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Holy Cross College Lands

Daylight and Sunlight Analysis

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Contents

Executive Summary

This report presents the process and findings of design development, analysis and simulations that have been completed to examine the daylight and sunlight availability both at the proposed site (Holy Cross College Lands, Dublin) and in the existing surrounding buildings.

To align with this, the analysis within the report is split into two distinct sections:

- The impact of the proposed development on the existing surrounding environment
- The performance of the proposed development

In general, a considered and iterative design development approach has been taken in the generation of the architectural scheme, with daylight and sunlight availability being a key driver. The daylight and sunlight design influenced the architecture through the application of two distinct processes:

- The first was an iterative analysis of various massing models, with results from each simulation being then fed back into the design. The intention with this exercise was to minimise impact on the existing surrounding properties, but also increase the daylight and sunlight availability to the proposed apartment units and maximise sunlight availability in amenity spaces.
- The second was an assessment of glazing size. A reverse engineering process was used to determine the appropriate window dimensions for rooms that performed poorly when first analysed. Through the application of a parametric formula, the project architects have adopted a responsive design approach that varies window dimensions to ensure that individual apartment rooms receive adequate levels of diffuse daylight (ADF).

When considering the impact of the proposed development on the daylight and sunlight availability in the existing surrounding environment, it can be stated that the proposed development has a negligible impact on almost all of the surrounding dwellings, with the exception of one smaller building (Caretakes Bungalow). At this location, a minor adverse impact in skylight availability and a negligible impact on sunlight availability is experienced.

When considering the performance of the proposed development itself, the daylight and a sunlight availability could be described as better than typical for a mid-rise suburban development of this nature. The following observations can be made:

- All proposed amenity spaces, both public and communal, will be greater than the BR 209 target for direct sunlight (SHOG).
- 68% of the south facing windows tested meet or exceed the BR 209 recommended target of 25% for annual sunlight (PASH).
- 84% of the south facing windows tested meet or exceed the BR 209 recommended target of 5% for winter sunlight (PWSH).

- When combined kitchen and living rooms are benchmarked against 1.5% ADF, 90% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.
- When combined kitchen and living rooms are benchmarked against 2.0% ADF, 81% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.
- The methods within this report have not been altered to remove kitchen spaces from the calculation grids. In doing so, the development could have been presented with a narrative of >95% of units tested meet the relevant ADF targets. For reasons of robustness, transparency, clarity and fairness, this method has not been completed and presented. The reader is asked to benchmark the total percentage of units exceeding BR 209 / BS 8206-2 ADF targets reported here in the context of this.
- The impact of balconies in the proposed scheme on levels of ADF is significant. Despite Build to Rent developments under Sustainable Housing Design Standards for New Apartments (2020) not requiring balconies, they have been provided. Considering the wider context within which a balcony can provide positive residential amenity, the applicant believes the provision of balconies and the associated benefits outweighs the reduction in ADF within the rooms beneath them. We suggest that the associated ADF values are read, assessed, analysed and considered in this context.

In summary, the proposed development is said to:

- Have an overall negligible impact on the levels of daylight and sunlight availability in the surrounding existing properties and amenity spaces.
- Produce an environment that allows for plentiful sunlight penetration into all created amenity spaces and the majority of south facing apartment windows, in addition to producing appropriate levels of ADF within the apartments themselves.

1 Introduction

This report considers the impact on daylight and sunlight availability of the proposed development at Holy Cross College Lands, Drumcondra on the surrounding environment, including residential buildings, amenity spaces and streetscapes. It also considers the performance of the development itself, when daylight and sunlight availability is examined.

To align with the above, the report is split into two distinct sections:

- The impact of the proposed development on the existing surrounding environment.
- The performance of the proposed development.

The Dublin City Developments Plan 2016-2022, the Urban Development and Building Height Guidelines for Planning Authorities (2018) and Sustainable Urban Housing: Design Standards for New Apartments (December 2020) all make reference to the document *"Site Planning for Daylight and Sunlight, A Good Practice Guide (BR 209)"*.

As such, the 2011 edition of this document has been applied in this report and during the analysis completed to produce it.

It is worth noting that BR 209 is considered best practice, but compliance with its targets is not designated as mandatory. This is very clearly laid out within the document by including the statement below:

> *The guide is intended for building designers and their clients, consultants and planning officials. This 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 light is only one of many factors in site layout design.*

1.1 Project Description

The development will consist of the construction of a Build To Rent residential development set out in 12 no. blocks, ranging in height from 2 to 18 storeys, to accommodate 1614 no. apartments including a retail unit, a café unit, a crèche, and residential tenant amenity spaces. The development will include a single level basement under Blocks B2, B3 & C1, a single level basement under Block D2 and a podium level and single level basement under Block A1 to accommodate car parking spaces, bicycle parking, storage, services and plant areas. To facilitate the proposed development the scheme will involve the demolition of a number of existing structures on the site.

The proposed development sits as part of a wider Site Masterplan for the entire Holy Cross College lands which includes a permitted hotel development and future proposed GAA pitches and clubhouse.

The site contains a number of Protected Structures including The Seminary Building, Holy Cross Chapel, South Link Building, The Assembly Hall and The Ambulatory. The application proposes the renovation and extension of the Seminary Building to accommodate residential units and the renovation of the existing Holy Cross Chapel and Assembly Hall buildings for use as residential tenant amenity. The wider Holy Cross College lands also includes Protected Structures including The Red House and the Archbishop's House (no works are proposed to these Structures).

The residential buildings are arranged around a number of proposed public open spaces and routes throughout the site with extensive landscaping and tree planting proposed. Communal amenity spaces will be located adjacent to residential buildings and at roof level throughout the scheme. To facilitate the proposed development the scheme will involve the removal of some existing trees on the site.

The site is proposed to be accessed by vehicles, cyclists and pedestrians from a widened entrance on Clonliffe Road, at the junction with Jones's Road and through the opening up of an unused access point on Drumcondra Road Lower at the junction with Hollybank Rd. An additional cyclist and pedestrian access is proposed through an existing access point on Holy Cross Avenue. Access from the Clonliffe Road entrance will also facilitate vehicular access to future proposed GAA pitches and clubhouse to the north of the site and to a permitted hotel on Clonliffe Road.

The proposed application includes all site landscaping works, green roofs, boundary treatments, PV panels at roof level, ESB Substations, lighting, servicing and utilities, signage, and associated and ancillary works, including site development works above and below ground.

2 Methodology

Generally, the methodology applied in this report follows that outlined within BR 209, BS 8206 and by proxy, BS EN 17037. It is split across two distinct parts:

- The first examines how the proposed development will impact the existing surrounding buildings and amenity spaces.
- The second investigates the performance of the proposed development itself.

When assessing the daylight and sunlight availability for each of the above, the metrics described below are applied.

We note that BS 8206 has been superseded by BS EN 17037, but we also note that Annex F within this document recommends the same values but through definitive illuminance recommendations. As such, where BS 8206-2 is mentioned within this report, the reference can be used interchangeably with BS EN 17037.

2.1 Availability of Daylight

2.1.1 Vertical Sky Component

Vertical Sky Component (VSC) gives a measure of daylight received on the outside of a window. The following is stated within BR 209:

> *In general, a building will retain potential for good interior diffuse daylighting provided that on all its main faces:*
>
> *No obstruction, measured in a vertical section perpendicular to the main face, from a point 2m above the ground level, subtends an angle of more than 25° to the horizontal;*
>
> *or*
>
> *if the above is not satisfied, then all points have a vertical sky component of 27% or more*

BR 209 continues that, for existing properties, a VSC of 27% or, where this is not achieved, a figure that is 80% of the existing condition, is acceptable.

