compliant	Imperceptible
Fifth Floor						
5a	39.98%	38.11%	0.95	27.00%	BRE Compliant	Imperceptible
5b	39.98%	38.41%	0.96	27.00%	BRE Compliant	Imperceptible
5c	39.76%	38.61%	0.97	27.00%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

Figure 6.1: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.1.2 Charlestown Place Tower

Table No. 6.2: VSC Results Charlestown Place Tower						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
Sixth Floor						
6a	39.98%	38.91%	0.97	27.00%	BRE Compliant	Imperceptible
6b	39.98%	39.07%	0.98	27.00%	BRE Compliant	Imperceptible
6c	39.76%	39.08%	0.98	27.00%	BRE Compliant	Imperceptible
Seventh Floor						
7a	39.98%	39.55%	0.99	27.00%	BRE Compliant	Imperceptible
7b	39.98%	39.62%	0.99	27.00%	BRE Compliant	Imperceptible
7c	39.76%	39.49%	0.99	27.00%	BRE Compliant	Imperceptible
Eight Floor						
8a	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
8b	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
8c	39.76%	39.76%	1.00	27.00%	BRE Compliant	Imperceptible
Ninth Floor						
9a	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
9b	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
9c	39.76%	39.76%	1.00	27.00%	BRE Compliant	Imperceptible
Tenth Floor						
10a	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
10b	39.98%	39.98%	1.00	27.00%	BRE Compliant	Imperceptible
10c	39.76%	39.76%	1.00	27.00%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

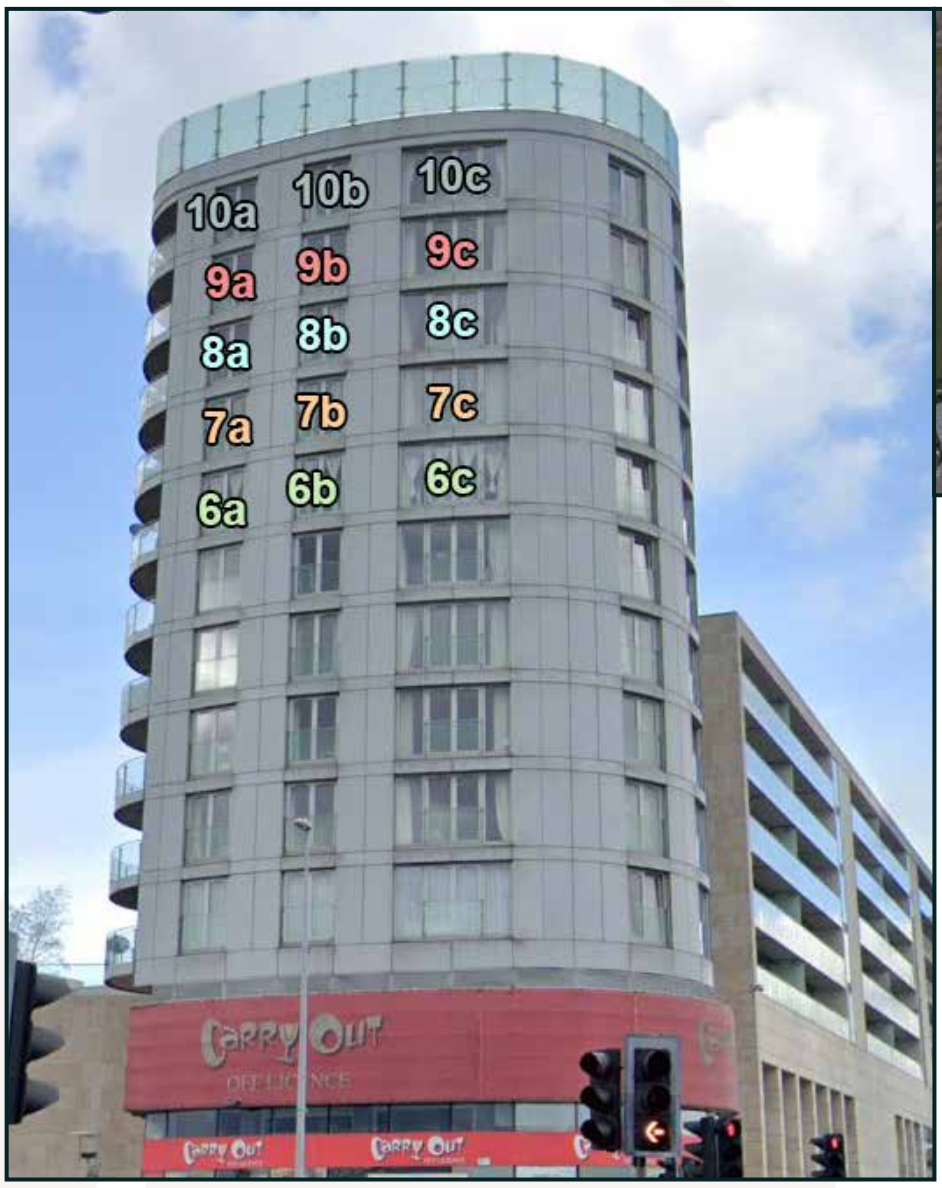

Figure 6.2: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.1.3 Charlestown Place

Table No. 6.3: VSC Results Charlestown Place						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
First Floor						
1a	39.90%	33.82%	0.85	27.00%	BRE Compliant	Imperceptible
1b	39.90%	33.45%	0.84	27.00%	BRE Compliant	Imperceptible
1c#	25.23%	20.36%	0.81	20.19%	BRE Compliant	Imperceptible
Second Floor						
2a	39.92%	35.20%	0.88	27.00%	BRE Compliant	Imperceptible
2b	39.91%	34.89%	0.87	27.00%	BRE Compliant	Imperceptible
2c#	25.27%	21.40%	0.85	20.21%	BRE Compliant	Imperceptible
Third Floor						
3a	39.93%	36.61%	0.92	27.00%	BRE Compliant	Imperceptible
3b	39.92%	36.35%	0.91	27.00%	BRE Compliant	Imperceptible
3c#	25.53%	22.69%	0.89	20.42%	BRE Compliant	Imperceptible
Fourth Floor						
4a	39.93%	38.03%	0.95	27.00%	BRE Compliant	Imperceptible
4b	39.93%	37.84%	0.95	27.00%	BRE Compliant	Imperceptible
4c#	25.98%	24.19%	0.93	20.79%	BRE Compliant	Imperceptible
Fifth Floor						
5a	39.94%	39.23%	0.98	27.00%	BRE Compliant	Imperceptible
5b	39.94%	39.10%	0.98	27.00%	BRE Compliant	Imperceptible
5c#	26.29%	25.40%	0.97	21.03%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

Where multiple windows service the same room, each window has been assessed and the Average VSC Value has been taken.

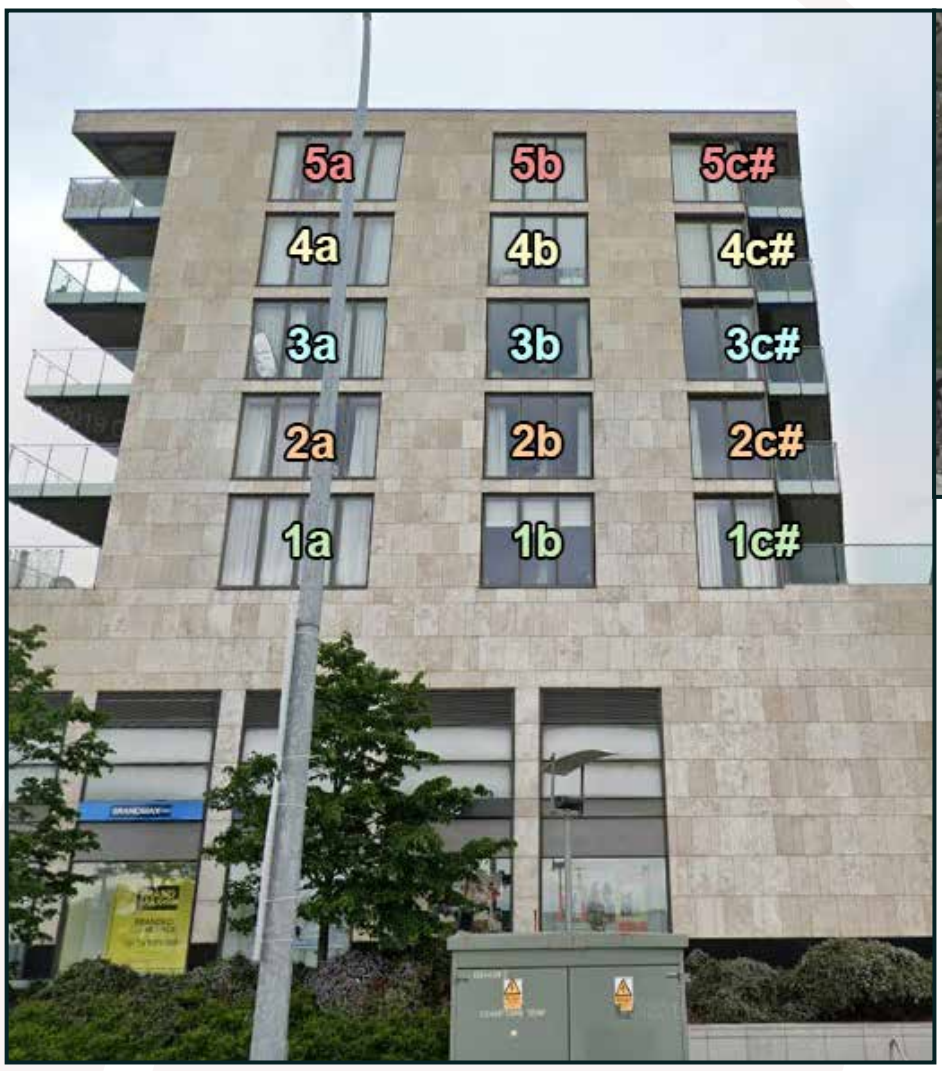

Figure 6.3: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.1.4 42-48 Mckelvey Avenue

Table No. 6.4: VSC Results 42-48 Mckelvey Avenue						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
42 Mckelvey Avenue						
42a	31.91%	30.67%	0.96	25.53%	BRE Compliant	Imperceptible
42b	36.60%	33.98%	0.93	27.00%	BRE Compliant	Imperceptible
42c	37.39%	34.68%	0.93	27.00%	BRE Compliant	Imperceptible
44 Mckelvey Avenue						
44a	31.89%	30.66%	0.96	25.51%	BRE Compliant	Imperceptible
44b	37.83%	35.07%	0.93	27.00%	BRE Compliant	Imperceptible
44c	38.09%	35.27%	0.93	27.00%	BRE Compliant	Imperceptible
46 Mckelvey Avenue						
46a	33.79%	32.62%	0.97	27.00%	BRE Compliant	Imperceptible
46b	38.25%	35.36%	0.92	27.00%	BRE Compliant	Imperceptible
46c	38.33%	35.35%	0.92	27.00%	BRE Compliant	Imperceptible
48 Mckelvey Avenue						
48a	30.89%	30.09%	0.97	24.71%	BRE Compliant	Imperceptible
48b	38.35%	35.27%	0.92	27.00%	BRE Compliant	Imperceptible
48c	38.34%	35.19%	0.92	27.00%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

Figure 6.4: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.1.5 50-56 Mckelvey Avenue

Table No. 6.5: VSC Results 50-56 Mckelvey Avenue						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
50 Mckelvey Avenue						
50a	31.97%	29.81%	0.93	25.57%	BRE Compliant	Imperceptible
50b	38.30%	35.07%	0.92	27.00%	BRE Compliant	Imperceptible
50c	38.23%	34.94%	0.91	27.00%	BRE Compliant	Imperceptible
52 Mckelvey Avenue						
52a	28.90%	27.81%	0.96	23.12%	BRE Compliant	Imperceptible
52b	38.08%	34.76%	0.91	27.00%	BRE Compliant	Imperceptible
52c	37.85%	34.55%	0.91	27.00%	BRE Compliant	Imperceptible
54 Mckelvey Avenue						
54a	36.69%	33.86%	0.92	27.00%	BRE Compliant	Imperceptible
54b	32.98%	31.46%	0.95	26.38%	BRE Compliant	Imperceptible
56 Mckelvey Avenue						
56a	29.51%	28.14%	0.95	23.61%	BRE Compliant	Imperceptible
56c	35.84%	32.36%	0.90	27.00%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

Figure 6.5: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.1.6 58-68 Mckelvey Avenue

