Assessment of Sunlight & Daylight Access within the Proposed Development

on

Lands at the Former Greenpark Racecourse, Limerick

September 2021

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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 development on lands at the former Greenpark Racecourse, Limerick. **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 10 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 with a total gross floor area of c. 36, 329 sq m will consist of the provision of 371 no. residential units comprising 157 no. two storey houses (consisting of 10 no. 4 bedroom units, 110 no. 3 bedroom units and 37 no. 2 bedroom units); 76 no. three storey duplex units (consisting of 14 no. 3 bedroom units, 38 no. 2 bedroom units and 24 no. 1 bedroom units) and 138 no. apartments (consisting of 92 no. 2 bedroom units and 46 no. 1 bedroom units arranged in 3 no. blocks ranging between 4 and 5 storeys together with communal amenity space) and a childcare facility (550 sq m), including all private, communal and public open space provision (including balconies and terraces to be provided on to front and rear elevations and related play areas); surface car parking (510 no. spaces in total, including car sharing and accessible spaces); electric vehicle charging points; bicycle parking (long and short stay spaces including secure stands); storage areas; internal roads and pathways; hard and soft landscaping and boundary treatments; piped infrastructural services and connections; plant; revised entrances and tie-in arrangements to adjoining roads, including emergency access via Log na gCapall and Greenpark Avenue; waste management provision; solar panels; attenuation tank and related SUDS measures; signage; public lighting; bulk earthworks; and all site development and excavation works above and below ground. Vehicular access to the site will be from Dock Road, via the proposed access road.

