5.0 Review of the BRE Sunlight and Daylight Assessment

5.1 Introduction

This appendix to Chapter 5 (Population & Human Health) of the Environmental Impact Assessment Report (EIAR) has been written by Nicholas Polley. Nicholas is a qualified building service engineer (B.Sc. (Eng) Dip Eng.) and Managing Director of 3D Design Bureau with over 24 No. years of experience in this industry. It provides a review of the BRE Sunlight and Daylight assessment of this proposed development. The detailed 3DDB Sunlight and Daylight assessment, and the full set of results, can be found in the Daylight and Sunlight Assessment Report (D/S Report) enclosed separately.

The *BRE Guide for Site Layout Planning for Daylight & Sunlight – a Guide to Good Practice 2022* (BRE209) does not set out rigid standards or limits. The BRE Guide is preceded by the following very clear instruction 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." - BRE 209.*

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).

In order to categorise the varying degrees of compliance with the BRE Guidelines when assessing the effect that 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 Section E.2 Definition of Effects of the Daylight & Sunlight report. The levels of effect, Negligible, Minor Adverse, Moderate Adverse and Major Adverse are in accordance with the BRE Guidelines and the DCC Development Plan 2022-2028.

This Appendix states mitigation and remedial measures implemented in the proposed design of the scheme as part of this new LRD application to ensure acceptable levels of sunlight and daylight will be achieved within the development itself and in terms of the impact it may have to its surrounding environment, if constructed as per the architectural design.

The surrounding area assessed for potential impact can be seen in Figure 5.3 of this chapter, Receiving Environment. This section should be referred to where VSC (Vertical Sky Component), APSH and WPSH (Annual / Winter Probable Sunlight Hours) and Sun on Ground (SOG) are stated/discussed within this appendix.

Development Description

Sandford Living Limited intend to apply for permission for a Large-Scale Residential Development at a c. 4.26 hectare site at Milltown Park, Sandford Road, Dublin 6, D06 V9K7. Works are also proposed on Milltown Road and Sandford Road to facilitate access to the development including improvements to pedestrian facilities on an area of c. 0.16 hectares.

The development's surface water drainage network shall discharge from the site via a proposed 300mm diameter pipe along Milltown Road through the junction of Milltown Road / Sandford Road prior to outfalling to the existing drainage network on Eglinton Road (approximately 200 metres from the Sandford Road / Eglinton Road junction), with these works incorporating an area of c. 0.32 hectares. The development site area, road works and drainage works areas will provide a total application site area of c. 4.74 hectares.

The development will principally consist of: the demolition of c. 4,847.5 sq m of existing structures on site including Milltown Park House (880 sq m), Milltown Park House Rear Extension (2,031 sq m), the Finlay Wing (622 sq m), the Archive (1,240 sq m) and the Link Building between Tabor House and Milltown Park House Rear Extension to the front of the Chapel (74.5 sq m); the refurbishment and reuse of Tabor House (1,575 sq m) and the Chapel (768 sq m) and the provision of a single storey glass entrance lobby to the front and side of the Chapel (52 sq m); and the provision of 562 No. residential units comprising 6 No. three-bed courtyard houses and 556 No. apartment units (70 No. studios, 176 No. one-bed units, 267 No. two-bed units and 43 No. three-bed units).

Block A1 will range in height from 5 No. storeys to 8 No. storeys and will comprise 81 No. apartment units; Block A2 will range in height from 6 No. storeys to 8 No. storeys and will comprise 139 No. apartment units; Block B will range in height from 3 No. to 7 No. storeys and will comprise 74 No. apartment units; Block C will range in height from 4 No. storeys to 7 No. storeys and will comprise 151 No. apartment units; Block D will range in height from 3 No. storeys to 5 No. storeys and will comprise 30 No. apartment units; Block E will be 2 No. storeys in height and will comprise 6 No. courtyard type houses; and Block F will range in height from 5 No. storeys to 7 No. storeys and will comprise 81 No. apartment units.

The development also includes the provision of: cultural/community space within Tabor House (4 No. storeys including lower ground floor level) and the Chapel (2 No. storeys including lower ground floor level and mezzanine level) (1,698 sq m) with associated outdoor space (248 sq m); a café/restaurant (179 sq m) and a creche (375 sq m) within Block F with associated outdoor creche play area; ancillary residents' amenities and facilities (324 sq m) within Blocks B & C; and a single storey bin store and substation adjacent to Block F (101 sq m).

The development also provides a new access from Milltown Road (which will be the principal vehicular entrance to the site) in addition to utilising and upgrading the existing access from Sandford Road as a secondary access principally for deliveries, emergencies and taxis; new pedestrian access points; pedestrian/bicycle connections through the site; 319 No. car parking spaces (288 No. at basement level and 31 No. at surface level); set down area for deliveries; bicycle parking; 22 No. motorcycle spaces; bin storage; boundary treatments; private balconies and terraces facing all directions; hard and soft landscaping including public open space and communal open space; green/blue roofs; PV panels; substations; lighting; plant; lift cores and overruns; and all other associated site works above and below ground.

The proposed development has a gross floor space of c.50,196 sq m above ground level over a partial basement (under part of Blocks A1 and A2 and under Blocks B and C) measuring c. 10,550 sq m, which includes parking spaces, bin storage, bike storage and plant.

The assessments that were carried out address the impact the proposed development would have on the neighbouring properties and environment in terms of sunlight and daylight. It also measures the levels of daylight (Spatial Daylight Autonomy – SDA) and sunlight

(Sunlight Exposure – SE) received within all habitable rooms in the proposed apartment units, and the levels of Sun on Ground (SOG) expected in the proposed amenity areas.

Furthermore, two supplementary assessments have also been carried out. Whilst the primary assessment of the scheme has been produced under the BRE209, SDA has also been assessed under I.S. EN 17037:2018 Daylight in Buildings (2018). Secondly, a No Sky Line (NSL) study has also been carried out on the scheme due to it being a requirement under the DCC Development Plan, which came into effect in December 2022.

Circa compliance rates have been given for the assessments carried out under BRE 209 and for the IS-EN 17037. Where units have failed to meet the recommended minimum SDA levels within the proposed scheme, under the BRE 209, Compensatory Design Solutions (CDSs) have been provided in the report. This is recommended in the Dublin City Development Plan 2022-2028.

5.2 Assessment Methodology

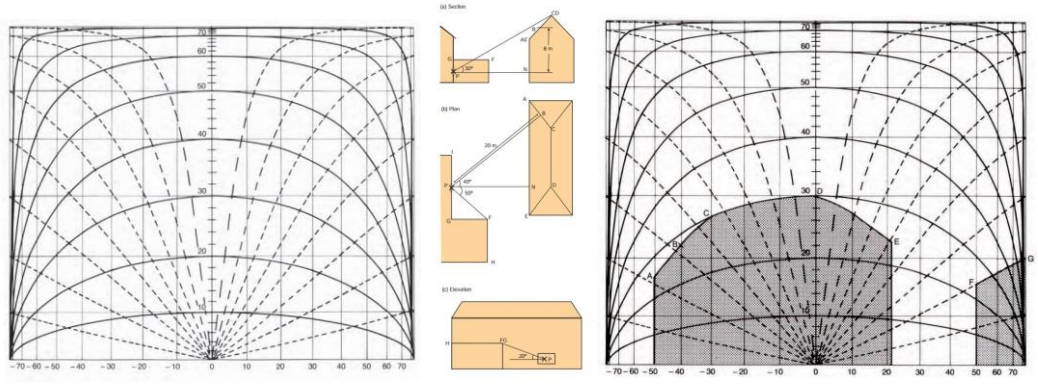
All target values for daylight and sunlight have been taken from the 2022 BRE Guidelines as set out in "Site Layout Planning for Daylight and Sunlight (2022)". Note that the BRE 209 references the BS-EN 17037 for target lux levels.

Glossary

The following glossary, (reference BRE Guidelines) has been included to help understand the terminology throughout this appendix.

VSC (Vertical Sky Component)
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.

When measuring the effect a proposed development will have on the VSC of an existing window, if the value drops below the 27% guideline and is less than 0.8 times the existing value, the proposed development could possibly have a noticeable impact on the amount of daylight received.



Left: Waldram diagram used for calculation of VSC; Centre: Sections, plans and elevation of a hypothetical model; and Right: Waldram diagram applied to the hypothetical model.

A/WPSH (Annual / Winter Probable Sunlight Hours)
Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours are a measure of sunlight that a given window may expect over a year period (1 Jan - 31 Dec), or the winter period (21 Sep - 21 Mar) respectively.

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, section 3.2.9 of the BRE Guidelines suggests that windows with an orientation within 90 degrees of due north need not be assessed.

If a room can receive more than 25% of APSH, including at least 5% in the winter period (WPSH), then the room should receive enough sunlight.

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.

Cloudless sky model
A completely cloudless sky model, used for sunlight exposure calculation.

Model State
The model state is a term used to describe the configuration of the digital model used to run analysis. Model states will typically reflect a baseline state and a proposed or cumulative state. For a complete definition of the model states used in the analysis, please refer to "Preparing the analytical model" on page 11 of 3DDB's daylight and sunlight report.

Sun On Ground (SOG)
Assessment of what portion of a garden or amenity space is capable of receiving 2 hours or more of direct sunlight on March 21st.

Average Sun Hours (ASH)
Assessment of the average possible sun hours received in an area over a given date.

Sunlight Exposure (SE)
The number of hours of direct sunlight a room can expect to receive on a given date between February 1st and March 21st at a determined point on the windows.

Spatial Daylight Autonomy (SDA)
Spatial Daylight Autonomy assesses whether a space receives sufficient daylight on a working plane during standard operating hours on an annual basis. For compliance, the target value is achieved across 50% of the working plane for half of the occupied period.

No Sky Line (NSL)
The No Sky Line divides points on the working plane which can and cannot see the sky.

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 300mm from the room boundaries under BRE 209 criteria, and 500mm from the room boundaries under I.S. EN 17037 criteria.

LKD
Living / Kitchen / Dining room.

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 that has a column identified as "Level of BRE Compliance", 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.

LUX
Lux is a standardised unit of measurement of light level intensity. A measurement of 1 lux is equal to the illumination of a one metre square surface that is one metre away from a single candle.

No Balcony Assessment
A 'No Balcony Assessment' is a hypothetical impact assessment carried out on a neighbouring window/room that is located underneath a balcony or overhanging element, such as a canopy. This assessment is conducted to understand what constraints the overhanging element is having on the potentially affected window.

Definition of Effects on Sunlight and Daylight Access

Section H3 and H4 of the BRE Guidelines state that:

> *"Adverse impacts occur when there is a significant decrease 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. The assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied."*

As such, Planning Authorities should consider a range of localised factors when making decisions. The terminology suggested in section H6 of the BRE Guidelines is listed below, whilst the assessment of impact should depend on a combination of factors. The BRE Guidelines (section H2) also state:

> *"Where a new development affects a number of existing buildings or open spaces, the clearest approach is usually to assess the impact on each one separately. It is also clearer to assess skylight and sunlight impacts separately."*

Taking this advice, 3DDB have categorised the level of effect on each window/room/open space on an individual basis. In quantifying the levels of effect, 3DDB have assigned numerical values to the levels of compliance with the BRE recommendations. By applying a numerical logic to the terminology used in defining the levels of effect there is no ambiguity regarding how the levels of effect have been categorised within this report.