Table No. 6.6: VSC Results 58-68 Mckelvey Avenue						
Window Number	Baseline VSC Value	Proposed VSC Value	Ratio of Proposed VSC to Baseline VSC	Recommended minimum VSC*	Level of Compliance with BRE Guidelines	Effect of Proposed Development**
58 Mckelvey Avenue						
58a	34.42%	28.80%	0.84	27.00%	BRE Compliant	Imperceptible
58b	38.55%	32.11%	0.83	27.00%	BRE Compliant	Imperceptible
58c	38.54%	31.91%	0.83	27.00%	BRE Compliant	Imperceptible
60 Mckelvey Avenue						
60a	29.35%	25.10%	0.86	23.48%	BRE Compliant	Imperceptible
60b	38.54%	31.79%	0.82	27.00%	BRE Compliant	Imperceptible
60c	38.54%	31.71%	0.82	27.00%	BRE Compliant	Imperceptible
62 Mckelvey Avenue						
62a	38.54%	31.63%	0.82	27.00%	BRE Compliant	Imperceptible
62b	38.53%	31.55%	0.82	27.00%	BRE Compliant	Imperceptible
64 Mckelvey Avenue						
64a	32.28%	26.93%	0.83	25.82%	BRE Compliant	Imperceptible
64b	38.52%	31.50%	0.82	27.00%	BRE Compliant	Imperceptible
64c	38.51%	31.46%	0.82	27.00%	BRE Compliant	Imperceptible
66 Mckelvey Avenue						
66a	34.13%	27.88%	0.82	27.00%	BRE Compliant	Imperceptible
66b	38.51%	31.46%	0.82	27.00%	BRE Compliant	Imperceptible
66c	38.50%	31.44%	0.82	27.00%	BRE Compliant	Imperceptible
68 Mckelvey Avenue						
68a	25.76%	22.57%	0.88	20.61%	BRE Compliant	Imperceptible
68b	38.48%	31.41%	0.82	27.00%	BRE Compliant	Imperceptible
68c	38.46%	31.41%	0.82	27.00%	BRE Compliant	Imperceptible
68d	38.82%	33.00%	0.85	27.00%	BRE Compliant	Imperceptible
68e	38.84%	33.16%	0.85	27.00%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the VSC of an existing window, the value needs to both drop below the stated target value of 27% **and** be less than 0.8 times the baseline value.

** For the interpretation of level of effects please refer to"3.2 Definition of Effects" on page 7.

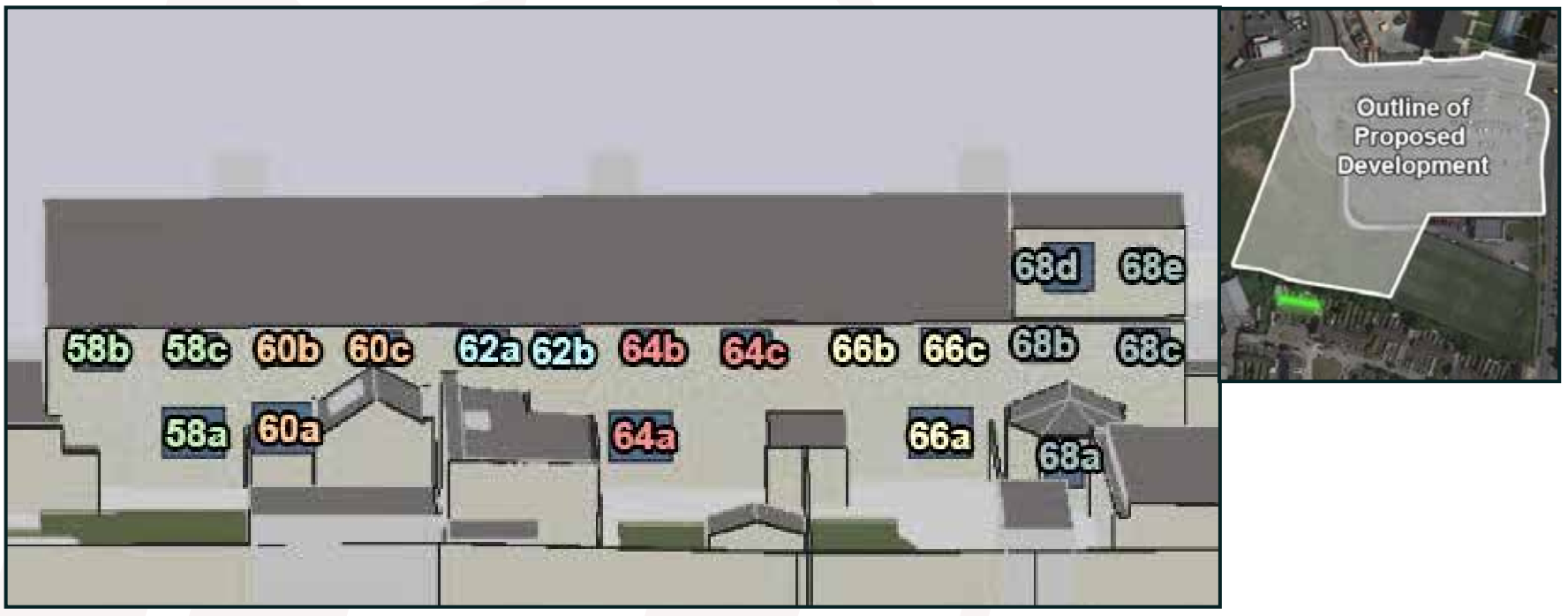

Figure 6.6: Left - Highlighted areas indicate the position of assessed windows., Right - Aerial view of assessed location

6.2 Effect on Annual Probable Sunlight Hours

6.2.1 Charlestown Place Tower- Annual APSH

Table No. 6.7: Annual APSH Results Charlestown Place Tower

Window Number	Baseline Annual APSH	Proposed Annual APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Annual APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
First Floor						
1a	86.3%	77.5%	0.90	25.0%	BRE Compliant	Imperceptible
1b	86.8%	78.3%	0.90	25.0%	BRE Compliant	Imperceptible
1c	85.7%	78.0%	0.91	25.0%	BRE Compliant	Imperceptible
Second Floor						
2a	86.7%	79.7%	0.92	25.0%	BRE Compliant	Imperceptible
2b	87.2%	80.4%	0.92	25.0%	BRE Compliant	Imperceptible
2c	86.2%	79.9%	0.93	25.0%	BRE Compliant	Imperceptible
Third Floor						
3a	87.0%	81.7%	0.94	25.0%	BRE Compliant	Imperceptible
3b	87.4%	82.3%	0.94	25.0%	BRE Compliant	Imperceptible
3c	86.5%	81.7%	0.94	25.0%	BRE Compliant	Imperceptible
Fourth Floor						
4a	87.1%	83.7%	0.96	25.0%	BRE Compliant	Imperceptible
4b	87.4%	84.0%	0.96	25.0%	BRE Compliant	Imperceptible
4c	86.5%	83.2%	0.96	25.0%	BRE Compliant	Imperceptible
Fifth Floor						
5a	87.1%	85.6%	0.98	25.0%	BRE Compliant	Imperceptible
5b	87.4%	85.7%	0.98	25.0%	BRE Compliant	Imperceptible
5c	86.5%	84.6%	0.98	25.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to “3.2 Definition of Effects” on page 7.

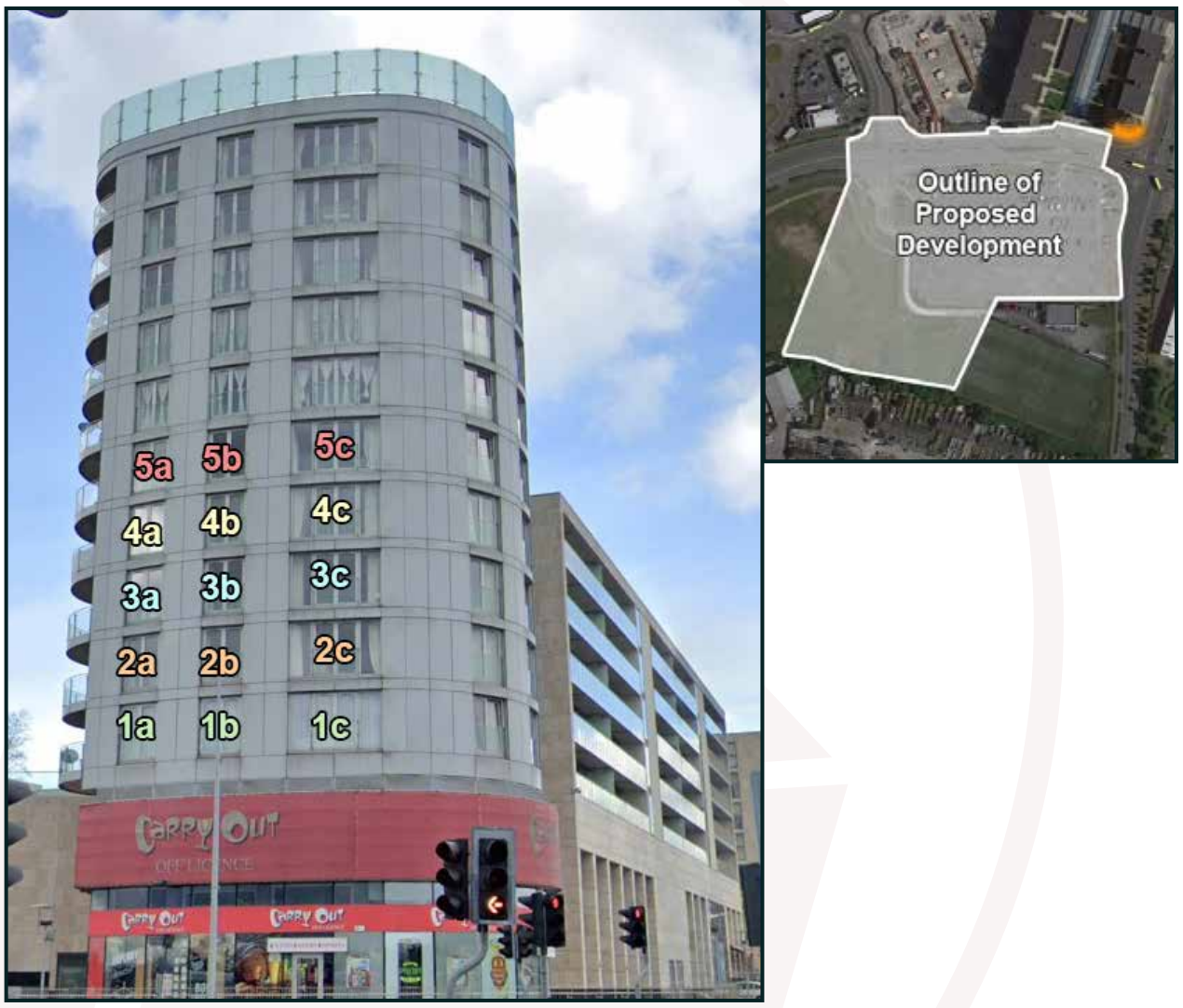

Figure 6.7: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.2.2 Charlestown Place Tower- Winter APSH

Table No. 6.8: Winter APSH Results Charlestown Place Tower						
Window Number	Baseline Winter APSH	Proposed Winter APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Winter APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
First Floor						
1a	98.2%	76.4%	0.78	5.0%	BRE Compliant	Imperceptible
1b	96.8%	76.8%	0.79	5.0%	BRE Compliant	Imperceptible
1c	99.0%	80.6%	0.81	5.0%	BRE Compliant	Imperceptible
Second Floor						
2a	99.2%	81.6%	0.82	5.0%	BRE Compliant	Imperceptible
2b	97.6%	81.4%	0.83	5.0%	BRE Compliant	Imperceptible
2c	99.4%	85.8%	0.86	5.0%	BRE Compliant	Imperceptible
Third Floor						
3a	99.7%	86.4%	0.87	5.0%	BRE Compliant	Imperceptible
3b	98.0%	85.6%	0.87	5.0%	BRE Compliant	Imperceptible
3c	99.5%	90.7%	0.91	5.0%	BRE Compliant	Imperceptible
Fourth Floor						
4a	99.8%	90.9%	0.91	5.0%	BRE Compliant	Imperceptible
4b	98.1%	89.5%	0.91	5.0%	BRE Compliant	Imperceptible
4c	99.6%	95.5%	0.96	5.0%	BRE Compliant	Imperceptible
Fifth Floor						
5a	99.9%	95.3%	0.95	5.0%	BRE Compliant	Imperceptible
5b	98.2%	93.3%	0.95	5.0%	BRE Compliant	Imperceptible
5c	99.6%	98.3%	0.99	5.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to "3.2 Definition of Effects" on page 7.

