

**DAYLIGHT & SUNLIGHT
ASSESSMENT
&
SHADOW ANALYSIS
REPORT**

Proposed Development
at
Cairns Road, Sligo

for
Novot Holdings Limited

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1.0 INTRODUCTION

1.1 Planning Guidelines Requirements:

The Sustainable Urban Housing Design Standards for New Apartments – Guidelines for Planning Authorities (published in December 2020), include a requirement that Planning authorities have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition) or British Standard BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’.

Section 6.5 and Section 6.6 of *The Sustainable Urban Housing Design Standards for New Apartments – Guidelines for Planning Authorities* sets out in regard to planning applications for proposed apartments that:

“6.5 The provision of acceptable levels of natural light in new apartment developments is an important planning consideration as it contributes to the liveability and amenity enjoyed by apartment residents. In assessing development proposals, planning authorities must however weigh up the overall quality of the design and layout of the scheme and the measures proposed to maximise daylight provision with the location of the site and the need to ensure an appropriate scale of urban residential development.

“6.6 Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition) or BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’ when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision”

The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in both of the above reference documents have been utilised and referenced in this Sunlight and Daylight Assessment Report.

Neither the Irish Apartment Design Guidelines, 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 aims 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.

1.2 BS 8026-2 2008 and BRE guidance document (2011) Site layout planning for daylight and sunlight

To ensure that this assessment can be appropriately evaluated against standard guidance the analysis has been carried out in line with BRE guidance “BR209 Site Layout Planning for Daylight and Sunlight” by Dr Paul Littlefair. This guide is a comprehensive revision to the 1991 edition of “Site Layout Planning for Daylight and Sunlight: A guide to good practice” and also in line with BS8206 2: 2008 “Lighting for Buildings part 2: Code of Practice for Daylighting”, to which the BRE guide refers. The BRE standards and relevant tests applied are described in the BRE Assessment Test Parameters below.

The purpose of the BRE guide is to provide advice on a buildings site plan and layout to achieve good levels of daylighting and sun lighting. The guide provides calculation methodologies which aims to assist

clients, consultants and planning officials make informed decisions on site layout to ensure no significant loss of light occurs. It should be noted that the guidance in this document should be seen as advice only and it should not constrain the design. The BRE guide clearly states that:

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

It should be noted that the BRE’s numerical target criteria do not represent “minimum standards” of natural light amenity for occupants. As noted in the guide, Average Daylight Factor (ADF) values are treated as “recommendations”.

1.3 Proposed Development

This report relates to the proposed development at Cairns Road in the south-eastern part of Sligo Town, Co. Sligo. This Daylight and Sunlight Assessment set out a detail an analysis of the Apartment and Duplex Units as well as an assessment of the impact of the overall development on existing adjoining properties (dwellings and gardens).

The overall development will comprise the construction of a scheme comprising 74 No. residential units, comprising 50No. houses and 24No. apartments and duplex units.

The development description for this planning application is:

Novot Holdings Ltd., intend to apply for permission for development on a site which extends to c. 2.1ha on lands located on the Cairns Road, Sligo, Co. Sligo.

The development will consist of:

1) Construction of 74 no. residential units comprising:

- 5 no. 1-bed own-door apartments,***
- 19 no. 2-bed own-door apartments,***
- 8 no. 3-bed terrace houses,***
- 14 no. 3-bed semi-detached houses,***
- 2 no. 4-bed terrace houses,***
- 26 no. 4-bed semi-detached houses.***

2) Provision of all associated surface water and foul drainage services and connections with all associated site works and ancillary services.

3) Pedestrian, cycle, and vehicular access/egress with Cairns Road, and pedestrian and cycle access/egress with the adjoining Ardcairn residential estate.

4) Provision of public open space, communal open space, private open space, site landscaping, public lighting, refuse storage, resident and visitor car parking including electric vehicle charging points, bicycle parking, boundary treatments, and all associated site development works.

5) Demolition of existing bungalow dwellinghouse and outbuildings located to the north-east of the development site.

6) This application is accompanied with a Natura Impact Statement (NIS).

2.0 BRE ASSESSMENT TEST PARAMETERS

2.1 PARAMETERS FOR NEW INTERNAL SPACES:

2.1.1 Average Daylight Factor (ADF):

In order to assess the quality of daylight enjoyed within the proposed development, Average Daylight Factor (ADF) calculations have been undertaken. The ADF is a ratio between indoor illuminance and outdoor illuminance expressed as a percentage. 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 is offset 500 mm from the room boundaries.

The ADF (Average Daylight Factor) test is the most detailed and representative level of analysis as per the BS and BRE guidance for measuring internal light levels and it takes account of number of factors including the interior dimensions and surface reflectance within the room being tested as well as the amount of sky visible from the window. This test is used in assessing new developments, and may also be used as a very detailed test in the assessment of daylighting in existing buildings and effects on them by adjacent development.

In terms of housing, BS 8206-2:2008, as referenced in the BRE Guidelines, 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 worst case habitable rooms across in the apartment/ duplex blocks. These units/spaces within the blocks have been selected and assessed as a worst-case scenario, as they are located most closely to the subject site boundary (and therefore the surrounding properties) &/or are in closest proximity to other proposed blocks.

Therefore, it can be assumed that where these spaces/ units meet their recommended ADF , the comparable units elsewhere in the development will be compliant as well. A combination of the calculated results and reasonable inference made from these results will be used to give an approximate compliance rate for the ADF for the proposed development as a whole.

Where ADF compliance rates are stated for combined Living/ Kitchen/ Dining (LKDs), the higher 2% target value has been considered. The appropriate ADF target value for LKDs is at the discretion of the planning authority.

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

2.2 PARAMETERS FOR EXISTING NEIGHBOURING BUILDINGS/ WINDOWS:

2.2.1 Angle of Obstruction/ Vertical Sky Component Testing

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.

Obstructions can limit access to light from the sky. This can be checked by measuring or calculating the angle of visible sky, angle of obstruction or vertical sky component (VSC) at the centre of the lowest window where daylight is required.

This report assesses the obstruction angle from the centre point of neighbouring windows that could be affected by the proposed development.

Section 2.2.21 of the BRE Guide suggests that:

“If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value...”

Furthermore, the BRE Guidelines state that if the VSC is:

- At least 27%, (i.e. obstruction angle of at less than 25 degrees) 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 unobstructed angle to the centre point on each of the assessed windows (in closed proximity to the proposed development) are assessed.

2.3 PARAMETERS FOR EXISTING NEIGHBOURING EXTERNAL GARDENS / AMENITY AREAS

2.3.1 Shadow Analysis:

A shadow analysis 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 shadow analysis included in this assessment report.

Shadow cast plans have been shown at the Spring Equinox at the following times.

- Spring equinox: March 21st at 9.00am, 12.00pm (Noon), 3.00pm & 6.00pm

3.0 ASSESSMENT METHODOLOGY

3.1 Baseline and Proposed 3-Dimensional Models:

In order to obtain the results of this assessments, we have constructed an architectural 3D digital model of the development and surrounds using Revit, a BIM software application made available by Autodesk. The model is created in 3D in preparation for daylight and sunlight analysis.

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.

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. If and when trees have been included as part of the study, it will be clearly stated.

3.1.1 Baseline Model:

The baseline state reflects the existing environment. It includes the surrounding context and the subject site in their current standing. This includes any structures that are to be demolished as part of this application.

3.1.2 Proposed Model:

The proposed state reflects the subject site if the development is built as proposed. This includes the demolishing of structures, landscaping etc.

3.2 Generating Results:

The 3D models as stated above were brought into specialist software packages designed specifically for the purposes of daylight and sunlight analysis. The results are generated by the specialised software and analysed considering the BRE Guidelines, as expanded on below.

3.2.1 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 Point:

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. The average window will be denoted with a #-sign. Where the height of windows to rear of existing buildings is unclear from survey & photographic information, the worst case scenario of full height window from floor to 2.2m above finished floor level has been assumed.