The list of definitions given below is taken from '*Appendix H: Environmental impact assessment*' of the BRE 209 with a clear indication of how they have been applied in the context of this report.

Negligible
For the purposes of this sunlight and daylight document, a '*Negligible*' 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.

Minor Adverse
For the purposes of this sunlight and daylight document, a '*Minor Adverse*' 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 '*Minor Adverse*' level of effect will be applied if the level of daylight or sunlight is reduced to equal or greater than 80% and less than 100% of the applied target value.

Moderate Adverse
For the purposes of this sunlight and daylight document, a 'Moderate Adverse' level of effect will be stated if the level of daylight or sunlight is reduced to equal or greater than 50% and less than 80% of the applied target value. '*Moderate Adverse*' levels of effect are quite typical in instances where a proposed development is planned on an under-developed plot of land.

Major Adverse
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 document, a '*Major Adverse*' level of effect will be stated if the proposed development reduces the availability of daylight or sunlight of a neighbouring property to significantly below a baseline level. A '*Major Adverse*' level of effect will be stated if the level of daylight or sunlight is reduced to less than 50% of the applied target value.

Beneficial Impact
In relation to sunlight or daylight access, it is conceivable that a proposed development could yield positive effects on the neighbouring properties. In such circumstances, the development would typically involve a reduction to the size or scale of built form (e.g. such as the demolition of a building or the removal of a large belt of evergreen trees, which might result in an increase in light access). Where such improvements occur, a '*Beneficial Impact*' will only be stated if the ratio of change is greater than 1.20 (an improvement of 20%). Should less perceptible improvements occur, a '*Negligible*' level of effect will be stated.

Not Applicable (n.a.)
In instances where a baseline value is particularly low, levels of effects can appear exaggerated. To mitigate against such occurrences, if the baseline value in the VSC,

APSH/WPSH or SOG studies is below 1%, 3DDB have categorised the level of effect as n.a. (not applicable).

Averaged Windows (-)
If it can be determined or reasonably assumed that multiple windows are servicing the same room, each window will be assessed, and a weighted average will be calculated. In such instances, the level of effect for the room will be stated, but the level of effect for the individual windows contributing towards the average will be left blank in the table. This will be indicated in the tables with the dash symbol. (-)

Definition of Levels of Sunlight Exposure

For interiors, access to sunlight can be quantified. BRE 209 recommends that a space should receive a minimum of 1.5 hours of direct sunlight on a selected date between 1 February and 21 March with cloudless conditions. It is suggested that 21 March (equinox) be used. The medium level of recommendation is three hours, and the high level of recommendation is four hours. For dwellings, at least one habitable room, preferably a main living room, should meet at least the minimum criterion.

The level of sunlight exposure will be stated for each assessed room in the tables under section "C.3 Sunlight Exposure (SE) in Proposed Units" on page 186 of 3DDB's daylight & sunlight report. Below is a list of the terms used to categorise the levels of sunlight exposure:

Below Minimum
Sunlight exposure will be categorised as 'below minimum' if the potential sunlight for the assessed room is less than 1.5 hours on March 21st. Note: the recommendation is that a room within a proposed unit is capable of receiving 1.5 hours of direct sunlight on March 21st. If an individual room of a proposed unit does not achieve this recommendation, it does not mean that the unit is non-compliant.

Minimum
A minimum level of sunlight exposure will be stated if the potential sunlight for the assessed room is between 1.5 hours and 3 hours on March 21st.

Medium
A medium level of sunlight exposure will be stated if the potential sunlight for the assessed room is between 3 hours and 4 hours on March 21st.

High
A high level of sunlight exposure will be stated if the potential sunlight for the assessed room is greater than 4 hours on March 21st.

Preparing the Analytical Model.

5.2.1.1 Building the Model States

The project architect, O'Mahony Pike Architects(OMP) supplied 3DDB with 3D models of the proposed development from which a 3D analytical model was created. Landscape drawings were provided by Cameo & Partners Landscape Architects.

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, a reasonable tolerance should be allowed to the placement of windows, boundary treatments and the results generated.

5.2.1.2 Baseline Model State

As illustrated in Fig 5.1, the baseline model 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. There is a granted development to the south of the subject site (DCC Reg. Ref. 3116/22), as highlighted in red in the figure below. This permitted development has not been constructed at the time of writing, but has been included in the baseline model state. Existing trees on the subject site are represented using information from a tree survey, provided by CMK Urban Forestry Consultants. For trees outside of the subject site photogrammetry information has been used, with assumptions made regarding exact size, position and species.

Fig 5.1. Baseline Model State

The BRE Guidelines recommend that impact assessments should be carried out 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. These criteria have been used to ensure all windows that could possibly sustain an adverse level of effect have been included in the model when running VSC and APSH/WPSH assessments. However, additional windows of surrounding properties have also been included in the impact assessment. This has been done to align with the impact assessment that was conducted as part of the previous proposal on the same site.

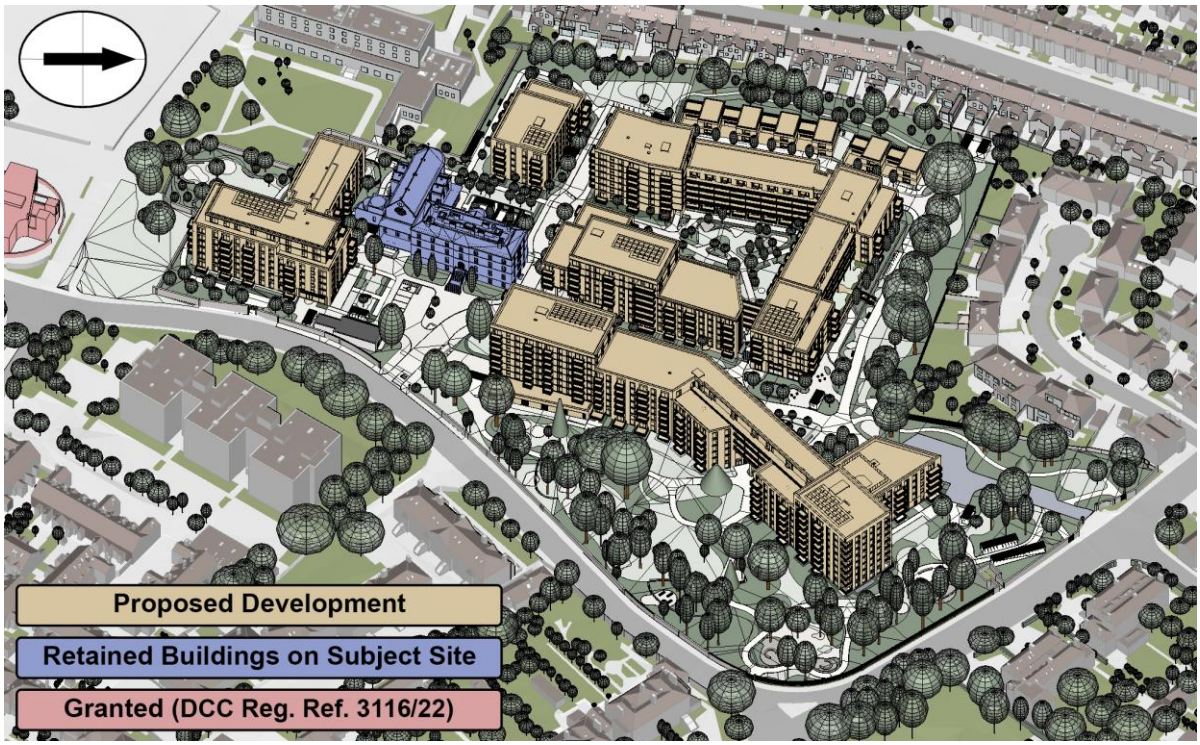


Fig 5.2 – Proposed Model State.

All of the above information was subsequently used to prepare a digital analytical model in software specifically designed for daylight and sunlight analysis.

5.2.1.3 Trees in the Model States

As stated in section 3.3.9 of the BRE Guidelines, the exact shapes of trees are "almost impossible to predict". A tree survey was used when modelling a simplified representation of existing trees on the subject site. This survey contained information related to the species, height and crown spread of the existing trees. Where tree survey information was not provided, the position and size of existing trees have been estimated using photogrammetry information. The shape of the trees have been simplified and an average transmittance value has been applied using information from table G1 from the BRE Guidelines. Simplified models of proposed trees within the development have also been included according to the information provided by the landscape architect.

BR 209 provides guidance on how trees should be treated depending on the study being carried out, as summarised below:

Impact to Vertical Sky Component (VSC) and Annual / Winter Probable Sunlight Hours (APSH / WPSH)

Section G1.2 of the BRE Guidelines states that when assessing the effect a new development would have on existing buildings, "it is usual to ignore the effect of deciduous trees". This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf. Evergreen trees should be included, particularly where a dense belt or group of evergreens is specifically planned as a windbreak or for privacy purposes.

Additionally, it should be noted that there is a mature tree line along the north and west boundaries of the proposed site, of which a significant portion is made up of deciduous trees.

These deciduous trees have not been included in the analytical model, as per the advice in the BRE Guidelines. This methodology ensures that the calculated impacts reflect the worst case scenario, where the proposed buildings are not obscured behind deciduous trees that will be bare during winter months. During the summer months, when these trees are in full foliage, impacts caused by the proposed development will be less perceptible.

Sun On Ground (SOG)

Regarding SOG assessments, section G4.1 of the BRE Guidelines states:

> *"…trees and shrubs are not normally included in the calculation unless a dense belt or group of evergreens is specifically planned as a windbreak or for privacy purposes. This is partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees)."*

As such, deciduous trees have not been included in the calculation of SOG, unless there is a dense belt present or a group of trees specifically planned as a windbreak or for privacy purposes. Evergreen trees are included in the SOG assessment.

Sunlight Exposure (SE)

Section G3.1 of the BRE Guidelines states that as deciduous trees would not be in full leaf on the recommended assessment date (March 21st), sunlight would be expected to penetrate deciduous trees. However, as trees have so many variables, it is impossible to accurately represent how they would affect sunlight at a given time. The suggested methodology (BR 209) to allow for this is to run the sunlight exposure study in two states. First, with trees as opaque objects and secondly, without deciduous trees in the assessment model. This gives a range of potential sunlight hours.

Spatial Daylight Autonomy (SDA)

BR 209 recommends when assessing daylight in a proposed building, it is appropriate to run the assessment with trees represented over the course of the whole year. Light transmittance values for the modelled trees are varied to account for summer and winter foliage.

Taking average dates from *BRE Digest 350*, appropriate light transmittance values have been applied to deciduous trees to represent the 'full leaf' and 'bare branch' states.

Evergreen trees are represented as 'full leaf' throughout the year. The BRE Guidelines (section G2.3) also state:

> *"The calculation model should account for the obstruction to daylight caused by the trees. This needs to be done by modelling a representative shape of the trees. Often trees are irregularly shaped and simple modelling, using height and spread data and assuming a circular tree, will give inaccurate results. A special survey on site is generally required to produce the required data on the tree profile, using a clinometer or other device to measure tree height. Buildings and other solid objects should also be taken into account."*

In the absence of a 'special survey' being conducted, as mentioned above, simplified models representing trees have been used. The information for these trees has been taken from

photogrammetry information and an arborist report, when available. A reasonable tolerance should be applied to the results generated to account for trees not being represented exactly as they appear on site.

Units have also been assessed without trees to give an understanding of how the architecture performs should trees not be factored into the calculation.