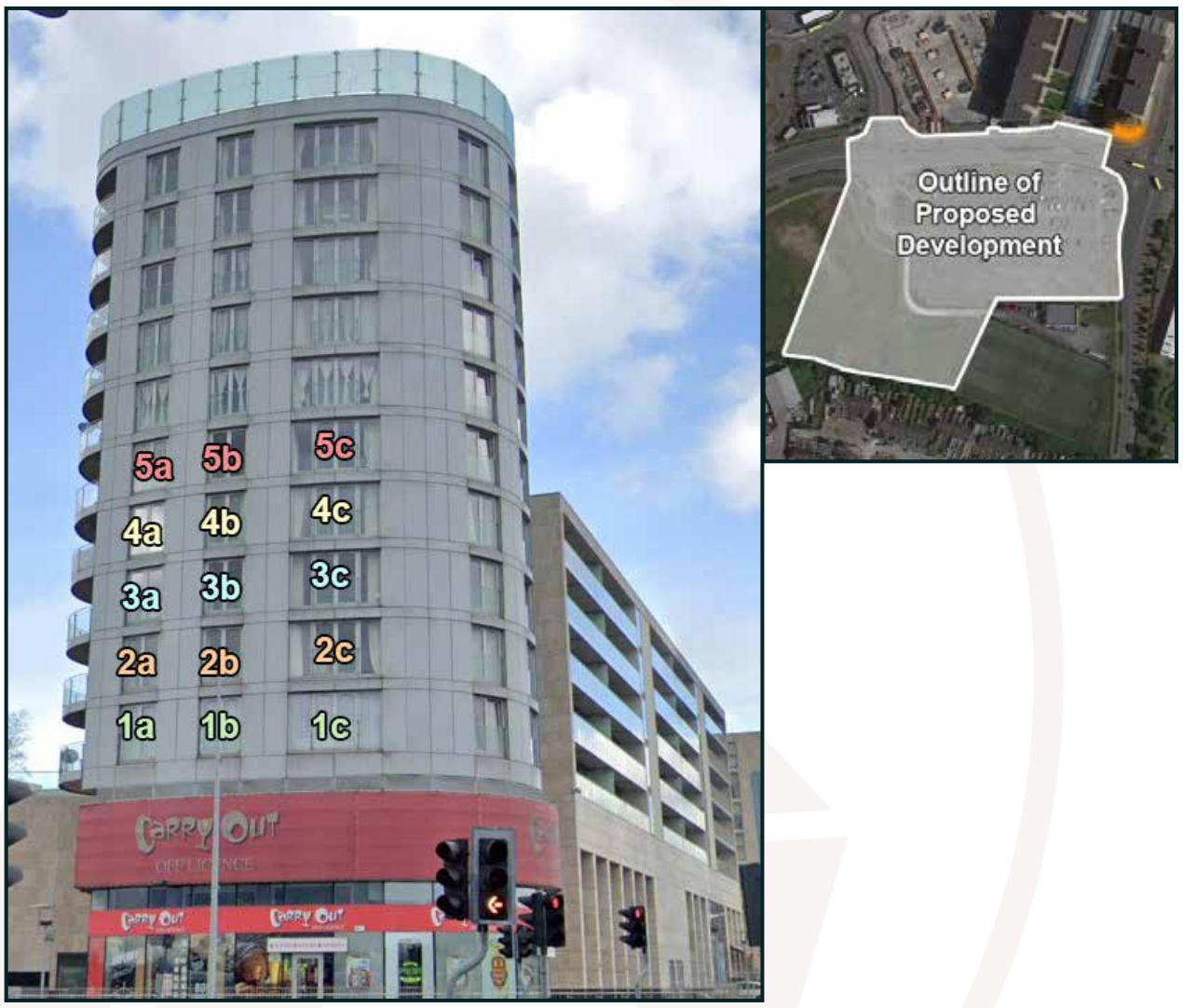

Figure 6.8: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.2.3 Charlestown Place Tower- Annual APSH

Table No. 6.9: Annual APSH Results Charlestown Place Tower

Window Number	Baseline Annual APSH	Proposed Annual APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Annual APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
Sixth Floor						
6a	87.1%	86.7%	1.00	25.0%	BRE Compliant	Imperceptible
6b	87.5%	86.9%	0.99	25.0%	BRE Compliant	Imperceptible
6c	86.5%	85.8%	0.99	25.0%	BRE Compliant	Imperceptible
Seventh Floor						
7a	87.1%	86.9%	1.00	25.0%	BRE Compliant	Imperceptible
7b	87.4%	87.2%	1.00	25.0%	BRE Compliant	Imperceptible
7c	86.5%	86.2%	1.00	25.0%	BRE Compliant	Imperceptible
Eight Floor						
8a	87.1%	87.0%	1.00	25.0%	BRE Compliant	Imperceptible
8b	87.5%	87.3%	1.00	25.0%	BRE Compliant	Imperceptible
8c	86.5%	86.3%	1.00	25.0%	BRE Compliant	Imperceptible
Ninth Floor						
9a	87.1%	87.0%	1.00	25.0%	BRE Compliant	Imperceptible
9b	87.5%	87.3%	1.00	25.0%	BRE Compliant	Imperceptible
9c	86.5%	86.3%	1.00	25.0%	BRE Compliant	Imperceptible
Tenth Floor						
10a	87.1%	87.0%	1.00	25.0%	BRE Compliant	Imperceptible
10b	87.5%	87.3%	1.00	25.0%	BRE Compliant	Imperceptible
10c	86.5%	86.3%	1.00	25.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to "3.2 Definition of Effects" on page 7.

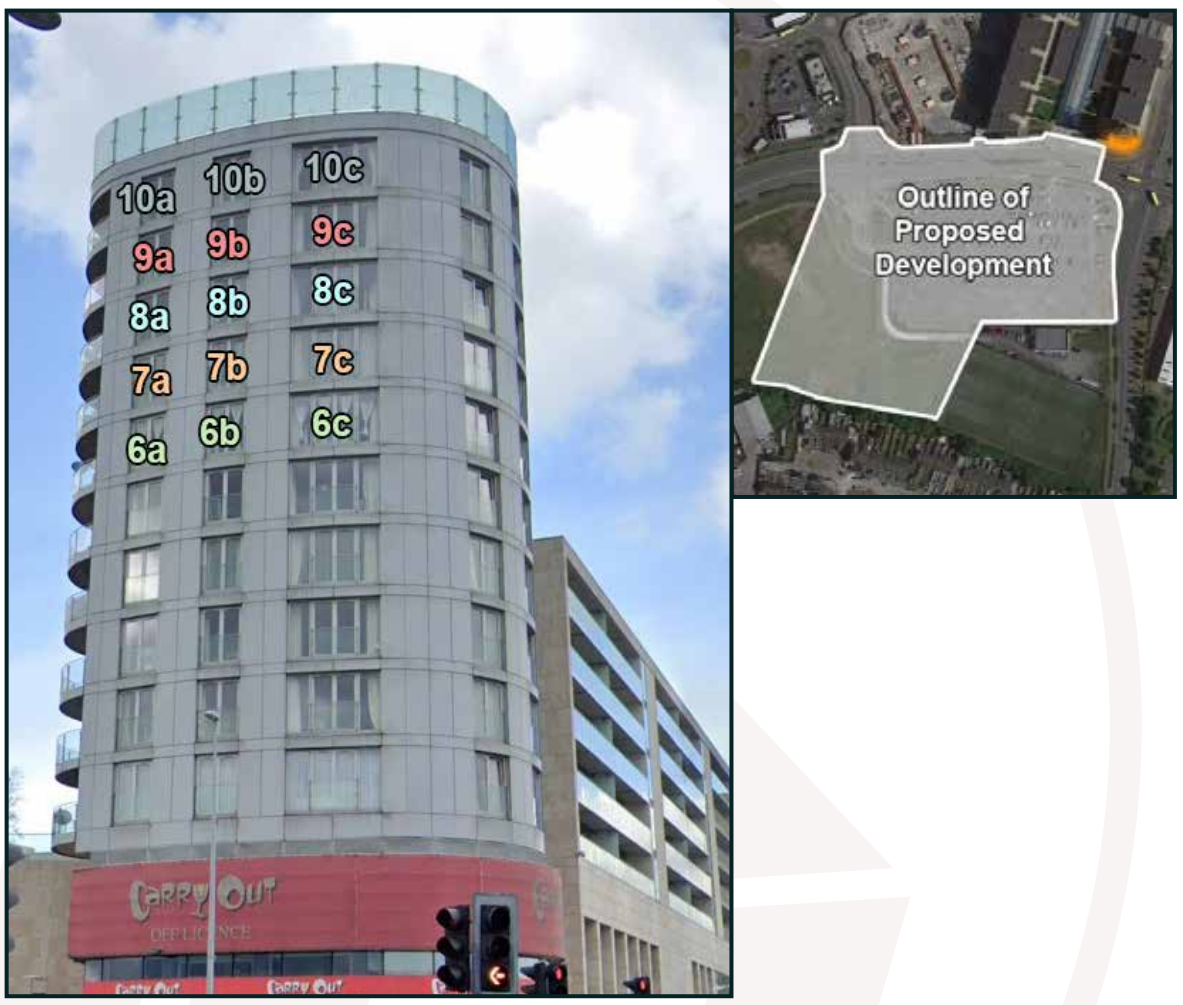

Figure 6.9: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.2.4 Charlestown Place Tower- Winter APSH

Table No. 6.10: Winter APSH Results Charlestown Place Tower

Window Number	Baseline Winter APSH	Proposed Winter APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Winter APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
Sixth Floor						
6a	99.9%	98.3%	0.98	5.0%	BRE Compliant	Imperceptible
6b	98.1%	96.2%	0.98	5.0%	BRE Compliant	Imperceptible
6c	99.5%	98.9%	0.99	5.0%	BRE Compliant	Imperceptible
Seventh Floor						
7a	99.9%	99.2%	0.99	5.0%	BRE Compliant	Imperceptible
7b	98.1%	97.3%	0.99	5.0%	BRE Compliant	Imperceptible
7c	99.5%	99.0%	0.99	5.0%	BRE Compliant	Imperceptible
Eight Floor						
8a	99.9%	99.3%	0.99	5.0%	BRE Compliant	Imperceptible
8b	98.1%	97.6%	1.00	5.0%	BRE Compliant	Imperceptible
8c	99.5%	98.9%	0.99	5.0%	BRE Compliant	Imperceptible
Ninth Floor						
9a	99.9%	99.3%	0.99	5.0%	BRE Compliant	Imperceptible
9b	98.2%	97.6%	0.99	5.0%	BRE Compliant	Imperceptible
9c	98.2%	97.6%	0.99	5.0%	BRE Compliant	Imperceptible
Fifth Floor						
10a	99.9%	99.4%	0.99	5.0%	BRE Compliant	Imperceptible
10b	98.2%	97.6%	0.99	5.0%	BRE Compliant	Imperceptible
10c	98.1%	75.1%	0.77	5.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to “3.2 Definition of Effects” on page 7.

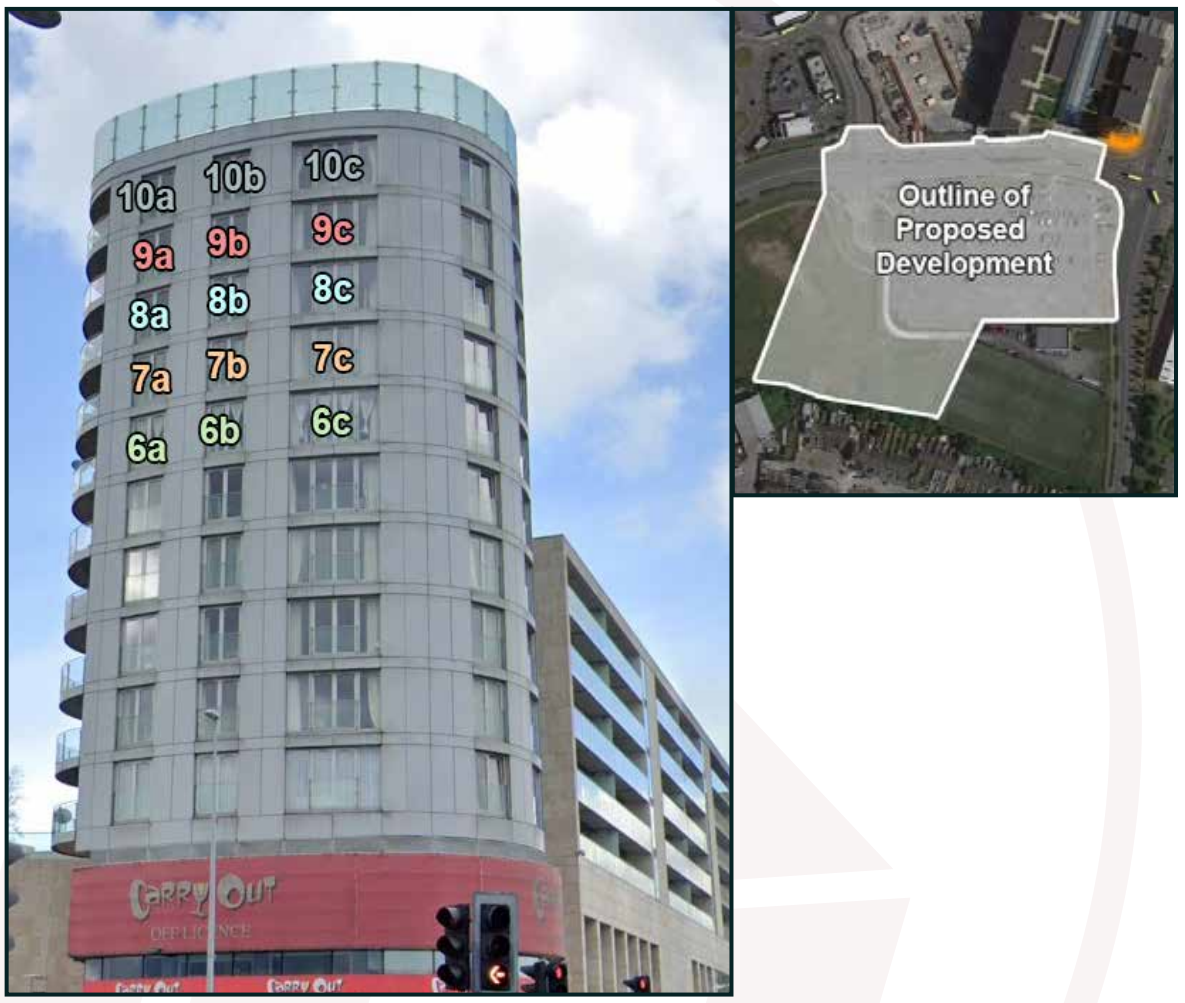

Figure 6.10: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.2.5 Charlestown Place- Annual APSH