3.2.2 Shadow Analysis Assessment Criteria:

A three dimensional digital model of the proposed development and of existing buildings in the area was constructed by Douglas Wallace based on site surveys, planning drawings, on-site, satellite and aerial photography. Using the digital model, shadows were cast by at several times of the day at the Spring equinox.

An equinox occurs twice a year: the March or vernal equinox (typically in or around the 20th to 21st March) and the September or autumnal equinox (typically in or around the 21st to 23rd September). For the purposes of this analysis and with reference to the BRE Guidance, shadows were cast at several times of the day on 21st March.

The BRE guidelines recommend using the 21st March for plotting shadow, it states:

“If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing due to the equal length of the day and night time.”

The results are presented in shadow study diagrams associated with this report. A separate page has been prepared for each selected time of the Equinox:

The plans will show shadows cast for ‘perfect sunny’ conditions with no clouds and assumed that the sun is out for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

3.2.3 Average Daylight Factor (ADF) Assessment Criteria

Recommended Minimum ADF:

The recommended minimum for Average Daylight Factor (ADF) 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 a room serves more than one purpose, such as the modern day apartment design of the living/kitchen/dining (LKD) space, the minimum average daylight factor should be taken for the room with the highest value. Therefore an ADF target value of 2% is taken for LKDs within this assessment. We note that the appropriate ADF target value for LKDs is at the discretion of the planning authority, for which there is precedent in applying the lower 1.5% (Living Room target value).

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, we have applied a target value they deem to be appropriate.

Defining Areas:

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)

Typically, ADF values increase in rooms located on higher floor levels, due to an improved relationship with adjacent obstructions. Where a room meets the guidelines for ADF, it can be reasonably assumed that similar rooms on subsequent floors will also meet the guidelines.

It should be noted that all of the relevant habitable rooms in all of the proposed new apartment/ duplex blocks (Block H & Block J) have been assessed.

A combination of the calculated results and reasonable inference made from these results will be used to give an approximate compliance rate for the ADF for the proposed development as a whole. Where ADF compliance rates are stated both target values for LKDs (2% and 1.5%) have been considered. The appropriate ADF target value for LKDs is at the discretion of the planning authority.

4.0 IMPACT ASSESSMENT

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces. The guide does not give a specific range or percentages but sets out parameters set out below.

“Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate.

Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.

Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- *only a small number of windows or limited area of open space are affected*
- *the loss of light is only marginally outside the guidelines*
- *an affected room has other sources of skylight or sunlight*
- *the affected building or open space only has a low level requirement for skylight or sunlight*
- *there are particular reasons why an alternative, less stringent, guideline should be applied.*

Factors tending towards a major adverse impact include:

- *a large number of windows or large area of open space are affected*
- *the loss of light is substantially outside the guidelines*
- *all the windows in a particular property are affected*
- *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, eg a living room in a dwelling or a children’s playground.*

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space.

Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact.”

A flexible approach should be taken when assessing the impact with daylight and sunlight being one of many factors that influence the environment when planning a new development.

5.0 TERMS & DEFINITIONS

5.1 Terms:

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.

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.

5.2 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, this report has 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 draft '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 should not be applied rigidly, but rather as a guide. Circumstances may occur that lead to flexibility being sought in our interpretation of these definitions. 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

6.0 RESULTS & CONCLUSIONS

6.1 Analysis of Results

Results were generated and analysed for the following studies in relation to effect on adjacent properties:

- Angle of Obstruction/ Vertical Sky Component
- Average Daylight Factor (for Proposed new Apartments & Duplexes)
- Shadow Analysis Studies of existing and proposed conditions

See Section 7 below for details

6.2 Effect on Angle of Obstruction/ Vertical Sky Component (VSC)

The effect on VSC has been assessed for relevant windows of adjacent properties which are located in closest proximity to the development and which face towards the development site.

The sectional results and demonstrate that no part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal.

Therefore, as per BRE guidance, as no new structure subtends the 25° to the horizontal line measurement from adjoining relevant windows, further investigation of these scenarios is not required as the diffuse daylighting of the existing building will not be adversely affected.

Cross sections outlining the worst-case scenarios in terms of existing & proposed building proximity are included in Section 7.1 for reference.

The development would not have a perceptible effect to the daylight the neighbouring windows would be able to receive. Therefore, the proposed development is in compliance with the BRE guidance.

6.3 Average Daylight Factor (ADF)

This study has assessed the Average Daylight Factor (ADF) in all habitable rooms across the duplex/ apartment blocks (Block H & Block J) of the proposed development. This has ensured that where unit types differ by way of layout and/ or floor to ceiling heights, a clear understanding has been obtained of the performance of the scheme with regard to ADF.

All of the assessed residential rooms met their recommended BRE Criteria minimum value, being either a minimum or in excess of 1% ADF for bedrooms or 2% ADF for Living/ Kitchen/ Dining areas.

This means that the overall compliance rate across the apartment/ duplex blocks would be 100%.

The complete results for the study on ADF can be seen in the analysis in Section 7.2

6.4 Shadow Cast Analysis:

This analysis has established the shadows cast by existing buildings & structures surrounding and within the site at the Spring Equinox. It also identifies the affect shadows cast by the proposed development would have on rear gardens of the neighbouring properties and with the site in the same timeframe.

Shadows of the proposed development differing from the existing conditions are evident in the following instances:

- A minor increase of shadows cast to a small area of the rear (south-west) area of the back garden of adjacent No.1 Hilltop Park can be observed throughout the day due to proposed Units 40 & 41
- In the early morning only, the gardens of The Hawthorns No.s 8, 9, 10, 11, 40 & 41 have an increased shadow footprint. By Midday, no change in comparison to the existing conditions is evident and there is no increase either later in the day.
- In the late evening only, the rear (eastern) part of gardens to two no. adjacent bungalow dwellings on Cairns Road have a slight increased shadow footprint due to construction of new boundary walls)

For the particular adjacent gardens where there is an increase in shadows cast is observed as a result of the proposed development, the increase is either of limited extents &/or of limited time duration. These gardens would experience an imperceptible level of effect with all garden retaining well in excess of the BRE requirements of at least 2 hours of sunlight to 50% of the garden at the Spring Equinox.

All other areas neighbouring areas are unaffected by the proposed development. The complete results of the study on effect on sunlight the neighbouring gardens can be found in the analysis in section 7.3

6.6 Conclusions

Douglas Wallace Consultants were commissioned to carry out a daylight assessment, sunlight assessment and shadow study for the proposed residential development at Cairns Road, Sligo. This assessment has studied the effect the proposed development would have on the level of daylight and sunlight received by the neighbouring residential properties that are in close proximity to the proposed development.

The Angle of Obstruction/ VSC test results are very favourable, with all assessed windows sustaining an imperceptible level of effect.