I.S. EN 17037 does not give any guidance on how trees should be represented. For the purpose of this report, the SDA calculation under the I.S. EN 17037 criteria has been carried out with trees represented in the same manner as the BR 209 assessment. Units have also been assessed without trees to give an understanding of how the architecture performs should trees not be factored into the calculation.

No Sky Line (NSL)

Because some sky can usually be seen through a tree canopy, deciduous trees have not been included in the No Sky Line assessment model. Evergreen trees may be included in this assessment, particularly if there is a dense belt or group planned for windbreak or for privacy purposes.

Shadow Study

The hourly renderings of the shadow study have been generated with evergreen trees represented as opaque objects, where applicable, and without deciduous trees. This method best represents the methodology used for the impact assessment and allows for a better understanding of potential shadows cast by the proposed development through the tree canopy.

5.3 Daylight & Sunlight Impact Assessment Criteria

The impact assessment that was carried out for the purpose of this report has studied the potential levels of effect the surrounding existing environment and/or properties would sustain should the proposed development be built as proposed. The effects were assessed in the baseline state versus the proposed state.

Following advice within the BRE Guidelines, the surrounding context was carefully considered to ensure all properties and amenity spaces that may potentially experience a level of effect have been included in the study. A more detailed explanation of the criterion applied can be found in section "2.1 Impact Assessment, Window Selection Criteria", page 9, of the 3DDB Report.

Vertical Sky Component (VSC) – Impact Assessment

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.

For the proposed development, all properties within a radius of three times the height of the proposed development have been considered for impact assessment. Should the angle from the windows to the proposed development subtend 25° in a perpendicular section, then VSC is calculated in both the baseline and proposed model states, and a comparison made.

A no skyline assessment requires accurate dimensions and layouts of both rooms and windows. However, the required information is rarely available for existing dwellings. As such, it is not common practice to carry out a No Sky Line (NSL) impact assessment. A No Sky Line (NSL) assessment has only been carried out for the granted archive storage and office building (DCC Reg. Ref. 3116/22) where room layouts have been obtained from the planning portal.

VSC can be defined as the amount of skylight that falls on a vertical wall or window.

Where applicable, this report assesses the percentage of direct sky illuminance that falls on the assessment point of neighbouring windows that could be affected by the proposed development.

Section 2.1.6 of the BRE Guidelines states 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.

The VSC for each window/room will be calculated in the relevant model states, as outlined in section 2.2 on page 11 of 3DDB's daylight & sunlight report. A comparison between the results generated with these model states 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.

In instances where a baseline value is less than 1%, the impact will be considered '*non-applicable*' (n.a.).

Under BRE Guidelines (section 2.2.2), only habitable rooms need to be assessed for effect to VSC. 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 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.

Weighted Averages

If it can be determined or reasonably assumed that multiple windows are servicing the same room, each window has been assessed and a room VSC has been calculated by applying a weighted average calculation to the results.

When calculating weighted averages, the proportion of the total glazing area represented for each window is taken into account. It should be noted that assumptions typically need to be made regarding window sizes, so a tolerance should be applied regarding calculated weighted averages.

In instances where weighted averages have been calculated, the VSC figures will be stated for each window on an individual basis, as well as the calculated figure to be applied to the room, but the level of effect will only be stated for the room.

Project Assessment

A VSC impact assessment has been carried out on the windows/rooms of the neighbouring properties that could be affected by the proposed development. Additionally, the impact assessment has been extended to include all existing properties as per the previous application.

The assessed properties are: Rowan Hall / Cedar Hall, Mount Sandford, 1 St. James Terrace, Loyola House (87 Eglinton Road), 132-138 Sandford Road, 1-11 Norwood Park, 28-35 Cherryfield Avenue Lower, 1-20 Cherryfield Ave Upper, Jesuit Building, and a Granted archive storage and office building (DCC Reg. Ref. 3116/22).

In accordance with Section 2.2.13 of the BRE Guidelines, an additional VSC impact assessment was also conducted for the windows of Rowan Hall / Cedar Hall that are located under recessed balconies to demonstrate how the balconies are contributing to perceived levels of effect.

No VSC impact assessment was conducted for other properties that are within three times the height of the proposed development. This is because they do not have a window from which the proposed development would subtend an angle of 25° when measured in a perpendicular section.

The results for the VSC assessment can be found in the Appendix results section A.1 on page 35, with analysis of the results in Section 3.1.1 on page 20 of the main Report.

Annual & Winter Probable Sunlight Hours (APSH / WPSH) – Impact Assessment

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

A proposed development could potentially have a negative effect on the level of sunlight that a neighbouring property receives, if the obstructing building is located to the south and is large in relation to their distance from the existing dwelling. This can be determined if the distance of a proposed development is less than three times its height from an existing dwelling, or if the angle from an existing window to the proposed development subtends 25° to the horizontal when measured in a perpendicular section.

Whether a window is considered for APSH/WPSH impact 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.

The above criteria have been used to ensure all windows that could possibly sustain an adverse level of effect have been included in the APSH/WPSH assessment.

The APSH/WPSH for each of the assessed windows will be calculated in the relevant model states, as outlined in Section 2.2 on page 11 of 3DDB's daylight & sunlight report. A comparison between the results generated with these model states will determine the level of effect.

If it can be determined or reasonably assumed that multiple windows are servicing the same room, the APSH/WPSH will be assessed for the room as opposed to each individual window. When APSH/WPSH is assessed for a room, it considers sunlight coming from all windows, but does not double-count if sunlight is reaching multiple windows at the same time.

If a room can receive more than 25% of APSH, including at least 5% of the WPSH, then the room should receive enough sunlight. Despite being two components of the same technical study, the results for APSH and WPSH are presented separately in this report. This approach distinguishes between annual and winter sunlight impacts, thereby facilitating a more detailed analysis of the effect of the proposed development.

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.

In some circumstances, the available sunlight during the winter period (WPSH) may both drop below the recommended minimum of 5% with a proposed value of less than 0.8 times the baseline value, but the reduction to annual probable sunlight (APSH) is less than 4%. Such occurrences are considered compliant with the BRE Guidelines (Section 3.2.6), and the impact to WPSH will be stated as '*n.a.*' on that basis.

Additionally, where a baseline value is less than 1%, the impact will be considered '*non-applicable*' (n.a.)

According to Section 3.2.3 of the BRE Guidelines, only main living-rooms need to be assessed for effect on sunlight. In the absence of design layouts or floor plans, or information pertaining to the internal 'as-built' layouts, all windows assumed to be servicing habitable rooms have been included in the APSH/WPSH assessment provided they are orientated within 90° of due south and are in relatively close proximity to the proposed development.

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 APSH/WPSH 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.

Project Assessment.
The APSH/WPSH impact assessment has been carried out on the windows/rooms of the neighbouring properties as indicated in Figure 5.1 on page 3, with an orientation within 90 degrees of due south.

The assessed properties are: The front elevation of Loyola House (87 Eglinton Road), 132-138 Sandford Road, 1-11 Norwood Park, 28-35 Cherryfield Avenue Lower, 1-20 Cherryfield Ave Upper and the Jesuit Building at Milltown Park.

No APSH/WPSH assessment has been conducted for the windows on the side elevation of Loyola House (87 Eglinton Road), Rowan Hall / Cedar Hall, Mount Sandford, 1 St. James Terrace, and the granted archive storage and office building (DCC Reg. Ref. 3116/22) on the basis that the windows of this property that face the subject site do not have an orientation within 90° of due south.

An APSH/WPSH impact assessment was also not conducted for other properties that are within three times the height of the proposed development. This is because they do not have a window from which the proposed development would subtend an angle of 25° when measured in a perpendicular section.

The results for the APSH/WPSH assessment can be found in the appendix results section A.3 on page 65, of 3DDB's daylight and sunlight report.

Sun On Ground (SOG) – Impact Assessment

Section 3.3.17 of the BRE Guidelines recommends that for a garden or amenity area to appear adequately sunlit throughout the year, at least half the area should receive at least two hours of sunlight on March 21st. As the BRE Guidelines do not provide clear criteria on which neighbouring properties should be included in an impact on SOG study, 3DDB have carefully considered the neighbouring properties that may be affected when running the impact assessment. Gardens or amenity areas included in this study are typically located within close proximity, to the north of the proposed development.

Where a quantitative assessment has not been carried out it is on the basis that the omitted areas are unlikely to be adversely affected. Such instances may be because the areas are not deemed to be in close proximity to the proposed development or because they are located to the south. Should there be any concerns over the potential impact on any areas that have not been included in the quantitative assessment, a qualitative assessment may be carried out using the shadow study and false colour plans included in 3DDB's daylight & sunlight report.

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

In accordance with section 3.3.9 of the BRE Guidelines, typically deciduous trees will not be included unless there is a particularly dense belt. The analytical model for SOG impact assessment includes evergreen trees, where applicable.

Where applicable, the percentage of assessed areas which can receive two hours or more of direct sunlight on March 21st is calculated in the relevant model states, as outlined in section 2.2 on page 11. A comparison between the results generated with these model states can be used to determine the level of effect.

A proposed development could possibly have a noticeable effect on the sunlight received by an existing garden and/or amenity area, if the following occurs:

- Half the area of the space does not receive at least two hours of sunlight during the spring equinox; **and**
- The area that receives more than two hours of sun on the spring equinox is less than 0.8 times its former value.

In instances where a baseline value is less than 1%, the impact will be considered '*non-applicable*' (n.a.)

Effect on sunlight to existing neighbouring gardens and/or amenity areas has been assessed to the north of the proposed development, as areas located to the south are unlikely to be affected due to sun direction. Overshadowing is highly unlikely to occur in areas that are due south of any proposed development.

Project Assessment:

A SOG impact assessment has been carried out on the rear gardens of existing neighbouring properties to the north of the subject site that share a boundary.

Namely: 1-11 Norwood Park (6), 28-35 Cherryfield Avenue Lower (7) and 1-20 Cherryfield Ave Upper (8).

The results of the impact to sun on ground assessment in the neighbouring gardens/amenity areas (including a visual representation in the form of 2-hour false colour plans) can be found in the appendix results section A.4 on page 96, of 3DDB's daylight and sunlight report.

Shadow Study – Qualitative Assessment

A shadow study has been carried out to allow a qualitative comparison between the relevant model states, as outlined in Section 2.2 on page 11 of 3DDB's D/S Report. This visual representation of the shadows cast by the proposed development can be found in the hourly shadow diagrams in the appendix of results in 3DDB's sunlight and daylight report, starting on page 105.

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

- Spring equinox: March 21st Sunrise 6:32 | Sunset 18:32 (GMT)
- Summer solstice: June 21st. Sunrise 5:04 | Sunset 21:49. (BST) (Daylight savings)
- Winter solstice: December 21st Sunrise 8:45 | Sunset 16:00. (GMT)

The shadow study has been generated using the same model states as described in Section 2.2.1 of 3DDB's daylight and sunlight report. In certain cases, assumptions or estimations may have been made when modelling elements of the surrounding context and/or proposed site details when creating the various model states. Therefore, it is advisable for a reasonable tolerance to be applied when interpreting shadows in the qualitative assessment.

The hourly renderings of the shadow study will be generated without deciduous trees and with evergreen trees, where applicable, represented as opaque objects when present in the model states.

Note: The spring equinox (March 21st) and autumn equinox (21st September) yield similar shadows, albeit with a one hour difference as daylight saving time (BST) would be in effect. Only the spring equinox was included in the shadow study images in accordance with the BRE Guidelines.