A VSC target of 27% has been chosen, but it could be argued that this is unrealistically high for a mid-rise suburban location such as the proposed development.

2.1.2 Average Daylight Factor

The Average Daylight Factor (ADF) is a measure of the diffuse quantity of daylight within a space. It is defined as the ratio between the quantity of the average diffuse daylight within a space against the diffuse daylight under an unobstructed sky, where that sky is the standard CIE overcast sky.

BR 209 and BS 8206-2 contain an obvious amount of overlap. In determining appropriate ADF targets for various spaces within the scheme, both documents offer the targets below:

- Bedrooms greater than 1% ADF.
- Living Rooms greater than 1.5% ADF.
- Kitchens greater than 2% ADF.

Beyond the above targets, BS 8206-2 offers guidance on ADF targets within combined kitchen and living spaces. The document states the following:

> *Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%.*

However, BR 209 is clear in the concept that the document is not intended to be prescriptive. Clause 1.6 within BR 209 states:

> *The guide is intended for building designers and their clients, consultants and planning officials. This 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 light is only one of many factors in site layout design.*

Within the Foreword (p.iii) of BS 8206-2, the document offers a parallel sentiment that the values it recommends should be viewed in the context of the wider set of design objectives within the planning process:

> *The aim of the standard is to give guidance to architects, engineers, builders and others who carry out lighting design. It is recognized that lighting is only one of many matters that influence fenestration. These include other aspects of environmental performance (such as noise, thermal equilibrium and the control of energy use) fire hazards, constructional requirements, the external appearance and the surroundings of the site. The best design for a building does not necessarily incorporate the ideal solution for any individual function. For this reason, careful judgement needs to be exercised when using the criteria given in the standard for other purposes, particularly town planning control.*

The development at Holy College Cross Lands considers a range of much wider planning objectives beyond the diffuse daylight availability within apartment spaces. These are outlined fully within the accompanying Planning Report prepared by Brady Shipman Martin and summarised in the points noted below:

- Provision of high quality residential accommodation and associated tenant facilities on a zoned and serviced site in proximity to the City Centre in line with National Planning Policy and the delivery of residential development. The provision of extensive sunlit public open space and ensuring its integration with and access to the adjacent existing communities of Drumcondra and Ballybough

- The design development of the project taking account of the existing site features including protected structures, historic views and settings, existing trees, adjacent residential development and future proposed development on the wider site.
- Meeting the required and sometime competing standards under the Dublin City Development Plan and the Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2020) in the context of the National Planning Framework

In attempting to determine a suitable, appropriate and fair target, a review of recent similar permitted schemes suggests 1.5% to be acceptable (at times) to An Bord Pleanála. Some examples of recently permitted projects, through the SHD process, that have applied a target value of 1.5% for combined kitchen and living spaces are listed below.

- St. Clare's Convent and No's. 115-119 Harold's Cross Road, Harold's Cross, Dublin 6W (*Case reference: TA29S.308533*)
- 52, 54, 56, 58 Station Road, Raheny, Dublin 5 (*Case reference: TA29N.308552*)
- No. 54 Glasnevin Hill and "Ardmore" with lands adjacent there to No. 38 Glasnevin Hill, No. 52 Glasnevin Hill, lands to the rear of Nos. 48, 50 and 52 Glasnevin Hill, and Nos. 40 and 42 Glasnevin Village, Dublin 9 (*Case reference: TA29N.308905*)
- Lands formerly known as Richmond Cheshire Home, Richmond Park, Monkstown, Co. Dublin (*Case reference: TA06D.308432*)

The above list is not exhaustive. It simply offers some recent, searchable, verifiable, evidence to suggest that the practice of determining 1.5% as the appropriated ADF target in combined kitchen and living rooms has been permitted by An Bord Pleanála. A wider search, even beyond the SHD process, offers further insight into frequency with which this deviation from BS 8206-2 is applied and accepted.

Rather than make a definitive call on which target is, or is not, appropriate, the report here proposes to benchmark the results across the scheme for combined kitchen and living spaces against both 1.5% and 2%. Doing so results in a set of ADF targets as shown in the table below.

Room Usage	**ADF Target**
Bedroom	1%
Living Room	1.5%
Combined Kitchen / Dining	Both 1.5% and 2%

The following parameters have been considered for the calculation of ADF:

- Framing factor: 0.85
- Glazing Transmittance: 0.70
- Internal Surface reflectances: Floors 20%, Walls 50%, Ceilings 70%

- Maintenance Factor: 1.00

2.1.2.1 Room Sampling for ADF Analysis

Given the scale of the development, a representative sample of units have been simulated for ADF, rather than all of the 1,600 plus units. Beyond the units sampled for ADF, the VSC at all windows on the Proposed Development has been simulated. In applying this approach, the reader has access to information required to estimate the ADF value in every room within the development.

In completing our room selection process, we note the below:

- The ADF analysis considered a representative sample of units, but the VSC is calculated for every window in the proposed development.
- The representative sample simulated amounts to between 10% - 15% of the total units in the development.
- The units have been carefully selected to avoid a positive or negative bias in the results that would be reported. This is evident from the layouts and a professional visual review of same. A sample of the process is offered later in this section.
- The intention is that this representative sample of rooms will offer clear insight into how the levels of ADF within apartments through the development are experienced.
- Where the reader has some doubt over the ADF in rooms that have not been simulated and results presented, the VSC is available for all windows in the proposed development. For the informed reader, an approximation of ADF in various room typologies and geometries will be easily estimated from this information available within the appendices.

Selection Process Example

To offer extra insight into the process behind selecting the sample of rooms, two examples are offered below. These cover Block A4 and Block B3, but the same rationale has been applied throughout the development.

The graphic below shows a typical layout from Block A4. It has the rooms assessed for ADF highlighted. When reviewing the selection process, the following can be noted:

- There is a mix of studio, two bed and three bed units.
- There is a mix of orientations and obstructions. This includes a north facing, unobstructed two bed unit, a south-west facing studio apartment that is obstructed by block A1 (see key plan) and a north facing three bed that is self-obstructing to the west due to the form of the massing.

Figure 1: A layout showing the rooms selected for testing within Block A4.

The graphic below shows a typical layout from Block B3. It has the rooms assessed for ADF highlighted. When reviewing the selection process, the following can be noted:

- There is a mix of studio, one bed and two bed units.
- There is a mix of orientations and obstructions. This includes a south facing one bed unit that is obstructed by the adjacent Block D1, two units (studio and the two bed) that are obstructed by Block B2 adjacent and a north facing two bed unit that is largely unobstructed.

Figure 2: A layout showing the rooms selected for testing within Block B3.

2.1.2.2 Precedent ADF Methods in Ireland

Comparable with the planning process in the UK, where BR 209 and BS 8206-2 have been authored, the comprehensive application of these documents in Ireland is somewhat new. As such, the expectations, methods, metrics and summaries drawn by consultants in Ireland can differ from those offered within the UK (where assessment with BR 209 and BS 8206-2 is more established and perhaps better understood).

One such deviation seen in Ireland, that is not facilitated in the UK nor outlined within BR 209 or BS 8206-2, is the removal of kitchen areas from the calculation of ADF in combined kitchen and living rooms. In short, this approach:

- Denotes the kitchen space within combined kitchen / living spaces as either *small, in-habitable, internal* or a *galley* type kitchen.
- The method then removes the kitchen area from the calculations completely.
- The results are benchmarked against an ADF value of 1.5% for living rooms only, rather than the requisite values for combined kitchen and living rooms.