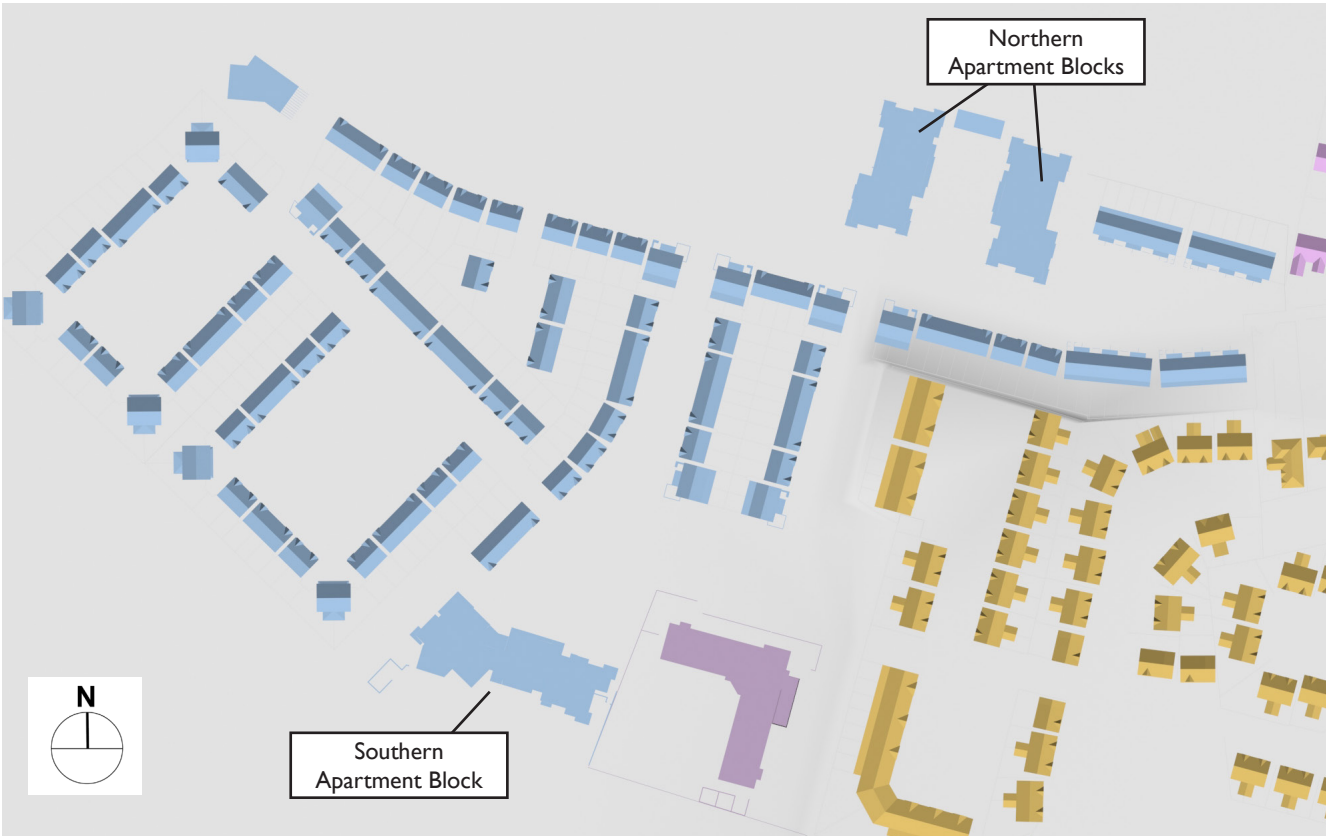

Figure 1: Overview diagram of the proposed development showing location of studied apartment blocks

Figure 2: Indicative diagram based on floor plan prepared by Reddy Architecture + Urbanism showing location of sample rooms in the proposed apartment block at the south of the site analysed as part of this assessment of daylight access – annotated in yellow by ARC