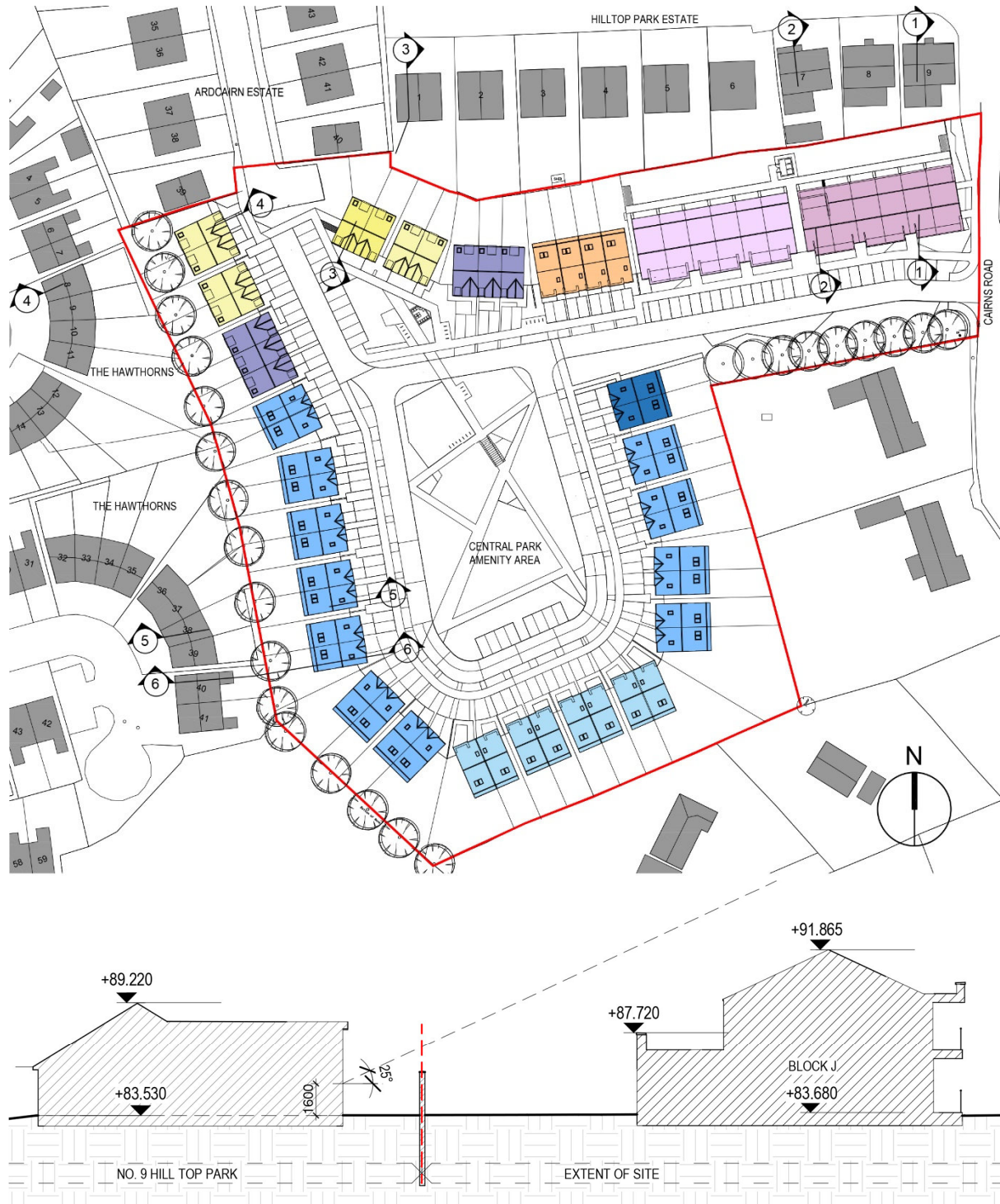
The shadow analysis studies demonstrate that the rear gardens of the neighbouring properties would experience an imperceptible level of effect and all will retain at least 2 hours of sunlight for at least 50% of the garden areas at the Equinox (21st March) as per the BRE requirements.

Finally, future occupants as per the detailed ADF assessments for the relevant apartment/ duplex blocks will enjoy good levels of internal daylight in excess of the BRE target values.

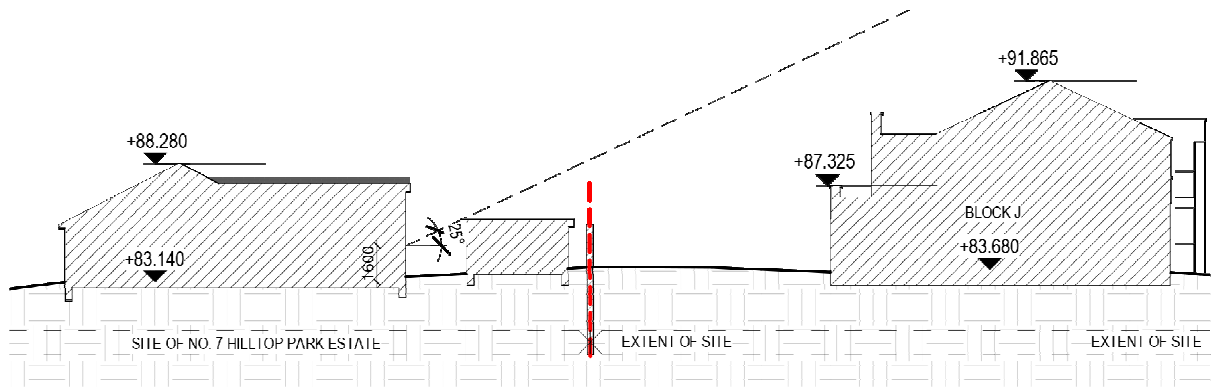
7.0 ASSESSMENT RESULTS/ CALCULATIONS

7.1 VERTICAL SKY COMPONENT ASSESSMENT RESULTS

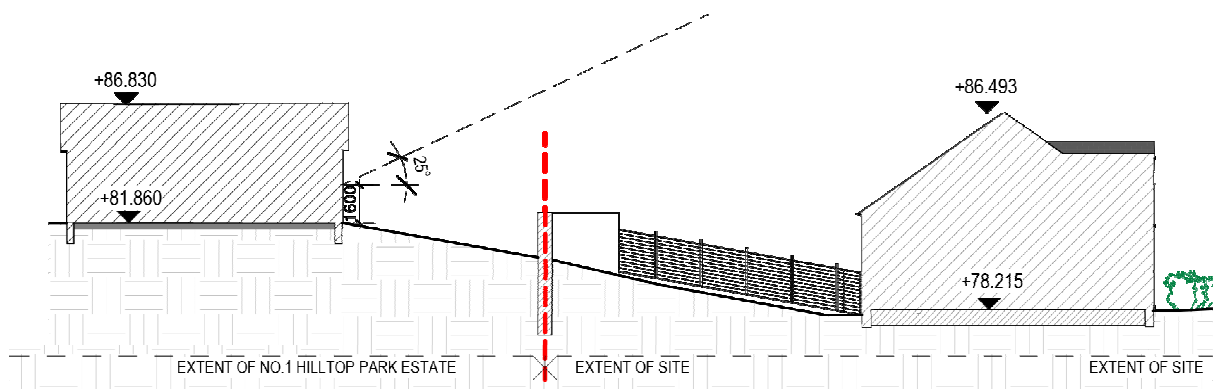
The plan below identifies the sections showing the relationship between existing & proposed dwellings where their proximity is relatively close to each other. The diagrams confirm, that no proposed building falls within the 25 degree angle required for further analysis in terms of VSC



