Assessment of Sunlight & Daylight Access within the Proposed Development

St. Joseph's House and Adjoining Properties, Brewery Road and Leopardstown Road, Dublin 18

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1.0 Introduction

ARC Architectural Consultants Ltd has been retained by the Applicant to prepare this assessment of sunlight and daylight access within the proposed residential development on lands at St. Josephs House and adjoining properties, Brewery Road and Leopardstown Road, Dublin 18. Please note that the assessment of the impact of the proposed development on sunlight and daylight access to the surrounding area is set out in Chapter 18 of the Environmental Impact Assessment Report submitted with the application.

Note on Reference to Context under Technical and Guidance Documents and on Reference to Methodology

In order to avoid repetition, the sections outlining the relevant recommendations of technical and guidance documents and the methodologies used in undertaking this assessment have been set out in the Technical Appendix at the end of the written section of this report.

1.2 Relevant Characteristics of the Proposed Development

The development will consist of a new residential and mixed use scheme to include apartments, residential amenity space, a café and a childcare facility as follows:

- The demolition of 10 no. properties and associated outbuildings at 'Madona House' (single storey), 'Woodleigh' (2 storeys), 'Cloonagh' (2 storeys), 'Souk El Raab (2 storeys), 'Welbrook' (2 storeys), 'Calador' (2 storeys), 'Alhambra' (2 storeys), 'Dalwhinnie' (2 storeys), 'Annaghkeen' (2 storeys) and 'The Crossing' (single storey) (combined demolition approx. 2,291.3 sq m GFA)

- The refurbishment, separation and material change of use of Saint Joseph's House (a Protected Structure, RPS No. 1548) from residential care facility to residential use and a childcare facility; and the construction of a new build element to provide for an overall total of 463 no. residential units, residential amenity space and a café as follows:
  - Block A (5 storeys) comprising 49 no. apartments (13 no. 1 bed units, 33 no. 2 bed units and 3 no. 3 bed units);
  - Block B (4 - 7 storeys) comprising 88 no. apartments (28 no. 1 bed units, 57 no. 2 bed units and 3 no. 3 bed units);
  - Block C (5 - 7 storeys) comprising 115 no. apartments (26 no. studio units, 26 no. 1 bed units and 57 no. 2 bed units and 6 no. 3 bed units);
  - Block D (5 - 10 storeys) comprising 157 no. apartments (36 no. studio unit, 40 no. 1 bed units and 81 no. 2 bed units), residential amenity areas of approx. 636 sq m and a café of approx. 49 sq m;
  - Block E (St. Joseph's House) (2 storeys) comprising 9 no. apartments (8 no. 2 bed units and 1 no. 3 bed units) and a childcare facility of 282 sq m with associated outdoor play areas of approx. 130 sq m;
  - Block F (3 - 6 storeys) comprising 45 no. apartments (23 no. studio units, 10 no. 1 bed units; and 12 no. 2 bed units);

- Open Space (approx. 9,885 sq m)

- 259 no. car parking spaces (232 no. at basement level and 27 no. at surface level)

- 968 no. bicycle spaces (816 no. at basement level and 152 no. at surface level)

- 10 no. motorcycle spaces (all at basement level)

- Vehicular Access

- Basement Areas

- Substations and Switch Rooms

- All associated site development works.

Figure 1: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block A – annotated in yellow by ARC