To help the reader better understand this and offer insight into the wider impact of this method, the following paragraphs outline three case studies, being:

- Case Study 1 – Case reference: TA29N.307656 Rathbourne Avenue, Pelletstown, Ashtown, Dublin 15.
- Case Study 2 – Case reference: TA28.309059 The Former Ford Distribution Site, Fronting on to Centre Park Road, Marquee Road and Monahan's Road, Cork.
- Case Study 3 – Case reference: TA29N.309345 Old Bakery Site, also known as 113 Phibsborough Road, Cross Guns Bridge, Phibsborough, Dublin 7.

All three of these projects have been recently permitted through the SHD process and each has applied a version of the approach described above.

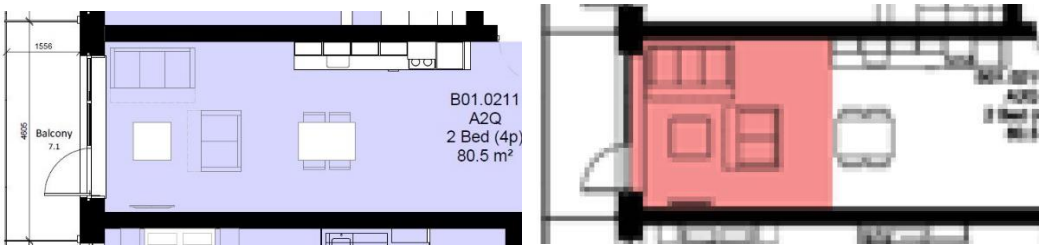
Case Study 1 (Case reference: TA29N.307656 Rathbourne Avenue, Pelletstown, Ashtown, Dublin 15)

The daylight and sunlight report for this project states *"In units where the kitchens are completely internal and not serviced by window on the external facade, the kitchen area will be omitted from the analysis area and an ADF target value of 1.5% will be applied (as per the BRE Guidelines)".* No further explanation is offered.

In reporting results, the summaries section (5., pg78) states *"The proposed development would consist of 725 No. units, which makes up approximately 1750 No. rooms. With only 16 No. of these rooms not meeting the recommended level of daylight the compliance rate is above 99%".*

In examining the graphics within the report, the extent of kitchen space excluded from the calculation is clearer.

Figure 3: The graphics below are taken from the results section (Appendix 10.1, pg62) and show a 1st floor apartment within Block B2. On the left is the architectural GA and, on the right, (shown in red) is the extent of the measurement grid. The full extent of the kitchen space has been removed from the calculation of the combined kitchen and living room. The remaining area is benchmarked against an ADF target of 1.5% for living rooms.



Case Study 2 (Case reference: TA28.309059 The Former Ford Distribution Site, Fronting on to Centre Park Road, Marquee Road and Monahan's Road, Cork*)*

The daylight and sunlight report for this project states:

> *BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight states the following in Appendix C with respect to Average Daylight Factors (ADF);*
>
> > *If a predominantly daylight appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if electric lighting is provided. There are additional requirements for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These additional values are minimum values of ADF and should be attained even if a predominantly daylit appearance is not achievable.*
>
> *From this the recommended Average Daylight Factor (ADF) are therefore:*
>
> - *Bedrooms – 1.0%*
> - *Living Rooms – 1.5%*

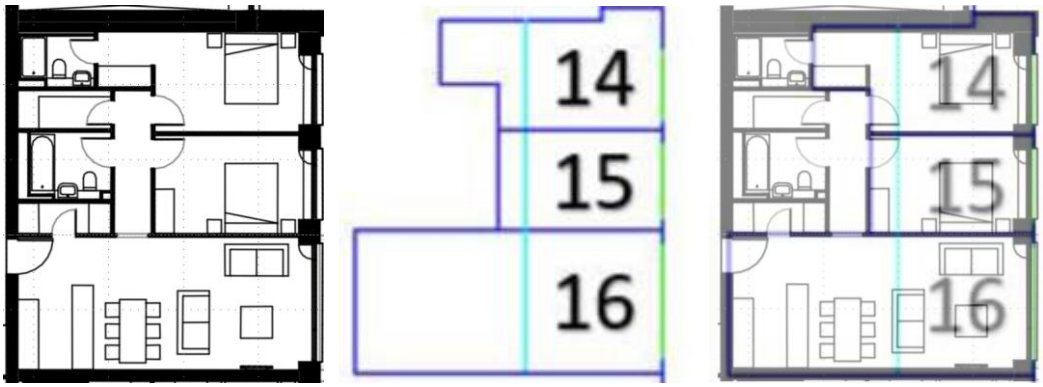
Beyond the above, no further explanation is given.

In reporting results, the executive summary states *"94% of the proposed rooms tested of the new development are achieving Average Daylight Factors (ADF) above the BRE guidelines".*

In examining the graphics within the report, the extent of kitchen space removed is highlighted.

Figure 4: The snapshots below are taken from both the architectural layouts (Block B1, Level 01) and the daylight and sunlight report (7.4, pg29). On the left is the architectural GA, in the centre is the daylight and sunlight references (with measurement grids shown in baby blue and room layouts in purple) and farthest on the right is the two overlaid.

When overlaid, the extent of the kitchen excluded can be seen (i.e. from the couch back to the rear wall).



Case Study 3 (Case reference: TA29N.309345 Old Bakery Site, also known as 113 Phibsborough Road, Cross Guns Bridge, Phibsborough, Dublin 7)

The daylight and sunlight report for this project states (5.2, pg12):

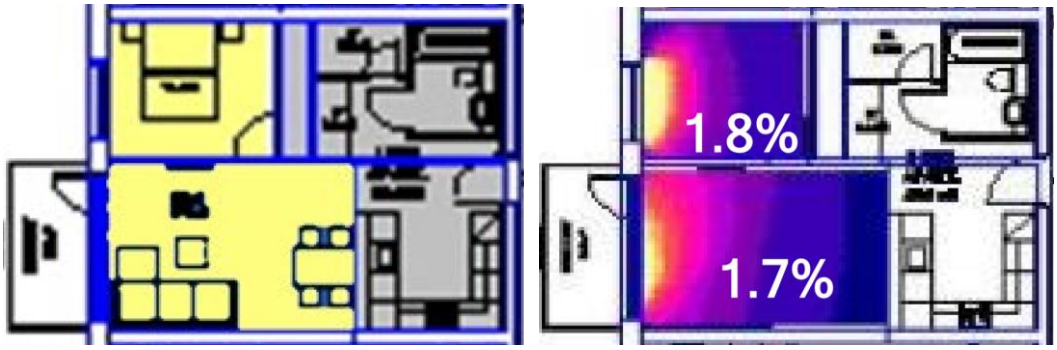
> *It may be noted that for the purpose of analysis, and as per accepted practice, the Kitchenettes to Apartments have been excluded as these types of galley kitchens do not provide dining/sitting area. The associated requirement within BS.8206-2 for "Kitchens" (ADF>2.0%) was developed for residential housing where the kitchen would be an identifiable separate room with seating and where occupants would be expected to eat and spend time as well as being generally present throughout the day. The Apartments assessed do not include a kitchen of this type; they instead include a kitchenette which would be expected to be used solely to prepare food with the residents spending most of their time in the Living area. We therefore assessed each Living Dining Area in its entirety, with Daylighting deemed compliant only where the combined space of these was found to achieve at least 1.5% ADF.*

In reporting of results, the executive summary (pg2) outlines *"The analysis demonstrated that 97% of rooms were in excess of BRE guidelines for average daylight factor (ADF)…".*

In examining the graphics, an example of the extent of kitchen space excluded is shown below.

Figure 5: The graphics below are taken from the results section (5.13, pg23) and show a 3rd floor apartment within Block B. The full extent of the kitchen space has been

removed from the calculation of the combined kitchen and living room. The remaining area is benchmarked against an ADF target of 1.5% for living rooms.