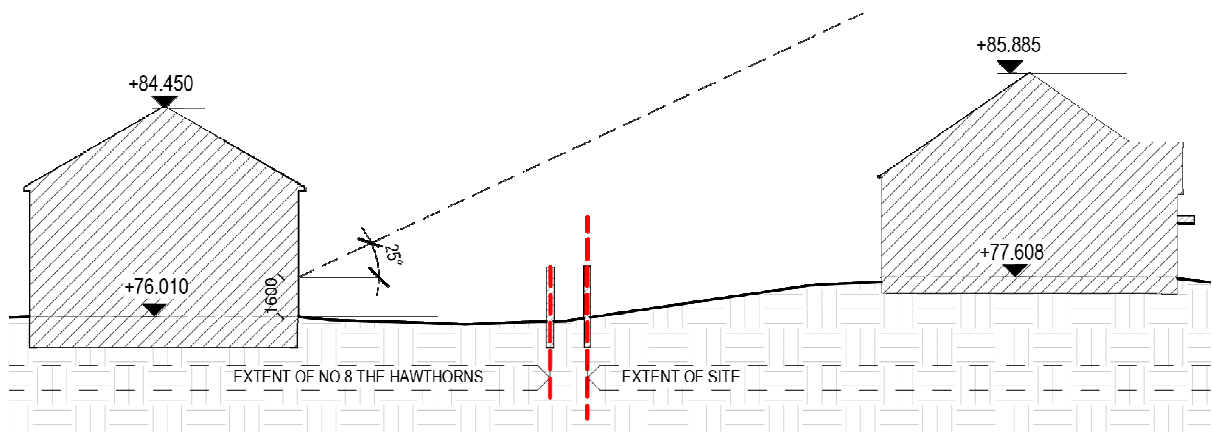
Section 1-1



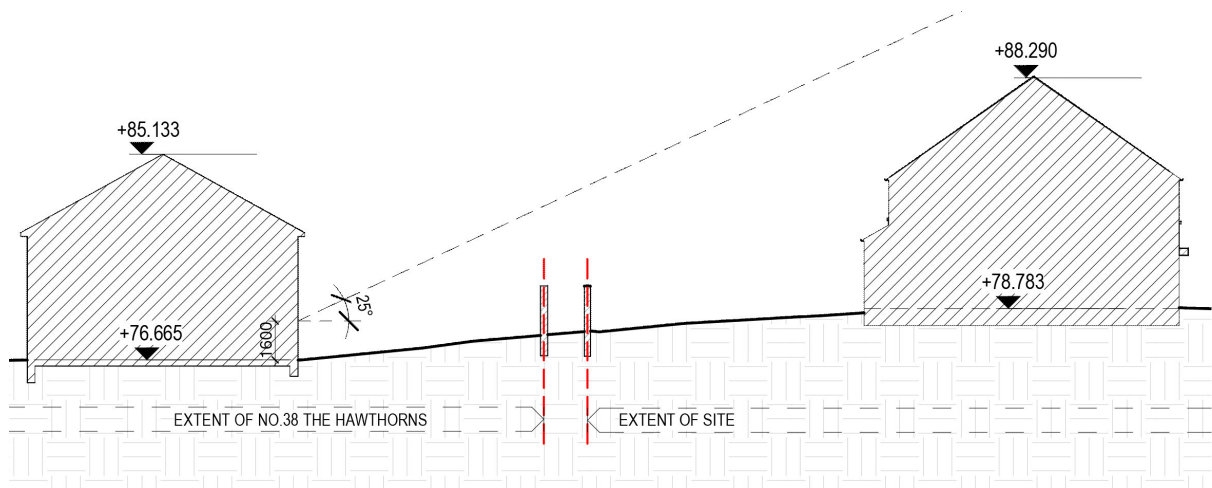
Section 2-2



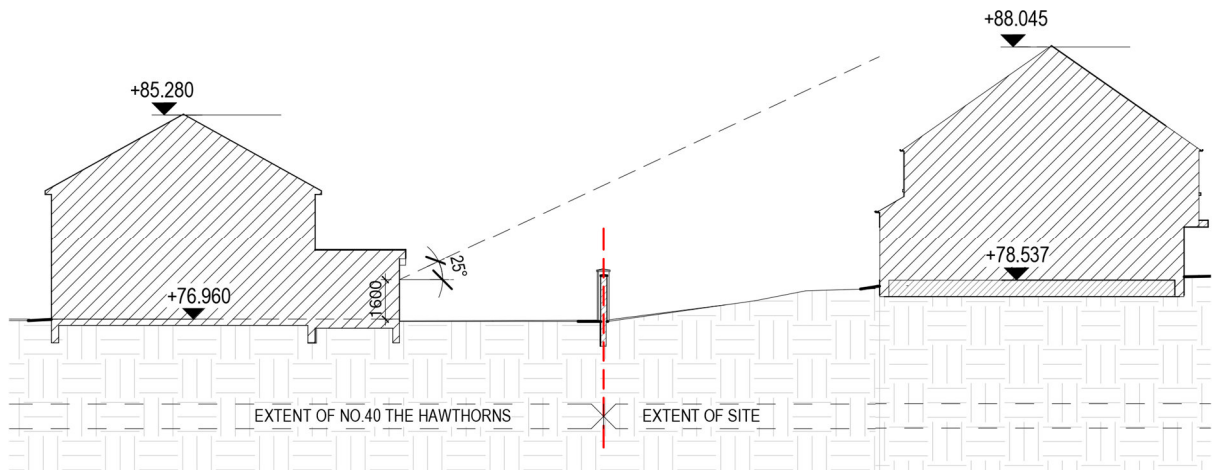
Section 3-3



Section 4-4



Section 5-5



Section 6-6

Results of VSC/ Angle of Obstruction Testing:

The effect on VSC has been assessed for relevant windows of adjacent properties which are located in closest proximity to the development and which face towards the development site.

The above sectional results and demonstrate that no part of a proposed new building, measured in a vertical section perpendicular to a main window wall of an existing adjacent building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal.

Therefore, as per BRE guidance, as no new structure subtends the 25° to the horizontal line measurement from adjoining relevant windows, further investigation of these scenarios is not required as the diffuse daylighting of the existing building will not be adversely affected.

The development would not have a perceptible effect to the daylight the neighbouring windows would be able to receive. Therefore, the proposed development is in compliance with the BRE guidance.

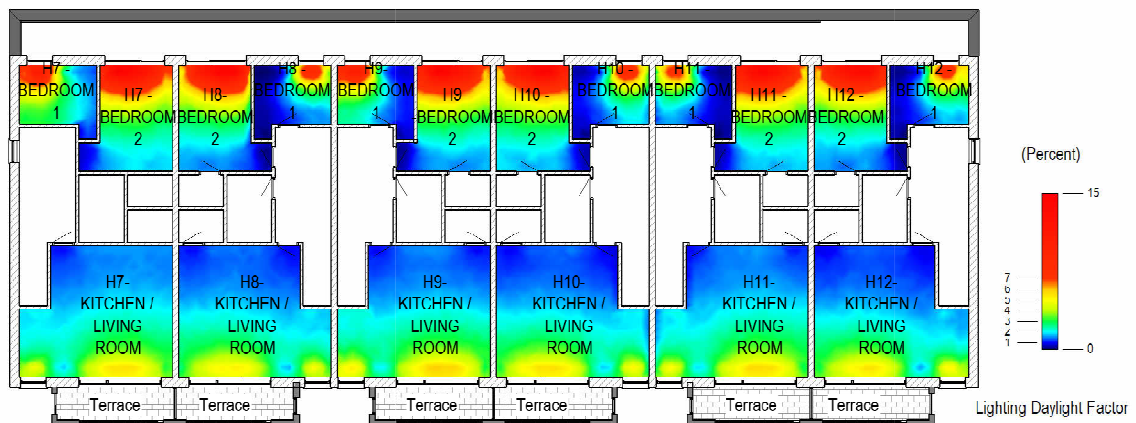
7.2 - AVERAGE DAYLIGHT FACTOR ASSESSMENT RESULTS:

