

5.13 Climate – Daylight Analysis

5.13.1 Introduction

ARC Architectural Consultants Ltd has been commissioned by the Applicant, Dublin City Council and PSQ Developments Limited (Joint Applicants), to carry out an analysis of the impact of the proposed development on lands at Parnell Square, Dublin 1 on daylight access in the surrounding area.

To date, it is understood that no standards or guidance documents (statutory or otherwise) on the subject of daylight access to buildings have been prepared or published in Ireland. In the absence of guidance on the matter of daylight access tailored to Irish climatic conditions, Irish practitioners tend to refer to the relevant British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting. The standards for daylight access in buildings (and the methodologies for assessment of same) suggested in the British Standard have been referenced in this Daylight Access Analysis.

The Dublin City Development Plan 2016-2022 states as follows in relation to residential development: "Development shall be guided by the principles of Site Layout Planning for Daylight and Sunlight, A guide to good practice (Building Research Establishment Report, 2011)." While the subject development does not propose residential development and most of the lands surrounding the application site accommodate a range of residential & commercial uses, the contents of 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 have also been considered in the preparation of the report.

Neither the British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide 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.]

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas or when assessing

applications for highly constrained sites (e.g. lands in close proximity or immediately to the south of residential lands).

Given that the British Standard and the BRE Guide were drafted in the UK in the context of UK strategic planning policy, recommendations or advices provided in either document that have the potential to conflict with Irish statutory planning policy have been disregarded for the purposes of this analysis.

The purpose of this report is to provide in order a general indication of daylight performance before and after the construction of the proposed development on the basis on numerous assumptions outlined below and with reference to design tools set out in the guidance documents referenced above.

This Chapter and assessment has been completed having regard to the guidance outlined in the EPA documents Guidelines on information to be contained in EIAR (Draft, August 2017) and Advice note for Preparing Environmental Impact Statements (Draft, September 2015) as outlined under Chapter 1: Introduction, of this EIAR.

5.13.2 Methodology for Daylight Access Impact Assessment

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; on drawings and information available from the Dublin City Council online planning register; and with reference to on-site, satellite and aerial photography.

As ARC did not have access to the sample rooms analysed in existing buildings, assumptions were made as to the use of the room, the size and layout of the interior of the rooms, the colour schemes used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opes. As such, the rooms in existing buildings in proximity to the application site analysed as part of this analysis must be considered to be notional. However, comparative analysis of daylight access within such notional rooms is instructive as to the likely extent of change in the daylight environment in existing buildings in proximity to the application site.

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 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.

ARC then carried out an assessment of the likely impact of the proposed development on daylight access to sample rooms in the surrounding area with reference to the results of the above analysis and with reference to relevant guidance on daylighting of buildings. BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting states as follows at Section 5.5: Average daylight factor:

"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 daylight appearance. In order to achieve this the average daylight factor should be at least 2%.

If the average daylight factor in a space is at least 5% then electric lighting is not normally needed during the daytime, provided the uniformity is satisfactory. If the average daylight factor in a space is between 2% and 5% supplementary electric lighting is usually required."

The British Standard goes on to recommend average daylight factors of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms.

In terms of assessing the impact of development on daylight access in an existing room, the British Standard suggests that, where a room has an ADF of 5% (i.e., one not requiring supplemental

electric lighting), a reduction in daylight access of between 15% and 8% is likely to be noticed - the room "would be likely to appear more gloomy, and electric lighting would be needed for more of the time". In other words, where daylight access is reduced to between 0.85 times and 0.92 times its former value, the occupant of that residence is likely to notice the change. What this is saying is that, in some cases (the details of which are not explained in the British Standard), a reduction in ADF to anything less than 0.92 times the former light levels will be noticeable. In other cases (again not explained), light levels will have to fall to 0.85 times their former value before the change is noticed. Therefore, in all cases where a room has an ADF of 5%, anything greater than a 15% drop in daylight levels (or a drop to 0.85 times its former value) will be noticed. A general rule of thumb is that if daylight access was reduced by one fifth, the occupants will be likely to notice.

5.13.2.1 Definition of Impacts on Daylight Access

The assessment of impacts on daylight access had regard to the Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2002), and to Directive 2011/92/EU (as amended) on the assessment of the likely effects of certain public and private projects on the environment.

The list of definitions given below is taken from Section 5: Glossary of Impacts contained in the Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency. Some comment is also given below on what these definitions might imply in the case of impact on daylight access. The definitions from the EPA document are in italics.