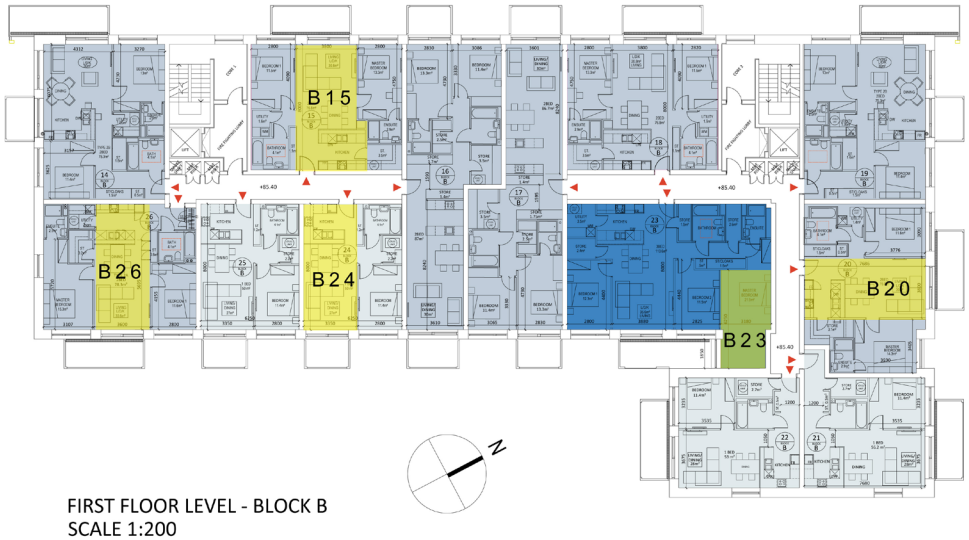


Figure 2: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block B – annotated in yellow by ARC

Figure 3: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block C – annotated in yellow by ARC

Figure 4: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block D – annotated in yellow by ARC

LEGEND

- Studio Apartment
- 1 Bed Apartment
- 2 Bed Apartment
- 3 Bed Apartment
- Resident Amenities
- Arc Analysis Zones

FIRST FLOOR LEVEL - ST JOSEPHS

Figure 5: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block E / St. Josephs House – annotated in yellow by ARC

Figure 6: Indicative diagram based on floor plan prepared by O'Mahony Pike Architects showing location of sample rooms analysed as part of this assessment of daylight access within the proposed development – Block F – annotated in yellow by ARC

2.0 Assessment of Daylight Access within the Proposed Development

2.1 Introduction

The *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* provide that *"planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."*

Section 3.2 of the *Urban Development and Building Height Guidelines* states: *"Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints 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."*

The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in the BRE Guide have been referenced in preparing this report.

The *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'* was withdrawn in May 2019, while *BS EN 17037: Daylight in Buildings* was adopted in the United Kingdom in May 2019. In Ireland, *IS EN 17037: Daylight in Buildings* was published by the National Standards Authority of Ireland on 28th January 2019.This report does not refer to *IS EN 17037: Daylight in Buildings* or to the United Kingdom's *BS EN 17037: Daylight in Buildings*. The standards for daylight access (and the methodologies recommended for assessing whether rooms meet those standards) in the BRE Guide are entirely different from those set out in IS EN 17037: 2018 and BS EN 17037: 2018. Given this and given that the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* refers to the BRE Guide and not to IS EN 17037: 2018 or BS EN 17037: 2018, the BRE Guide has been referenced in the preparation of this report.

The BRE Guide states as follows (at paragraph 2.1.8) in relation to daylight access within new development:

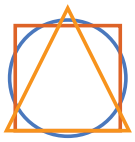
> *"2.1.8 Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space... BS 8206-2 Code of practice for daylighting, recommends an ADF of 5% for a well daylit space and 2% for a partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum value of ADF of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms."*

While not expressly discussed in the BRE Guide, Section 5.6 of the *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'* (withdrawn in May 2019) states as follows in relation to multi-function rooms: *"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%."*

2.2 Detailed Analysis of Daylight Access to Proposed Units – Selection of Representative Sample

As part of this *Assessment of Sunlight & Daylight Access within the Proposed Development,* ARC undertook an assessment of the likely daylight access within the proposed residential units.