5.4 Scheme Performance Assessment Criteria

Daylight access for the habitable rooms of the residential units of the proposed development have been assessed through a Spatial Daylight Autonomy (SDA) study. Sunlight access for the same rooms has been quantified through a Sunlight Exposure (SE) assessment. A Sun On Ground (SOG) study has also been carried out to indicate the level of sunlight on March 21st in the proposed external amenity spaces. Supplementary scheme performance studies have also been carried out. These include an SDA assessment under the I.S. EN 17037 criterion, a No Sky Line (NSL) study within proposed habitable rooms and an Average Sun Hours (ASH) for each assessed outdoor amenity space on three key dates: the spring equinox (March 21st), the summer solstice (June 21st), and the winter solstice (December 21st).

Sun On Ground (SOG) - Proposed Outdoor Amenity Areas

Section 3.3.17 of the BRE Guidelines recommends 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 analytical model for SOG assessment in proposed amenity areas includes evergreen trees, where applicable, as per section G4.1 of the BRE Guidelines. Typically, deciduous trees will not be included unless there is a particularly dense belt.

A quantitative SOG assessment may be carried out on the areas as indicated by the project architect. Shadow studies and false colour plans can allow for a qualitative assessment for all other areas.

The portion of each assessed space capable of receiving 2 hours of direct sunlight on March 21st should be calculated individually. These areas can be combined to give the development average where appropriate.

Project Assessment

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.

The results for the study on sun on ground in the proposed outdoor amenity areas (including a visual representation in the form of 2-hour false colour plans) can be found in the appendix results section C.4 on page 233, of 3DDB's daylight and sunlight report.

This analysis quantifies the anticipated sunlight levels within the assessed amenity areas. The as-built outcome is subject to variation, depending on real-world weather and any changes to the exterior setting.

Fig 5.2 indicates the proposed amenity areas that were assessed.

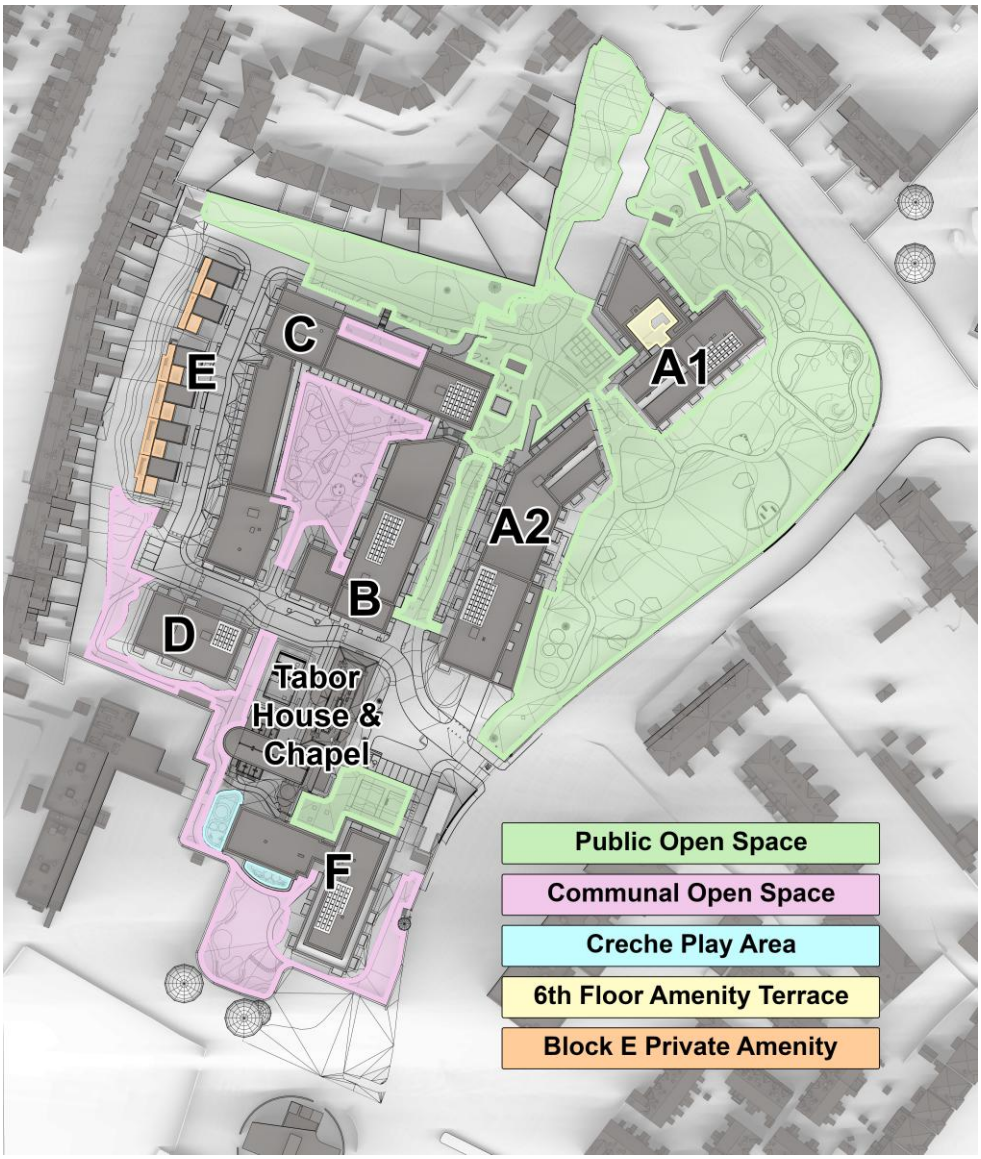


Fig 5.2: Proposed areas assessed for SOG

Sunlight Exposure in Proposed Habitable Rooms (SE)

Since the publication of the 3rd edition of the BRE Guidelines (BRE 209 - 2022), Sunlight Exposure (SE) is the recommended metric for assessing sunlight access within a proposed development. Sunlight Exposure replaces APSH/WPSH in this regard, which was the recommended metric under the 2nd edition of the BRE Guidelines (BRE 209 - 2011).

Sunlight exposure (SE) is a measure of sunlight that a given window may expect to receive on a given date between the 1st of February and the 21st of March. Section 3.1.10 of the BRE guidelines suggests that March 21st (equinox) is used as the assessment date.

In the presence of trees, SE results have been generated, both with deciduous trees as opaque objects and without the inclusion of deciduous trees, in accordance with section G3 of the BRE Guidelines. Evergreen trees have been included as opaque objects, where applicable, in both states.

The level of sunlight exposure is categorised as follows:

• 1.5 Hours - Minimum • 3 Hours - Medium • 4 Hours – High

The recommendation for dwellings is that at least one habitable room, preferably a main living room, should receive at least the minimum criterion. Should no room within a given unit meet the recommended minimum level of sunlight exposure, it will be stated as non-compliant.

Sunlight exposure is carried out on habitable rooms within a proposed development. The assessment point for windows is 1.2 metres above the finished floor level, or 0.3 metres above the sill level (whichever is higher). If a room has multiple windows, the amount of sunlight received by each can be added together, provided they occur at different times and sunlight hours are not double-counted.

The criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west, it is unlikely to be met. As such, it is not always possible to achieve full compliance, especially in developments that contain single aspect units.

The sunlight exposure assessment focuses on habitable residential rooms. Unless sunlight access is deemed important for the functionality of a non-residential room in a proposed development, it will not be included in the study, which remains limited to residential rooms. In the case of the proposed development, only the residential units have been included in the sunlight exposure assessment.

Project Assessment
The results for the study on sunlight exposure can be found in the appendix results section C.3 on page 186, of 3DDB's daylight and sunlight report.

This study predicts the sunlight potential of the proposed units. Real-world performance post-construction can vary based on actual weather patterns and any alterations to the external environment.

Spatial Daylight Autonomy (SDA)

Since the publication of the 3rd edition of the BRE Guidelines (BRE 209 - 2022), Spatial Daylight Autonomy (SDA) is the recommended metric for assessing daylight access within a proposed development. Spatial Daylight Autonomy replaces ADF in this regard, which was the recommended metric under the 2nd edition of the BRE Guidelines (BRE 209 - 2011).

Spatial Daylight Autonomy assesses whether a room receives sufficient daylight on a working plane during standard operating hours on an annual basis. A given target value should be achieved across 50% of the working plane for half of the daylight hours.

There are two methods for calculating SDA:

• *Calculation method using illuminance level:* This requires the use of a detailed daylight calculation method where hourly (or sub-hourly) internal daylight illuminance values for a typical year are computed using hourly (or sub-hourly) sky and sun conditions derived from climate data appropriate to the site. This calculation method determines daylight provision directly from simulated illuminance values on the reference plane. The illuminance value of at least half the required area of the space should equal or exceed the target values.

• *Calculation method using daylight factor:* The daylight factor method assumes a constant ratio between internal and external illuminance. The daylight factors in the space shall be calculated by any reliable method that is based on the ISO 15469:2004 standard overcast sky (TYPE 1 or TYPE 16). Daylight factors are to be predicted across grid of points on a plane 0.85m above the floor of the space. The daylight factor of at least half the required area of the space should equal or exceed the target values.

It is the opinion of 3DDB that the calculation method using illuminance level better represents a real-world scenario as it accounts for the quality of daylight based on orientation. As such, the illuminance methodology has been adopted as the preferred SDA assessment methodology by 3DDB. A localised EnergyPlus Weather File is used to apply the relevant climate information. In the case of this report, the weather file used is IRL_Dublin.039690_IWEC.epw.

In terms of housing, *BRE 209* provides target SDA values to be received across at least 50% of the working plane for at least half the daylight hours. The target values differ based on the function of the room assessed:

• 200 Lux for kitchens • 150 Lux for living rooms • 100 Lux for bedrooms

Where rooms serve more than one function, the higher SDA target value should be taken. 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 BRE 209. In such instances, 3DDB have applied a target value they deem to be appropriate.

In the case of the proposed development there are a number of rooms associated with the proposed childcare facility, *these include classrooms, staff rest areas, an office and a kitchen*. 3DDB recommend that an SDA target value of 200 Lux be applied to classrooms and the kitchen due to the task orientated nature of these rooms with 150 lux applied to the staff rest area and office. The rooms of the childcare facility have not been included in the calculated compliance rates.

Under I.S. EN 17037 at least 50% of the working plane should receive above 300 lux for at least half the daylight hours, with 95% of the working plane receiving above 100 Lux for all rooms. The target SDA values do not vary depending on the room function under this criteria. This study has assessed the Spatial Daylight Autonomy (SDA) received in the habitable rooms of the proposed development under the BRE 209 criterion. The SDA of the proposed development has been calculated under the I.S. EN 17037 criterion as part of a supplementary assessment.

Defining Rooms

Definition of rooms are typically taken directly from the architectural drawings supplied by the project architect. Sometimes, the applied names of rooms may differ slightly. e.g. A

"Kitchen / Living / Dining room (KLD)" may be referred to as a "Living/ Kitchen / Dining room (LKD)".

According to Section 2.1.14 of the BRE Guidelines areas like bathrooms, stairwells, garages, and storage areas do not have a special requirement for daylight. As such these spaces have not been assessed.

Where an SDA assessment has been conducted, an indication of the assessed space in each room has been indicated in the floor plans that correspond to the SDA results in the appendix section "Proposed Floor Plans" on page 114 of 3DDB's daylight and sunlight report.