7.2.1 DUPLEX/ APARTMENT BLOCK H

7.2.1.1 Block H - ADF Analysis Diagrams:



Ground Floor Plan – ADF Analysis



First Floor Plan – ADF Analysis

7.2.1.2 Block H - ADF Analysis Results Table:

| BLOCK H - DAYLIGHT ANALYSIS | | |
|--|----------------------------|-------|
| Daylight Factor Sky (unshaded horizontal 100%) | | |
| Level | Name | ADF % |
| L0 | H1 - BEDROOM 1 | 4.2 |
| L0 | H1 - BEDROOM 2 | 5.9 |
| L0 | H1 - KITCHEN / LIVING ROOM | 4.2 |
| L0 | H2 - BEDROOM 1 | 4.1 |
| L0 | H2 - BEDROOM 2 | 4.9 |
| L0 | H2 - KITCHEN / DINING ROOM | 4.0 |
| L0 | H3 - BEDROOM 1 | 4.2 |
| L0 | H3 - BEDROOM 2 | 4.7 |
| L0 | H3 - KITCHEN / LIVING ROOM | 2.4 |
| L0 | H4 - BEDROOM 1 | 4.2 |
| L0 | H4 - BEDROOM 2 | 4.9 |
| L0 | H4 - KITCHEN / LIVING ROOM | 2.0 |
| L0 | H5 - BEDROOM 1 | 3.9 |
| L0 | H5 - BEDROOM 2 | 4.5 |
| L0 | H5 - KITCHEN / LIVING ROOM | 2.3 |
| L0 | H6 - BEDROOM 1 | 3.2 |
| L0 | H6 - BEDROOM 2 | 6.0 |
| L0 | H6 - KITCHEN / LIVING ROOM | 2.1 |
| L1 | H7 - BEDROOM 1 | 3.3 |
| L1 | H7 - BEDROOM 2 | 4.4 |
| L1 | H7- KITCHEN / LIVING ROOM | 2.3 |
| L1 | H8 - BEDROOM 1 | 2.1 |
| L1 | H8- BEDROOM 2 | 4.0 |
| L1 | H8- KITCHEN / LIVING ROOM | 2.1 |
| L1 | H9 -BEDROOM 2 | 4.2 |
| L1 | H9- BEDROOM 1 | 2.9 |
| L1 | H9- KITCHEN / LIVING ROOM | 2.3 |
| L1 | H10 - BEDROOM 1 | 2.4 |
| L1 | H10 - BEDROOM 2 | 4.3 |
| L1 | H10- KITCHEN / LIVING ROOM | 2.1 |
| L1 | H11 - BEDROOM 1 | 2.0 |
| L1 | H11 - BEDROOM 2 | 4.3 |
| L1 | H11- KITCHEN / LIVING ROOM | 2.2 |
| L1 | H12 - BEDROOM 1 | 2.2 |
| L1 | H12 - BEDROOM 2 | 4.0 |
| L1 | H12- KITCHEN / LIVING ROOM | 2.1 |

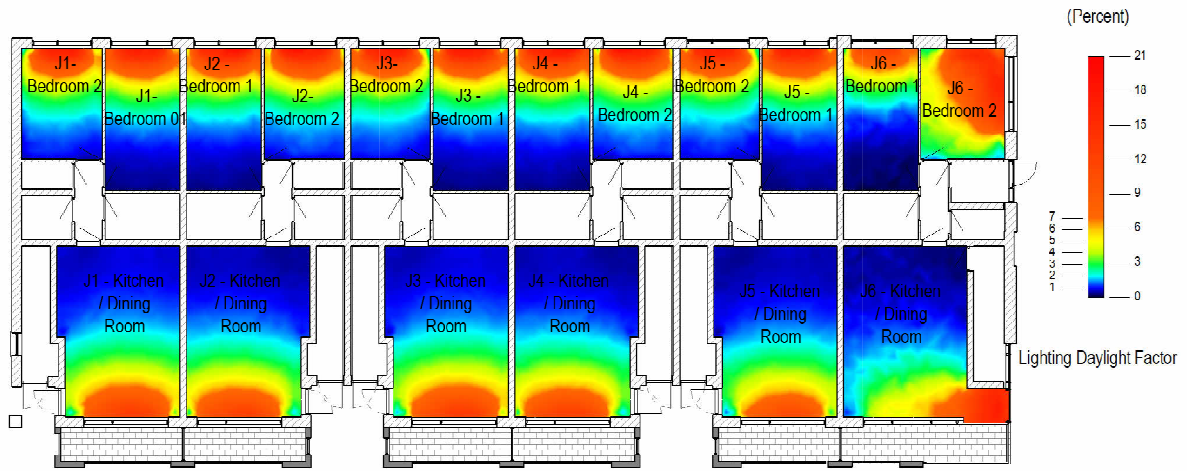
The recommended minimum for Average Daylight Factor (ADF) is based on the function of the room being assessed. The relevant recommendations as per the BS 8206-2:2008 / BRE Guidance are:

- **2% for combined Living/ Kitchen/ Dining rooms**
- **1% for Bedrooms**

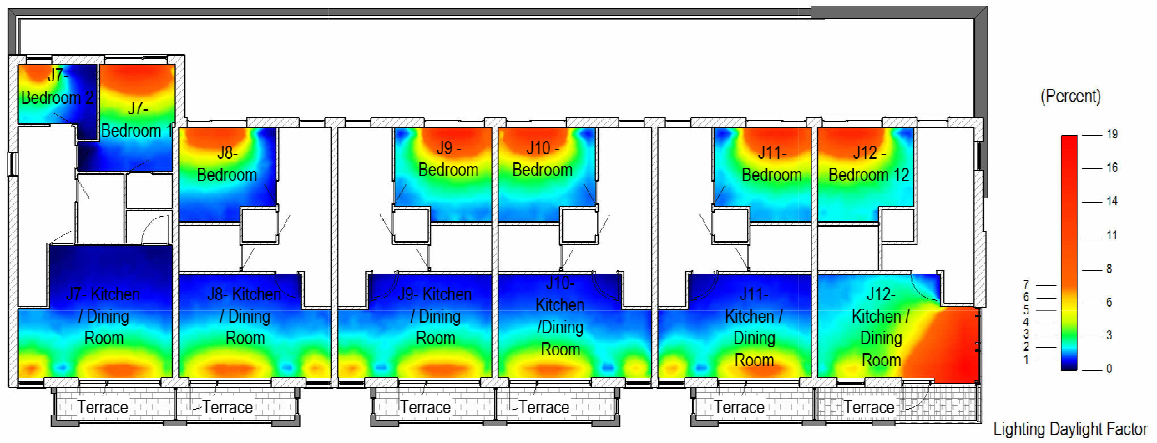
As per the analysis results shown above, it is demonstrated that all relevant rooms in proposed Block H will all meet or exceed the minimum BRE criteria requirements for Living/ Kitchen/ Dining rooms and Bedrooms as the case may be.