The BRE Guide does not dictate how its recommendations in relation to daylight access should be applied to large multi-unit schemes. Specifically, the BRE Guide does not suggest what proportion of rooms within a multi-unit scheme should be analysed to ensure good daylight performance within such a scheme as a whole. Moreover, the BRE Guide does not suggest how to



choose the sample of rooms that should be analysed. The following approach was used in choosing the sample for assessment:

- Section 2.1.12 of the BRE Guide states that an initial approach would be to look at daylight access to the *"ground (or lowest storey base)"* of a proposed structure. This is because daylight to the lowest levels of accommodation will be the most obstructed. As there is considerable similarity in the plans from floor to floor, a sample of units for study was chosen from the ground and first floors of accommodation. Where rooms are similar from floor to floor within an apartment block, it is reasonable to assume that rooms on upper floors will achieve similar or better daylight levels as these rooms will be less obstructed.
- On these lower floors, care was taken to ensure that the sample of rooms is representative of the development (e.g. it was ensured that rooms on all sides of the development were analysed).
- Rooms likely to receive lower levels of daylight due to their location within the scheme (e.g. in close proximity to opposing buildings; in close proximity to obstructions, such as corners; etc) were included in the sample.
- Rooms likely to receive lower levels of daylight due to their design (e.g. deep rooms; rooms served by one principal window wall) were included in the sample.
- Where there was a reasonable expectation that rooms would perform well in terms of daylight access, these rooms were omitted from the sample (e.g. dual aspect rooms, particularly those with large windows).
- Where examples of specific unit types had already been included in the sample, others of that unit type may have been omitted from the sample (e.g. the units at B 11, B 12, B 24 and B 25 are all west-facing units of a similar design located within a similar place within the block relative to external obstructions – only one of these units was included in the sample (B 12) as the results for this unit will be similar or lesser than other units of this type within Block B).

The locations of the sample study rooms analysed as part of this analysis of daylight access within residences within the proposed development are illustrated at Figures 1 to 6 above. For more detail on the methodology used in assessing daylight access, please refer to the Technical Appendix of this Report.

2.3 *Engagement with the Design Team during the Design Phase*

ARC engaged in a prolonged, iterative process with the Design Team over a period of months to ensure that all habitable rooms within residences within the proposed development would be capable of achieving the recommendations of the BRE Guide with regard to daylight access. This process involved:

- Detailed quantitative assessment of emerging designs for proposed unit types where there was a potential for issues with daylight access to arise;
- Where issues were identified in respect of early design iterations of unit types, further detailed quantitative analysis was carried out to identify whether the issue was restricted to low levels of accommodation or occurred on upper floors;
- Detailed quantitative analysis of potential design solutions for the improvement of daylight access was carried out. Solutions implemented included changes in the massing of proposed blocks; different balcony arrangements; changes to window sizes / designs; inclusion of additional windows to some units.
- Once suitable solutions were identified, relevant rooms were re-analysed to confirm that these rooms could achieve the recommendations of the BRE Guide with regard to daylight access.

2.4 *Results of Assessment of Daylight Access within the Proposed Development*

ARC's analysis predicts that all sample study rooms (a large proportion of which represent a worst case scenario) within the proposed development will achieve levels of daylight access at or above the minimum Average Daylight Factor recommended by the BRE Guide for living rooms (i.e. 1.5% Average Daylight Factor) and for bedrooms (i.e. 1% Average Daylight Factor). ARC's analysis further indicates that all kitchen / living / dining rooms in unit types throughout the proposal are likely to receive a level of daylight access in excess of the recommended 2% Average Daylight Factor for mixed function rooms[1].

1 The British Standard states that: *"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%."*

Given that worst case analysis units were included in the assessment sample, ARC's analysis would suggest that all units within the proposed development are likely to achieve Average Daylight Factors in excess of the minimum standards outlined in the BRE Guide.