2.1.3 Observations on Case Studies

From examining the case studies presented in the previous section, the following observations can be made:

- BR 209 and BS 8206-2 have been drafted with the intention to be read as complimentary documents. This is evident in the quantum of crossover, with an amount of text copied verbatim (e.g. 8.2.2 within BS 8206-2 and 3.2.3 with BR 209).
- The text below is offered within Appendix C, Clause C1 of BR 209:

  The guidance contained within this publication (BR 209) is intended to be used with BS 8206-2 and LG10.

- BR 209 draws ADF values directly from BS 8206-2. This is given below and taken from BS 8206-2, Clause 5.2 – Table 2:

  Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%.

- 2.1.14 within BR 209 states:

  Non-daylit internal kitchens should be avoided wherever possible, especially where the kitchen is used as a dining area too. If the layout means that a small internal gallery-type kitchen in inevitable, it should be clearly linked to a well-daylit living room.

- Reviewing the architectural arrangements for each of the three case studies suggests that:
  - In the main, the kitchens excluded are not *"small internal galley type"*;
  - Where internal kitchens are small, they still constitute a habitable room. The first schedule within Part 1 of the Irish Building regulations lays out that –"*"habitable room" means a room used for living or sleeping purposes but does not include a kitchen having a floor area of less than*

6.5 m^2 in area". The kitchens in these schemes would be considered habitable rooms.

- Internal kitchens throughout the various scheme have not been *'avoided wherever possible'* nor were they *"inevitable"*.

- There is no obvious evidence to suggest that BS 8206-2 *"was developed for residential housing where the kitchen would be an identifiable separate room with seating and where occupants would be expected to eat and spend time as well as being generally present throughout the day"*. Indeed, and as quoted previously in this section, BS 8206-2 outlines specific guidelines for situations where combined kitchen and living rooms are present.

In summary, it is very difficult to understand how the practice of removing the kitchen area from the calculations of combined kitchen and living rooms is justifiable within the guidance in either BR 209 or BS 8206-2.

2.1.4 Impact of Case Studies and Similar Schemes

Whilst the case studies above are specific examples, the practice of removing kitchens from ADF assessments in combined kitchen and living room units in Ireland is not uncommon. A search through recently permitted schemes, either through the SHD process or otherwise, will reveal others that are similar in nature. The widespread application of this technique has a considerable knock-on effect on how the overall results, summaries and conclusions for various developments are presented, interpreted and benchmarked.

Again, using the case studies as examples, the table below outlines the overall pass rate reported for each of the schemes.

Reference	Reported Percentage Pass Rate for ADF
Case Study 1 (Case reference: TA29N.307656)	99%
Case Study 2 (Case reference: TA28.309059)	94%
Case Study 3 (Case reference: TA29N.309345)	97%

The above results have been prepared and presented in line with the methods outlined in the case studies, i.e.:

- Combined kitchen and living rooms have been benchmarked against 1.5% ADF.
- The entire kitchen area within combined kitchen and living rooms has been removed.

The knock-on impact of the two points above, relative to the overall results narrative reported for ADF values within rooms cannot be understated.

In reviewing the information given within this section, the following overriding observations could be made:

- Without detailed analysis of these type of projects but using the full area of the combined kitchen and living spaces and benchmarked vs 2% ADF, it is

impossible to tell exactly what percentage of rooms within the various developments would actually meet the minimum ADF targets outlined in BR 209.

- Whilst the exact figure is unattainable, an educated estimation suggests that the values would fall far below those quoted as a > 90% pass rate.

2.1.4.1 The Impact of Balconies

Beyond BR 209 and BS 8206-2, the current Irish Design Standards for New Apartments (Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities Department - December 2020) contain a requirement for balconies or private amenity spaces. Extracts from 3.35 and 3.36 from this document are given below:

> *It is a policy requirement that private amenity space shall be provided in the form of gardens or patios/terraces for ground floor apartments and balconies at upper levels. Where provided at ground level, private amenity space shall incorporate boundary treatment appropriate to ensure privacy and security.*
>
> *Balconies should adjoin and have a functional relationship with the main living areas of the apartment.*

The requirement for a balcony impacts on the ability of the scheme to deliver the relevant ADF targets in BR 209, which have been drafted without this strict requirement in mind. BR 209 acknowledges that the presence of balconies makes good daylighting below them difficult. 2.1.17 within BR 209 states *"balconies significantly reduce the light entering windows beneath them".*

The proposed development at Holy Cross College Lands is a Build to Rent development and as such, it is exempt from the above requirement. The specific requirement is *Planning Policy Requirement 8 - (ii) Flexibility shall apply in relation to the provision of a proportion of the storage and private amenity space associated with individual units*. Despite this available flexibility, and in the interest of increased residential amenity, balconies have been applied across the scheme.

To quantitively determine the impact that balconies have on the levels of diffuse daylight within the combined kitchen and living spaces at Holy Cross College Lands, a series of calculations have been completed with and without the balcony for a selection of rooms.

2.2 Availability of Sunlight

2.2.1 Availability of Sunlight in Dwellings

The percentage of probable annual sunlight hours is calculated and presented in terms of total annual values and winter values. Taken from BR 209, a target of 25% of total Probable Annual Sunlight Hours (PASH) and of 5% of total Probable Winter Sunlight Hours (PWSH) has been applied. As stated within BR 209, this target for sunlight hours in dwellings is applied only to windows that face within

90° of due South. Windows facing North are not expected to meet a sunlight availability target, hence have not been included in the assessment.

2.2.2 Availability of Sunlight in Amenity Spaces

Within BR 209, recommendations are given as to the quantity of sunlight penetration in amenity areas that is required to produce a well sunlit space throughout the year. This text is given below:

> *"It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development, an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable."*

Details of exact location for designated amenity spaces on the site are given within the appendices.

2.3 Impact on the Surrounding Environment

The following massing models have been considered in the assessment of daylight and sunlight availability in the surrounding environment:

- **The Baseline Condition**: This configuration is the existing site condition before any proposed development works begin. The mirror building method described within section 2.3 of BR 209 has been used to set the baseline condition and determine targets in accordance with this.
- **The Proposed Condition**: This configuration adds to the existing site condition the massing and layout arrangement proposed within the planning application.

These models and their comparative masses are used to demonstrate the difference in daylight and sunlight performance in surrounding areas between the Baseline Condition and the Proposed Condition.

In line with BR 209 (*2.3 Adjoining Development Land*), the benchmark for the daylight and sunlight assessment has been set using a "mirror image building" criterion. A mirrored image building has been copied across the site boundary, considering the same distance and geometry of the existing mass, and has been taken as baseline model for the simulations. This approach has been applied to each surrounding building individually.

The following metrics have been used to assess the effects of the proposed development on the surrounding environment:

- Vertical Sky Component (VSC)
- Probable Annual Sunlight Hours (PASH)
- Probable Winter Sunlight Hours (PWSH)
- Sun Hours on Ground (SHOG)

For the buildings surrounding the Holy Cross College Lands development, many points were chosen from online mapping systems. These are considered to best represent the location of surrounding residential windows. No survey has been undertaken to assess the precise position of these windows.

The selection of points to be tested was completed in accordance with the guidance in BR 209. This includes all the windows falling inside an area 3 times the height of the proposed scheme radius. Below is quoted directly from section 2.2.4 of BR 209:

> *"Loss of light to existing windows need not be analysed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. In these cases, the loss of light will be small."*

2.3.1 Classification of Reduction

Full tabulated and graphical representation of results for each point is given within the Appendices, but to help understand the impact that the Proposed Condition is having, results are broken into categories as shown in the table below. These categories relate back to the description of impact within BR 209. The application of these categories offers some insight into the total number of points in the surrounding buildings that are affected, in addition to the magnitude of this effect.