7.2.2 DUPLEX/ APARTMENT BLOCK J

7.2.2.1 Block J - ADF Analysis Diagrams:



Ground Floor Plan – ADF Analysis



First Floor Plan – ADF Analysis

7.2.2.2 Block J - ADF Analysis Results Table:

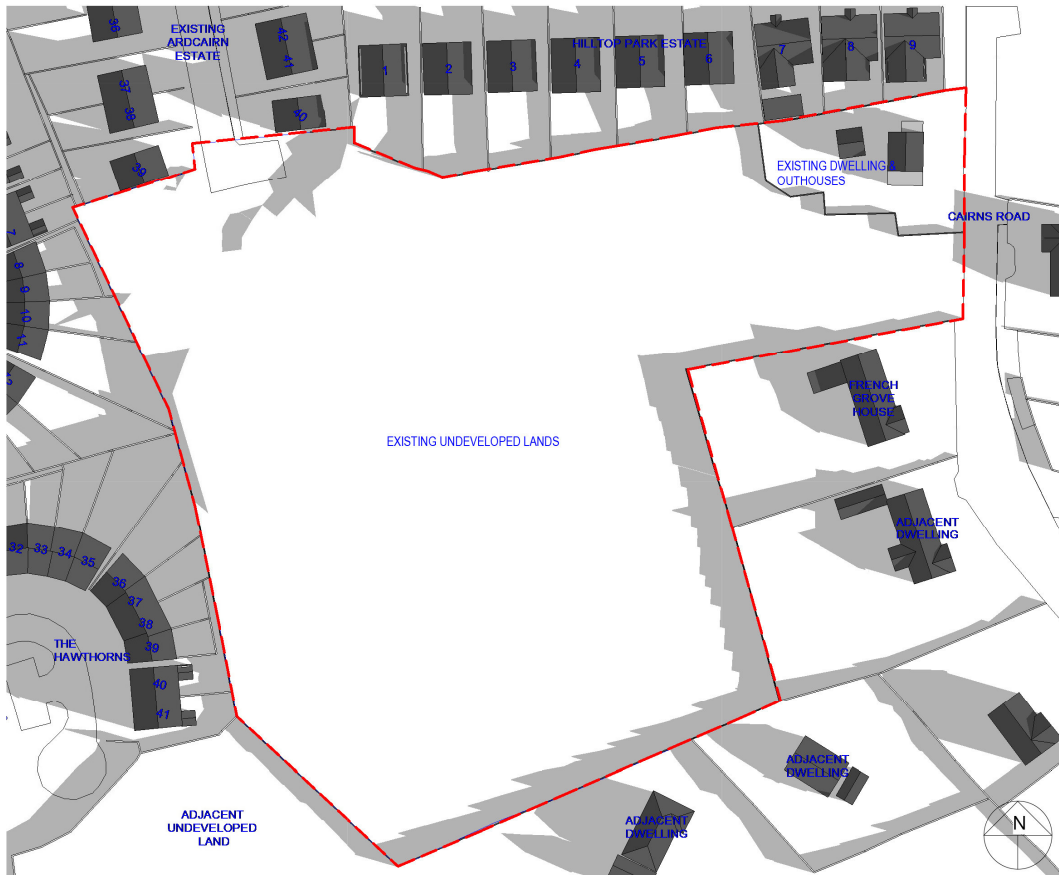
| Block J - Daylight Analysis | | |
|--|----------------------------|-------|
| Daylight Factor Sky (unshaded horizontal 100%) | | |
| Level | Name | ADF % |
| L0 | J1 - Kitchen / Dining Room | 3.0 |
| L0 | J1- Bedroom 01 | 3.9 |
| L0 | J1- Bedroom 2 | 4.3 |
| L0 | J2 - Bedroom 1 | 3.9 |
| L0 | J2 - Kitchen / Dining Room | 2.8 |
| L0 | J2- Bedroom 2 | 4.7 |
| L0 | J3 - Kitchen / Dining Room | 3.0 |
| L0 | J3 - Bedroom 1 | 3.8 |
| L0 | J3- Bedroom 2 | 4.4 |
| L0 | J4 - Bedroom 1 | 3.9 |
| L0 | J4 - Bedroom 2 | 4.7 |
| L0 | J4 - Kitchen / Dining Room | 2.8 |
| L0 | J5 - Bedroom 1 | 3.8 |
| L0 | J5 - Bedroom 2 | 4.2 |
| L0 | J5 - Kitchen / Dining Room | 2.5 |
| L0 | J6 - Bedroom 1 | 2.7 |
| L0 | J6 - Bedroom 2 | 7.5 |
| L0 | J6 - Kitchen / Dining Room | 2.6 |
| L1 | J7- Bedroom 1 | 4.3 |
| L1 | J7- Bedroom 2 | 2.4 |
| L1 | J7- Kitchen / Dining Room | 2.0 |
| L1 | J8- Bedroom | 3.1 |
| L1 | J8- Kitchen / Dining Room | 2.2 |
| L1 | J9 - Bedroom | 4.3 |
| L1 | J9- Kitchen / Dining Room | 2.2 |
| L1 | J10 - Bedroom | 4.0 |
| L1 | J10- Kitchen /Dining Room | 2.1 |
| L1 | J11- Bedroom | 4.3 |
| L1 | J11- Kitchen / Dining Room | 2.1 |
| L1 | J12 - Bedroom 12 | 4.4 |
| L1 | J12- Kitchen / Dining Room | 4.6 |

The recommended minimum for Average Daylight Factor (ADF) is based on the function of the room being assessed. The relevant recommendations as per the BS 8206-2:2008 / BRE Guidance are:

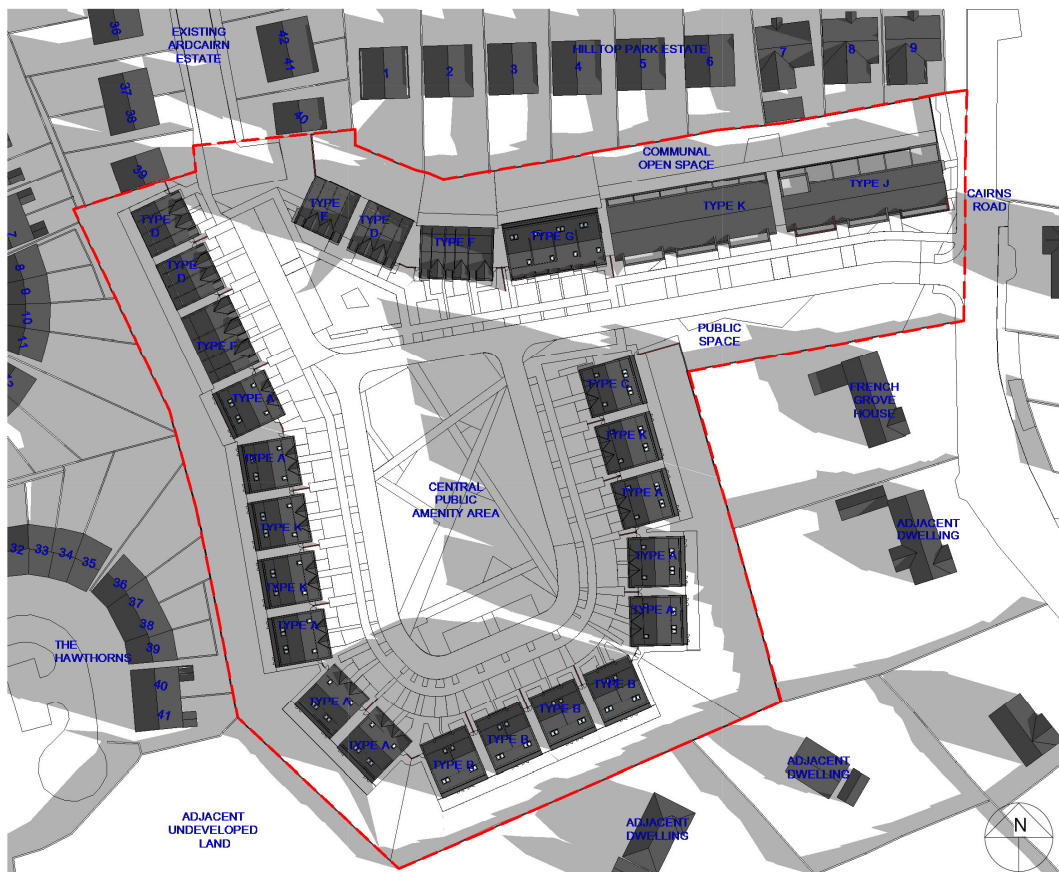
- **2% for combined living/kitchen/ dining rooms**
- **1% for bedrooms.**

As per the analysis results shown above, it is demonstrated that all relevant rooms in proposed Block J will all meet or exceed the minimum BRE criteria requirements for Living/ Kitchen/ Dining rooms and Bedrooms as the case may be.