The results of ARC's analysis of likely daylight access within the proposed development are set out in Table 2.1 below:

*Table 2.1: Predicted daylight access to sample rooms** within the proposed development*

Location	Floor	Room Type	Predicted Average Daylight Factor	Achieves recommended minimum?
Zone A 01	Floor 00	Kitchen / Dining / Living Room	3.46%	Yes
Zone A 03	Floor 00	Kitchen / Dining / Living Room	4.66%	Yes
Zone A 04	Floor 00	Kitchen / Dining / Living Room	3.78%	Yes
Zone A 09	Floor 00	Kitchen / Dining / Living Room	2.79%	Yes
Zone A 12	Floor 01	Kitchen / Dining / Living Room	2.82%	Yes
Zone A 17	Floor 01	Kitchen / Dining / Living Room	2.78%	Yes
Zone A 19	Floor 01	Kitchen / Dining / Living Room	2.48%	Yes
Zone B 03	Floor 00	Kitchen / Dining / Living Room	3.43%	Yes
Zone B 04	Floor 00	Kitchen / Dining / Living Room	3.27%	Yes
Zone B 09	Floor 00	Kitchen / Dining / Living Room	4.71%	Yes
Zone B 10	Floor 00	Kitchen / Dining / Living Room	4.36%	Yes
Zone B 10	Floor 00	Bedroom	2.31%	Yes
Zone B 12	Floor 00	Kitchen / Dining / Living Room	2.99%	Yes
Zone B 15	Floor 01	Kitchen / Dining / Living Room	2.75%	Yes
Zone B 20	Floor 01	Kitchen / Dining / Living Room	3.29%	Yes
Zone B 23	Floor 01	Bedroom	1.74%	Yes
Zone B 24	Floor 01	Kitchen / Dining / Living Room	2.96%	Yes
Zone B 26	Floor 01	Kitchen / Dining / Living Room	3.14%	Yes
Zone C 01	Floor 00	Kitchen / Dining / Living Room	2.27%	Yes
Zone C 03	Floor 00	Kitchen / Dining / Living Room	3.46%	Yes
Zone C 05	Floor 00	Kitchen / Dining / Living Room	6.82%	Yes
Zone C 07	Floor 00	Kitchen / Dining / Living Room	3.82%	Yes
Zone C 09	Floor 00	Kitchen / Dining / Living Room	4.70%	Yes
Zone C 10	Floor 00	Kitchen / Dining / Living Room	5.89%	Yes
Zone C 11	Floor 00	Kitchen / Dining / Living Room	3.22%	Yes
Zone C 13	Floor 00	Bedroom	5.27%	Yes
Zone C 13	Floor 00	Kitchen / Dining / Living Room	3.27%	Yes
Zone C 19	Floor 01	Kitchen / Dining / Living Room	3.69%	Yes
Zone C 28	Floor 01	Bedroom	1.99%	Yes
Zone C 30	Floor 01	Kitchen / Dining / Living Room	5.59%	Yes
Zone D 02	Floor 00	Kitchen / Dining / Living Room	4.34%	Yes
Zone D 03	Floor 00	Kitchen / Dining / Living Room	3.86%	Yes
Zone D 04	Floor 00	Studio*	2.19%	Yes
Zone D 07	Floor 00	Bedroom	5.67%	Yes
Zone D 09	Floor 00	Kitchen / Dining / Living Room	5.52%	Yes
Zone D 11	Floor 00	Kitchen / Dining / Living Room	3.52%	Yes