Table No. 6.11: Annual APSH Results Charlestown Place						
Window Number	Baseline Annual APSH	Proposed Annual APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Annual APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
First Floor						
1a	85.3%	78.1%	0.92	25.0%	BRE Compliant	Imperceptible
1b	85.0%	77.9%	0.92	25.0%	BRE Compliant	Imperceptible
1c	84.8%	77.7%	0.92	25.0%	BRE Compliant	Imperceptible
Second Floor						
2a	85.7%	80.6%	0.94	25.0%	BRE Compliant	Imperceptible
2b	85.4%	80.4%	0.94	25.0%	BRE Compliant	Imperceptible
2c	85.2%	80.2%	0.94	25.0%	BRE Compliant	Imperceptible
Third Floor						
3a	85.9%	82.5%	0.96	25.0%	BRE Compliant	Imperceptible
3b	85.7%	82.3%	0.96	25.0%	BRE Compliant	Imperceptible
3c	85.6%	82.2%	0.96	25.0%	BRE Compliant	Imperceptible
Fourth Floor						
4a	86.1%	83.8%	0.97	25.0%	BRE Compliant	Imperceptible
4b	86.0%	83.7%	0.97	25.0%	BRE Compliant	Imperceptible
4c	85.8%	83.5%	0.97	25.0%	BRE Compliant	Imperceptible
Fifth Floor						
5a	86.3%	84.7%	0.98	25.0%	BRE Compliant	Imperceptible
5b	86.2%	84.6%	0.98	25.0%	BRE Compliant	Imperceptible
5c	86.0%	84.6%	0.98	25.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to "3.2 Definition of Effects" on page 7.

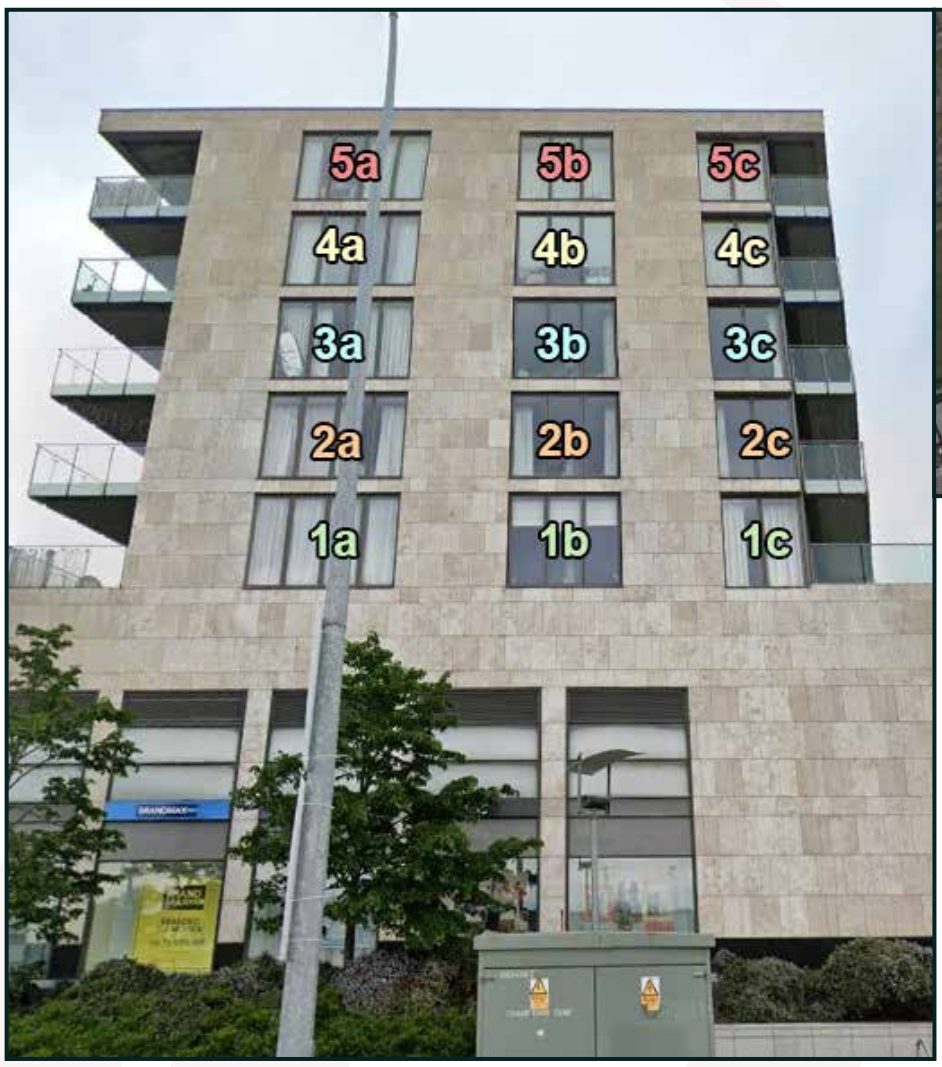

Figure 6.11: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.2.6 Charlestown Place- Winter APSH

Table No. 6.12: Winter APSH Results Charlestown Place						
Window Number	Baseline Winter APSH	Proposed Winter APSH	Ratio of Proposed APSH to Baseline APSH	Recommended minimum Winter APSH*	Level of Compliance with BRE Guidelines	Effect of Proposed Development
First Floor						
1a	98.1%	79.7%	0.81	5.0%	BRE Compliant	Imperceptible
1b	98.0%	79.7%	0.81	5.0%	BRE Compliant	Imperceptible
1c	98.0%	79.7%	0.81	5.0%	BRE Compliant	Imperceptible
Second Floor						
2a	98.8%	85.7%	0.87	5.0%	BRE Compliant	Imperceptible
2b	98.7%	85.7%	0.87	5.0%	BRE Compliant	Imperceptible
2c	72.3%	62.1%	0.86	5.0%	BRE Compliant	Imperceptible
Third Floor						
3a	99.1%	90.2%	0.91	5.0%	BRE Compliant	Imperceptible
3b	99.0%	90.3%	0.91	5.0%	BRE Compliant	Imperceptible
3c	73.0%	66.1%	0.91	5.0%	BRE Compliant	Imperceptible
Fourth Floor						
4a	99.3%	93.2%	0.94	5.0%	BRE Compliant	Imperceptible
4b	99.2%	93.2%	0.94	5.0%	BRE Compliant	Imperceptible
4c	74.1%	69.3%	0.93	5.0%	BRE Compliant	Imperceptible
Fifth Floor						
5a	99.3%	95.2%	0.96	5.0%	BRE Compliant	Imperceptible
5b	99.3%	95.4%	0.96	5.0%	BRE Compliant	Imperceptible
5c	74.3%	71.1%	0.96	5.0%	BRE Compliant	Imperceptible

* The BRE Guidelines state that in order for a proposed development to have a noticeable effect on the APSH of an existing window, the value needs to drop below the stated target value of 25% (annual) / 5% (winter) **and** be less than 0.8 times the baseline value **and** it has to have a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

** For the interpretation of level of effects please refer to "3.2 Definition of Effects" on page 7.

Figure 6.12: Highlighted areas indicate the position of assessed windows (L), Aerial view of assessed location (R).

6.3 Sunlight in Proposed Outdoor Amenity Areas

6.3.1 Proposed Amenity Areas

Table No. 6.13: Sunlight in Proposed Outdoor Amenity Areas Results			
Assessed Area	Area Capable of Receiving 2 Hours of Sunlight on March 21st	Recommended minimum	Level of Compliance with BRE Guidelines
Block 1 Amenity Area	76.3%	50.0%	BRE Compliant
Block 2 Amenity Area	77.4%	50.0%	BRE Compliant
Block 3 Amenity Area	89.5%	50.0%	BRE Compliant
Block 4 Amenity Area	67.5%	50.0%	BRE Compliant
Block 1 Roof Garden	50.3%	50.0%	BRE Compliant
Block 2 Roof Garden Average	38.5%	50.0%	77.0%
Block 4 Roof Garden	98.5%	50.0%	BRE Compliant
Pedestrian Boulevard	98.6%	50.0%	BRE Compliant
Public Open Space 1	99.4%	50.0%	BRE Compliant
Public Open Space 2	92.8%	50.0%	BRE Compliant
Creche	80.2%	50.0%	BRE Compliant
* The BRE Guidelines recommend that for a garden or amenity appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on March 21st.			

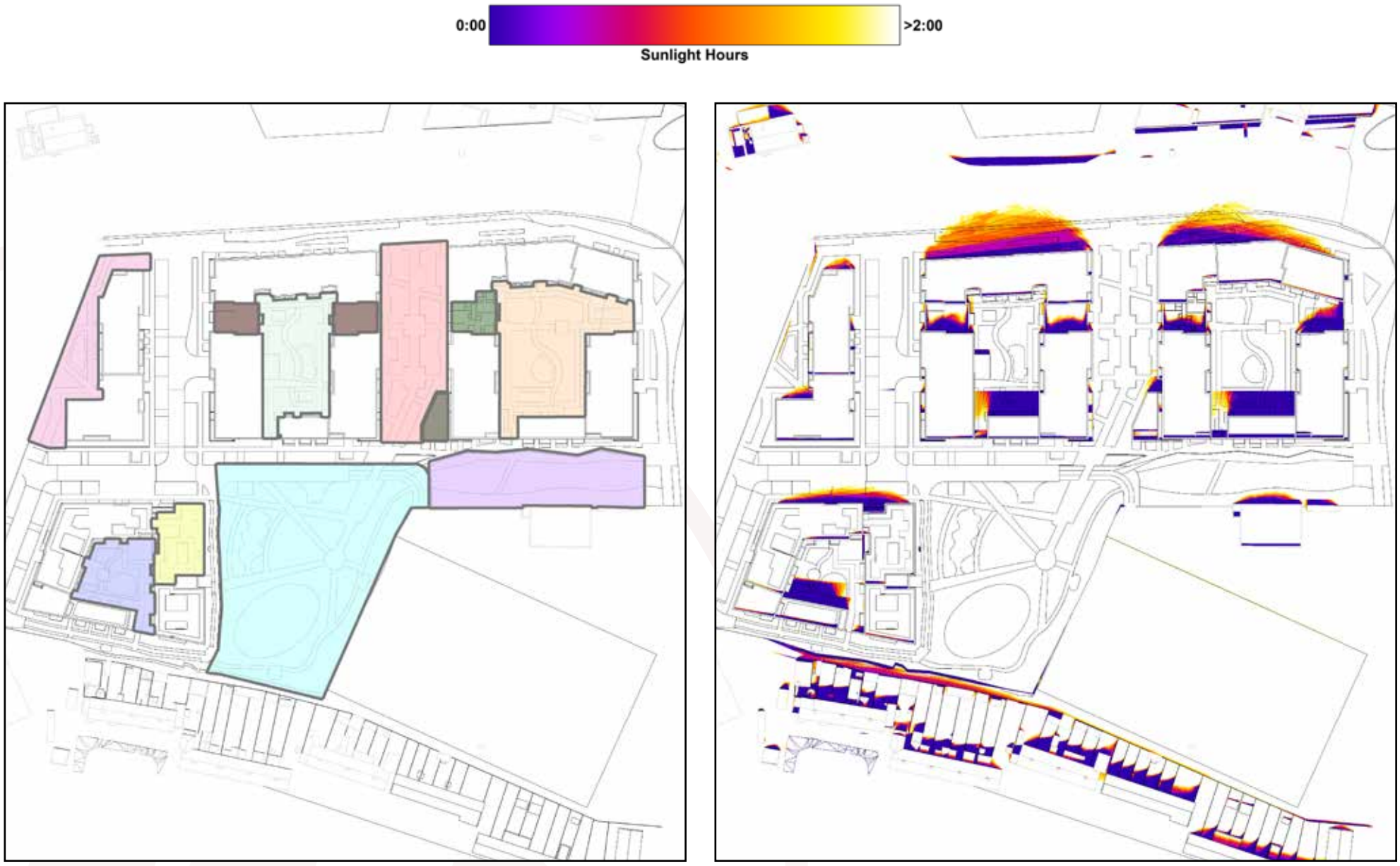

Figure 6.13: Indication of the amenity areas that have been analysed (L) Area capable of receiving 2 hours of sunlight on March 21st shown in white (R).