Imperceptible Impact: An impact capable of measurement but without noticeable consequences. The definition implies that the development would cause a change in the daylight received at a location, capable of measurement, but not noticeable. If the development caused no reduction in daylight access, there could be no impact.

Slight Impact: An impact which causes noticeable changes in the character of the environment without affecting its sensitivities. For this definition to apply, the amount of daylight received at a location would be changed by the development to an extent that is both capable of measurement and is noticeable. Published guidance on daylight access suggests that a reduction in the amount of daylight received in a room only becomes noticeable if the average daylight factor in the room is reduced by one fifth.

Moderate Impact: An impact that alters the character of the environment in a manner that is consistent with emerging trends. This would occur where there is a noticeable reduction in daylight received in a room and where this reduction is ongoing because of development already taking place in the area.

Significant Impact: An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. In terms of daylight access, a development, to have a significant impact, must result in a diminution of daylight access to the extent that minimum standards for daylighting are not met and artificial lighting is required for part of the day.

Profound Impact: An impact which obliterates sensitive characteristics. A profound impact would occur where a development would result in daylight received in a room falling well below the minimum standard for average daylight factor and where artificial lighting would be required in that room as the principal source of lighting all the time.

5.13.3 Receiving Environment (Baseline scenario)

The application site is located at Nos. 20 & 21 and Nos. 23-28 inclusive, Parnell Square North, with public realm works extending to Parnell Square West and East, and additional site works occurring at the laneways to the rear of the site at Bethesda Place and Frederick Street North.

The site is bounded to the west by Charlemont House, now occupied by the Hugh Lane Gallery, which presents a three storey façade of similar height to its four storey neighbours on to Parnell Square. Charlemont House has been extended very significantly to the rear. The site is bounded to the southwest by a terrace of buildings ranging in height from one to six storeys at Granby Row; and, to the northwest, three storey residential development at Bethesda Place.

5.13.4 Characteristics of the Proposed Development

The proposal, which is the subject of this EIAR, comprises the development of a new Dublin City library and public realm works on a c. 0.99 ha site at Parnell Square North, Dublin 1.

5.13.4.1 Demolition and Construction Phase

As described in more detail in Chapter 3: Description of Development, the demolition and construction phase of the proposed development will be carried out in four phases as follows:

- Phase 1 – Enabling Works (including erection of temporary structures such as hoardings, compounds and cranes; and demolitions);
- Phase 2 – Substructure Works;
- Phase 3 – Superstructure and Conservation Works; and
- Phase 4 – Public Realm Works.

5.13.4.2 Operational Phase

In summary, the proposed development for the purposes of the EIAR Assessment comprises development of a new Dublin City library and public realm works, comprising:

- The adaptive re-use of Nos. 20-21 & Nos. 23-28 Parnell Square North (all Protected Structures).
- The construction of a new 5-storey over basement extension, with roof gardens, for library and cultural use (c.5,720 sq.m gross floor area, and associated demolition of existing 3-storey

Amharclann (theatre) building, single storey atrium and 2-storey return, to the rear of Nos. 23-28 Parnell Square North.

- The total Gross Floor Area (existing and new) of the proposed cultural use amounts to c.11,198 sq.m.
- Improvements to the public realm to facilitate a new public plaza, including reconfiguration of vehicular roadway (2-lane), parking and set down areas, street furniture, street art and public lighting, widening of footpaths, and relocation of Dublin Bikes Station, at Parnell Square North, in the area between Parnell Square West and East and the Garden of Remembrance.
- Modifications to Bethesda Place and Frederick Lane North to facilitate access by service and emergency vehicles to Frederick Lane North.
- The Proposed Development in its simplistic terms comprises development on a site of c. 0.99 ha.

The accompanying Planning Application Report sets out a list of all of the plans and particulars submitted as part of the Section 175 planning application to the Board, that provide the comprehensive description of the project and that have been made available to the EIA team in preparing this EIAR. Further details in relation to the Proposed Development are described under Chapter 3: Description of the Proposed Development, of this EIAR.



Figure 5.13.1: Location of sample rooms assessed as part of this daylight access

5.13.5 Potential Impact of the Proposed Development on Daylight Access

The BRE Guide provides that “The quantity and quality of daylight inside a room will be impaired if obstructing buildings are large in relation to their distance away”. Generally speaking, new development is most likely to affect daylight access in existing buildings in close proximity to the application site.