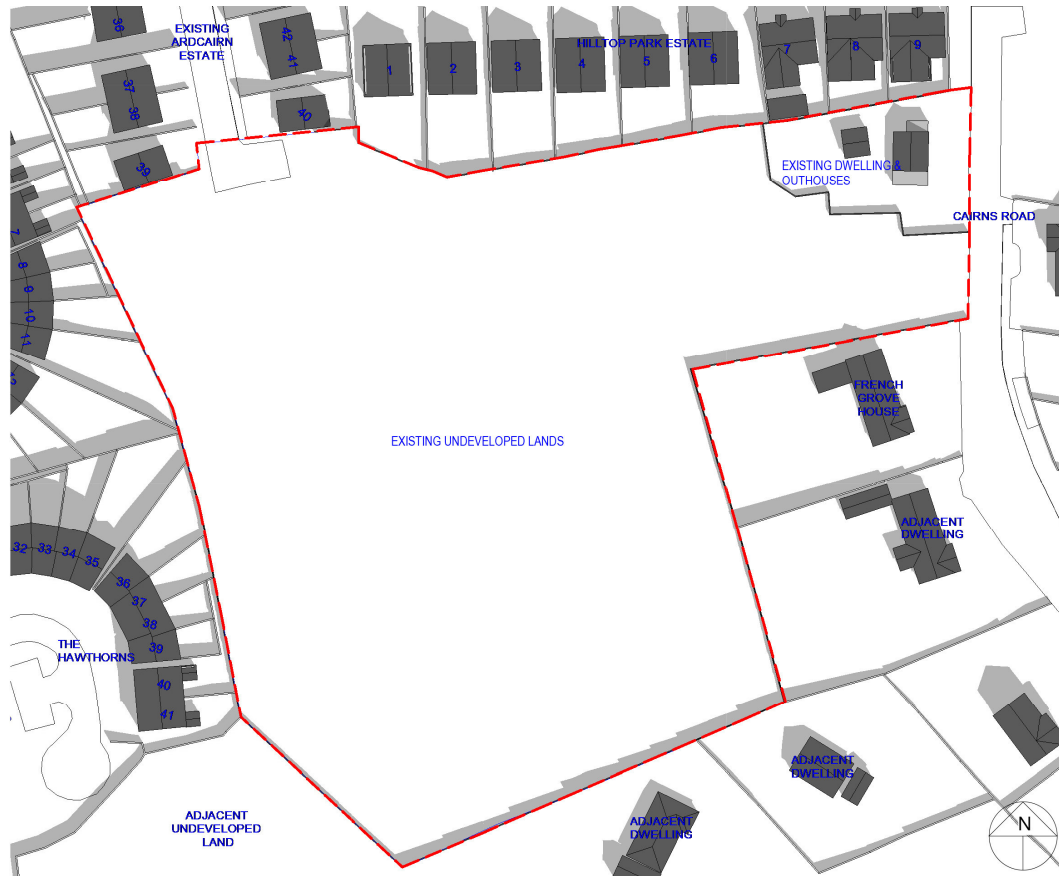
7.3 SHADOW ANALYSIS RESULTS – SPRING EQUINOX



MARCH 21st – 09:00 – EXISTING CONDITIONS



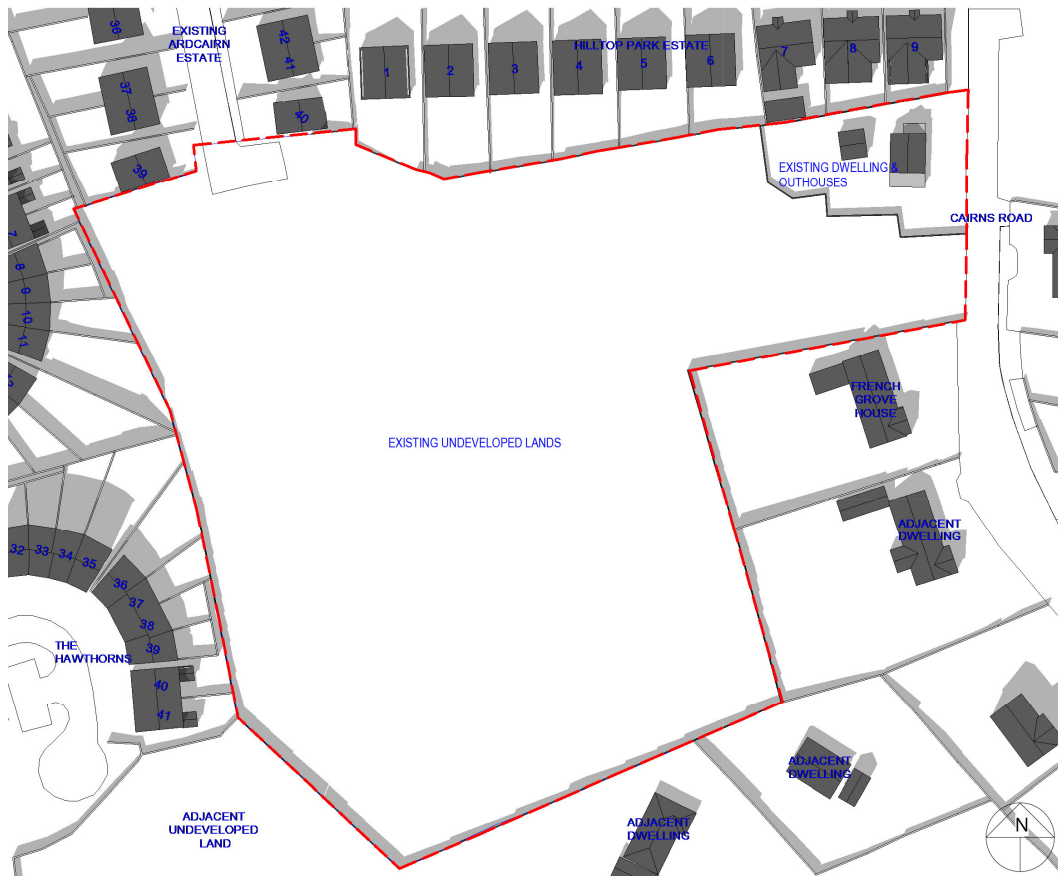
MARCH 21st – 09:00 – PROPOSED CONDITIONS



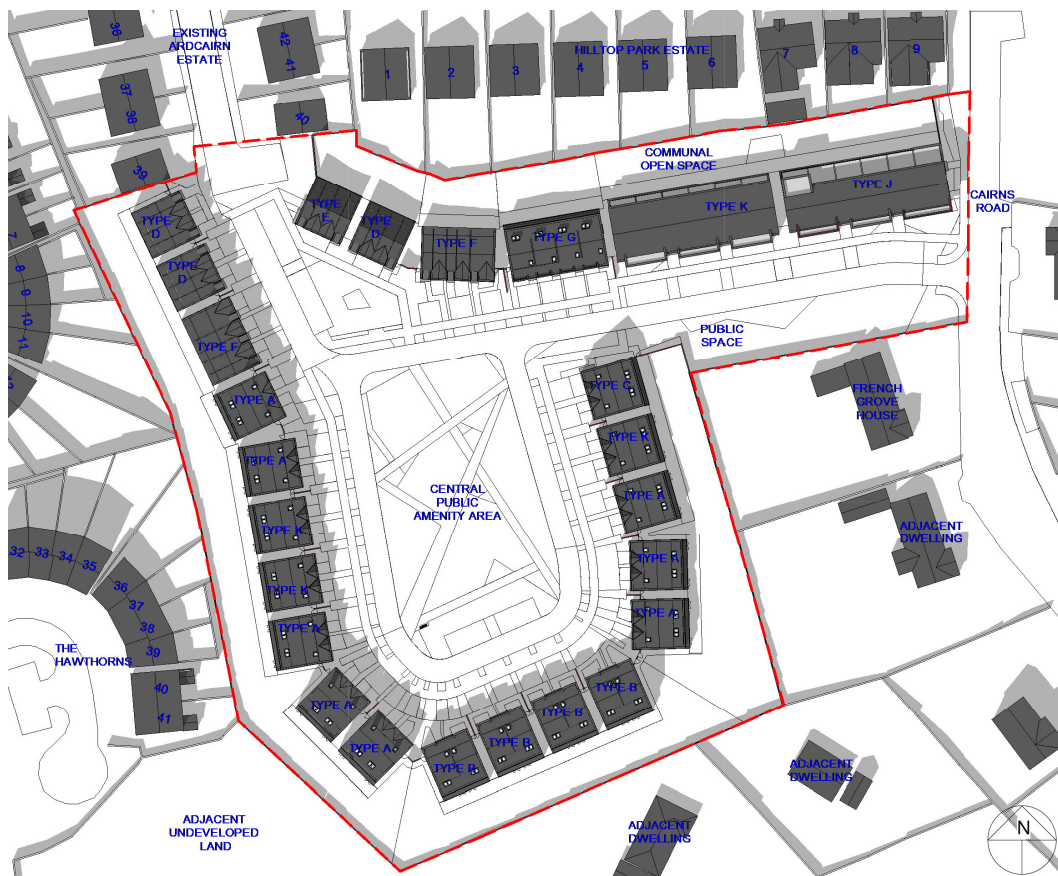
MARCH 21st – 12:00 – EXISTING CONDITIONS