Location	Floor	Room Type	Predicted Average Daylight Factor	Achieves recommended minimum?
Zone D 17	Floor 01	Kitchen / Dining / Living Room	6.95%	Yes
Zone D 18	Floor 01	Studio*	2.64%	Yes
Zone D 22	Floor 01	Kitchen / Dining / Living Room	3.28%	Yes
Zone D 27	Floor 01	Kitchen / Dining / Living Room	4.68%	Yes
Zone D 29	Floor 01	Kitchen / Dining / Living Room	3.91%	Yes
Zone D 33	Floor 01	Kitchen / Dining / Living Room	4.11%	Yes
Zone J 01	Floor 00	Kitchen / Dining / Living Room	2.98%	Yes
Zone J 02	Floor 00	Kitchen / Dining / Living Room	3.48%	Yes
Zone J 03	Floor 00	Kitchen / Dining / Living Room	3.39%	Yes
Zone J 04	Floor 00	Kitchen / Dining / Living Room	4.67%	Yes
Zone J 08	Floor 00	Kitchen / Dining / Living Room	3.94%	Yes
Zone J 09	Floor 00	Kitchen / Dining	6.43%	Yes
Zone J 09	Floor 00	Living Room	4.80%	Yes
Zone F 03	Floor 00	Bedroom	5.46%	Yes
Zone F 04	Floor 00	Kitchen / Dining / Living Room	7.48%	Yes
Zone F 04	Floor 00	Bedroom	1.73%	Yes
Zone F 07	Floor 00	Studio*	4.14%	Yes
Zone F 08	Floor 00	Kitchen / Dining / Living Room	4.33%	Yes
Zone F 11	Floor 00	Kitchen / Dining / Living Room	7.14%	Yes
Zone F 21	Floor 01	Kitchen / Dining / Living Room	5.54%	Yes
Zone F 21	Floor 01	Bedroom	3.31%	Yes

* Studios are indicated as having a sliding clear glass screen in the middle of the studio. For the purpose of this analysis, the studios were assessed as one large open plan room.

** Please note that ARC's assessment assumes that all kitchen / living / dining rooms are open plan and that these rooms are not split up by walls or fixed furniture (e.g. a kitchen island).

2.5 *Compensatory Design Solutions*

Section 3.2 of the *Urban Development and Building Height Guidelines* states: *"Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints 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."*

As mentioned above, ARC engaged in a prolonged, iterative process with the Design Team over a period of months to ensure that all habitable rooms within residences within the proposed development would be capable of achieving the recommendations of the BRE Guide with regard to daylight access. As ARC's analysis suggests that all rooms within the proposal are likely to achieve the recommendations of the BRE Guide for daylight access, no additional compensatory design solutions are proposed.

Figure 3.1 Indicative diagram showing location of open spaces within the proposed development assessed as part of this analysis. Communal open spaces are shown in red (Open Spaces 01, 02, 03, 04, 05, 07, 14 and 15). Public open spaces are shown in green (Open Spaces 09, 10, 11). Visual Amenity Open Spaces are shown in purple (Open Spaces 06, 08, 12 and 13). Creche Open Spaces are shown in yellow (Creche Open Spaces 1 and 2).

3.0 Assessment of Sunlight Access within the Proposed Open Spaces

Appendix 1 of the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* sets out the requirements for quantum of communal amenity space associated with developments of new apartments. The Apartment Guidelines do not prescribe requirements on the issue of sunlight access to proposed open spaces and does not require that planning authorities have regard to quantitative performance approaches to sunlight provision in amenity spaces set out in the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide).

Section 3 of the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* sets out design advice and recommendations for site layout planning to ensure good sunlight access and suggests 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 sunlight on 21st March. ARC had regard to the BRE Guide in undertaking this assessment of sunlight access to open spaces within the proposed development.

Please note that, in determining whether or not to include existing and proposed substantial trees in the three dimensional model for the purposes of this quantitative analysis, ARC made reference to the BRE Guide (as updated in 2011), which states that the *"question of whether trees or fences should be included in the calculation depends upon the type of shade they produce. Normally trees and shrubs need not be included, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees)."* Given this, ARC did not show the shadows cast by trees on the shadow study diagrams.