5.13.5.1 Demolition and Construction Phase

The potential of the construction phase of the proposed development on daylight access is likely to be, initially, lesser than the impact of the completed development. As the proposed development nears completion, the impact of the emerging structure is likely to be similar in all material respects to that of the completed structure. It is noted that temporary structures and machinery (e.g. hoarding, scaffolding, cranes, etc.) may also result in a change to the existing daylight environment, although any additional impacts arising from temporary structures or machinery are likely to be temporary and minor.

5.13.5.2 Operational Phase

All impacts described in Section 5.13.5.2 will be permanent. Impacts described as “imperceptible” are considered to be neutral in character. Any reduction in daylight access resulting in a “slight”, “moderate” and “significant” impact would usually be considered to be negative in character, unless otherwise indicated. Any increase in daylight access resulting in a “slight”, “moderate” and “significant” impact would usually be considered to be positive in character, unless otherwise indicated.

5.13.5.2.1 Overview of the potential impact of the proposed development on daylight access to existing buildings outside the application site

The impact of the proposed development on daylight access within existing buildings is likely to be most significant in the case of existing buildings at close proximity with windows directly opposing the application site. Specifically, the proposed development is likely to result in a “moderate” to “significant” reduction in daylight access to a small number of southwest-facing rooms at Sheridan Place, although, given statutory planning policy for densification for the urban area, the impact of the proposed development on these rooms could be considered to be consistent with an emerging

pattern of very high density development on backland or infill sites in Dublin City Centre.

The impact of the proposed development on daylight access within buildings at very close proximity to the site (e.g. Parnell Court and within Charlemont House to the east) are likely to range from "imperceptible" to "moderate". The impact on daylight access on other nearby buildings at Granby Row and Frederick Lane North is likely to range from "imperceptible" to "slight".

Given that the potential for development to result in impacts on daylight access diminishes with distance, it is the finding of ARC's analysis that the impacts outlined above represent a worst case scenario and the proposed development is unlikely to have any undue adverse effects on daylight access within buildings in the wider surrounding area.

5.13.5.2.2 Detailed analysis of the potential impact of the proposed development on daylight access to existing buildings outside the application site

This analysis assesses the impact of the proposed development to all potential receptors surrounding the application site - these impacts are described in the Section 5.13.5.2.1 Overview of the potential impact of the proposed development on daylight access to existing buildings outside the application site above.

However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed development to result in impacts on daylight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the application site. Within that representative sample of buildings, a worst case scenario was studied whereby rooms most likely to have the lowest levels of daylight were analysed (e.g. rooms at the lowest levels of accommodation; rooms with the potential to receive lower levels of daylight access due to their location relative to the proposed development and/or due to their layout and fenestration) (see **Error! Reference source not found.** above). Having regard to the height of the proposed development, ARC also undertook analysis of a number of sample representative rooms on upper floors in neighbouring buildings in the interests of completeness.

As ARC did not have access to the sample rooms analysed in existing buildings, assumptions were made as to the use of the room, the size and layout of the interior of the rooms, the colour schemes used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opens. As such, the

rooms in existing buildings adjoining the application site analysed as part of this analysis must be considered to be notional.

While it was necessary, in undertaking the analysis, to make assumptions regarding the parameters of chosen sample rooms, comparative analysis of daylight access within assumed rooms is instructive as to the likely extent of change in the daylight environment in existing buildings in proximity to the application site. The results of the analysis are set out in Table 5.13.1 below:

Table 5.13.1: Predicted Impact of the proposed development on daylight access to sample rooms in existing buildings in proximity to the application site.

| Sample Room | Existing Average Daylight Factor | Proposed Average Daylight Factor | Change |
|---|----------------------------------|----------------------------------|---|
| Sheridan Place | | | |
| Zone 00a – Floor 00 | 1.95% | 1.56% | Daylight levels are predicted to decrease to 0.80 times their former value. |
| Zone 00b – Floor 00 | 1.98% | 1.77% | Daylight levels are predicted to decrease to 0.89 times their former value. |
| Parnell Court | | | |
| Zone 00a – Floor 00 | 12.04% | 10.53% | Daylight levels are predicted to decrease to 0.88 times their former value. |
| Zone 00b – Floor 00 | 2.70% | 2.53% | Daylight levels are predicted to decrease to 0.94 times their former value. |
| Zone 00c – Floor 00 | 1.69% | 1.50% | Daylight levels are predicted to decrease to 0.89 times their former value. |
| Charlemont House, Parnell Square | | | |
| Zone 00 – Floor 00 | 7.49% | 7.19% | Daylight levels are predicted to decrease to 0.96 times their former value. |
| Zone 01 – Floor 01 | 2.12% | 2.09% | Daylight levels are predicted to decrease to 0.99 times their former value. |