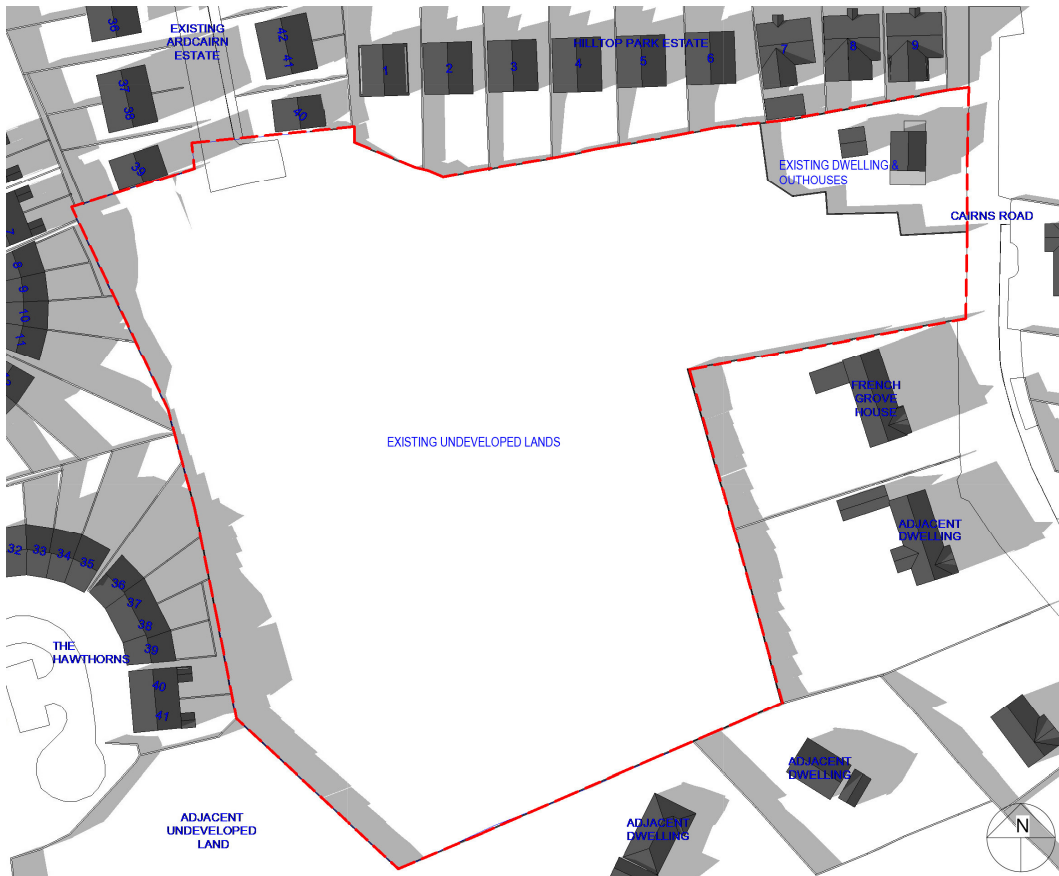
MARCH 21st – 12:00 – PROPOSED CONDITIONS



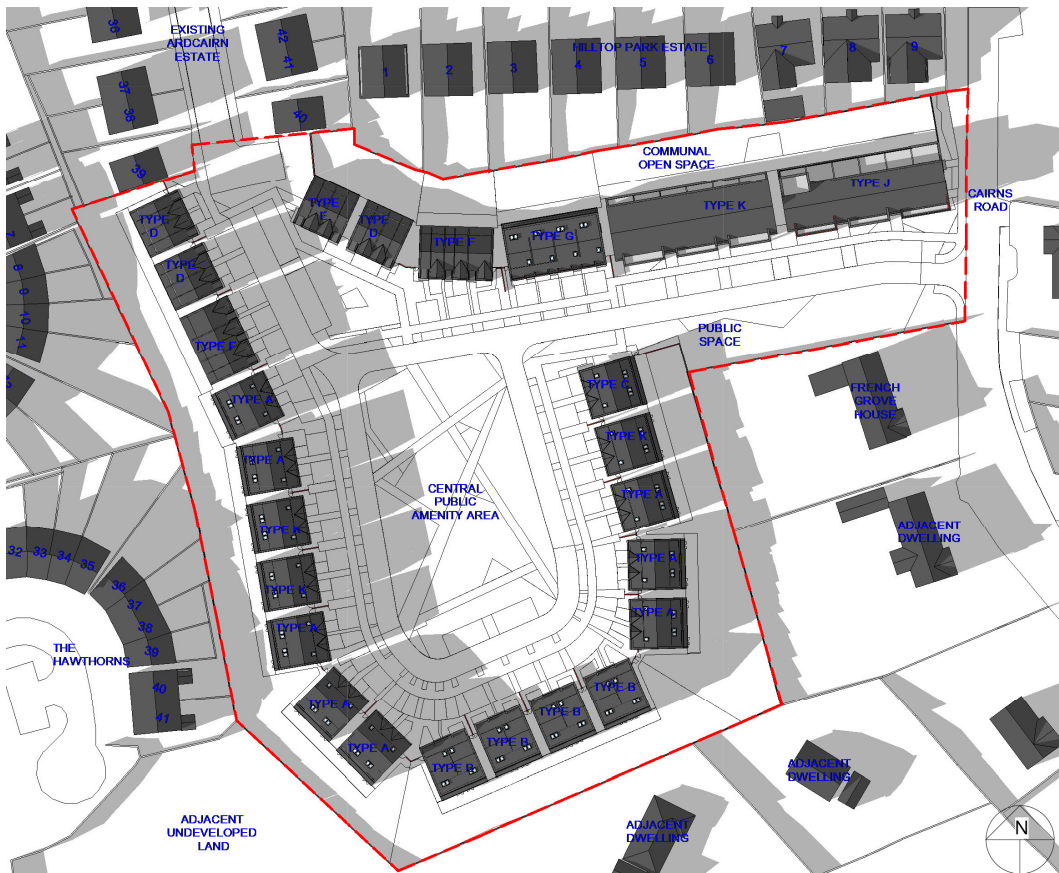
MARCH 21st – 15:00 – EXISTING CONDITIONS



MARCH 21st – 12:00 – PROPOSED CONDITIONS



MARCH 21st – 18:00 – EXISTING CONDITIONS



MARCH 21st – 18:00 – PROPOSED CONDITIONS

Shadow Analysis Results:

The analysis has established the shadows cast by existing buildings & structures surrounding and within the site at the Spring Equinox. It also identifies the affect shadows cast by the proposed development would have on rear gardens of the neighbouring properties and with the site in the same timeframe.

The shadow analysis is taken at the BRE Guidance reference date of 21st March (Spring Equinox) and is studied a various time throughout the day – at 09.00, 12.00 (noon), 15.00 and 18.00 to gain an understanding of the shadows cast throughout the course of the day at the Equinox.

The results show that Shadows of the proposed development differing from the existing conditions are evident in the following instances:

- A minor increase of shadows cast to a small area of the rear (south-west) area of the back garden of adjacent No.1 Hilltop Park can be observed throughout the day due to proposed Units 40 & 41
- In the early morning only, the gardens of The Hawthorns No.s 8, 9, 10, 11, 40 & 41 have an increased shadow footprint. By Midday, no change in comparison to the existing conditions is evident and there is no increase either later in the day.
- In the late evening only, the rear (eastern) part of gardens to two no. adjacent bungalow dwellings on Cairns Road have a slight increased shadow footprint due to construction of new boundary walls)

For the particular adjacent gardens where there is an increase in shadows cast is observed as a result of the proposed development, the increase is either of limited extents &/or of limited time duration. These gardens would experience an imperceptible level of effect with all gardens retaining well in excess of the BRE requirements of at least 2 hours of sunlight to 50% of the garden at the Spring Equinox.

All other areas neighbouring garden areas are unaffected by the proposed development.

The results of the Shadow Analysis demonstrates that the new development will meet BRE Criteria and will not have an adverse effect on adjacent private gardens/ amenity areas.