Classification of Impact	Ratio Differential
Negligible	Between 0.8 and 1.0 times the current value
Minor Adverse	Between 0.8 and 0.6 times less than the current value
Major Adverse	Less than 0.6 times the current value

2.4 Performance of the Proposed Development

The performance of the proposed development is assessed using the Proposed Condition massing and architectural arrangements. The metrics below have been used to assess the performance of the proposed development:

- Vertical Sky Component (VSC)
- Average Daylight Factor (ADF)
- Probable Annual Sunlight Hours (PASH)
- Probable Winter Sunlight Hours (PWSH)
- Sun Hours On Ground (SHOG)

Definitions for the above are as described previously. These metrics are calculated for the proposed site layout and massing, with these results then being compared to the targets set out within BR 209, BS 8206-2.

2.4.1 Trees

BR 209 outlines that trees need not be considered in the assessment of the surrounding existing buildings. As such, in this report, trees have not been included in same.

In the assessment of the proposed development, Appendix H of BR 209 states that:

> *"However, sometimes, trees should be taken into account, eg where a new dwelling is proposed near to large existing trees."*

Appendix H in BR 209 outlines a methodology for estimating the reduction of light caused by existing trees adjacent to proposed developments. The method involves a detailed tree survey on site and the application of various transmission values to these based on the tree types identified.

A number of tree surveys are available for the proposed site, but those required to complete an accurate assessment of internal diffuse daylight levels have not been incorporated. As such, results for the proposed development are presented without the impact of tress.

Whilst the above is not fully in line with BR 209 methods, it should be noted that existing trees are likely to cause a potential reduction in available daylight and sunlight at one location only (adjacent to Drumcondra Road near A Block). At this location, and as discussed later in this report and shown within the appendices, the ADF values within the proposed apartments are far more than the minimum values suggested within BR 209. Applying the most stringent transmission values from table H1 in BR 209 to the existing trees at Drumcondra Road is still very likely to result in ADF values above the BR 209 minimum targets.

3 Designing for Daylight and Sunlight

Throughout the lifespan of the project, daylight and sunlight has been given due consideration from the outset. More specifically, the following key tasks have been undertaken:

- First, an analysis to investigate the influence of various massing arrangements on the impact to daylight and sunlight availability in the surrounding existing buildings, in parallel with daylight and sunlight availability on each façade and within each amenity space.
- An analysis of the ADF values for a set of sample rooms of the scheme and further design workshops aimed at improving the performance through some architectural optimisations.

3.1 Iterative Analysis

An iterative daylight and sunlight analysis approach was applied to various massing options. For each of these massing options, feedback was delivered and discussed with the architect and the wider design team, with this advice then being used to inform future decisions.

The key elements analysed throughout this process are outlined in the bullet points below, along with a brief reasoning as to how this helped daylight and sunlight availability generally.

The iterative analysis considered in particular:

- Direct sunlight access to the open courtyards, especially within the A1 and D2 blocks.
- Window width across the scheme to improve the daylight provision to the most obstructed rooms.
- Layout configuration to increase the daylight availability of specific apartments.

3.2 Unit Typologies and Arrangements

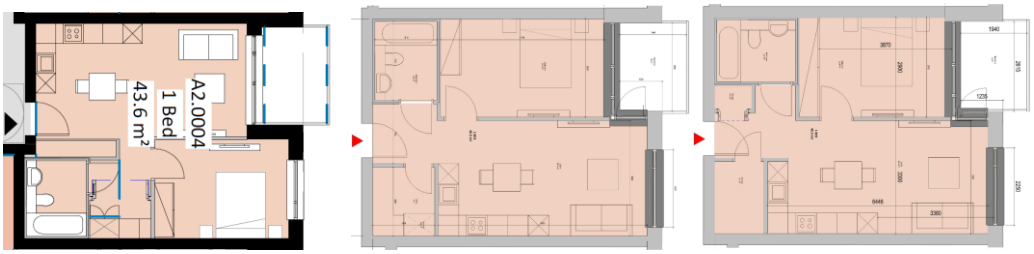
Various iterative analyses were completed to investigate the ADF values in certain apartment arrangements. The purpose of this exercise was to ensure that the unit arrangements provided responded in the best way possibly to the levels of VSC on their exterior. The images below show the development of a sample one bed unit within the A blocks.

The key changes resulting from the iterative analysis include:

- Swapping the kitchen / living space with the bedroom.
- Rearranging the bathroom / service area to maximise space not requiring daylight at the rear of the unit.
- Shortening of the bedroom and expansion of the shower room.

- Additional glazing to the living space from the balcony side.

Figure 6: From left to right, the design progression of a typical one bed unit in Block A as a result of the daylight and sunlight analysis.



3.3 Glazing Sizing

A series of workshops have been organised with each architect to assess the best performing window dimension for the most sensitive units to meet the ADF targets suggested within BS 8206-2.

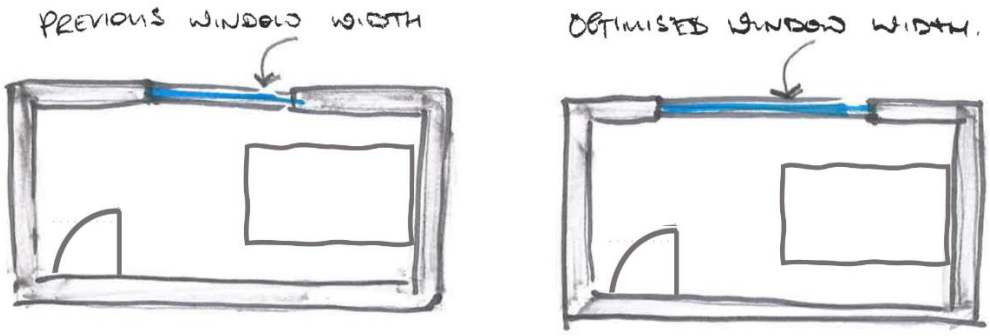
Generally, the availability of skylight is lower where balconies and or building corners occur, which is typically unavoidable in a development of this size and scale. To overcome it, glazing size can vary to work with this – i.e. larger windows, additional windows.

This assessment took the current scheme window widths and relative skylight availability values at the exteriors. From here, the glazing size and VSC were input into a parametric formula to determine the required window width to meet the chosen ADF targets.

The calculation quickly returns the ADF values, so it is immediate to determine which glazing size provides an internal daylight condition that meets the ADF targets within BS 8206-2.

The plans below demonstrate this analysis for one of the poorly performing rooms and show the difference between before and after the window width analysis.

Figure 7: The screenshots below show a sample room with before and after glazing sizes.



This optimised window area was made available to each architect and the wider design team to inform the suggested improvements. In most cases, this helped to

improve the performance of most of the poorly lit units, as evident from the overall ADF performance available within the appendices.

3.4 Sun in Amenity Spaces

Sunlight to amenity spaces and internal facing windows was shaped and maximised by managing the architectural form, orientation, massing and location of each of the proposed blocks. As a priority, avoiding impact to surrounding existing properties was a principle objective. Beyond this, the proposed blocks were spaced and orientated such that sunlight can penetrate from the south (e.g. Block A1 is U shaped and with least mass to the south. This allows sun penetration into the internal courtyard and direct sunlight to the internal facing windows).

4 Results

4.1 The Impact of the Proposed Development on the Baseline Surrounding Environment

The following tables summarise the effect of the Proposed Condition, compared with the Baseline Condition. Results are presented for each metric separately.

Full tabulated results for each point are given within the Appendices.

4.1.1 Baseline vs. Proposed

4.1.1.1 Vertical Sky Component (VSC)

From the summary results below and the full tabulated breakdown given within the Appendices, it can be seen that the Proposed Condition will cause a generally negligible impact on the majority of the surrounding buildings, but with a noticeable reduction in VSC on a number of windows in one specific location (Caretakers Bungalow on the Eastern side).