| Sample Room | Existing Average Daylight Factor | Proposed Average Daylight Factor | Change |
|--------------------|----------------------------------|----------------------------------|---|
| Zone 02 – Floor 02 | 2.13% | 2.01% | Daylight levels are predicted to decrease to 0.94 times their former value. |

Table 5.13.1 above sets out the predicted impact of the construction of the proposed development on daylight access to rooms most likely to be affected within buildings neighbouring the application site. As such, the results set out above represent a worst-case scenario and the impact of the proposed development on daylight access to other rooms in the identified buildings is likely to be similar or, in most cases, lesser than the impact described above.

ARC's analysis indicates that the construction of the proposed development is likely to reduce daylight access in the sample rooms at Parnell Court and Charlemont House. The impact of the proposed development on the large majority of relevant rooms within these buildings is likely to range from "imperceptible" to "moderate". While the sample studied southeast-facing rooms opposing the new commercial block at close proximity has the potential to experience a "moderate" to "significant" reduction in daylight access as a result of the construction of the proposed development, developments comprising the densification of backland or infill sites in the core of Dublin City often result in impacts of similar extent. As such, the impact of the proposed development might more properly be considered to be consistent with emerging trends for development in Dublin City.

The potential for noticeable impacts on daylight access as a result of the construction of the proposed development is largely restricted to rooms in existing buildings in very close proximity to the application site. The impact on rooms in buildings even a small distance away from the application site is likely to be so minor that it is unlikely to be noticeable (e.g. further north along Granby Row; Frederick Lane North). Where the change is noticeable to occupants, the impact of the proposed development is unlikely to affect the sensitivities of the daylight environment within the room. As such, the impact of the proposed development on daylight access within buildings with the wider area is likely to range from none to "imperceptible" to "slight".

5.13.5.3 Do Nothing Impact

In a "do nothing" scenario, the existing level of daylight access to buildings will remain unchanged.

5.13.6 Mitigation Measures

The subject application proposes the major re-development of a brownfield site situated in an inner-city location characterised by high density development. In these circumstances, during the construction or operational phases scope for mitigation measures, which would preserve a sustainable level of density, is limited.

5.13.7 Predicted Impact of the Proposed Development on Daylight Access

As no ameliorative, remedial or reductive measures are now proposed, the predicted impact of the proposed development on daylight access will be as described under 5.13.5 above.

5.13.8 Monitoring

Monitoring of avoidance, remedial and mitigation measures is not relevant to the assessment of impacts on daylight in the case of the subject application.

5.13.9 Reinstatement

Reinstatement is not relevant to the assessment of impacts on daylight in the case of the subject application. It is intended that the proposed development will be permanent.

5.13.10 Interactions

As is always the case where a development will result in a change to the daylight environment of an area, the impacts of the development on daylight access will result in interactions with climate, population and human health, material assets and the landscape. In the case of the subject application, having regard to the location of the proposed development within the historic core of Dublin City, there is also likely to be some degree of interaction between the impact of the development on daylight access and the impact of the proposal on cultural heritage.

Interactions between the various environmental topics is discussed under Chapter 8: Interactions and Cumulative Impacts, of this EIAR.

5.13.11 Difficulties Encountered in Compiling

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

Similarly, as noted above, in carrying out this assessment, as ARC did not have access to the sample rooms studied as part of this analysis, assumptions were made as to the size and layout of the interior of the rooms, the colour schemes used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opens, where relevant.

5.13.12 References

ARC referenced the following documents or sources above:

- British Standards Institution (2008) BS8206: Part 2: 2008 Lighting for Buildings: Part 2 – Code of Practice for Daylight. Milton Keynes, BSI.
- Council Directive 14/52/EU (amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment) (Official Journal No. L 124/1, 25.4.2014)
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- Environmental Protection Agency. 2002. Guidelines on the Information to be Contained in Environmental Impact Statements. Wexford: Environmental Protection Agency.
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