

1.0 DAYLIGHT ANALYSIS - INTRODUCTION

Achieving satisfactory standards of daylight and sunlight access in urban residential development is fundamental to the creation of a quality residential community. Daylighting and sunlighting is an important aspect in the provision of a good quality of life for future residential occupants. Adequate natural daylighting and solar access can further help reduce both energy and heating demands for residents.

National and local planning guidance, for example the *Draft Planning Guidelines on Sustainable Residential Development in Urban Areas* (2008), make reference to guidelines and standards on daylight and sunlight access which are useful when designing new developments to ensure appropriate access to sunlight and daylight.

Section 6.6 of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities states 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 the British Standard 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.

BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting states as follows at Section 5.5:

The average daylight factor is used as the measure of general illumination from skylight. It is considered good practice to ensure that rooms in dwellings and in most other buildings have a predominantly daylit appearance. In order to achieve this the average daylight factor should be at least 2%.

The British Standard goes on to recommend a minimum of 1% Average Daylight Factor for bedrooms; 1.5% Average Daylight Factor for living rooms and 2% Average Daylight Factor for kitchens. The British Standard states:

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%.

These minimum recommendations are also set out at Section 2.1.8 of the BRE Guide, which further states:

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

Irish Standard IS EN 17037:2018 Daylight in Buildings makes specific reference to direct sunlight:

The recommendation is that a space should receive possible sunlight for a duration....on a selected date between February 1st and March 21st. When applying the recommendation to a whole dwelling, the proposal is that at least one habitable room in the dwelling should have at least exposure to sunlight in accordance with:

Minimum 1.5 hours
Medium 3 hours

It is noted that the British Standard recommends caution in applying the recommendations contained therein as part of the planning process, stating:

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.

For more detail on the methodology used in assessing daylight access, please refer to the Appendix at the end of this Report. The results of our analysis of anticipated daylight within the proposed apartment blocks and external amenity spaces are set out in the following section.

Rathcoole Housing Development, Newcastle Road, Rathcoole, County Dublin Document: Daylight Analysis and Report - Planning Application, August 2022

ASSESSMENT OF DAYLIGHT ACCESS WITHIN THE PROPOSED RESIDENCES

As part of this Assessment of Sunlight & Daylight Access within the Proposed Development, PAC Studio undertook an assessment of the likely daylight access within all habitable rooms/ residential units within the apartment block proposed as part of the subject application. A computational model was prepared using both the Planning Application drawings and the topographical and building survey information for the surrounding context. For the purpose of this analysis, we made reference to the British Standard recommendations when assessing daylight access within the proposed residences:

- 1.0% Average Daylight Factor for bedrooms,
- 1.5% Average Daylight Factor for combined living/dining rooms,
- 2.0% Average Daylight Factor for combined living / kitchen/ dining rooms.

According to BS 8206 (Section 13.3, Room Depth), where there is glazing along one front wall only of the living spaces, there is a limitation on the depth 'L' from the window to beneficial daylight access in these apartments, described by the formula:

LW + L/H < 2/1-Rb, where:

L = depth of room from window, in metres,

W = width of room, parallel to window, in metres

H = height of window head above finished floor

Rb = Area Weighted Light Reflectance of the interior surfaces.

In the proposed arrangement, the limiting depth of useful daylight for living/ dining spaces with single sided windows is therefore in the range of 6m from the external windows, adequately accommodating both the open plan living and dining space. The results of the analyses overleaf demonstrate that kitchens are connected to a bright daylit space in all instances, with daylight factors in all instances comfortably exceeding 1.5%, and generally exceeding 2.0%, with at least 2 hours of access to sunshine on March 21st in line with the BRE recommendations.

All dwellings have the benefit of a large sheltered external private terrace; whilst this does impact the quantum of daylit to the interior of bedrooms in particular, the orientation and depth/ height of these terraces and the glazed openings to the terrace have been designed to allow adequate daylight to the interior spaces, as demonstrated in the results overleaf. More importantly, the amenity of these spaces for residents will provide a positive contribution to the overall quality of life within the proposed development.