N

Baseline	Proposed
March 21st 7:00	
March 21st 8:00	
March 21st 9:00	
March 21st 10:00	

6.4 6.4.1	Shadow Studies Shadow Study 21 March	Project: Charlestown Place SHD	3D DESIGN BUREAU
	March 21st Sunrise 6:25 | Sunset 18:40	Applicant: Puddenhill Property Limited	

N

Baseline	Proposed
March 21st 11:00	
March 21st 12:00	
March 21st 13:00	
March 21st 14:00	

	Project: Charlestown Place SHD	3D DESIGN BUREAU
March 21st **Sunrise 6:25 | Sunset 18:40**	**Applicant: Puddenhill Property Limited**	

N

	Baseline	Proposed
March 21st 15:00		
March 21st 16:00		
March 21st 17:00		
March 21st 18:00		

Project: Charlestown Place SHD

3D DESIGN BUREAU

March 21st
Sunrise 6:25 | Sunset 18:40

Applicant: Puddenhill Property Limited

N

Baseline	Proposed
June 21st 6:00	
June 21st 7:00	
June 21st 8:00	
June 21st 9:00	








6.4.2	**Shadow Study 21 June**	**Project: Charlestown Place SHD**	3D DESIGN BUREAU
	June 21st Sunrise 4:57 | Sunset 21:57	**Applicant: Puddenhill Property Limited**	

N

Baseline	Proposed
June 21st 10:00	
June 21st 11:00	
June 21st 12:00	
June 21st 13:00	








	Project: Charlestown Place SHD	3D DESIGN BUREAU
June 21st **Sunrise 4:57 | Sunset 21:57**	**Applicant: Puddenhill Property Limited**	

N

Baseline	Proposed
June 21st 14:00	
June 21st 15:00	
June 21st 16:00	
June 21st 17:00	

	Project: Charlestown Place SHD	3D DESIGN BUREAU
June 21st **Sunrise 4:57 | Sunset 21:57**	**Applicant: Puddenhill Property Limited**	

N

Baseline	Proposed
June 21st 18:00	
June 21st 19:00	
June 21st 20:00	
June 21st 21:00	








Project: Charlestown Place SHD

3D DESIGN BUREAU

June 21st
Sunrise 4:57 | Sunset 21:57

Applicant: Puddenhill Property Limited

N

Baseline	Proposed
December 21st 9:00	
December 21st 10:00	
December 21st 11:00	
December 21st 12:00	








6.4.3	**Shadow Study 21 December**	**Project: Charlestown Place SHD**	3D DESIGN BUREAU
	December 21st Sunrise 8:38 | Sunset 16:08	**Applicant: Puddenhill Property Limited**	

N

Baseline	Proposed
December 21st 13:00	
December 21st 14:00	
December 21st 15:00	
December 21st 16:00	

	Project: Charlestown Place SHD	3D DESIGN BUREAU
December 21st **Sunrise 8:38 | Sunset 16:08**	**Applicant: Puddenhill Property Limited**	

6.5 Average Daylight Factor

6.5.1 Block 1- Ground Floor, Western Section

Table No. 6.14: ADF Results Block 1- Ground Floor, Western Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 01	LKD	1.5%	1.39%	93%
Unit 01	Bedroom 1	1.0%	3.14%	Compliant
Unit 01	Bedroom 2	1.0%	4.20%	Compliant
Unit 02	LKD	1.5%	1.51%	Compliant
Unit 02	Bedroom 1	1.0%	3.16%	Compliant
Unit 03	LKD	1.5%	1.40%	93%
Unit 03	Bedroom 1	1.0%	3.07%	Compliant
Classroom 1	Classroom 1	2.0%	4.32%	Compliant
Classroom 2	Classroom 2	2.0%	4.32%	Compliant
Classroom 3	Classroom 3	2.0%	3.78%	Compliant
Classroom 4	Classroom 4	2.0%	4.64%	Compliant
Classroom 5	Classroom 5	2.0%	3.62%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

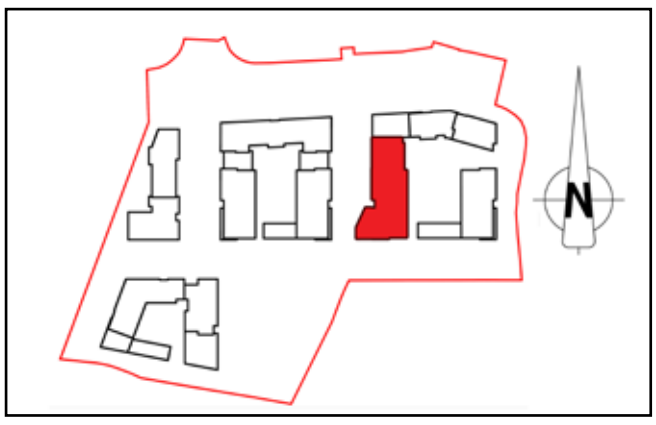

Figure 6.14: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.2 Block 1- Ground Floor, Northern Section

Table No. 6.15: ADF Results Block 1- Ground Floor, Northern Section

Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 50	LKD	1.5%	1.59%	Compliant
Unit 50	Bedroom 1	1.0%	1.58%	Compliant
Unit 50	Bedroom 2	1.0%	1.83%	Compliant
Unit 84	LKD	1.5%	2.13%	Compliant
Unit 84	Bedroom 1	1.0%	1.91%	Compliant
Unit 84	Bedroom 2	1.0%	3.57%	Compliant
Unit 84	Bedroom 3	1.0%	1.84%	Compliant
Unit 85	LKD	1.5%	1.95%	Compliant
Unit 85	Bedroom 1	1.0%	1.53%	Compliant
Unit 85	Bedroom 2	1.0%	2.94%	Compliant
Unit 85	Bedroom 3	1.0%	1.76%	Compliant
Unit 107	LKD	1.5%	1.51%	Compliant
Unit 107	Bedroom 1	1.0%	4.26%	Compliant
Unit 107	Bedroom 2	1.0%	1.78%	Compliant
Unit 107	Bedroom 3	1.0%	3.29%	Compliant
Unit 108	LKD	1.5%	6.78%	Compliant
Unit 108	Bedroom 1	1.0%	2.56%	Compliant
Unit 108	Bedroom 2	1.0%	11.82%	Compliant
Unit 109	LKD	1.5%	1.53%	Compliant
Unit 109	Bedroom 1	1.0%	2.72%	Compliant
Unit 109	Bedroom 2	1.0%	1.67%	Compliant
Unit 109	Bedroom 3	1.0%	1.00%	Compliant

*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.

Figure 6.15: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.3 Block 1- Ground Floor, Eastern Section

Table No. 6.16: ADF Results Block 1- Ground Floor, Eastern Section

Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 151	LKD	1.5%	2.75%	Compliant
Unit 151	Bedroom 1	1.0%	4.89%	Compliant
Unit 152	LKD	1.5%	6.02%	Compliant
Unit 152	Bedroom 1	1.0%	5.01%	Compliant
Unit 152	Bedroom 2	1.0%	6.09%	Compliant
Unit 153	LKD	1.5%	2.91%	Compliant
Unit 153	Bedroom 1	1.0%	2.19%	Compliant
Unit 153	Bedroom 2	1.0%	4.89%	Compliant
Unit 154	LKD	1.5%	1.73%	Compliant
Unit 154	Bedroom 1	1.0%	2.89%	Compliant
Unit 154	Bedroom 2	1.0%	1.89%	Compliant
Unit 155	LKD	1.5%	1.42%	95%
Unit 155	Bedroom 1	1.0%	3.07%	Compliant
Unit 156	LKD	1.5%	3.32%	Compliant
Unit 156	Bedroom 1	1.0%	3.11%	Compliant
Unit 156	Bedroom 2	1.0%	3.68%	Compliant
Unit 157	LKD	1.5%	4.47%	Compliant
Unit 157	Bedroom 1	1.0%	4.98%	Compliant
Unit 157	Bedroom 2	1.0%	6.00%	Compliant
Unit 158	LKD	1.5%	2.83%	Compliant
Unit 158	Bedroom 1	1.0%	4.86%	Compliant
Unit 207	LKD	1.5%	3.95%	Compliant
Unit 208	LKD	1.5%	4.18%	Compliant
Unit 209	LKD	1.5%	4.11%	Compliant
Unit 210	LKD	1.5%	4.07%	Compliant

*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.

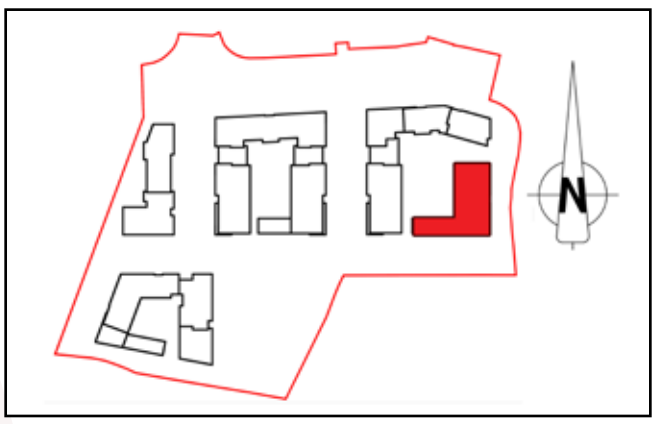

Figure 6.16: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.4 Block 1- First Floor, Western Section

Table No. 6.17: ADF Results Block 1- First Floor, Western Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 04	LKD	1.5%	1.59%	Compliant
Unit 04	Bedroom 1	1.0%	3.69%	Compliant
Unit 04	Bedroom 2	1.0%	5.19%	Compliant
Unit 05	LKD	1.5%	1.35%	90%
Unit 05	Bedroom 1	1.0%	3.74%	Compliant
Unit 06	LKD	1.5%	1.67%	Compliant
Unit 06	Bedroom 1	1.0%	4.08%	Compliant
Unit 06	Bedroom 2	1.0%	1.68%	Compliant
Unit 07	LKD	1.5%	4.22%	Compliant
Unit 07	Bedroom 1	1.0%	6.21%	Compliant
Unit 07	Bedroom 2	1.0%	3.85%	Compliant
Unit 08	LKD	1.5%	1.16%	77%
Unit 08	Bedroom 1	1.0%	3.42%	Compliant
Unit 09	LKD	1.5%	1.40%	93%
Unit 09	Bedroom 1	1.0%	3.80%	Compliant
Unit 09	Bedroom 2	1.0%	4.45%	Compliant
Unit 51	LKD	1.5%	1.65%	Compliant
Unit 51	Bedroom 1	1.0%	3.35%	Compliant
Unit 52	LKD	1.5%	1.76%	Compliant
Unit 52	Bedroom 1	1.0%	3.61%	Compliant
Unit 53	LKD	1.5%	1.84%	Compliant
Unit 53	Bedroom 1	1.0%	2.99%	Compliant
Unit 53	Bedroom 2	1.0%	3.56%	Compliant
Unit 54	LKD	1.5%	3.62%	Compliant
Unit 54	Bedroom 1	1.0%	1.42%	Compliant
Unit 55	LKD	1.5%	3.83%	Compliant
Unit 55	Bedroom 1	1.0%	1.31%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.17: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.5 Block 1- First Floor, Northern Section