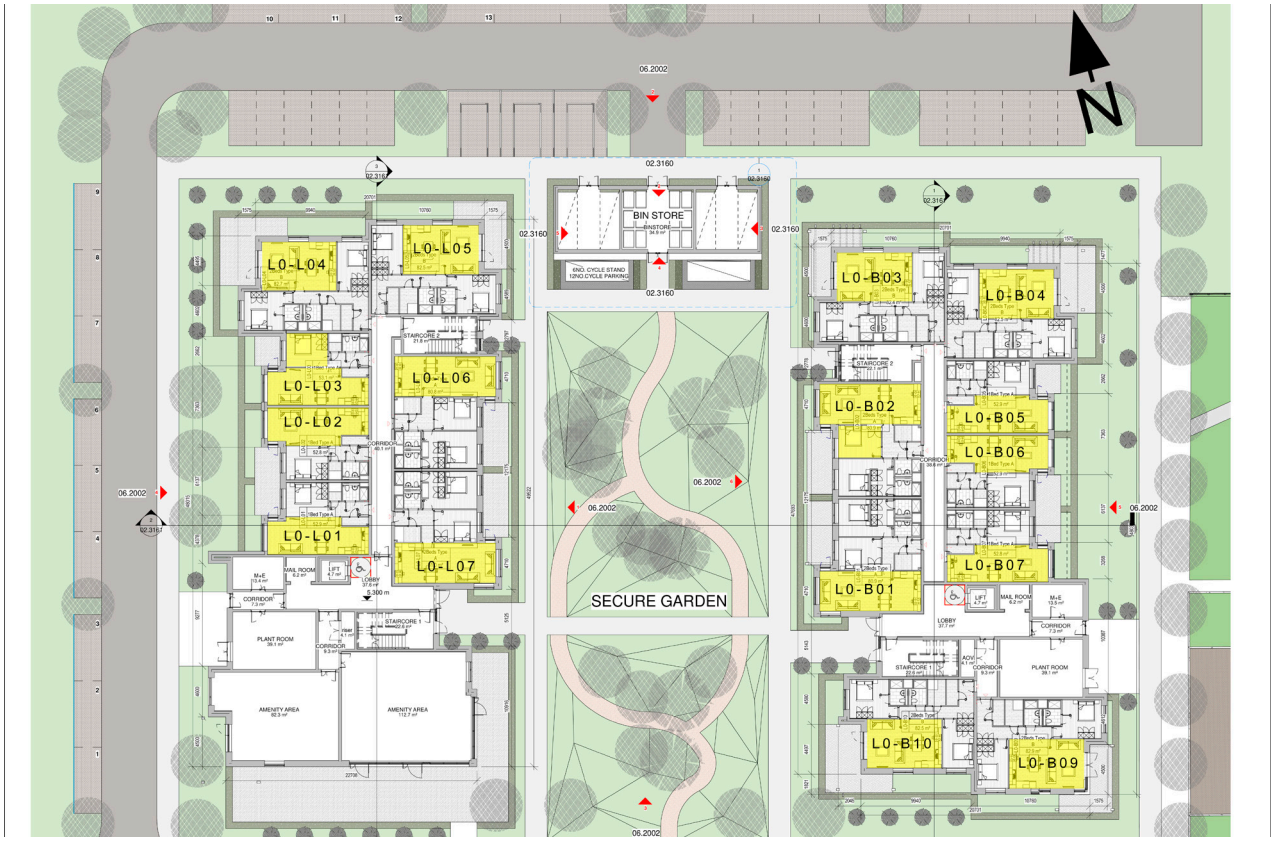

Figure 3: Indicative diagram based on floor plan prepared by Reddy Architecture + Urbanism showing location of sample rooms in the proposed apartment blocks at the north of the site analysed as part of this assessment of daylight access – annotated in yellow by ARC

2.0 Assessment of Daylight Access within the Proposed Development

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."*

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%."*

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. 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 apartment layouts on the lower floors are similar to those on upper floors, ARC analysed all kitchen / living / dining rooms on the lowest level of accommodation in the proposed apartment blocks, together with a small number of sample bedrooms in the interests of completeness. Bedrooms likely to receive lower levels of daylight due to their location within the scheme or due to their design and bedrooms were included in the sample. 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 3 above. For more detail on the methodology used in assessing daylight access, please refer to the Technical Appendix of this Report.

For more detail on the methodology used in assessing daylight access, please refer to the Technical Appendix of this Report. 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?
Southern Apartment Block				
L0-A01	Floor 00	Kitchen / living / dining room	3.33%	Yes
L0-A02	Floor 00	Kitchen / living / dining room	3.96%	Yes
L0-A03	Floor 00	Kitchen / living / dining room	3.83%	Yes
L0-A04	Floor 00	Kitchen / living / dining room	4.67%	Yes
L0-A04 Bed	Floor 00	Bedroom	4.02%	Yes
L0-A05	Floor 00	Kitchen / living / dining room	4.08%	Yes
L0-A06	Floor 00	Kitchen / living / dining room	8.28%	Yes
L0-A06 Bed	Floor 00	Bedroom	4.04%	Yes
L0-A07	Floor 00	Kitchen / living / dining room	3.67%	Yes
L0-A08	Floor 00	Kitchen / living / dining room	4.51%	Yes
L0-A09	Floor 00	Kitchen / living / dining room	7.16%	Yes
L0-A10	Floor 00	Kitchen / living / dining room	5.36%	Yes
Southern Apartment Blocks				
L0-B01	Floor 00	Kitchen / living / dining room	5.30%	Yes
L0-B02	Floor 00	Kitchen / living / dining room	3.78%	Yes
L0-B02 Bed	Floor 00	Bedroom	3.88%	Yes
L0-B03	Floor 00	Kitchen / living / dining room	5.10%	Yes
L0-B04	Floor 00	Kitchen / living / dining room	5.43%	Yes
L0-B05	Floor 00	Kitchen / living / dining room	4.47%	Yes
L0-B06	Floor 00	Kitchen / living / dining room	4.41%	Yes
L0-B07	Floor 00	Kitchen / living / dining room	4.88%	Yes
L0-B09	Floor 00	Kitchen / living / dining room	8.15%	Yes
L0-B10	Floor 00	Kitchen / living / dining room	6.30%	Yes
L0-L01	Floor 00	Kitchen / living / dining room	4.82%	Yes
L0-L02	Floor 00	Kitchen / living / dining room	4.93%	Yes
L0-L03	Floor 00	Kitchen / living / dining room	4.53%	Yes
L0-L03 Bed	Floor 00	Bedroom	4.31%	Yes
L0-L04	Floor 00	Kitchen / living / dining room	5.05%	Yes
L0-L05	Floor 00	Kitchen / living / dining room	5.29%	Yes
L0-L06	Floor 00	Kitchen / living / dining room	3.81%	Yes
L0-L07	Floor 00	Kitchen / living / dining room	5.25%	Yes