Of the surrounding points tested, 98% experienced a negligible impact and 2% experienced a minor adverse impact.

The reason for the different degrees of impact and the context in which they are experienced, is discussed later in the report.

Classification of Impact	**Proposed Condition**
Percentage of points experiencing a **Negligible Impact** relative to the Existing Condition	98%
Percentage of points experiencing a **Minor Adverse Impact** relative to the Existing Condition	2%
Percentage of points experiencing a **Major Adverse Impact** relative to the Existing Condition	0%

The table below outlines VSC results on the surroundings, split by building

Reference building	**Negligible**	**Minor Adverse**	**Major Adverse**
Corn Mill	100%	0%	0%
Corn Mill Row	96%	4%	0%
College Terrace	100%	0%	0%
Holy Cross Ave	87%	13%	0%
Education Secretariat	100%	0%	0%
133-137 Drumcondra Rd Low	97%	3%	0%
Caretakers Bungalow	63%	15%	22%
59-79 Drumcondra Rd Low	100%	0%	0%
Gate Lodge	100%	0%	0%

Reference building	Negligible	Minor Adverse	Major Adverse
Lydon house	100%	0%	0%
Red house	100%	0%	0%
Belvedere Rugby building	92%	8%	0%
33 Kingston Lodge	100%	0%	0%
26 Kingston Lodge	100%	0%	0%
23 Kingston Lodge	100%	0%	0%
O'Callaghan Court	100%	0%	0%
Clonliffe Rd	100%	0%	0%
Riversdale	100%	0%	0%

4.1.1.2 Probable Annual Sunlight Hours (PASH)

From the summary results below and the full tabulated and graphical breakdown given within the Appendices, it can be seen that the Proposed Condition will have a negligible impact on levels of PASH in the all the surrounding existing buildings.

Of the points tested, 100% experienced a negligible impact.

Classification of Impact	Proposed Condition
Percentage of points experiencing a **Negligible Impact** relative to the Existing Condition	100%
Percentage of points experiencing a **Minor Adverse Impact** relative to the Existing Condition	0%
Percentage of points experiencing a **Major Adverse Impact** relative to the Existing Condition	0%

The table below outlines PASH results on the surroundings, split by building.

Reference building	Negligible	Minor Adverse	Major Adverse
Corn Mill	100%	0%	0%
Corn Mill Row	100%	0%	0%
College Terrace	100%	0%	0%
Holy Cross Ave	100%	0%	0%
Education Secretariat	100%	0%	0%
133-137 Drumcondra Rd Low	97%	3%	0%
Caretakers Bungalow	100%	0%	0%
59-79 Drumcondra Rd Low	100%	0%	0%
Gate Lodge	100%	0%	0%
Lydon house	100%	0%	0%
Red house	100%	0%	0%
Belvedere Rugby building	100%	0%	0%
33 Kingston Lodge	100%	0%	0%

Reference building	Negligible	Minor Adverse	Major Adverse
26 Kingston Lodge	-	-	-
23 Kingston Lodge	100%	0%	0%
O'Callaghan Court	100%	0%	0%
Clonliffe Rd	100%	0%	0%
Riversdale	-	-	-

4.1.1.3 Probable Winter Sunlight Hours (PWSH)

As with the Probable Annual Sunlight Hours, the Proposed Condition will have a negligible impact on levels of PWSH in all the surrounding existing buildings. Full tabulated and graphical breakdown are given within the Appendices.

Of the points tested, 100% experienced a negligible impact.

Classification of Impact	Proposed Condition
Percentage of points experiencing a **Negligible Impact** relative to the Existing Condition	100%
Percentage of points experiencing a **Minor Adverse Impact** relative to the Existing Condition	0%
Percentage of points experiencing a **Major Adverse Impact** relative to the Existing Condition	0%

The table below outlines PWSH results on the surroundings, split by building.

Reference building	Negligible	Minor Adverse	Major Adverse
Corn Mill	100%	0%	0%
Corn Mill Row	100%	0%	0%
College Terrace	100%	0%	0%
Holy Cross Ave	100%	0%	0%
Education Secretariat	100%	0%	0%
133-137 Drumcondra Rd Low	100%	0%	0%
Caretakers Bungalow	100%	0%	0%
59-79 Drumcondra Rd Low	100%	0%	0%
Gate Lodge	100%	0%	0%
Lydon house	100%	0%	0%
Red house	100%	0%	0%
Belvedere Rugby building	100%	0%	0%
33 Kingston Lodge	100%	0%	0%
26 Kingston Lodge	-	-	-
23 Kingston Lodge	100%	0%	0%
O'Callaghan Court	100%	0%	0%
Clonliffe Rd	100%	0%	0%
Riversdale	-	-	-

4.1.1.4 Sun Hours on Ground

From results presented below, it can be stated that the proposed development has a negligible impact on the sunlight availability in the surrounding exterior amenity spaces.

Classification of Impact	Proposed Condition
Percentage of areas experiencing a **Negligible Impact** relative to the Existing Condition	100%
Percentage of areas experiencing a **Minor Negative Impact** relative to the Existing Condition	0%
Percentage of areas experiencing a **Major Negative Impact** relative to the Existing Condition	0%

Figure 8: A screenshot showing the location of surrounding amenity spaces tested. Full results are available within the appendices.

4.2 Performance of the Proposed Development

The final analysis completed for this submission examined the following:

- VSC at every window (4,884 points)

- PASH and PWSH at every South facing window (2,437 points)
- ADF for a representative sample number of rooms within the development (415 rooms in total)

4.2.1 Vertical Sky Component (VSC)

Of the points tested on the proposed development for VSC, 42% met the target set in BR 209. Full tabulated and graphical results for each point are given within the appendices.

Whilst the VSC offers some insight into the skylight availability on the exterior of the building facades, the ADF is what actually gives a predictor of the levels of diffuse daylight within a space. This is discussed in greater detail later in the report.

4.2.2 Average Daylight Factor (ADF)

A representative sample of 415 rooms was selected across the development. These were chosen using the methodology described previously and they cover the various room layouts and functions at different levels.

From the rooms tested, the following results can be drawn:

- When combined kitchen and living rooms are benchmarked against 1.5% ADF, 90% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.
- When combined kitchen and living rooms are benchmarked against 2.0% ADF, 81% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.

This outcome is discussed further in the section following this. A breakdown of the building by building results is given below.

Whilst only a sample number of rooms across the development have been tested, the typical and repetitive nature of the layouts can be used in conjunction with the VSC results (completed for every window of the development) to produce a level of satisfaction that the sample selected is more than representative of how rooms will perform within the development. In addition, the VSC results can be used to investigate the performance of any room that is in question.

Room Ref	Number of rooms tested	Percentage of all rooms passing when a 1.5% target ADF is used for combined kitchen and living spaces	Percentage of all rooms passing when a 2% target ADF is used for combined kitchen and living spaces
A1	64	91%	78%
A2	15	93%	93%
A3	18	94%	83%
A4	45	98%	98%
B1	23	78%	65%
B2	28	96%	82%
B3	39	90%	72%
C1	28	86%	71%
C2	19	95%	89%
D1	48	92%	81%
D2	63	86%	81%
SEM	25	84%	72%
Total	***415***	***90%***	***81%***

4.2.3 The Impact of Balconies

The table below has been produced to investigate the impact that balconies across the scheme have on the ADF levels in a sample number of combined kitchen and living rooms. The results present two separate conditions. These conditions are:

1. With a balcony (this is the current arrangement as drawn with the architectural pack).
2. This is the same room dimensions as currently drawn, but with the balcony removed. Results are simulated in the same location within the site (i.e. all other external obstructions and influences will still have an impact).