Working Plane

The calculation of SDA is carried out on a hypothetical working plane which lies 850 mm from the finished floor level in residential units and 700 mm in academic and office spaces.

In the BRE 209 study the working plane is offset 300 mm from the room boundaries. Under the I.S. En 17037 criteria the working plane is offset 500 mm from the room boundaries. The working plane has a grid density of c. 300 mm.

Material Palette

Following instructions from the project architect, material values used for SDA calculations are as per the table below:

Table No. 2.5.1 - Material Palette for SDA Calculations

Object	Material	Reflectance	Object	Material	Reflectance / Transmittance
Exterior walls	Standard Brick	0.3	Interior Walls	White paint	0.8
	Light Brick	0.4	Interior Ceiling	White paint	0.8
	Dark Brick	0.15	Interior Floor	Light timber	0.4
	Render	0.6	Miscellaneous	Miscellaneous	0.5
	Concrete	0.4	Glass	Glass transmittance value	0.80
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

Trees

BR 209 recommends that when assessing daylight in a proposed building, it is appropriate to run the assessment with trees represented over the course of the whole year. Light transmittance values for the modelled trees are varied to account for summer and winter foliage.

Taking average dates from *BRE Digest 350*, appropriate light transmittance values have been applied to deciduous trees to represent the 'full leaf' and 'bare branch' states.

Evergreen trees are represented as 'full leaf' throughout the year. The BRE Guidelines (section G2.3) also state:

> *"The calculation model should account for the obstruction to daylight caused by the trees. This needs to be done by modelling a representative shape of the trees. Often trees are irregularly shaped and simple modelling, using height and spread data and assuming a circular tree, will give inaccurate results. A special survey on site is generally required to produce the required data on the tree profile, using a clinometer or other device to measure tree height. Buildings and other solid objects should also be taken into account."*

In the absence of a 'special survey' being conducted, as mentioned above, simplified models representing trees have been used. The information for these trees has been taken from photogrammetry information and an arborist report, when available. A reasonable tolerance should be applied to the results generated to account for trees not being represented exactly as they appear on site.

Units have also been assessed without trees to give an understanding of how the architecture performs should trees not be factored into the calculation.

I.S. EN 17037 does not give any guidance on how trees should be represented. For the purpose of this report, the SDA calculation under the I.S. EN 17037 criteria has been carried out with trees represented in the same manner as the BR 209 assessment. Units have also been assessed without trees to give an understanding of how the architecture performs should trees not be factored into the calculation.

Project Assessment
The results for the study on SDA can be found in the appendix results Section C.2 on page 139 of 3DDB's daylight and sunlight report.

The results of the supplementary SDA study under the I.S. EN 17037 criterion can be found in section D.0 on page 244 of 3DDB's daylight and sunlight report.

This study indicates the daylight potential of the proposed development. As-built daylight performance within the occupied development may vary from the results of this assessment due to changes to the exterior context, weather conditions and/or occupier's choice of interior finishes and furniture placement.

No Skyline in Proposed Habitable Rooms (NSL)

The no sky line divides the areas of the working plane which can receive direct skylight, from those which cannot. It indicates the distribution of direct daylight within a room.

Section D3 of the BRE Guidelines recommend the No Sky Line study as an appropriate metric for an impact assessment to daylight, but only where room layouts are known.

"*The calculation can only be carried out where room layouts are known. Using estimated room layouts is likely to give inaccurate results and is not recommended.*"

All advice given for NSL in the BRE Guidelines (section 2.2) are in relation to impact assessments. NSL is not mentioned in the BRE section regarding daylight in new developments. Regardless, a NSL assessment was carried out on the proposed development as a supplementary study as it is requested in the DCC Development Plan 2022-2028 (Section 5.1, Appendix 16).

As the BRE Guidelines does not give advice on target NSL values for proposed rooms, no compliance rate has been stated. However a no skyline of 80% could be considered an appropriate figure given that section 2.2.10 of the BRE Guidelines state that supplementary electric lighting will be needed if a significant part of the working plane (20% of the room or more) lies beyond the no sky line.

The results of the supplementary NSL study can be found in section D.0 on page 244, of 3DDB's daylight and sunlight report.

5.5 Existing Surrounding Environment

For the purposes of this study, the receiving environment for the impact assessment covered the following areas listed below. This is the extent of the surrounding receiving environment that was deemed applicable for assessment. The subject site was included as per its existing state when calculating baseline figures for assessments.

The surrounding context was carefully considered to ensure all properties and amenity spaces that may potentially experience a level of effect were included in the study.

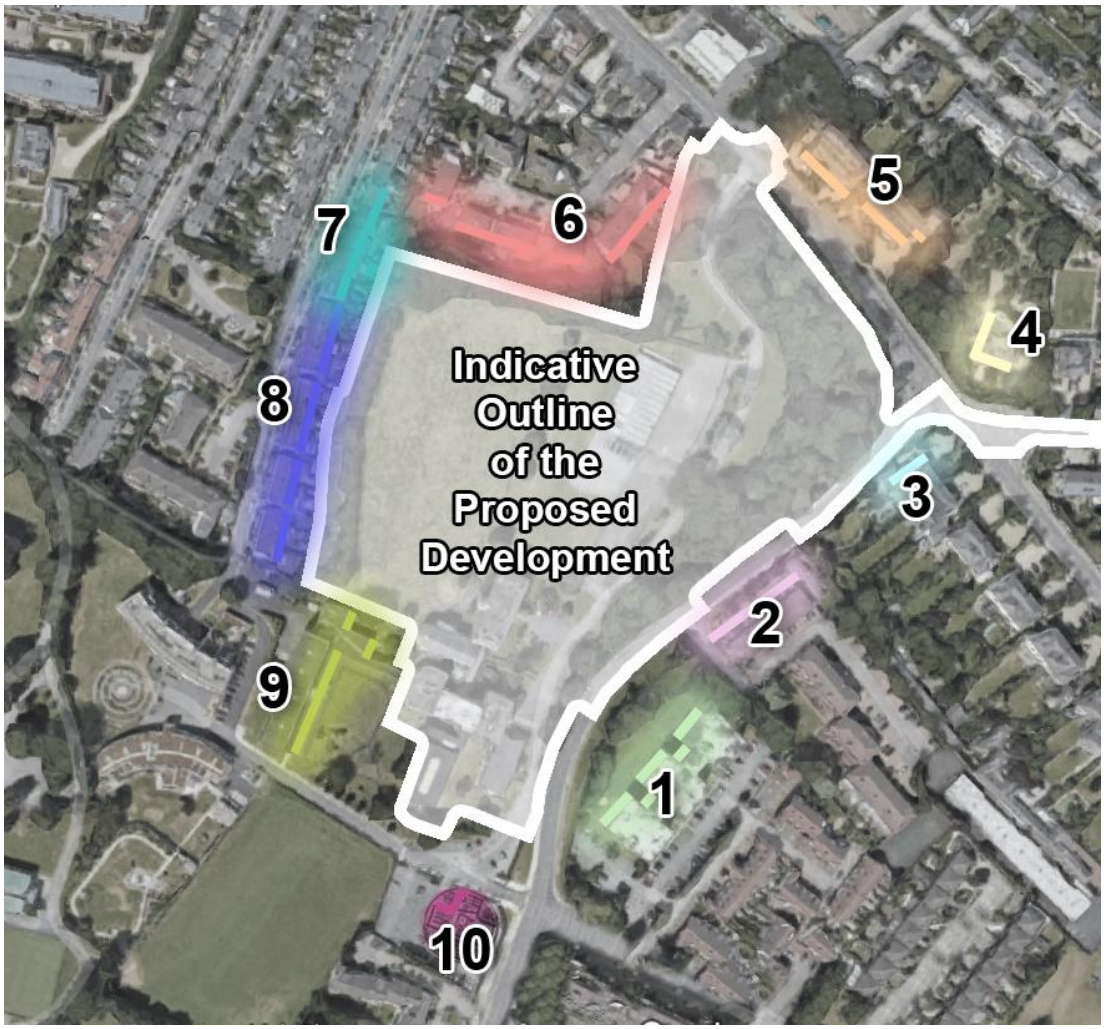


Fig 5.3: Existing Environment that was studied. Description of properties below.

Effect on daylight (VSC) to surrounding properties

Effect on daylight (VSC) to surrounding properties. The effect to the VSC of the windows of the following neighbouring properties was assessed:

- Rowan Hall / Cedar Hall (1)
- Mount Sandford (2)
- 1 St. James Terrace (3)
- Loyola House, 87 Eglinton Road (4)
- 132-138 Sandford Road (5)
- 1-11 Norwood Park (6)

- 28-35 Cherryfield Avenue Lower (7)
- 1-20 Cherryfield Ave Upper (8)
- Jesuit Building, Milltown Park (9)
- Granted archive storage and office building (DCC Reg. Ref. 3116/22) (10)

Effect on sunlight (APSH/WPSH) to surrounding properties

Effect on sunlight to surrounding properties. The effect to the annual and winter probable sunlight hours (APSH/WPSH) of the windows of the following neighbouring properties was assessed:

- The front elevation of Loyola House, 87 Eglinton Road (4)
- 132-138 Sandford Road (5),
- 1-11 Norwood Park (6),
- 28-35 Cherryfield Avenue Lower (7),
- 1-20 Cherryfield Ave Upper (8)
- The Jesuit Building at Milltown Park (9).

Effect on SOG on surrounding external amenity spaces (e.g. gardens and public parks).

Effect on sun on ground (SOG) to surrounding neighbouring rear gardens:

- 1-11 Norwood Park (6),
- 28-35 Cherryfield Avenue Lower (7)
- 1-20 Cherryfield Ave Upper (8).

For the full set of Impact Assessment results, including floor plans, please see 3DDB's daylight and sunlight report.

5.6 Proposed Development

Daylight access for the habitable rooms of the residential units of the proposed development have been assessed through a Spatial Daylight Autonomy (SDA) study. Sunlight access for the same rooms has been quantified through a Sunlight Exposure (SE) assessment. A Sun On Ground (SOG) study has also been carried out to indicate the level of sunlight on March 21st in the proposed external amenity spaces. Supplementary scheme performance studies have also been carried out. These include an SDA assessment under the I.S. EN 17037 criterion, a No Sky Line (NSL) study within proposed habitable rooms and an Average Sun Hours (ASH) for each assessed outdoor amenity space on three key dates: the spring equinox (March 21st), the summer solstice (June 21st), and the winter solstice (December 21st).

It is understood that the existing Chapel Building and Tabor House will be re-purposed as community & culture spaces, should the proposed development be granted as proposed. The exact function and interior layouts of these spaces, are yet to be determined. As such, no assessment has been carried out on the proposed community & culture spaces.

In addition to the residential units, the daylight assessment has been carried out for habitable rooms of the proposed childcare facility in Block F. However, they have not been included in the calculated compliance rates, which focus on proposed residential units only.

For the full set of Scheme Performance results, including floor plans, please see 3DDB's daylight and sunlight report.

5.7 Characteristics of the Development.

Construction Phase

The normal works associated with a construction phase relate to temporary machinery, construction hoarding, construction works and the potential use of cranes. Further details of the construction phase can be found in other chapters of the EIAR.