Table No. 6.18: ADF Results Block 1- First Floor, Northern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 56	LKD	1.5%	5.79%	Compliant
Unit 56	Bedroom 1	1.0%	4.26%	Compliant
Unit 56	Bedroom 2	1.0%	5.95%	Compliant
Unit 57	LKD	1.5%	1.30%	87%
Unit 57	Bedroom 1	1.0%	4.75%	Compliant
Unit 57	Bedroom 2	1.0%	5.07%	Compliant
Unit 86	LKD	1.5%	1.70%	Compliant
Unit 86	Bedroom 1	1.0%	5.68%	Compliant
Unit 86	Bedroom 2	1.0%	6.38%	Compliant
Unit 87	LKD	1.5%	2.18%	Compliant
Unit 87	Bedroom 1	1.0%	4.56%	Compliant
Unit 88	LKD	1.5%	1.44%	96%
Unit 88	Bedroom 1	1.0%	5.68%	Compliant
Unit 88	Bedroom 2	1.0%	5.55%	Compliant
Unit 110	LKD	1.5%	1.42%	95%
Unit 110	Bedroom 1	1.0%	3.58%	Compliant
Unit 110	Bedroom 2	1.0%	2.57%	Compliant
Unit 110	Bedroom 3	1.0%	2.64%	Compliant
Unit 111	LKD	1.5%	2.16%	Compliant
Unit 111	Bedroom 1	1.0%	4.16%	Compliant
Unit 112	LKD	1.5%	1.82%	Compliant
Unit 112	Bedroom 1	1.0%	4.20%	Compliant
Unit 112	Bedroom 2	1.0%	4.62%	Compliant
Unit 211	LKD	1.5%	8.24%	Compliant
Unit 211	Bedroom 1	1.0%	11.49%	Compliant
Unit 211	Bedroom 2	1.0%	5.81%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.18: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.6 Block 1- First Floor, Eastern Section

Table No. 6.19: ADF Results Block 1- First Floor, Eastern Section

Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 159	LKD	1.5%	2.34%	Compliant
Unit 159	Bedroom 1	1.0%	5.46%	Compliant
Unit 160	LKD	1.5%	6.35%	Compliant
Unit 160	Bedroom 1	1.0%	5.65%	Compliant
Unit 160	Bedroom 2	1.0%	6.86%	Compliant
Unit 161	LKD	1.5%	2.89%	Compliant
Unit 161	Bedroom 1	1.0%	3.13%	Compliant
Unit 161	Bedroom 2	1.0%	5.60%	Compliant
Unit 162	LKD	1.5%	1.66%	Compliant
Unit 162	Bedroom 1	1.0%	4.01%	Compliant
Unit 162	Bedroom 2	1.0%	1.78%	Compliant
Unit 163	LKD	1.5%	1.26%	84%
Unit 163	Bedroom 1	1.0%	3.88%	Compliant
Unit 164	LKD	1.5%	3.38%	Compliant
Unit 164	Bedroom 1	1.0%	3.96%	Compliant
Unit 164	Bedroom 2	1.0%	4.64%	Compliant
Unit 165	LKD	1.5%	4.50%	Compliant
Unit 165	Bedroom 1	1.0%	5.60%	Compliant
Unit 165	Bedroom 2	1.0%	6.74%	Compliant
Unit 166	LKD	1.5%	2.63%	Compliant
Unit 166	Bedroom 1	1.0%	5.45%	Compliant
Unit 207	Bedroom 1	1.0%	6.14%	Compliant
Unit 207	Bedroom 2	1.0%	1.89%	Compliant
Unit 208	Bedroom 1	1.0%	6.19%	Compliant
Unit 208	Bedroom 2	1.0%	3.91%	Compliant
Unit 209	Bedroom 1	1.0%	4.37%	Compliant
Unit 209	Bedroom 2	1.0%	6.20%	Compliant
Unit 210	Bedroom 1	1.0%	6.21%	Compliant
Unit 210	Bedroom 2	1.0%	4.03%	Compliant

*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.

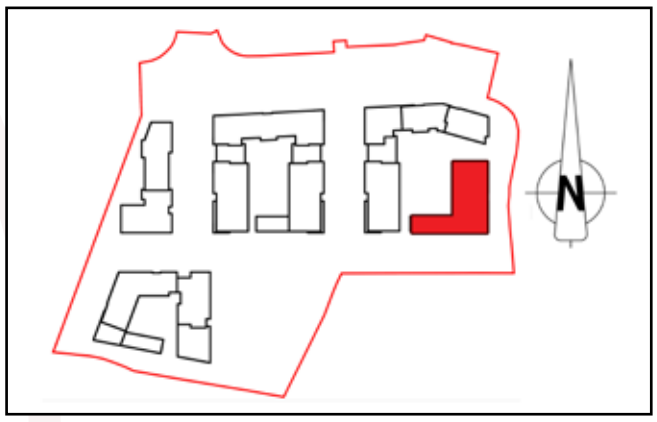

Figure 6.19: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.7 Block 1- Second & Third Floor

Rooms that have not met the applied target values on the Second & Third Floor have been marked up below.

All rooms will meet the guidelines from the Fourth Floor up.

Table No. 6.20: ADF Results Block 1- Second & Third Floor				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Second Floor				
Unit 15	LKD	1.5%	1.29%	86%
Unit 16	LKD	1.5%	1.26%	84%
Unit 171	LKD	1.5%	1.36%	91%
Unit 64	LKD	1.5%	1.41%	94%
Third Floor				
Unit 24	LKD	1.5%	1.44%	96%
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

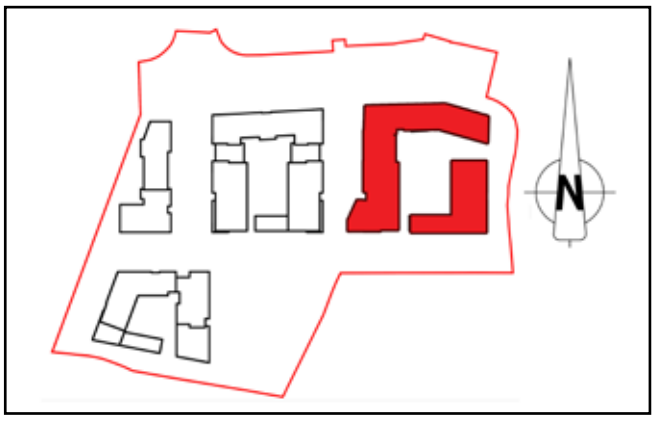

Figure 6.20: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

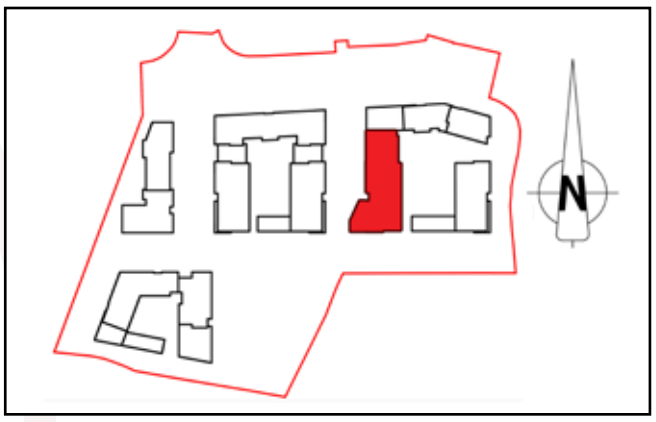

Figure 6.21: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.8 Block 2- Ground Floor, Western Section

Table No. 6.21: ADF Results Block 1- Ground Floor, Western Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 01	LKD	1.5%	1.05%	70%
Unit 01	Bedroom 1	1.0%	2.70%	Compliant
Unit 01	Bedroom 2	1.0%	3.42%	Compliant
Unit 02	LKD	1.5%	3.52%	Compliant
Unit 02	Bedroom 1	1.0%	2.64%	Compliant
Unit 02	Bedroom 2	1.0%	3.52%	Compliant
Unit 03	LKD	1.5%	4.32%	Compliant
Unit 03	Bedroom 1	1.0%	3.14%	Compliant
Unit 03	Bedroom 2	1.0%	4.14%	Compliant
Unit 04	LKD	1.5%	0.67%	45%
Unit 04	Bedroom 1	1.0%	2.93%	Compliant
Unit 53	LKD	1.5%	1.74%	Compliant
Unit 53	Bedroom 1	1.0%	2.37%	Compliant
Unit 53	Bedroom 2	1.0%	2.62%	Compliant
Unit 54	LKD	1.5%	0.81%	54%
Unit 54	Bedroom 1	1.0%	1.41%	Compliant
Unit 55	LKD	1.5%	0.57%	52%
Unit 55	Bedroom 1	1.0%	0.77%	77%
Unit 56	LKD	1.5%	1.82%	Compliant
Unit 56	Bedroom 1	1.0%	2.12%	Compliant
Unit 56	Bedroom 2	1.0%	2.57%	Compliant
Unit 182	LKD	1.5%	4.24%	Compliant
Unit 183	LKD	1.5%	4.42%	Compliant
Unit 184	LKD	1.5%	4.41%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.22: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.9 Block 2- Ground Floor, Northern Section

Table No. 6.22: ADF Results Block 1- Ground Floor, Northern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 57	LKD	1.5%	2.68%	Compliant
Unit 57	Bedroom 1	1.0%	3.77%	Compliant
Unit 58	LKD	1.5%	1.26%	84%
Unit 58	Bedroom 1	1.0%	2.44%	Compliant
Unit 58	Bedroom 2	1.0%	2.54%	Compliant
Unit 83	LKD	1.5%	1.58%	Compliant
Unit 83	Bedroom 1	1.0%	2.67%	Compliant
Unit 83	Bedroom 2	1.0%	3.23%	Compliant
Unit 83	Bedroom 3	1.0%	2.90%	Compliant
Unit 84	LKD	1.5%	1.51%	Compliant
Unit 84	Bedroom 1	1.0%	2.10%	Compliant
Unit 84	Bedroom 2	1.0%	2.55%	Compliant
Unit 84	Bedroom 3	1.0%	2.32%	Compliant
Unit 103	LKD	1.5%	1.06%	71%
Unit 103	Bedroom 1	1.0%	2.14%	Compliant
Unit 103	Bedroom 2	1.0%	2.20%	Compliant
Unit 103	Bedroom 3	1.0%	3.08%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.23: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.10 Block 2- First Floor, Western Section

Table No. 6.23: ADF Results Block 1- Ground Floor, Western Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 05	LKD	1.5%	1.20%	80%
Unit 05	Bedroom 1	1.0%	3.31%	Compliant
Unit 05	Bedroom 2	1.0%	4.10%	Compliant
Unit 06	LKD	1.5%	1.16%	77%
Unit 06	Bedroom 1	1.0%	3.16%	Compliant
Unit 07	LKD	1.5%	1.23%	82%
Unit 07	Bedroom 1	1.0%	3.57%	Compliant
Unit 07	Bedroom 2	1.0%	1.43%	Compliant
Unit 08	LKD	1.5%	3.87%	Compliant
Unit 08	Bedroom 1	1.0%	3.50%	Compliant
Unit 08	Bedroom 2	1.0%	5.31%	Compliant
Unit 09	LKD	1.5%	5.39%	Compliant
Unit 09	Bedroom 1	1.0%	3.76%	Compliant
Unit 09	Bedroom 2	1.0%	4.94%	Compliant
Unit 10	LKD	1.5%	1.34%	89%
Unit 10	Bedroom 1	1.0%	3.56%	Compliant
Unit 11	LKD	1.5%	1.25%	83%
Unit 11	Bedroom 1	1.0%	3.33%	Compliant
Unit 12	LKD	1.5%	1.23%	82%
Unit 12	Bedroom 1	1.0%	3.42%	Compliant
Unit 12	Bedroom 2	1.0%	3.98%	Compliant
Unit 59	LKD	1.5%	1.57%	Compliant
Unit 59	Bedroom 1	1.0%	2.87%	Compliant
Unit 59	Bedroom 2	1.0%	3.29%	Compliant
Unit 60	LKD	1.5%	1.86%	Compliant
Unit 60	Bedroom 1	1.0%	2.81%	Compliant
Unit 60	Bedroom 2	1.0%	3.28%	Compliant
Unit 182	Bedroom 1	1.0%	6.88%	Compliant
Unit 182	Bedroom 2	1.0%	2.18%	Compliant
Unit 183	Bedroom 1	1.0%	6.86%	Compliant
Unit 183	Bedroom 2	1.0%	4.82%	Compliant
Unit 184	Bedroom 1	1.0%	6.81%	Compliant
Unit 184	Bedroom 2	1.0%	4.85%	Compliant

*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.