It is noted that specific apartments are marginal in terms of achieving the target daylight factor - notably for 4 of the bedrooms with private set back terraces - although these are all within 10% of the recommendations. In these instances, an analysis of the number of hours of sunshine on a clear day on 21 March has been undertaken to check that adequate provision has been achieved, in terms of a habitable room within the apartment having in excess of 1.5 hours of available sun on the Spring Equinox (March 21st) - this is achieved in all apartments. The locations of these bedrooms are:

Ground Floor Plan - All bedrooms >1.0% ADF (higher floor to ceiling and window head levels)

First Floor Plan - 3×6 x bedrooms < 1.0% ADF (set back bedrooms with private external terrace) In each situation a minimum of 2 hours sun on March 21st enters the main living space

Second Floor Plan - 1 x bedrooms < 1.0% ADF (set back bedrooms with private external terrace)
In each situation a minimum of 2 hours sun on March 21st enters the main living space

Third Floor Plan - All bedrooms >1.0% ADF (private external terrace is open to the sky at roof level)

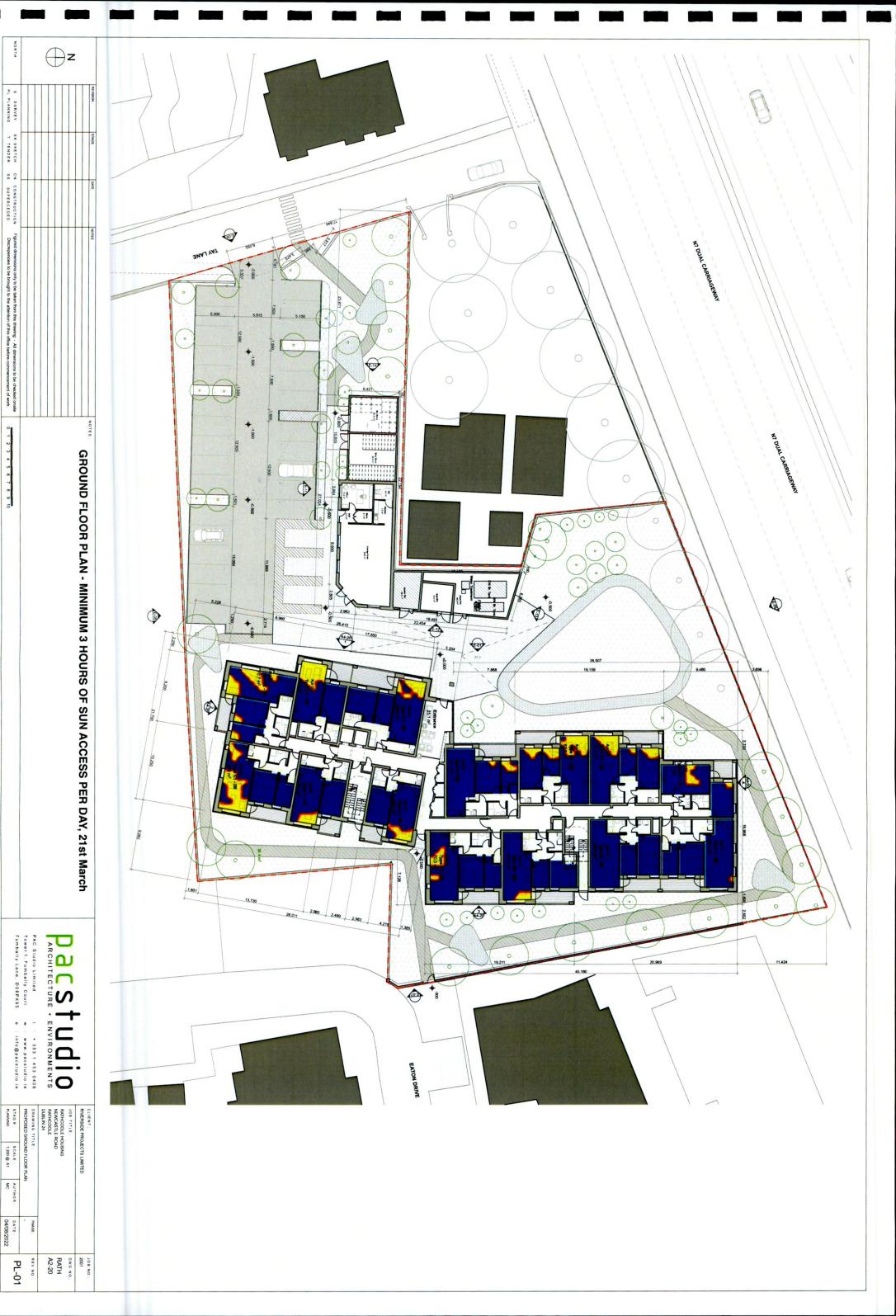
We can conclude that 93% of the residences will exceed the minimum suggested levels for Average Daylight Factors. Whilst 4 apartments contain bedrooms that are generally within 10% of achieving the recommended daylight factors, they do provide at least 2 hours (and in most cases 3 hours) of exposure to sunlight on the Spring Equinox (number of hours of sunshine per day for March 21, assuming clear skies) as defined by IS EN 17037:2018 Daylight in Buildings. We are satisfied that the proposed development will provide appropriate standards of daylight and sunlight access for all habitable rooms.