Operational Phase

Several key attributes to the design were considered by the project architects, which had a positive impact on the original results generated, of this specific application and proposed design, as part of the daylight & sunlight assessment process. 3DDB worked closely with the design team, and in particular the project architects, to ensure a high level of compliance was achieved, for the operational phase, with regard to sunlight and daylight access. This included:

- Proposed amenity spaces utilize a strategic landscape design that pairs excellent overall 'Sun on Ground' metrics with a thoughtful mix of sun-filled and naturally shaded settings.
- Glazing size to habitable rooms on the building facades has been optimised for daylight access entering the apartments.
- Balcony sizes and their positions have been carefully considered to balance the need for private outdoor amenity space and obstructions to daylight of the apartments below.
- Positioning and sizing of proposed trees, that have been included in the assessments as per the BRE Guidelines, have been carefully considered, repositioned and resized where needed, in order to minimise any potential impact on the proposed development.
- Numerous other design mitigations were carried out such as reconfiguration of some internal layouts and introduction of additional windows where necessary all contributed to a high level of compliance.

5.8 Potential Impact of the Proposed Development

Construction Phase

The potential impact of the construction phase of the proposed development on daylight and sunlight access is likely to be, initially, less than the potential impact of the completed development in the operational phase. As the proposed development nears completion, the potential impact of the emerging development is likely to be similar in all material respects to that of the completed development. It is noted that temporary structures and machinery (e.g. hoarding, scaffolding, cranes, etc.) also have the potential to cast shadows, although any additional impacts arising from temporary structures or machinery are likely to be temporary and minor.

Operational Phase (Internally and Externally)

5.8.1.1 Internally (Scheme Performance)

With regard to the sunlight and daylight assessment, this operational phase is considered the 'as-built' development. Internally refers to the Scheme Performance, whilst Externally refers to the Impact Assessment. Note that real-world performance post-construction can vary based on actual weather patterns and any alterations to the external environment.

The following is a summary of the potential scheme performance of the proposed development. Full detailed results can be found in the 3DDB's daylight and sunlight report. Table below summarises the scheme performance results shown in 3DDB's daylight and sunlight report.

Summary of Scheme Performance Results		
Assessment Name	Guiding Document	Compliance Rate
SDA (without trees)	BR 209 (2022)	c. 94%
SDA (with trees)	BR 209 (2022)	c. 91%
SE (no deciduous trees)	BR 209 (2022)	c. 80%
SE (trees as opaque objects)	BR 209 (2022)	c. 76%
SOG (public & communal open space)	BR 209 (2022)	c. 63%*
*The figures stated in the SOG section above refer only to the public and communal open spaces. SOG assessments have also been conducted for the creche play areas and the private amenity areas of the proposed houses in Block E		

Sun on Ground (SOG) to proposed outdoor amenity spaces.

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 assessed spaces in this section of 3DDB's report have been categorised as:

- Public Open Space, of which there are 4 No. spaces. The larger 2 No. of these achieve the recommended level of sunlight, while the smaller 2 No. do not.
- Communal Open Space: of which there are 4 No. spaces, including the 6th floor amenity terrace. 3 No. of the communal open spaces achieve the recommended level of sunlight.
- Creche play areas: Both external creche play areas achieve the recommended level of sunlight on March 21st.
- Private amenity areas of the proposed houses. Each of the 6 No. houses in the proposed Block E contains a ground level garden and a terrace at level 01. While some terraces are shaded by the adjacent property to the south and fall slightly below the recommended levels, the combined amenity area (garden plus terrace) for each property successfully achieves the recommended level of sunlight.

Average Sun Hours

In order to provide a more detailed understanding of the level of sunlight in the proposed external amenity areas, an additional study has been carried out to assess the average sun-hours that these spaces may receive. This study assesses the average sun-hours each proposed external amenity space may receive on March 21st, June 21st (the summer solstice) and December 21st (the winter solstice).

As summarised above, in total 16 No. spaces have been assessed, 13 No. of which would meet the criteria as set out in the BRE Guidelines. This gives a circa 81% compliance rate.

The assessed spaces are comprised of the proposed communal and public open spaces at ground level within the proposed development; a 6th floor amenity terrace in Block A1; 2 No. creche play areas in Block F, and 6 No. private amenity areas all of which are the combination of a garden and terrace in the houses of Block E.

All areas assessed have been defined by the landscape architect. The proposed communal open space is located throughout the site, some areas will receive a better level of sunlight than others, but overall the development can be considered to have good potential for sunlight access.

Spatial Daylight Autonomy - SDA (under the BRE 209)

This study has assessed the Spatial Daylight Autonomy (SDA) received in all habitable rooms within the residential portion of the proposed development. This has ensured that a clear understanding has been obtained regarding the daylight performance of the proposed development.

Assessment has been carried out on 562 No. residential units, which are made up of c. 1419 No. habitable rooms. Under the criteria as set out in the BRE 209, the SDA value in c. 1286 No. habitable rooms meet or exceed their target values in the "annual tree" calculations. Whilst in the "no tree" calculations 1329 No. habitable rooms meet or exceed their target values. This gives a circa compliance rate of 91% with trees included & 94% without trees. A favourable balance has been achieved in terms of daylight levels, provision of trees and appropriate density on the proposed site.

Spatial Daylight Autonomy - SDA (under the IS-EN 17037)

I.S. EN 17037 sets out more onerous recommendations for SDA. As such, the number of rooms achieving compliance under this standard is c. 995 No. in the "annual tree" state and 1093 No. in the "no tree" state, giving a reduced circa compliance rate of c. 70% and 77% respectively.

Sunlight Exposure – SE

A sunlight exposure assessment has been carried out on all habitable rooms within the residential portion of the proposed development. For these assessments, trees have been included in the analytical model as opaque objects. The assessments have been carried out in two states:

- All trees (evergreen and deciduous) included in assessment model.
- Only evergreen trees included in the assessment model.

This approach is in accordance with section 3.1 of the BRE Guidelines. In total, 562 No. units have been assessed. The level of sunlight exposure for the assessed units is as follows:

In the assessment carried out with all trees considered as opaque objects:

- high: 195 No. (at least 4 hours)
- medium: 51 No. (at least 3 hours)
- minimum: 182 No. (at least 1.5 hours)
- below minimum recommendation: 134 No. (less than 1.5 hours)

When only evergreen trees included in the assessment model:

- high: 210 No. (at least 4 hours)
- medium: 62 No. (at least 3 hours)
- minimum: 175 No. (at least 1.5 hours)
- below minimum recommendation: 115 No. (less than 1.5 hours)

The SE assessment has shown that, depending on the effect of trees, the circa compliance rate for the assessed units, in accordance with section G3.4 of the BRE Guidelines, is between 76% & 80%.

5.8.1.2 Impact - Externally (the Surrounding Properties & Environment)

With regard to the sunlight and daylight assessment, the operational phase relates to the 'as-built' development. The following is a summary of the potential impact of the proposed development on the surrounding properties and environment. Full detailed results can be found in the 3DDB's daylight and sunlight report. Please also refer to Fig. 3 above for a mark-up of the receiving environment.

Impact on Vertical Sky Component (VSC) on existing surrounding properties

The effect on VSC has been assessed for 362 No. windows/rooms across the surrounding properties. 318 No. of these are of residential properties with the remaining 44 No. on non-residential properties.

The only instances in this study that did not comply with the criteria as set out in the BRE guidelines for impact to VSC are 18 No. windows located within recessed balconies in the Rowan Hall / Cedar Hall development which is south-east of the subject site.

It is the opinion of 3DDB that, given the size and density of the proposed development, the results of the VSC impact assessment can be considered favourable.

See also 'Residual Impact of The Proposed Development' below for further detail on the impacted windows.

Impact on Annual & Winter Probable Sunlight Hours (APSH / WPSH) on existing surrounding properties

The APSH / WPSH assessments have been carried out on the relevant windows of the surrounding properties that have an orientation within 90 degrees of due south. As such, no APSH/WPSH assessment has been carried out on Rowan Hall / Cedar Hall, Mount Sandford, 1 St. James Terrace and the side elevation of 87 Eglinton Road and the granted archive storage and office building on Jesuit lands (DCC Reg. Ref. 3116/22).

The effect on APSH/WPSH has been assessed for 182 No. windows/rooms of the surrounding existing residential properties across 87 Eglinton Road, 132-138 Sandford Road, 1-11 Norwood Park, 28-35 Cherryfield Avenue Lower, 1-20 Cherryfield Avenue Upper and a further 40 No. windows on the non-residential Jesuit Building at Milltown Park.

The effect on the APSH of 217 No. of these windows or rooms would be considered *negligible*, with a further 5 No. presenting a *minor adverse level of impact.* This shows that c. 98% of these windows have met the criteria for effect on APSH as set out in the BRE Guidelines.

The effect on the WPSH of 199 No. of these windows or rooms would be considered *negligible*, 1 No. *minor adverse, 2 moderate adverse and* 3 No. *major adverse*. A further 17 No. windows/rooms have been categorised as *non-applicable* (n.a.) on the basis that the baseline value is so low (less than 1%), that any reduction would appear exaggerated.

This indicates that c. 98% of the assessed windows have met the criteria for effect on APSH as set out in the BRE Guidelines, whilst 97% of windows assessed under the WPSH criteria achieve compliance. (The windows/rooms categorised as 'non-applicable' have not been included when calculating compliance rates).

Despite the high level of compliance with the BRE Guidelines in both the annual and winter assessments, concerns could be raised by the number of impacts to winter sunlight that have been categorised as major adverse, leading to closer inspection.

For full details on this localised area of concern, and a clear rationale as to why this WPSH study should still be considered favourable, please refer to Residual Impacts of the Proposed Development below.

Impact on Sun on Ground in existing gardens

This study has assessed the effect the proposed development would have on the level of sunlight on March 21st in the rear gardens of the neighbouring properties that share a boundary with the subject site. The assessed gardens are located along Norwood Park, Cherryfield Avenue Lower and Cherryfield Avenue Upper.

In total 39 No. gardens have been assessed. 37 No. of which would experience a *negligible* level of effect with a further 2 No. gardens have been categorised as *non-applicable* (n.a.) on the basis that the baseline value is so low (less than 1%), that no comparison can be drawn.

These results show that 100% of the assessed gardens have met the criteria for effect on sun on ground as set out in the BRE Guidelines. (The gardens categorised as 'non-applicable' have not been included when calculating compliance rates).

Please refer to Residual Impacts of the Proposed Development below for further detail on the affected gardens.

5.9 Do Nothing Impact

In a 'Do -Nothing' Scenario the levels of daylight and sunlight received by the surrounding existing properties and environment will remain as per the results generated in the baseline state. This would apply if the proposed development does not go ahead.

5.10 Mitigation Measures

Design Phase

Throughout the design phase of the project, and under this new application, various 'reduction' mitigation measures in terms of the design of the scheme were introduced. This was to ensure a favourable performance of the development from a daylight & sunlight point of view. The following are some key items in terms of design reduction mitigation measures that were considered and implemented. For a full list of compensatory design solutions on underperforming units on the SDA study, which have been provided by the project architect, please refer to section 3.2.1 of 3DDB's daylight and sunlight report, page 26.

- Proposed amenity spaces utilize a strategic landscape design that pairs excellent overall 'Sun on Ground' metrics with a thoughtful mix of sun-filled and naturally shaded settings.
- Glazing size to habitable rooms on the building facades has been optimised for daylight access entering the apartments.
- Balcony sizes and their positions have been carefully considered to balance the need for private outdoor amenity space and obstructions to daylight of the apartments below.
- Positioning and sizing of proposed trees, that have been included in the assessments as per the BRE Guidelines, have been carefully considered, repositioned and resized where needed, in order to minimise any potential impact on the proposed development.
- Numerous other design mitigations were carried out such as reconfiguration of some internal layouts and introduction of additional windows where necessary all contributed to a high level of compliance.