ARC's analysis indicates that all sample study rooms within the proposed development will achieve levels of daylight access at or above the minimum Average Daylight Factor recommended by the British Standard for bedrooms (1% Average Daylight Factor), living rooms (i.e. 1.5% Average Daylight Factor), for kitchens (i.e. 2% Average Daylight Factor) or for mixed function living rooms and kitchens (i.e. 2% Average Daylight Factor) as appropriate. All sample study rooms within the proposed development are predicted to achieve a level of daylight in excess of that recommended by the British Standard for a predominantly daylit appearance (i.e. 2% Average Daylight Factor). 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.

3.0 Assessment of Sunlight Access within Open Spaces proposed as part of the Proposed Development

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 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). However, notwithstanding this, ARC referenced 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 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.

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 any landscape planting in the assessment model.

As part of this analysis, ARC assessed the likely proportion of the proposed communal open spaces serving the proposed residential development (please see Figure 4) predicted to receive sunlight access on 21st March. Please note that, in the interests of presenting a worst case scenario, the assessment model includes the planned nursing home development on the adjoining site in the ownership of the Applicant to the east (LCC Reg. Ref. 21/1222) and the permitted development at Greenpark Avenue, South Circular Road of 30 no. residential dwellings and associated development (LCC Reg. Ref. 17/1190; ABP Ref. ABP-302015-18). The results of ARC's analysis are set out in Table 3.1 below.

Figure 4: Indicative diagram showing location of amenity areas / open spaces analysed as part of this assessment of sunlight access within the proposed development

Table 3.1: Approximate areas of proposed communal open space in sunshine on 21st March

Time	Open Space 01 (814 sq m)	Open Space 02 (1,974 sq m)	Open Space 03 (5,5510 sq m)	Open Space 04 (1,204 sq m)
0900	76%	88%	86%	81%
1000	97%	99%	82%	76%
1100	100%	100%	84%	79%
1200	100%	100%	81%	82%
1300	100%	100%	84%	81%
1400	100%	100%	78%	77%
1500	100%	100%	67%	75%
1600	94%	98%	67%	77%
1700	74%	70%	57%	74%

As suggested by the results set out in Table 3.1, the proposed communal open spaces are predicted to receive levels of sunlight considerably in excess of the level recommended by the BRE Guide for amenity spaces. ARC's analysis, therefore, indicates that the proposed communal open spaces will appear adequately sunlit throughout the year within the meaning of the BRE Guide.

More than this, the communal open spaces are predicted to receive a high level of sunlight access throughout the day and throughout the year, with most spaces receiving some sunshine even at mid winter. ARC's analysis indicates that the proposed communal open spaces 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 and throughout the year.

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ARC Architectural Consultants Ltd
September 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 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 of 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.

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

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.

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, the planned nursing home development on the adjoining site in the ownership of the Applicant to the east (LCC Reg. Ref. 21/1222); the permitted development at Greenpark Avenue, South Circular Road of 30 no. residential dwellings and associated development (LCC Reg. Ref. 17/1190; ABP Ref. ABP-302015-18) 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. 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 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, the planned nursing home development on the adjoining site in the ownership of the Applicant to the east (LCC Reg. Ref. 21/1222); the permitted development at Greenpark Avenue, South Circular Road of 30 no. residential dwellings and associated development (LCC Reg. Ref. 17/1190; ABP Ref. ABP-302015-18) 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. Existing and proposed landscaping was not included in this 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. Three separate pages 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. 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.
- ***Cumulative:*** this image shows the shadows cast by the existing buildings together with the shadows cast by the proposed development and nearby planned and permitted developments. The existing buildings surrounding the site are shown in light grey, while the proposed development on the application site is shown in blue. Nearby planned and permitted developments are shown in purple. The shadows cast are shown in a dark grey tone.

In order to calculate sunlight access to the open spaces, ARC used proprietary sunlight analysis software to calculate the proportion of the open spaces in sunlight at regular intervals on 21st March. For the purposes of the detailed quantitative assessment, the cumulative model (i.e. including the planned nursing home development for the adjoining site) was used in order to present a worst case scenario.