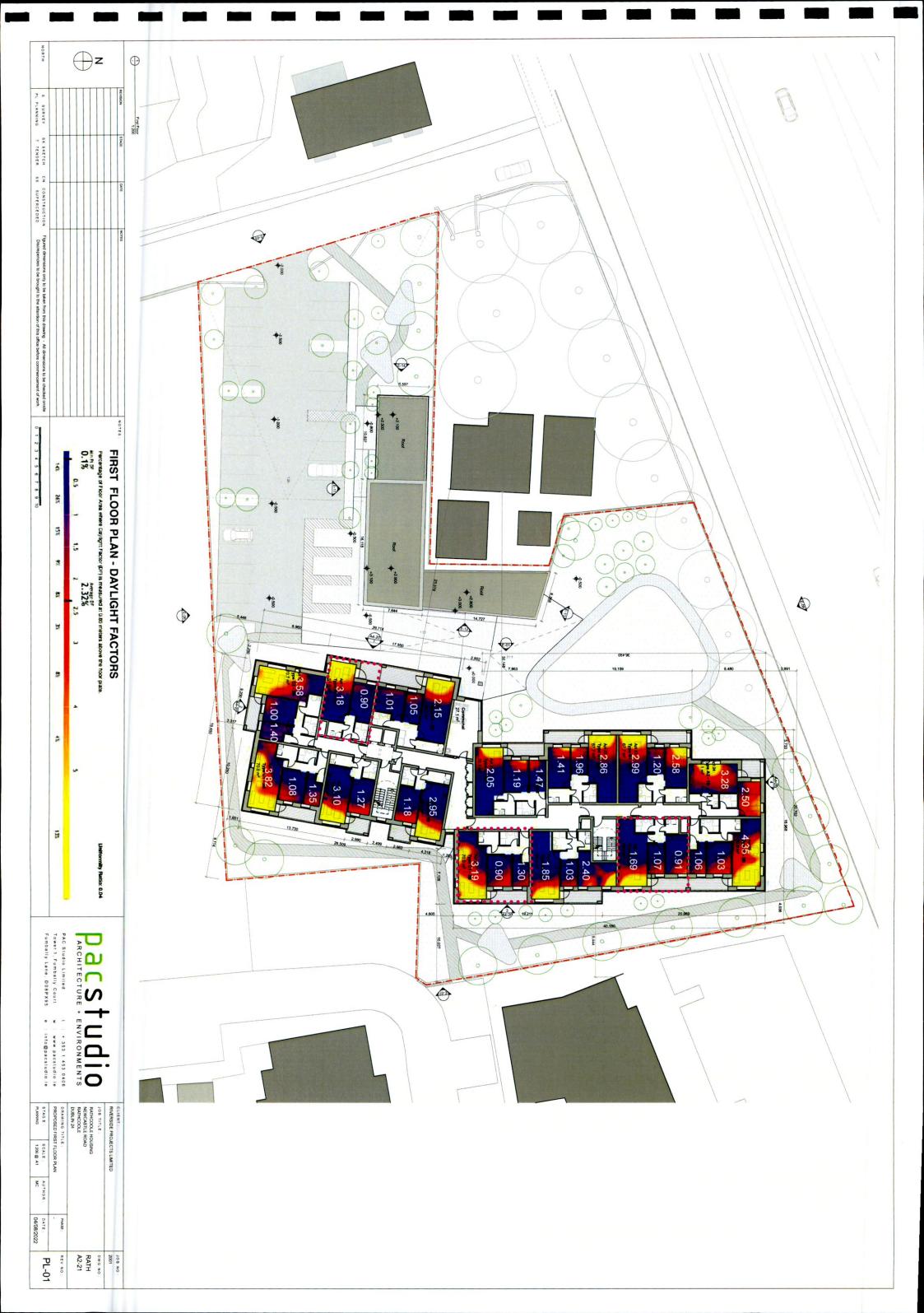