Figure 6.24: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.11 Block 2- First Floor, Northern Section

Table No. 6.24: ADF Results Block 1- Ground Floor, Northern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 62	LKD	1.5%	6.08%	Compliant
Unit 62	Bedroom 1	1.0%	6.26%	Compliant
Unit 62	Bedroom 2	1.0%	7.04%	Compliant
Unit 63	LKD	1.5%	0.83%	55%
Unit 63	Bedroom 1	1.0%	7.15%	Compliant
Unit 63	Bedroom 2	1.0%	7.59%	Compliant
Unit 85	LKD	1.5%	2.33%	Compliant
Unit 85	Bedroom 1	1.0%	6.58%	Compliant
Unit 85	Bedroom 2	1.0%	6.61%	Compliant
Unit 86	LKD	1.5%	1.72%	Compliant
Unit 86	Bedroom 1	1.0%	3.71%	Compliant
Unit 87	LKD	1.5%	1.52%	Compliant
Unit 87	Bedroom 1	1.0%	6.52%	Compliant
Unit 87	Bedroom 2	1.0%	6.31%	Compliant
Unit 104	LKD	1.5%	0.91%	61%
Unit 104	Bedroom 1	1.0%	6.75%	Compliant
Unit 104	Bedroom 2	1.0%	6.56%	Compliant
Unit 105	LKD	1.5%	6.03%	Compliant
Unit 105	Bedroom 1	1.0%	5.10%	Compliant
Unit 105	Bedroom 2	1.0%	3.56%	Compliant
Unit 106	LKD	1.5%	1.52%	Compliant
Unit 106	Bedroom 1	1.0%	4.06%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

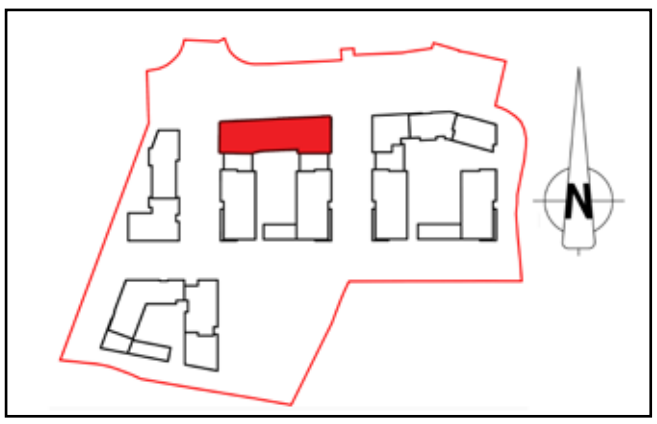

Figure 6.25: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.12 Block 2- First Floor, Eastern Section

Table No. 6.25: ADF Results Block 1- Ground Floor, Northern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 107	LKD	1.5%	1.51%	Compliant
Unit 107	Bedroom 1	1.0%	3.80%	Compliant
Unit 108	LKD	1.5%	2.19%	Compliant
Unit 108	Bedroom 1	1.0%	3.47%	Compliant
Unit 108	Bedroom 2	1.0%	3.64%	Compliant
Unit 109	LKD	1.5%	1.55%	Compliant
Unit 109	Bedroom 1	1.0%	2.71%	Compliant
Unit 109	Bedroom 2	1.0%	2.98%	Compliant
Unit 134	LKD	1.5%	1.25%	84%
Unit 134	Bedroom 1	1.0%	4.04%	Compliant
Unit 135	LKD	1.5%	2.95%	Compliant
Unit 135	Bedroom 1	1.0%	4.35%	Compliant
Unit 135	Bedroom 2	1.0%	5.58%	Compliant
Unit 136	LKD	1.5%	5.53%	Compliant
Unit 136	Bedroom 1	1.0%	2.65%	Compliant
Unit 136	Bedroom 2	1.0%	6.24%	Compliant
Unit 137	LKD	1.5%	1.26%	84%
Unit 137	Bedroom 1	1.0%	3.27%	Compliant
Unit 137	Bedroom 2	1.0%	1.31%	Compliant
Unit 138	LKD	1.5%	1.02%	68%
Unit 138	Bedroom 1	1.0%	3.16%	Compliant
Unit 139	LKD	1.5%	1.09%	73%
Unit 139	Bedroom 1	1.0%	3.29%	Compliant
Unit 139	Bedroom 2	1.0%	4.10%	Compliant
Unit 140	LKD	1.5%	1.51%	Compliant
Unit 140	Bedroom 1	1.0%	3.90%	Compliant
Unit 140	Bedroom 2	1.0%	4.60%	Compliant
Unit 141	LKD	1.5%	1.36%	91%
Unit 141	Bedroom 1	1.0%	3.74%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.26: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.13 Block 2- Second & Third Floor

Rooms that have not met the applied target values on the Second & Third Floor have been marked up below.

All rooms will meet the guidelines from the Fourth Floor up.

Table No. 6.26: ADF Results Block 1- Second & Third Floor				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Second Floor				
Unit 13	LKD	1.5%	1.32%	88%
Unit 14	LKD	1.5%	1.25%	83%
Unit 19	LKD	1.5%	1.25%	84%
Unit 20	LKD	1.5%	1.27%	85%
Unit 68	LKD	1.5%	0.93%	62%
Unit 146	LKD	1.5%	1.10%	73%
Unit 147	LKD	1.5%	1.19%	79%
Third Floor				
Unit 28	LKD	1.5%	1.38%	92%
Unit 73	LKD	1.5%	1.02%	68%
Unit 154	LKD	1.5%	1.29%	86%
Unit 155	LKD	1.5%	1.34%	89%
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

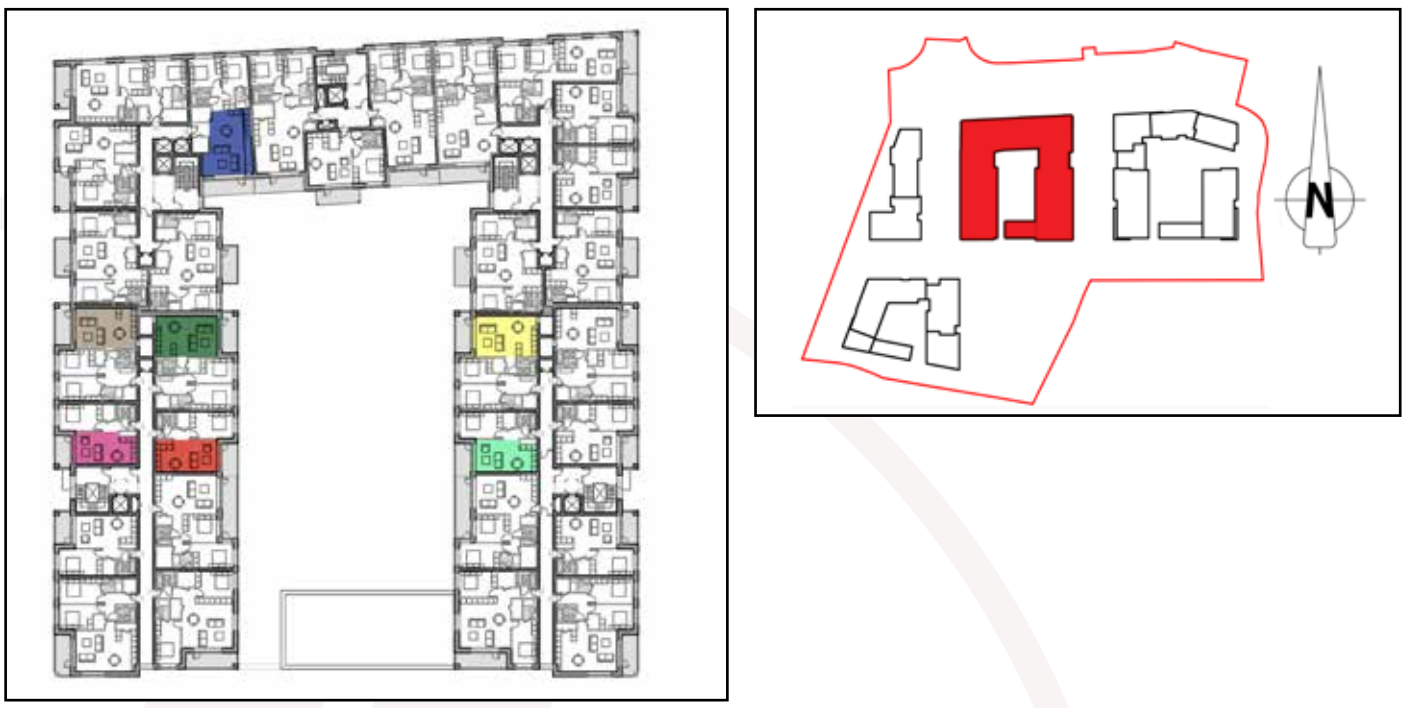

Figure 6.27: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

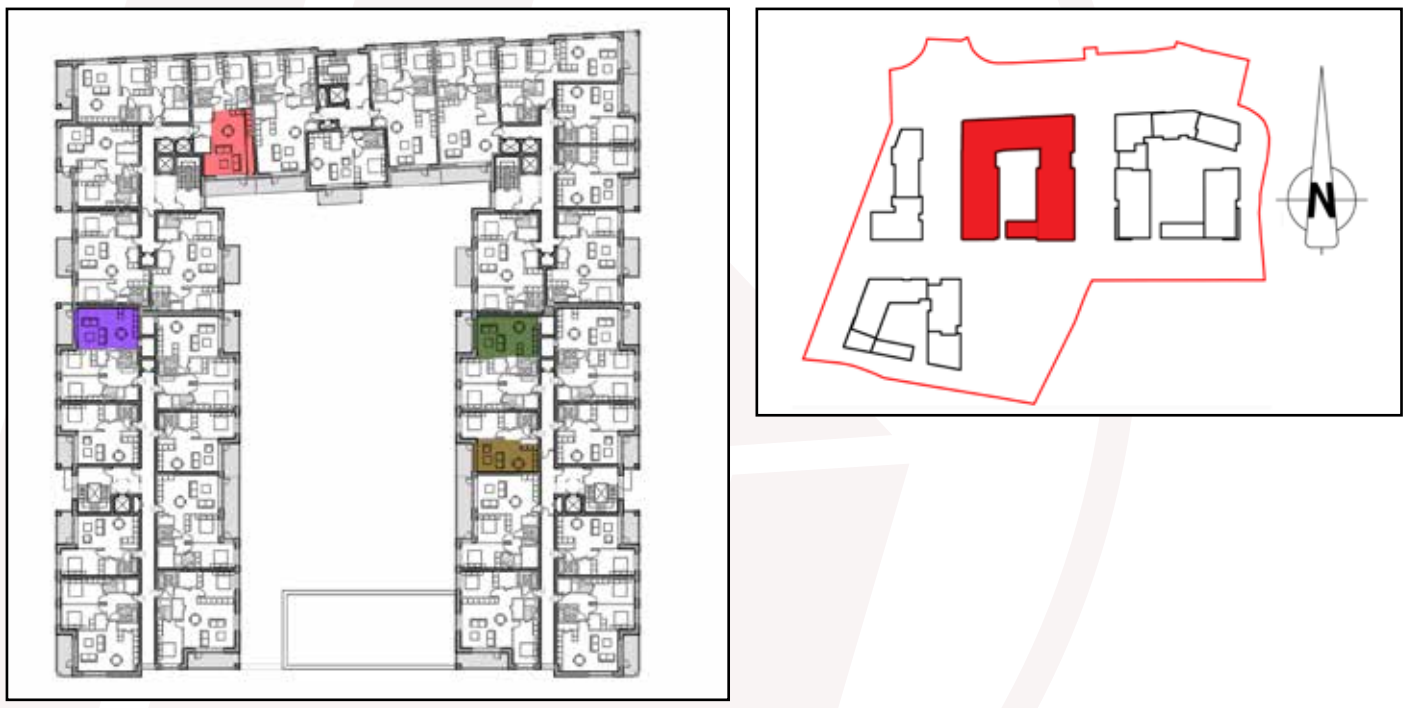

Figure 6.28: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.14 Block 3- Ground Floor

Table No. 6.27: ADF Results Block 3- Ground Floor				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 01	LKD	1.5%	4.69%	Compliant
Unit 01	Bedroom 1	1.0%	3.29%	Compliant
Unit 02	LKD	1.5%	5.02%	Compliant
Unit 02	Bedroom 1	1.0%	4.99%	Compliant
Unit 03	LKD	1.5%	5.43%	Compliant
Unit 03	Bedroom 1	1.0%	3.63%	Compliant
Unit 04	LKD	1.5%	1.32%	88%
Unit 04	Bedroom 1	1.0%	4.79%	Compliant
Unit 54	LKD	1.5%	1.87%	Compliant
Unit 54	Bedroom 1	1.0%	1.70%	Compliant
Unit 54	Bedroom 2	1.0%	4.45%	Compliant
Unit 54	Bedroom 3	1.0%	4.19%	Compliant
Unit 55	LKD	1.5%	1.27%	85%
Unit 55	Bedroom 1	1.0%	3.76%	Compliant
Unit 56	LKD	1.5%	5.02%	Compliant
Unit 56	Bedroom 1	1.0%	3.48%	Compliant
Unit 56	Bedroom 1	1.0%	4.10%	Compliant
Unit 57	LKD	1.5%	1.55%	Compliant
Unit 57	Bedroom 1	1.0%	3.95%	Compliant
Unit 58	LKD	1.5%	5.19%	Compliant
Unit 58	Bedroom 1	1.0%	4.88%	Compliant
Unit 58	Bedroom 2	1.0%	2.27%	Compliant
Unit 59	LKD	1.5%	4.94%	Compliant
Unit 59	Bedroom 1	1.0%	4.33%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.29: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.15 Block 3- First Floor

Rooms that have not met the applied target values on the first floor have been marked up below.