Construction Phase

There are no ameliorative, remedial, or reductive measures proposed as no significant adverse effects were identified. Furthermore, given the nature of the environmental topic, there are no mitigation measures that can be brought forward.

Operational Phase

There are no mitigation measures that can be implemented, or will be implemented, at operational phase that will alter the projected sunlight and daylight levels generated in 3DDB's daylight and sunlight study.

5.11 Residual Impact of the Proposed Development.

Construction Phase

There are no residual impacts outside the impacts outlined in this appendix.

Operational Phase

Once constructed, the following residual impacts will be experienced. It should be noted that, considering the scale and massing of the proposed development (notwithstanding the localised area of concern), its design has yielded positive results in terms of sunlight and

daylight. The design of the proposed development has minimised impacts on its surrounding environment and itself and achieved high levels of compliance for daylighting within the units.

Vertical Sky Component (VSC)

The effect on VSC has been assessed for 362 No. windows/rooms of the surrounding properties. This includes 318 No. windows/rooms of the following residential properties: Rowan Hall / Cedar Hall, Mount Sandford, 1 St. James Terrace, Loyola House (87 Eglinton Road), 132-138 Sandford Road, 1-11 Norwood Park, 28-35 Cherryfield Avenue Lower and 1-20 Cherryfield Ave Upper. 44 No. windows/rooms have also been assessed for non-residential premises in the vicinity, namely the Jesuit building at Milltown Park and the Granted archive storage and office building (DCC Reg. Ref. 3116/22).

The effect to VSC on 344 No. of these windows (or rooms if an average of multiple windows has been taken) would be considered *negligible*, 14 No. *minor adverse* and 4 No. *moderate adverse*. This shows that c. 95% of the assessed windows would experience a negligible level of effect.

All 18 No. windows that have not met the criteria of the BRE Guidelines for impact on VSC are located on Rowan Hall / Cedar Hall.

As illustrated in Figure 4 below, all windows that show a perceptible level of effect on Rowan Hall / Cedar Hall are located below recessed balconies. With respect to the existing windows situated beneath balconies, the BRE Guidelines state:

> *"Existing windows with balconies above them typically receive less daylight. Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC, and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and area receiving direct skylight, for both the existing and proposed situations, without the balcony in place. For example, if the proposed VSC with the balcony was under 0.80 times the existing value with the balcony, but the same ratio for the values without the balcony was well over 0.8, this would show that the presence of the balcony, rather than the size of the new obstruction, was the main factor in the relative loss of light."*

Fig. 5.4 Affected windows on Rowan Hall / Cedar Hall (L) Aerial view of assessed locations (R)

As such, an alternative study of the non-compliant windows of Rowan Hall / Cedar Hall has been carried out, with the assessment point taken from the balcony edge to eliminate the effect of the recessed balcony.

The results of this hypothetical study can be seen in section A.1.7 on page 42 of 3DDB's daylight and sunlight report. This demonstrates that the ratio of change between the baseline and proposed results are all well above 0.80. This indicates that the nature of the recessed balconies is the primary factor contributing to the relative loss of daylight for the affected windows of Rowan Hall / Cedar Hall, rather than the size or proximity of the proposed development.

Should the windows located under balconies on Rowan Hall / Cedar Hall, be discounted from the impact assessment, the VSC impact assessment would be fully compliant.

Although the results of the VSC impact assessment in the previous application were favourable, the current proposal has shown an improvement in this regard. Aside from the Rowan Hall/Cedar Hall windows discussed above, the previous scheme also showed some 'minor adverse' impacts to properties along Norwood Park and Cherryfield Avenue Upper and Lower. These effects have now been mitigated through a reduction of massing. Most notably, this includes a reduction to the tower element in Block A1 and the replacement of the three-storey duplexes in Block E (along the western boundary) with two-storey houses, which are also located further away from the western boundary of the site.

Additionally, it should be noted that there is a mature tree line along the north and west boundaries of the proposed site, of which a significant portion is made up of deciduous trees. These deciduous trees have not been included in the analytical model, as per the advice in the BRE Guidelines. This practice is to ensure the impacts that are calculated reflect the winter months, when deciduous trees will be bare and provide less of a natural barrier. During the summer months, when the existing trees are in full foliage, impacts caused by the proposed development will be less perceptible.

A slight improvement has been recorded on one of the windows within this study, identified as window '2c' on 2 Norwood Park. This improvement, however minor, is as a result of the

planned removal of some evergreen trees on the subject site and the fact that the buildings of the proposed development would not be visible from this window.

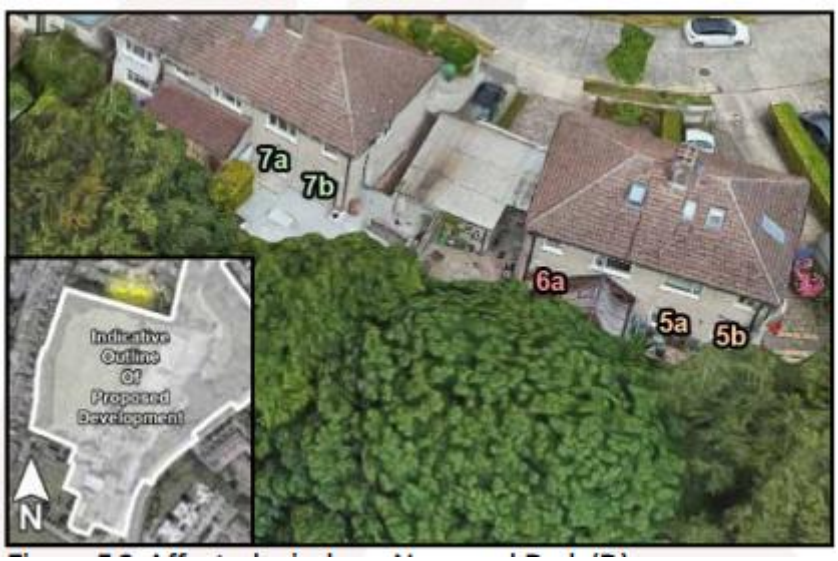


Fig. 5.5: Affected windows Norwood Park.

It is the opinion of 3DDB that, given the size and density of the proposed development, the results of the VSC impact assessment can be considered favourable.

APSH & WPSH

The effect on APSH/WPSH has been assessed for 222 No. of windows/rooms of the surrounding existing properties, 87 Eglinton Road, 132-138 Sandford Road, 1-11 Norwood Park, 28-35 Cherryfield Avenue Lower, 1-20 Cherryfield Avenue Upper and the Jesuit building at Milltown Park.

As per the BRE Guidelines, only windows that have an orientation within 90 degrees of due south have been included in this assessment. As such, no APSH/WPSH assessment has been carried out on Rowan Hall / Cedar Hall, Mount Sandford, 1 St. James Terrace and the side elevation of 87 Eglinton Road.

The effect on the APSH of 217 No. of these windows or rooms would be considered *negligible and 5* No. *minor adverse.* This shows that c. 98% of these windows have met the criteria for effect on APSH as set out in the BRE Guidelines.

The effect on the WPSH of 199 No. of these windows or rooms would be considered *negligible*, 1 No. *minor adverse,* 2 No. *moderate adverse* and 3 No. *major adverse*. Some 17 No. windows/rooms have been categorised as *non-applicable* (n.a.) on the basis that either the annual reduction is less than 4% or that the baseline value is so low (less than 1%), that any reduction would appear significant. This indicates that c. 97% of the assessed windows have met the criteria for effect on WPSH as set out in the BRE Guidelines.

(The windows/rooms categorised as 'non-applicable' have not been included when calculating compliance rates). All windows / rooms that have shown a perceptible level of effect to both APSH and WPSH are located along Cherryfield Avenue.

Despite the high level of compliance with the BRE Guidelines in both the annual and winter assessments, concerns could be raised by the instances within the WPSH study that have been categorised as 'major adverse'. All such instances occur along Cherryfield Avenue.

Further investigation into why the higher level of impacts occur has shown that the configuration to the rear of the houses along Cherryfield Avenue includes a deep recess to each property. This has proven to be a large contributing factor to instances where there is a perceived high level of impact.

Fig. 5.6: Aerial views of No. 12 Cherryfield Avenue Upper

Fig. 5.6 above demonstrates the localized factors that are resulting in such high levels of impact to sunlight along Cherryfield Avenue. The window marked in this diagram as '12a' is already obstructed to the south by the rear extension of 13 Cherryfield Avenue Upper. This limits access to southern light, leaving the window reliant on easterly sunlight. Because the solar altitude is lower during the morning, this window is more susceptible to shading from the proposed development. This is particularly evident in the WPSH study, where the impact is categorised as 'major adverse'

While the categorisation 'major adverse' appears negative, it must be viewed in the context of orientation and existing obstructions. Notably, window '12a' is categorised as 'major adverse,' whereas window '12b' is 'negligible'—despite '12b' being located closer to the proposed development. Typically, closer proximity to an obstruction results in a higher level of effect. The absence of this correlation here is clear evidence that the localised obstructions are exaggerating the impact on window '12a'.

Window '12a' as illustrated in Figure 5.6, represents the typical constraints that result in 'major adverse' levels of effect within this assessment, as all windows that have a perceptible level of impact to APSH or WPSH along Cherryfield Avenue have a strong easterly aspect and all have close obstruction directly to the south. The vast majority of the 'non-applicable' and 'adversely' affected windows along Cherryfield Avenue are similarly constrained as demonstrated with window '12a'

While the majority of windows that are categorised as 'n/a' are due to a baseline value of less than 1%, there are exceptions along Cherryfield Avenue Upper (windows 28b, 29b, 32a, 33b, and 14a). These are categorised as 'n/a' despite having a ratio of change greater than 0.8 and a proposed WPSH value lower than 5%. This is because the BRE Guidelines allow for a reduction of up to 4% in the Annual Probable Sunlight Hours (APSH), which supersedes the winter-specific criteria in these instances.

Given that the properties along Norwood Park are situated directly north of the proposed development, the windows of which have a southerly orientation, they would theoretically

be the most likely to experience an impact on probable sunlight hours. However, all properties along Norwood Park meet the BRE Guidelines recommendations for APSH and WPSH.

Taking all factors into consideration, it is the opinion of 3DDB that the assessment yields very favourable results, notwithstanding the affected windows on Cherryfield Avenue, where localised factors play a significant role in the perceived level of impact.

Sun on Ground (SOG) to Existing Gardens

This study has assessed the effect the proposed development would have on the level of sunlight on March 21st in the rear gardens of the neighbouring properties that share a boundary with the subject site. The assessed gardens are located along Norwood Park, Cherryfield Avenue Lower and Cherryfield Avenue Upper.

In total 39 No. spaces have been assessed. Using the rationale explained in section E.2 on page 340 of 3DDB's report, effect on the SOG of these spaces would be considered:

- negligible: 37 No.
- minor adverse: 0 No.
- moderate adverse: 0 No.
- major adverse: 0 No.
- non-applicable (n.a.): 2 No.

These results confirm that all assessed gardens meet the BRE Guidelines criteria for 'Sun on Ground.' (Gardens categorised as 'non-applicable' (n/a) were excluded from compliance calculations).