The subject application proposes seventeen open spaces (please see Figure 3.1). Detailed quantitative analysis was carried out on the proposed open spaces as follows:

- Table 3.1: Communal Open Space Areas (Eight Spaces: Spaces 01, 02 , 03, 04, 05, 07, 14, 15)
- Table 3.2: Visual Amenity Open Space Areas (Four Spaces: Spaces 06, 08, 12, 13)
- Table 3.3: Public Open Space Areas (Three Spaces: Space 09, 10, 11)
- Table 3.4: Crèche Open Space Areas (Two Spaces: Crèche Space 1 and 2).

Table 3.1: Communal Space Areas – Approximate areas in sunshine on 21st March

Time	Space 01 (922 sq m)	Space 02 (200 sq m)	Space 03 (123 sq m)	Space 04 (408 sq m)	Space 05 (1,027 sq m)	Space 07 (369 sq m)	Space 14 (43 sq m)	Space 15 (24 sq m)
0900	44%	45%	0%	70%	0%	94%	36%	0%
1000	59%	33%	0%	71%	0%	96%	60%	0%
1100	66%	84%	0%	74%	8%	97%	51%	38%
1200	73%	99%	0%	73%	33%	99%	50%	100%
1300	80%	96%	0%	75%	39%	99%	39%	100%
1400	81%	95%	5%	75%	41%	99%	37%	100%
1500	75%	86%	47%	70%	50%	90%	47%	45%
1600	60%	70%	100%	53%	39%	71%	60%	4%
1700	25%	30%	100%	2%	16%	9%	76%	0%
1800	0%	0%	0%	0%	4%	0%	76%	0%

Comment: While Open Space 05 will is likely to receive less sunlight than the BRE Guide recommendation, ARC's analysis indicates that seven of the proposed eight communal open space will achieve at least two sunshine over at least half their respective areas on 21st March. [Note: Space 03 receives sunlight over in excess of half its area between 1530 and 1730 on 21st March.]

Table 3.2: Visual Amenity Space Areas – Approximate areas in sunshine on 21st March

Time	Space 06 (369 sq m)	Space 08 (132 sq m)	Space 12 (157 sq m)	Space 13 (360 sq m)
0900	0%	100%	100%	78%
1000	0%	100%	100%	92%
1100	0%	100%	100%	100%
1200	0%	100%	100%	100%
1300	9%	100%	100%	100%
1400	55%	100%	100%	98%
1500	83%	100%	100%	98%
1600	6%	92%	96%	98%
1700	0%	8%	3%	94%
1800	0%	0%	0%	43%

Comment: While Open Space 06 will is likely to receive less sunlight than the BRE Guide recommendation, ARC's analysis indicates that three of the proposed four visual amenity space areas will achieve at least two sunshine over at least half their respective areas on 21st March.

Table 3.3: Public Open Space Areas – Approximate areas in sunshine on 21st March			
Time	Space 09 (3,638 sq m)	Space 10 (1,567 sq m)	Space 11 (865 sq m)
0900	26%	96%	100%
1000	34%	66%	100%
1100	49%	50%	100%
1200	67%	52%	100%
1300	79%	55%	100%
1400	85%	56%	100%
1500	82%	49%	100%
1600	68%	40%	100%
1700	40%	28%	95%
1800	0%	4%	0%
Comment: ARC's analysis indicates that all proposed public open space areas will achieve at least two sunshine over at least half their respective areas on 21st March.			

Table 3.4: Crèche Open Space Areas – Approximate areas in sunshine on 21st March		
Time	Crèche Space 1 (76 sq m)	Crèche Space 2 (43 sq m)
0900	0%	0%
1000	0%	53%
1100	0%	71%
1200	10%	90%
1300	24%	100%
1400	59%	100%
1500	65%	100%
1600	51%	100%
1700	4%	14%
1800	0%	0%
Comment: ARC's analysis indicates that both Crèche Open Space areas will achieve at least two sunshine over at least half their respective areas on 21st March.		