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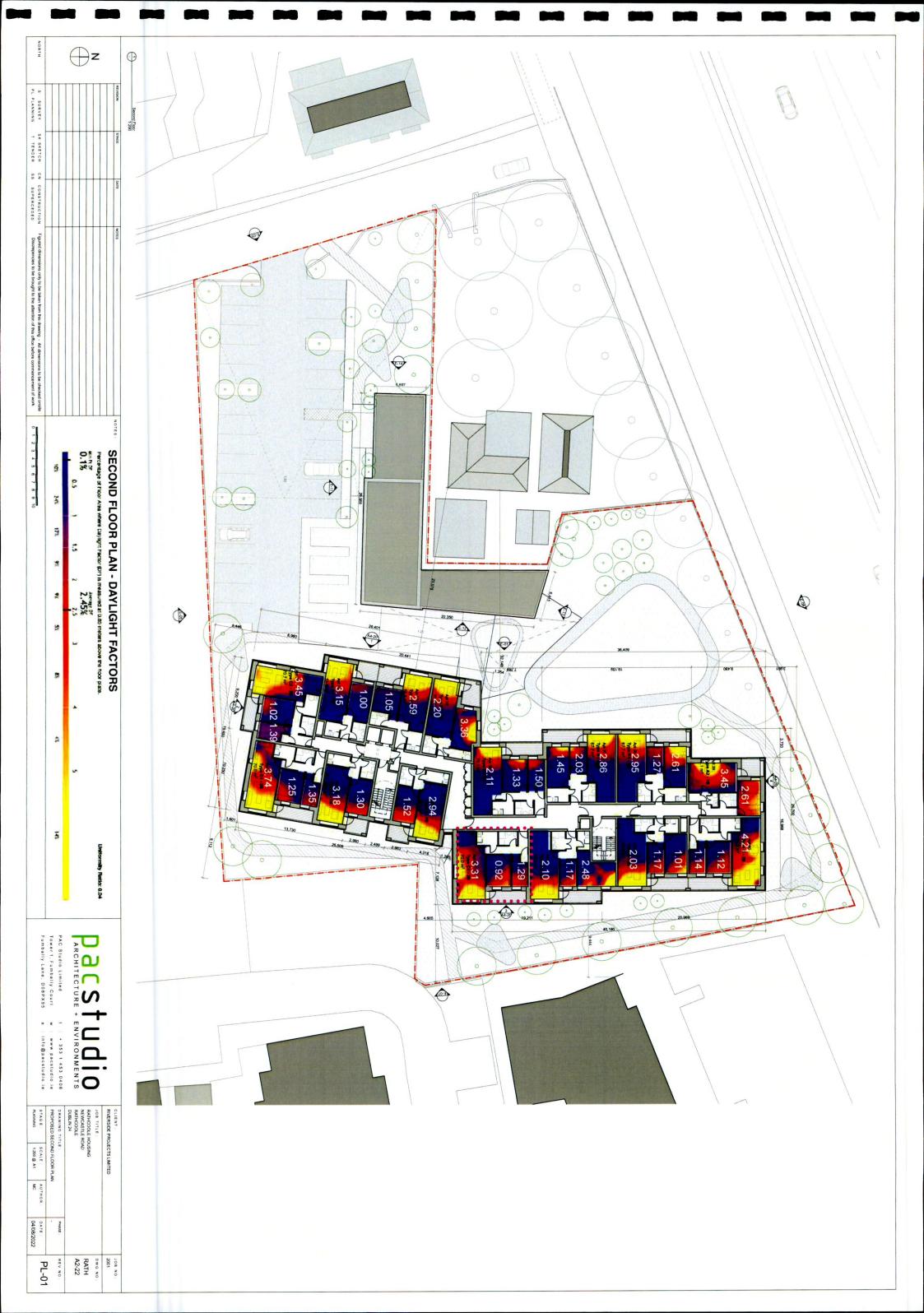