The table below shows the results for a sample of 28No rooms within the development.

Block	Room Ref	ADF with balcony	ADF without balcony	Percentage Increase
A1	A1.2.0101	1.8	3.3	86%
A1	A1.3.0204	2.2	4.4	104%
A1	A1.4.0207	0.7	2.1	202%
A1	A1.5.0402	1.4	2.8	95%
A1	A1.2.0509	1.1	2.3	100%
A1	A1.2.0601	1.9	3.4	80%
A2	A2.0304	2.0	3.6	81%
A3	A3.0107	1.8	3.3	88%
A4	A4.1.0101	1.3	1.7	26%
A4	A4.2.0504	2.3	3.2	40%
B1	B1-309	1.3	2.0	63%
B3	B3-307	1.3	3.0	131%
C1	C1-110	1.7	3.0	80%
C1	C1-309	1.3	2.6	109%
C2	C2-206	1.1	2.4	120%
D1	D1.00.0109	1.0	2.0	94%
D1	D1.00.0208	1.2	2.2	84%
D1	D1.00.0808	1.7	1.9	16%
D1	D1.00.1203	2.2	3.3	51%
D1	D1.00.1407	1.4	2.7	88%
D1	D1.00.1510	2.3	3.5	54%
D1	D1.00.1605	2.3	3.4	47%
D2	D2-119	0.9	1.6	85%
D2	D2-216	1.0	1.9	89%
D2	D2-350	1.0	2.1	117%
Seminary	Apt 1.1	1.8	2.5	42%
Seminary	Apt 2.3	2.8	3.7	32%
Seminary	Apt 4.1	4.7	6.3	35%
Average		***1.7***	***2.9***	***70%***

4.2.4 Probable Annual Sunlight Hours (PASH)

Of the points tested on the proposed development for PASH, 68% of these met the BR 209 recommended target of 25%. This would generally be considered higher than typical for a development of this nature. Further discussion on this is given within the section following.

4.2.5 Probable Winter Sunlight Hours (PWSH)

Of the points tested on the proposed development for PWSH, 84% of these met the BR 209 recommended target of 5%. Further discussion on this is given within the section following.

5 Commentary on Results

5.1 Effect of the Proposed Condition Relative to the Baseline Condition

When comparing the impact on daylight and sunlight availability to the surrounding buildings, it could be said that the Proposed Condition will produce an overall negligible impact.

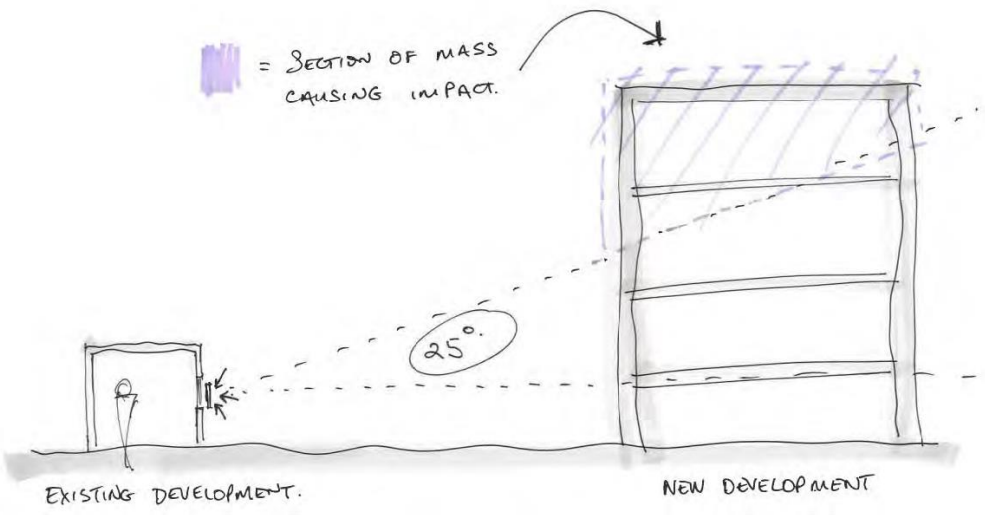
5.1.1 Impact to Surrounding Windows

Of all the surrounding points tested for VSC, 98% experienced a negligible impact and only 2% experienced a minor adverse impact. Of the points tested for PASH, 100% experienced a negligible impact. Similarly, 100% of points experience a negligible impact considering results for PWSH.

A minor adverse impact relative to the Baseline Condition is experienced only at one location (the existing West façade of the Caretakers Bungalow in front of Cornmill Apartments). Additionally, at this location, the impact is only to skylight (VSC). Levels of direct sunlight (both PASH and PWSH) will still fall within the guidelines given in BR 209. At the Caretakers Bungalow, 63% of points experience a negligible impact to levels of VSC, while 15% experience a minor adverse impact and 22% a major negative impact.

At present, the existing site is predominantly undeveloped. In general, when a proposed massing is constructed within 25° to the horizontal of the adjacent existing building, the proposed building will have a negative impact on the existing. The sketch below shows this visually.

Figure 9: Sketch showing the vertical angle through which a proposed massing will have a negative impact on existing surrounding buildings.



With the above in mind, and also considering the associated change in level between the Caretakers Bungalow and the proposed development, it becomes

apparent that the scale of any proposed massing adjacent to the Caretakers Bungalow would need to be very low rise to cause a negligible impact to the levels of daylight and sunlight in the existing apartment (the 25° would need to be taken from the bottom level). Applying this rule, the resultant proposed development at this location would be in the region of 2 levels maximum. Additionally, it is to be noted that the other windows of the dwelling will experience no impact.

The adjacent caretakers bungalow was permitted as part of the development of the Belvedere College Sports Pitches under DCC Ref: 1160/93, as amended by 0003/94, which included the following condition: Condition 1 stated: The proposed bungalow shall be restricted to use as a single dwelling unit only and shall be used solely in conjunction with the pavilion and associated sports ground. REASON: In the interest of the proper planning and development of the area. While the wider permission, including the bungalow location was revised under 0003/94, from a review of the planning files and comparison against the development from aerial mapping it appears the bungalow was constructed as permitted under 1160/93.

Figure 10: Dwelling at the East side facing the adjacent D2 block development is the only building to experience a minor adverse impact in daylight availability with the construction of the new development.

5.1.2 Sunlight Availability

Particular attention has been given to the existing amenity spaces (i.e. courtyards, terraces) surrounding the proposed scheme, with the intention to minimise the impact on their access to direct sunlight. The final assessment shows that the proposed development will cause a negligible impact on sunlight availability in all of these existing spaces.

The massing iterations and associated analysis completed ensured that the spacing from the site boundary, the height and the general scale of the proposed

development is such that it ensures no significant impact on direct sunlight to surrounding existing amenity spaces.

5.2 Performance of the Proposed Development

Daylight and sunlight have been given due consideration from the outset of the design process. The paragraphs following outline the approaches, feedback and typical changes made in responding to daylight and sunlight.

5.2.1 Sunlight Availability

Despite the density of the proposed development, the scheme design allows for the proposed amenity areas to receive adequate levels of sunlight across the year, exceeding the target of 2 hours for half of the area as set up in BRE209.

This increased level of sunlight penetration in open areas has a knock-on effect for the South facing apartments looking onto these courtyards. This is evident in the number of apartments (68%) that exceed the BR 209 recommended target of 25% PASH.

Figure 11: Apartments on Block A1 looking at the internal courtyard.