As suggested by the results set out in Tables 3.1-3.4, most of the proposed open spaces are predicted to receive a level of sunlight in excess of the level recommended by the BRE Guide for amenity spaces and will appear adequately sunlit throughout the year within the meaning of the BRE Guide. Having regard to the location of open spaces throughout the site, ARC's analysis indicates that open space provision will afford residents a place within the proposed development where residents can go to sit and enjoy the sunshine on a sunny day for a significant portion of the day for most of the year.

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August 2021

Technical Appendix

Explanatory Note

In assessing sunlight and daylight access, Irish practitioners tend to refer to the relevant PJ Littlefair's 2011 revision of the 1991 publication *Site layout planning for daylight and sunlight: a guide to good practice* for the Building Research Establishment (the BRE Guide).

Section 1.7 of the BRE Guide provides: *"The guidance here is intended for use in the UK and Republic of Ireland"*. Its use in assessing impacts on sunlight and daylight access as part of the planning process is supported by national government planning policy including:

- The *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas*, which, at Section 7.2 states: *"Planning authorities should require that daylight and shadow projection diagrams be submitted in all such proposals. The recommendations of "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" (B.R.E. 1991)*[1] *or B.S. 8206 "Lighting for Buildings, Part 2 1992: Code of Practice for Daylighting" should be followed in this regard."*

- The *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities*, which, at Section 6.6, states: *"Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."*

- The *Urban Development and Building Height Guidelines*, which, at Section 3.2, states: *""Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints 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."*

The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in the BRE Guide have been referenced in this report.

The BRE Guide does not set out rigid standards or limits, but is preceded by the following very clear warning as to how the design advice contained therein should be used:

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

This report is prepared by ARC Architectural Consultants Ltd for the benefit of the Applicant and in accordance with our instructions. ARC Architectural Consultants Ltd disclaims any liability, legal or otherwise, from any party, other than the Applicant, seeking to rely upon the content of this report. The purpose of this report is to provide a general indication of daylight performance and sunlight access within the proposed development on the basis of numerous assumptions outlined below and with reference to design tools set out in the guidance documents referenced above as part of the planning process. ARC takes no responsibility for any errors introduced by the third party proprietary sunlight and daylight analysis software used to perform the quantitative assessment. This report does not offer a guarantee of daylight performance or sunlight access to existing or future occupants or owners of the application site or neighbouring lands or any other party.

1 The *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas* refer to the first edition of the BRE Guide as published in 1991. A second edition of the Guide was published in 2011.

Daylight Access to Buildings

Context under Technical and Guidance Documents

The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in the BRE Guide have been referenced in preparing this report. The *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'* was withdrawn in May 2019, while *BS EN 17037: Daylight in Buildings* was adopted in the United Kingdom in May 2019. In Ireland, *IS EN 17037: Daylight in Buildings* was published by the National Standards Authority of Ireland on 28th January 2019. This report does not refer to *IS EN 17037: Daylight in Buildings* or to the United Kingdom's *BS EN 17037: Daylight in Buildings*. The standards for daylight access (and the methodologies recommended for assessing whether rooms meet those standards) in the BRE Guide are entirely different from those set out in IS EN 17037: 2018 and BS EN 17037: 2018. Given this and given that the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* refers to the BRE Guide and not to IS EN 17037: 2018 or BS EN 17037: 2018, the BRE Guide has been referenced in the preparation of this report.

The BRE Guide states as follows (at paragraph 2.1.8) in relation to daylight access within new development:

> *"2.1.8 Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space... BS 8206-2 Code of practice for daylighting, recommends an ADF of 5% for a well daylit space and 2% for a partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum value of ADF of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms."*

While not expressly discussed in the BRE Guide, Section 5.6 of the *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'* (withdrawn in May 2019) states as follows in relation to multi-function rooms: *"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%."*

Assessment Methodology for Daylight Access

A three dimensional digital model of the proposed development, of development permitted on adjoining sites and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team; and with reference to the online planning register, on-site, satellite and aerial photography. At paragraph H1.2, the BRE Guide states: *"It is generally more difficult to calculate the effects of trees on daylight because of their irregular shaps and because some light will generally penetrate through the tree crown. Where the effect of a new building on existing buildings nearby is being analysed, it is usual to ignore the effect of existing trees."* Given this, existing and proposed landscaping was not included in this model.