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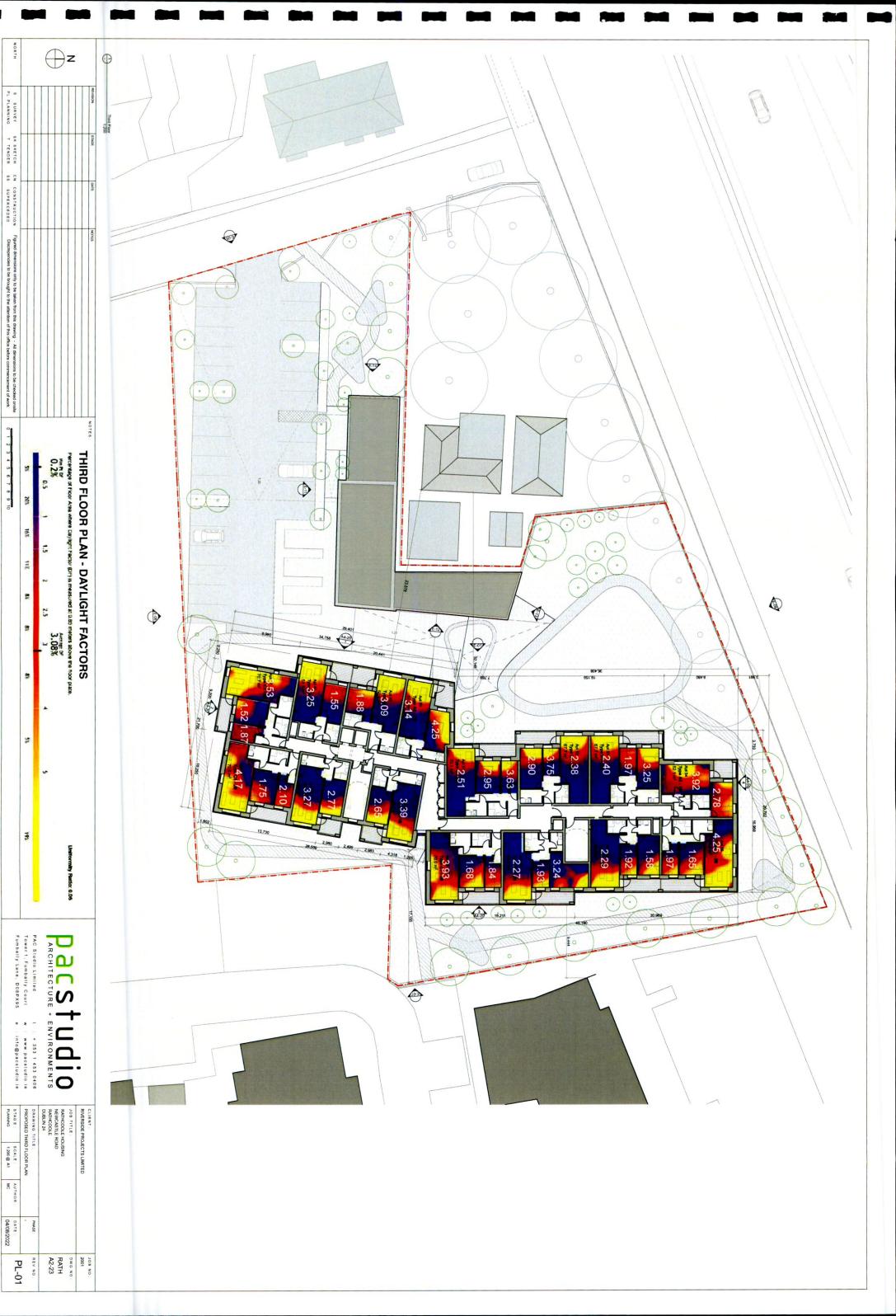
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The subject application proposes a south facing communal residential open space. Having regard to Section 3 of the BRE Guide, we undertook detailed quantitative analysis of the proportion of the amenity spaces in sunlight on 1st February and 21st March. The three-dimensional digital model of the proposed development and of the existing context was constructed based on the Planning Application documents and the topographical survey drawings. Using the digital model, shadows were cast for the vernal equinox (typically in or around the 20th to 21st March). For the purposes of this analysis and with reference to the BRE Guide, shadows were cast at hourly intervals on 21st March. A solar access analysis was also undertaken to establish the number of hours of sunshine on the reference days (1st February/ 21st March).