Two gardens are categorised as 'n/a': 35 Cherryfield Avenue Lower and 5 Cherryfield Avenue Upper, as shown in Fig 7. In both instances, large rear extensions completely overshadow the remaining garden areas.

Fig. 5.7: Highlighted rear gardens of 35 Cherryfield Avenue Lower and 5 Cherryfield Avenue Upper.

The hourly shadow renderings, "Shadow Study 21 June" on page 108 of 3DDB daylight and sunlight report, indicate that these gardens receive limited sunlight even at the height of summer.

Furthermore, the Average Sun Hour (ASH) studies in section A.4 of that report demonstrate that the proposed development reduces sunlight by less than one hour in either of these two spaces at the summer solstice.

All other assessed gardens comfortably meet the BRE Guidelines for sunlight in open spaces, as the ratio of change between the baseline and proposed values is within the recommended 0.80 limit. Therefore, it can be concluded that the proposed development will not excessively overshadow neighbouring properties.

The results of the Sun On Ground study (SOG) on the neighbouring gardens can be found in section A.4 on page 96 of 3DDB's daylight and sunlight report.

A visual representation of these readings can be seen in the 2-hour false colour plans in section A.4 and in the hourly shadow diagrams for March 21st in section B.1 on page 105, also of that report.

Sunlighting to Proposed Amenity Spaces:
This study has assessed the level of sunlight on March 21st within the proposed public open space, communal open space, creche play areas and the combined private amenity area for each proposed house of Block E.

In total 16 No. spaces have been assessed, 13 No. of which would meet the criteria as set out in the BRE Guidelines. Of the 3 No. spaces that do not meet the BRE criteria for sun on ground, the most constrained is the proposed communal amenity area named Belvedere Garden, as indicated in Figure 8.

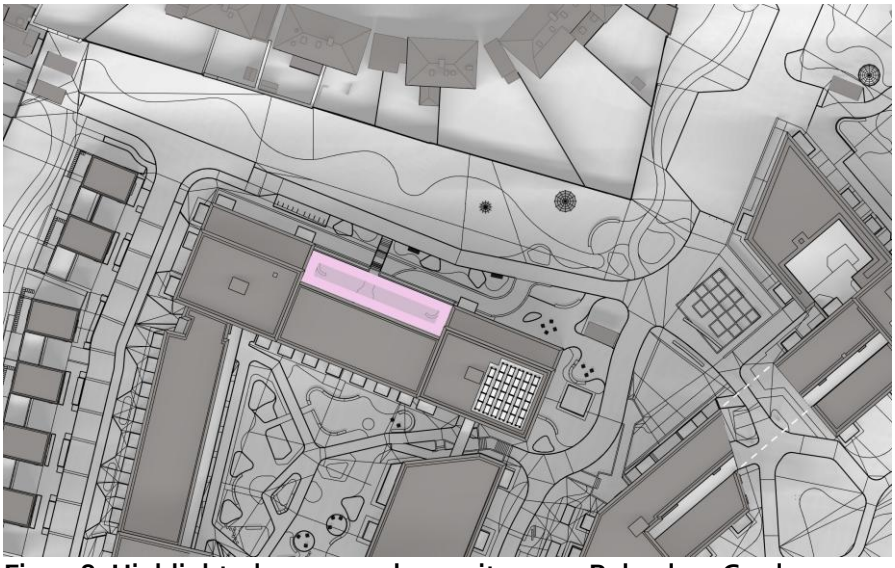


Fig. 5.8: Highlighted communal amenity area, Belvedere Garden

The average sun hours assessment indicates that this space has no sunlight access throughout the year. This is expected, as the area is enclosed on three sides and located directly north of Block C.

Belvedere Garden is proportionately small when compared with the other public and communal open spaces. As such, future occupants would not be reliant on this area for sunlight access. Although sunlight access is an important factor in site layout, this small area of non-compliance is not necessarily a negative. Occupants can choose to spend time in this area if seeking shelter from direct sunlight during the summer months, whilst also having the option to avail of plenty of amenity areas that would be capable of excellent sunlight levels.

Block E comprises six two-storey houses. Each property features a narrow, west-facing rear garden at ground floor level and a terrace at Level 01. While some terraces are shaded by the adjacent property to the south and fall slightly below the recommended levels, the combined amenity area (garden plus terrace) for each property successfully achieves the recommended level of sunlight.

This assessment has been carried out without the inclusion of deciduous trees, as per the BRE Guidelines. There is a large number of existing deciduous trees being retained that will inevitably cast shadows. The rationale given for the omission of deciduous trees in the SOG assessment, as per the BRE Guidelines, is that the dappled shade of a tree is more pleasant than the deep shadow of a building. Many of the proposed areas could expect a mix of direct sunlight and dappled shade, particularly during the summertime when trees are in full foliage.

It is the expert opinion of 3DDB, that the Sun On Ground assessment for the proposed amenity areas has yielded positive results, and that the level of sunlight potential is very favourable for the proposed development as a whole.

The results for the study on sun on ground in the proposed outdoor amenity areas (including a visual representation in the form of 2-hour false colour plans) can be found in the appendix results section C.4 on page 233 of 3DDB's daylight & sunlight report and in the hourly shadow diagrams for March 21st in B.1 on page 88 of the appendix section of 3DDB's report.

Sunlight Exposure in the Proposed Development (SE)

A sunlight exposure assessment has been carried out on all habitable rooms within the residential portion of the proposed development. For these assessments, trees have been included in the analytical model as opaque objects. The assessments have been carried out in two states:

- All trees (evergreen and deciduous) included in assessment model.
- Only evergreen trees included in the assessment model.

This approach is in accordance with section 3.1 of the BRE Guidelines.

In total, 562 No. units have been assessed. Using the rationale explained in section E.3 on page 341, the level of sunlight exposure for the assessed units is as follows:

In the assessment carried out with all trees considered as opaque objects:

- high: 195 No. (at least 4 hours)
- medium: 51 No. (at least 3 hours)
- minimum: 182 No. (at least 1.5 hours)
- below minimum recommendation: 134 No. (less than 1.5 hours)

When only evergreen trees included in the assessment model:

- high: 210 No. (at least 4 hours)
- medium: 62 No. (at least 3 hours)
- minimum: 175 No. (at least 1.5 hours)
- below minimum recommendation: 115 No. (less than 1.5 hours)

The SE assessment has shown that, depending on the effect of trees, the circa compliance rate for the assessed units, in accordance with section G3.4 of the BRE Guidelines, is between 76% & 80%.

Whilst the criterion applies to rooms of all orientations, it should be noted that if a room faces significantly north of due east or west it is unlikely to be met. As such, it is not always possible to achieve full compliance, especially in developments that contain single aspect units.

The compliance rate of c. 80% that has been achieved in the assessment without trees is in line with the example layout used in section 3.1.6 of the BRE Guidelines which provides advice on how to achieve a favourable balance in sunlight access within schemes where full compliance may not be possible.

No recommendation is made regarding the overall performance of a development for SE performance within the BRE Guidelines. However, it is the opinion of 3DDB that the proposed development performs adequately in this regard.

The results for the study on SE in the habitable rooms of the proposed units can be seen in section C.3 on page 186 of 3DDB's daylight and sunlight report.

Spatial Daylight Autonomy (SDA)

This study has assessed the Spatial Daylight Autonomy (SDA) for all habitable rooms within the residential portion of the proposed development both with and without trees. This has ensured that a clear understanding has been obtained regarding the daylight potential of the proposed development.

This proposed development consists of 562 No. units, which makes up approximately 1419 No. habitable rooms.

Under the criteria as set out in the BR 209, considering trees, the SDA value in 1286 No. habitable rooms meets or exceeds the appropriate target values. This gives a circa compliance rate of 91%. The additional SDA assessment that does not include trees has shown a compliance rate of 94%. This clearly indicates that the retention of existing trees and the inclusion of new trees on site are having an effect on daylight access in some proposed units. It is the opinion of 3D Design Bureau that a favourable balance has been achieved in terms of daylight levels, provision of trees and appropriate density on the proposed site.

3DDB worked closely with the landscape architects to minimise the effect that new trees would have on the daylight within the proposed units. While daylight is an important aspect of any proposed residential development, so too is the inclusion of trees. A balanced approach has been taken with the locations and species of proposed trees where appropriate screening, shading, biodiversity and visual amenity have been prioritised whilst the effect on daylight in internal units has also been considered. Standard maintenance regimes will

provide the flexibility to control tree growth and canopy spread, thereby mitigating excessive future obstructions.

The decision was made early in the design process to retain as many existing trees as possible on the site. Whilst the retention of trees will affect daylight within the proposed units, particularly the mature trees along the east and north of the site, the retention of existing trees is of particular importance to this development, as they form a crucial element to the character of the area.

Throughout the extensive design history of this site, 3DDB has worked closely with OMP, incorporating many design iterations and tweaks to improve the daylight performance within the proposed units. The optimisation measures include, but are not limited to, changes to internal layouts and balcony configurations. These established design principles have been implemented for this revised proposal, yielding a similar set of scheme performance results.

I.S. EN 17037 sets out more onerous recommendations for SDA. As such, the number of residential habitable rooms achieving compliance under this standard is 995 in the assessment that includes trees. This gives a reduced circa compliance rate of c. 70%. The additional SDA assessment, under this standard, that does not include trees has shown a compliance rate of c. 77%.

In cases where rooms comply with the criteria of BR 209 but do not meet the criteria of I.S. EN 17037, it is the recommendation of 3D Design Bureau that these rooms will be adequately daylit. This recommendation is based on the fact that BR 209 provides room-specific criteria, unlike I.S. EN 17037. BR 209 considers the varying daylight requirements for different room types, which I.S. EN 17037 does not account for.

With regards to internal daylighting, Section 6.7 of the, now superseded, Sustainable Urban Housing: Design Standards for New Apartments December 2022, states the following:

> *"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 specifics. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

While this statement is not included in the updated apartment guidelines: "Planning Design Standards for Apartments: Guidelines for Planning Authorities (2025)", it remains relevant in the context of the subject site as it is echoed in the current Dublin City Development Plan (2022-2028). As such, where possible, compensatory measures have been incorporated into the design of the proposed development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against within the primary study (BRE 209).

The full list of all compensatory design measures put forward by the project architect for units that do not achieve the recommended level of daylight with regards to BRE 209 can be found in Section 3.2.1 of 3DDB's daylight and sunlight report.

5.12 Monitoring

No monitoring is required from a sunlight and daylight assessment point of view during either the construction or operational phases.

5.13 Difficulties Encountered.

It was neither possible nor practical for the Design Team to gain unfettered access to every parcel of private property within the study area surrounding the application site in order to carry out a measured building survey. Therefore, while 3DDB has confidence that the three dimensional model used in the assessment of the impact of the proposed development on sunlight & daylight access achieves a high degree of accuracy, it should be noted that some level of assumption was necessary in completing the model.

REFERENCES

- BRE 209 edition 3: Site layout planning for daylight and sunlight A guide to good practice (2022)
- British National Annex to the European Standards BS-EN 17037: Daylight in buildings (2018)
- Irish Adaptation of the European Standards IS-EN 17037: Daylight in buildings (2019)
- Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities (2022)
- Planning Design Standards for Apartments: Guidelines for Planning Authorities (2025)
- Dublin City Development Plan 2022-2028 (The Daylight and Sunlight - "Appendix 16: Sunlight and Daylight") (2022)