In assessing daylight access within rooms within the proposed development, assumptions were made as to the colour schemes (e.g. materials, reflectances, etc) used in the decoration of the walls (assumed as mid grey with a Light Reflectance Value of 56%, floor (assumed as mid grey (concrete slab) with a Light Reflectance Value of 59%) and ceiling of the room (assumed as light grey / plaster with a Light Reflectance Value of 70%) and the type of glazing used in the window opes. In all cases, rooms are assessed as excluding furniture and window treatments (e.g. curtains, blinds). Assumptions are also made as to the materials and reflectances of external surfaces.

Daylight levels were assessed on the working plane (i.e., at work top level). The results of the analysis describe daylight access in terms of Average Daylight Factor (ADF), which expresses average daylight illuminance as a percentage of unobstructed outdoor illuminance. The factors considered in calculating Average Daylight Factor on the working plane (i.e. 850 mm above floor level) include the light coming from the sky (i.e., the sky component), the light reflected from surfaces outside the room directly to the point being considered (i.e., the externally reflected component) and the light reflected from surfaces inside the room (i.e., the internally reflected component).

Having regard to the extreme variability in sky luminance over the course of any given day depending on weather conditions and the changing seasons, in order for daylight factor to be a meaningful and comparable measure of daylight access, it is necessary to assume a particular luminance distribution for the sky when calculating Average Daylight Factor. This daylight

access analysis uses the Commission Internationale de l'Eclairage (CIE) Standard Overcast Sky Distribution model in its calculations, which is the standard sky most commonly used in daylight access analysis. This model assumes that sky luminance varies from horizon to zenith and is considered to correspond to an overcast day. As such, calculation of Average Daylight Factor in a room in circumstances where the sky luminance corresponds to the CIE Standard Overcast Sky Distribution could be considered to represent a worst case scenario. Unless specifically referenced, analysis of uniformity of daylight access within a room has not been carried out as part of this assessment.

Sunlight Access to Buildings and Open Spaces

Context under Technical and Guidance Documents

Section 3.3 of the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* sets out design advice and recommendations for site layout planning to ensure good sunlight access to amenity spaces and to minimise the impact of new development on existing amenity spaces. The Guide suggests 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 sunlight on 21st March.

Assessment Methodology for Sunlight Access

A three dimensional digital model of the proposed development and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team. Where survey data of surrounding context was not available, assumptions were made, with reference to on-site, satellite and aerial photography and to the online planning register, where relevant, in the creation of the three dimensional model.

Section 3.3.9 of the BRE Guide provides that the "question of whether trees or fences should be included in the calculation depends upon the type of shade they produce. Normally trees and shrubs need not be included, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees)." Given this, existing and proposed landscaping was not included in the assessment model.

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

The results are presented in shadow study diagrams associated with this report. Two images have been prepared for each time period on each representative date as follows:

- ***Receiving Environment:*** this image shows the shadows cast by the existing buildings only. Existing buildings surrounding the application site are shown in light grey, while existing buildings on the application site are shown in orange. The shadows cast are shown in a dark grey tone.
- ***Proposed Development:*** this image shows the shadows cast by the existing buildings together with the shadows cast by the proposed development. The existing buildings surrounding the site are shown in light grey, while the proposed development on the application site is shown in blue. The shadows cast are shown in a dark grey tone.

In order to calculate sunlight access to open spaces, ARC used proprietary sunlight analysis software to calculate the proportion of proposed open spaces in sunlight at regular intervals on 21st March.