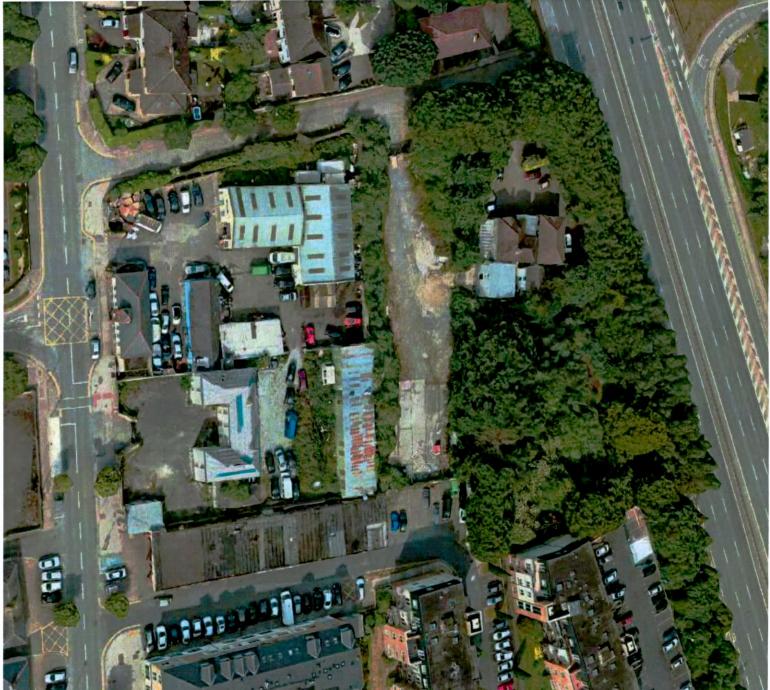
As shown in the results of this analysis overleaf, all public open spaces are in receipt of more than 2 hours of sunlight on March 21st with clear skies - well in excess of the BRE Guidance. We are therefore satisfied that the proposed development will provide appropriate standards of sunlight access for all communal residential open spaces, gardens and hard landscaping, as well as the private open terraces associated with individual apartments.

In reference to the daylight analysis for the habitable rooms in the apartments, it was previously noted that certain bedrooms within apartments were within 10% of achieving the guidance targets for average daylight factor. The analysis of the number of hours of solar access within each habitable room was referenced in Section 2; this information on number of hours of sun access to the interiors of habitable rooms is included in the Sunlight Access Analysis overleaf. It is also reiterated that Irish Standard IS EN 17037:2018 *Daylight in Buildings* makes specific reference to direct sunlight:

The recommendation is that a space should receive possible sunlight for a duration....on a selected date between February 1st and March 21st. When applying the recommendation to a whole dwelling, the proposal is that at least one habitable room in the dwelling should have at least exposure to sunlight in accordance with:

Minimum 1.5 hours; Medium 3 hours; High 4 hours

Using the same analysis format, we can verify that using February 1st as a 'worst case', all apartments have at least one habitable room with a minimum of 2 hours direct sun access, as shown overleaf.



Aerial View of Site From South

The Daylighting Visualisation tool deployed for this study uses Radiance and Daysim to assess daylighting performance and solar access. We conducted sensor-based Radiance simulations, assessing illuminance at discrete points at the workplane, to a 600mm spatial grid of sensors. The parameters of the model were applied to Radiance's rtrace program to produce results comparable to relevant and accepted benchmarks.

We made reference to the BRE Guide, 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, we did not show the shadows cast by trees on the shadow study diagrams.



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