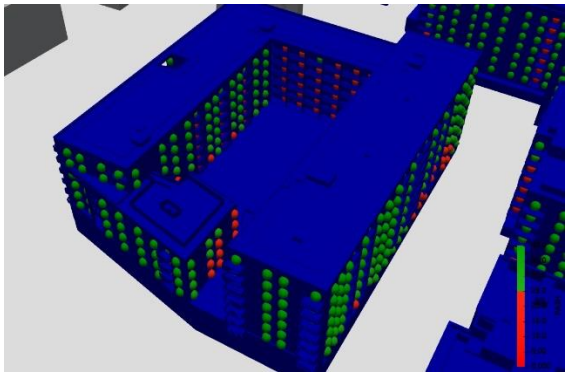
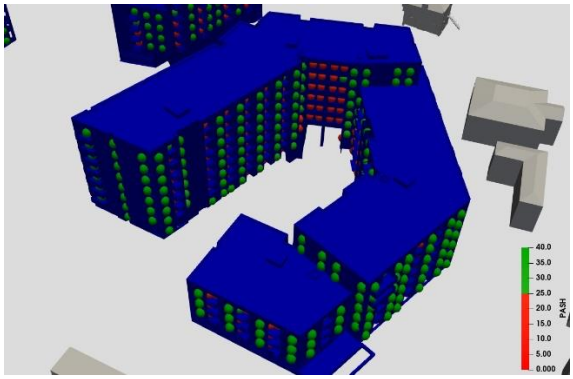


Figure 12: Apartments on Block D2 looking at the internal courtyard. The average sunlight availability (PASH) for these units is 48%.



Beyond the sunlight available at windows within the proposed development, the overriding majority of units contain a balcony. Each of these balconies will receive direct sunlight (both PASH and PWSH) that is in excess of the results

reported here, as these results are measured at the window and include the obstruction caused by the balcony itself.

5.2.2 Daylight Availability

Whilst the design development process paid due attention to the skylight availability on the exterior facades of the proposed development, there will inevitably be lower levels of skylight available when obstructions are more prominent – i.e. below balconies, at the lower levels or at buildings corners of this mid-rise development.

To mitigate against to the above, the project architects have adopted a responsive approach to the window design. The glazing area, and in particular the window width, have been specifically sized to maximise the number of units across the scheme that meet the BS 8206-2 recommendations for ADF.

When benchmarking these results against the expectations of the reader, we would like to note the following:

- The overall percentage of units that either meet or do not meet the offered ADF targets is only one factor within a wider series of planning objectives.
- The figures for ADF given are:
  - 90% of rooms passing when combined kitchen and living benchmarked vs 1.5% and;
  - 81% of rooms passing when combined kitchen and living benchmarked vs 2%.
- The simulation method for combined kitchen and living spaces considered the full extent of the area within the room. The kitchen portion of the space was not excluded.
- The impact of balconies on the availability of daylight within rooms is significant. A sample of 28No rooms was tested and within this sample, the addition of balconies caused a measurable reduction in ADF within the rooms below them. In the sample of rooms investigated, these rooms could be reported with having ADF values ~ 70% higher than they are at present if a balcony had been excluded. Whilst this exercise did not consider every room within the development or even every room within the representative sample, it offers some insight into the impact of balconies within the scheme. The proposed development is a Build to Rent development and under Sustainable Housing Design Standards for New Apartments (2020), it does not have a direct requirement for balconies. However, and in the knowledge that reduced ADF levels will be the outcome, balconies have been offered in the interest of better residential amenity. Given the results above and considering the wider context within which a balcony can provide positive residential amenity, the developer believes the provision of balconies and the associated benefits outweighs the reduction in ADF within the rooms beneath them. We would hope that the associated ADF values are read, assessed, analysed and considered in this context.

The reader is also urged to assess the points above in the context of the following items:

- The development delivers ample access to sunlight in amenity spaces.
- The development delivers good access to direct sunlight at unit windows.
- The development delivers balconies at upper levels to almost all units. The levels of direct sunlight here will be better than the results presented the for all windows in the proposed development. These have been measured at the window behind and the balconies in place as obstructions.
- The methods within this report have not been altered to remove kitchen spaces from the calculation grids. In doing so, the development could have been presented with a narrative of >95% of units tested meet the relevant ADF targets. For reasons of transparency, this has not been presented.

5.3 Observations

From reading the above and in conjunction with the full suite and results and analysis given within the appendices, the below observations could be drawn in summary:

- The proposed development will have an overall negligible impact on the levels of daylight and sunlight availability in the surrounding existing properties and amenity spaces.
- The proposed development will produce an environment that allows for plentiful sunlight penetration into all the amenity spaces and the majority of South facing apartment windows, in addition to producing appropriate levels of diffuse daylight within the apartments themselves.

6 Summary

This report presents the process and findings of design development, analysis and simulations that have been completed to examine the daylight and sunlight availability both at the proposed site (Holy Cross College Lands, Dublin) and in the existing surrounding buildings.

To align with this, the analysis within the report is split into two distinct sections:

- The impact of the proposed development on the existing surrounding environment
- The performance of the proposed development

In general, a considered and iterative design development approach has been taken in the generation of the architectural scheme, with daylight and sunlight availability being a key driver. The daylight and sunlight design influenced the architecture through the application of two distinct processes:

- The first was an iterative analysis of various massing models, with results from each simulation being then fed back into the design. The intention with this exercise was to minimise impact on the existing surrounding properties, but also increase the daylight and sunlight availability to the proposed apartment units and maximise sunlight availability in amenity spaces.
- The second was an assessment of glazing size. A reverse engineering process was used to determine the appropriate window dimensions for rooms that performed poorly when first analysed. Through the application of a parametric formula, the project architects have adopted a responsive design approach that varies window dimensions to ensure that individual apartment rooms receive adequate levels of diffuse daylight (ADF).

When considering the impact of the proposed development on the daylight and sunlight availability in the existing surrounding environment, it can be stated that the proposed development has a negligible impact on almost all of the surrounding dwellings, with the exception of one smaller building (Caretakes Bungalow). At this location, a minor adverse impact in skylight availability and a negligible impact on sunlight availability is experienced.

When considering the performance of the proposed development itself, the daylight and a sunlight availability could be described as better than typical for a mid-rise suburban development of this nature. The following observations can be made:

- All proposed amenity spaces, both public and communal, will be greater than the BR 209 target for direct sunlight (SHOG).
- 68% of the south facing windows tested meet or exceed the BR 209 recommended target of 25% for annual sunlight (PASH).
- 84% of the south facing windows tested meet or exceed the BR 209 recommended target of 5% for winter sunlight (PWSH).

- When combined kitchen and living rooms are benchmarked against 1.5% ADF, 90% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.
- When combined kitchen and living rooms are benchmarked against 2.0% ADF, 81% of the rooms tested within the development meet the relevant BR 209 / BS 8206-2 targets.
- The methods within this report have not been altered to remove kitchen spaces from the calculation grids. In doing so, the development could have been presented with a narrative of >95% of units tested meet the relevant ADF targets. For reasons of robustness, transparency, clarity and fairness, this method has not been completed and presented. The reader us asked to benchmark the total percentage of units exceeding BR 209 / BS 8206-2 ADF targets reported here in the context of this.
- The impact of balconies in the proposed scheme on levels of ADF is significant. Despite Build to Rent developments under Sustainable Housing Design Standards for New Apartments (2020) not requiring balconies, they have been provided. Considering the wider context within which a balcony can provide positive residential amenity, the applicant believes the provision of balconies and the associated benefits outweighs the reduction in ADF within the rooms beneath them. We suggest that the associated ADF values are read, assessed, analysed and considered in this context.

In summary, the proposed development is said to:

- Have an overall negligible impact on the levels of daylight and sunlight availability in the surrounding existing properties and amenity spaces.
- Produce an environment that allows for plentiful sunlight penetration into all created amenity spaces and the majority of south facing apartment windows, in addition to producing appropriate levels of ADF within the apartments themselves.