All rooms will meet the guidelines from the second floor up.

Table No. 6.28: ADF Results Block 3- First Floor				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 12	LKD	1.5%	1.37%	91%
Unit 55	LKD	1.5%	1.43%	95%
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.30: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.16 Block 4- Ground Floor, Western Section

Table No. 6.29: ADF Results Block 4- Ground Floor, Western Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 01	LKD	1.5%	1.90%	Compliant
Unit 01	Bedroom 1	1.0%	5.56%	Compliant
Unit 01	Bedroom 2	1.0%	8.45%	Compliant
Unit 02	LKD	1.5%	1.65%	Compliant
Unit 02	Bedroom 1	1.0%	3.97%	Compliant
Unit 03	LKD	1.5%	1.92%	Compliant
Unit 03	Bedroom 1	1.0%	3.52%	Compliant
Unit 04	LKD	1.5%	3.01%	Compliant
Unit 04	Bedroom 1	1.0%	5.32%	Compliant
Unit 05	LKD	1.5%	6.39%	Compliant
Unit 05	Bedroom 1	1.0%	4.95%	Compliant
Unit 05	Bedroom 2	1.0%	6.24%	Compliant
Unit 29	LKD	1.5%	1.94%	Compliant
Unit 29	Bedroom 1	1.0%	1.60%	Compliant
Unit 29	Bedroom 2	1.0%	4.57%	Compliant
Unit 29	Bedroom 3	1.0%	2.59%	Compliant
Unit 30	LKD	1.5%	2.55%	Compliant
Unit 30	Bedroom 1	1.0%	5.99%	Compliant
Unit 31	LKD	1.5%	6.14%	Compliant
Unit 31	Bedroom 1	1.0%	3.89%	Compliant
Unit 31	Bedroom 2	1.0%	4.90%	Compliant
Unit 31	Bedroom 3	1.0%	2.14%	Compliant
Unit 98	LKD	1.5%	4.56%	Compliant
Unit 99	LKD	1.5%	4.50%	Compliant
Unit 100	LKD	1.5%	3.97%	Compliant

*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.

Figure 6.31: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.17 Block 4- Ground Floor, Eastern Section

Table No. 6.30: ADF Results Block 4, Ground Floor, Eastern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 57	LKD	1.5%	2.40%	Compliant
Unit 57	Bedroom 1	1.0%	6.51%	Compliant
Unit 57	Bedroom 2	1.0%	7.43%	Compliant
Unit 58	LKD	1.5%	6.20%	Compliant
Unit 58	Bedroom 1	1.0%	6.32%	Compliant
Unit 58	Bedroom 2	1.0%	6.42%	Compliant
Unit 59	LKD	1.5%	1.57%	Compliant
Unit 59	Bedroom 1	1.0%	6.73%	Compliant
Unit 59	Bedroom 2	1.0%	3.94%	Compliant
Unit 60	LKD	1.5%	2.00%	Compliant
Unit 60	Bedroom 1	1.0%	3.91%	Compliant
Unit 61	LKD	1.5%	1.65%	Compliant
Unit 61	Bedroom 1	1.0%	2.14%	Compliant
Unit 61	Bedroom 2	1.0%	1.24%	Compliant
Unit 62	LKD	1.5%	1.20%	80%
Unit 62	Bedroom 1	1.0%	2.06%	Compliant
Unit 62	Bedroom 2	1.0%	3.43%	Compliant
Unit 62	Bedroom 3	1.0%	2.98%	Compliant
Unit 63	LKD	1.5%	5.60%	Compliant
Unit 63	Bedroom 1	1.0%	8.75%	Compliant
Unit 63	Bedroom 2	1.0%	4.71%	Compliant
Unit 64	LKD	1.5%	2.25%	Compliant
Unit 64	Bedroom 1	1.0%	6.47%	Compliant
Unit 65	LKD	1.5%	2.87%	Compliant
Unit 65	Bedroom 1	1.0%	6.37%	Compliant
Unit 65	Bedroom 2	1.0%	7.05%	Compliant
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading “Recommended Minimum ADF” on page 14.				

Figure 6.32: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

6.5.18 Block 4- First Floor

Rooms that have not met the applied target values on the First Floor have been marked up below.

All rooms will meet the guidelines from the Second Floor up.

Table No. 6.31: ADF Results Block 4, First Floor, Eastern Section				
Unit Number	Room Description	Recommended Minimum ADF*	ADF	Level of Compliance
Unit 08	LKD	1.5%	1.38%	92%
Unit 71	LKD	1.5%	1.20%	80%
*The following ADF target values have been applied: 2% for kitchens, 1.5% for living rooms, 1.5 for LKDs and 1% for bedrooms as outlined in the methodology section, under the heading "Recommended Minimum ADF" on page 14.				

Figure 6.33: Floor plan of assessed building (L), Keyplan highlighting the assessed building (R).

7.0 Analysis of Results

Results were generated and analysed for the following studies:

- Vertical Sky Component
  - Charlestown Place
  - Charlestown Place Tower
  - 42-68 Mckelvey Avenue
- Annual Probable Sunlight Hours
  - Charlestown Place
  - Charlestown Place Tower
- Sunlighting in Proposed Gardens/Amenity Spaces
  - 11 No. spaces in the proposed development.
- Average Daylight Factor (ADF) of internal proposed development:
  - 450 No. rooms have been assessed.

7.1 Effect on Vertical Sky Component (VSC)

The effect on VSC has been assessed for 86 No. windows across the surrounding properties. 86 No. of these windows would be considered *imperceptible*.

This shows that 100% of the assessed windows will experience an imperceptible level of effect as a result of the proposed scheme.

The complete results for the study on the effect on VSC caused by the proposed development can be found in Section 6.1 on page 16.

7.2 Effect on Annual Probable Sunlight Hours (APSH)

The APSH assessment has been carried out on the relevant windows of the surrounding properties that have an orientation within 90 degrees of due south.

The effect on APSH has been assessed for 45 No. of windows of the surrounding existing properties. The effect on the APSH of 45 No. of these windows would be considered *imperceptible*, both in the Annual and Winter months.

100% of these windows have met the criteria for effect on APSH as set out in the BRE Guideline.

The results of the study on APSH can be found in Section 6.2 on page 22.

7.3 Sunlighting in Proposed Outdoor Amenity Areas

This study has assessed the level of sunlight on March 21st with in the proposed amenity areas.

In total 11 No. spaces have been assessed, 10 No. of which would meet the criteria as set out in the BRE Guidelines.

Block 2's Roof Terraces located on the west and east leg of the block are not meeting the guidelines. They are receiving a combined result of 77% compliance, just shy of meeting the guidelines. Future residents of Block 2 will also have direct access to a large courtyard communal space that are capable of receiving good levels of sunlight.

The complete results for the study on sunlighting in the proposed outdoor amenity spaces can be found in Section 6.3 on page 28.

A visual representation of these readings can be seen in the false colour plan in Section 6.4 and in the hourly shadow diagrams for March 21st in Section 6.4on page 29.

7.4 Average Daylight Factor (ADF)

This study has assessed the Average Daylight Factor (ADF) received in all residential rooms across ground floor and first floor of the proposed Blocks 1 & 2, where a room did not meet the guidelines on the first floor we have assessed the same room configuration on the upper floors until they met the applied target value, all rooms will be meeting the applied target value from the fourth floor upwards. For Block 3 & 4, all the ground and first floor rooms have been assessed, all rooms will be meeting the guidelines from the second floor upward.

The proposed development would consist of 1575 No. rooms across the 4 blocks. With only 54 No. of these rooms not meeting the recommended level of daylight, the approximate compliance rate is above 97%. For a scheme of this size, this could be considered an acceptable level of compliance.

The majority of the rooms across the proposed scheme not meeting the guidelines are above the 80% compliance, the rooms receiving the lowest value are:

- **Block 2, Unit 04 LKD (ground floor)** is receiving 45% compliance, it is meeting the applied target value on the second floor and subsequent upper floors, although it should be noted there are slight difference

to floor to ceiling height and room configuration.

- **Block 2, Unit 54 LKD (ground floor)** is receiving 54% compliance, this unit's subsequent upper floor will meet the applied target value on the third floor and all higher floors.
- **Block 2, Unit 55 LKD (ground floor)** is receiving 52% compliance, this units subsequent upper floor will meet the applied target value on the third floor and all higher floors.
- **Block 2, Unit 63 (first floor)** is receiving 55% compliance, this room will meet the applied target value on the fourth floor and subsequent higher floors.

Although there are rooms not meeting the applied target value for ADF, for the scale and density of the development, a 97% approximate compliance rate should be considered favorable.

As stated in the *Sustainable Urban Housing: Design Standards for New Apartments; Guidelines for Planning authorities issued under Section 28 of the Planning and Development Act, 2000 (as amended). Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to a design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such as objectives might include securing comprehensive urban regeneration and or effective urban design and street scape solutions.*

The locational context and justification for the design and layout of the proposed development are set out in the *Architect's Design Report* by MCORM Architects.

Compensatory design solutions have been carried out by the design team in order to maximize the daylight received in the proposed units across the scheme. We have worked closely with MCORM Architects on the design of the building facades and layout of the apartment units to provide a series of compensatory design solutions that maximize the daylight received in the proposed units across the scheme;

- **Block 1;** redesigning the internal layout/configuration, increasing/adding windows where appropriate. These changes mostly occurred on the northern and eastern section of the block.
- **Block 2;** redesigning the internal layout including room depth, adding/increasing window sizes and removing balconies. Mostly occured on the northern section of the block.
- **Block 3;** increasing window sizes and changes to internal configuration to improve ADF values for the rooms facing East onto Block 2.
- **Block 4;** changes to room layout including room depth, maximizing window sizes to allow for more daylight.

The results of the ADF study could be considered to be favourable with an approximate overall compliance rate of 97%.

The complete results for the study on ADF can be seen in Section 6.6 on page 38.

8.0 Conclusion

3D Design Bureau (3DDB) were commissioned to carry out a daylight assessment, sunlight assessment and shadow study for the proposed SHD scheme located at Charlestown Place, Dublin 11.

This BRE daylight & sunlight report has assessed the potential impact the proposed development will have on the surrounding existing environment and properties and on itself. The impact assessment has studied Vertical Sky Component (VSC) and Annual Probable Sunlight Hours (APSH) to neighbouring property windows and levels of sunlight within adjoining gardens. The internal assessment has studied the Average Daylight Factor (ADF) within the proposed units and the access to sunlight within the proposed open amenity spaces.

It has been proved that the design and layout of the proposed scheme have been carefully considered and taken into account the existing surrounding environment and properties. The levels of impact the proposed scheme will have on these can be considered to be very favourable with a high level of compliance with the BRE guidelines. The complete set of results for the impact study can be seen in Section 6.1 and Section 6.2, pages 16-27.

Furthermore, the levels of sunlight to the proposed open amenity spaces of the development can be considered very good and also meet the recommended target values of the BRE guidelines for 10 No. of assessed areas. Block 2's Roof Terraces are coming in just shy of the guidelines with 77% compliance, however the residents of Block 2 will have access to a number of amenity areas that are capable of receiving good levels of sunlight. See section 6.3 on page 28 for the full set of results.

Access to daylight (Average Daylight Factor - ADF) within all proposed habitable rooms in all units across the ground and first floors, and subsequent higher floors where the room did not meet the guidelines on the first floor, were assessed. **Note:** Where rooms have not met the guidelines their corresponding room on the subsequent higher floors have been assessed and where rooms that have met the guidelines it is assumed (as previously stated) that the subsequent floors will also meet the guidelines. This approach equated to a study on 450 No. rooms out of 1575 No. rooms across the entire scheme. Of the 450 No. rooms assessed a total of 396 No. meet the guidelines with 54 No. failing to do so. However this gives a very welcomed 97% compliance rate across the 1575 room scheme. Furthermore the majority of the failing units are 80%+ of compliance.

From this study, it was found that for Blocks 1 & 2, all units will meet the guidelines from the 4th floor, while all units in block 3 & 4 will meet the guidelines from the 2nd floor upwards. An overall approximate compliance rate of 97% for ADF across all 4 Blocks is considered a favourable outcome. This is a direct result of considered design and corresponding design interventions (as highlighted in Section 7.4 in particular) by the design team. Every effort has been made to achieve the highest compliance rate possible (in terms of impact and the scheme on itself), whilst considering current housing policies and this should be welcomed.

The complete results for the study on ADF can be seen in Section 6.5 on page 38.

Finally, whilst future occupants can expect to have access to acceptable levels of daylight within the vast majority of the proposed units they will also have access to amenity areas that are capable of receiving very good levels of sunlight.