SHADOWS

(Hastings)

IN THE MATTER OF AN APPLICATION TO

AN BORD PLEANÁLA

FOR PERMISSION FOR

STRATEGIC INFRASTRUCTURE DEVELOPMENT

(THE CHILDREN'S HOSPITAL OF IRELAND)

ABP Reg. No. PL29N.PA0024

AND IN THE MATTER OF AN ORAL HEARING

Statement of Evidence of W.H. Hastings B.Arch FRIAI

1. Qualifications and Experience

My name is Bill Hastings and I hold a Bachelor in Architecture from University College Dublin (1970). I am a Fellow of the Royal Institute of Architects of Ireland and an RIAI accredited Grade I Conservation Architect. I have forty years experience working in architecture and architectural services in Ireland, the UK and overseas. After leaving Gillespie Kidd & Coia Architects, Glasgow, in 1972, entered into private practice in the areas of architecture, conservation, measured survey and recording, digital modelling & photomontage, environmental impact assessment, photography and design for print. I have been a lecturer in UCD since 1975 with past or present responsibility for teaching in the areas of conservation, measured survey & recording of historic structures, design, impact assessment, photography and drawing systems; with input into the undergraduate programme in the School of Architecture, the masters course in Urban and Building Conservation the masters course in Regional and Urban Planning, and the masters course in Landscape Architecture

I am Managing Director of ARC and my experience includes provision of advices in relation to sunlight and daylight access, assessment of sunlight and daylight access and / or sunlight and daylight access impact analysis in relation to the following projects:

- 'SIAC Monastery Road' Development, Dublin 22
- Dublin Central (Carlton Site), O'Connell Street, Dublin 1
- Horgan's Quay, Cork
- North Lotts Planning Scheme
- Poolbeg Planning Scheme
- Development at the site of the former Jury's Hotel, Ballsbridge

2. Role in Proposed Development

ARC analysis of the likely impact of the proposed Children's Hospital on the sunlight access and daylight access of the residences surrounding the site of the Mater Hospital, Eccles Street, Dublin 7.

3. Key Issues in relation to Daylight Access[1]

Daylight access within buildings depends on the amount of sky visible from windows, on reflected light, and on the size and shape of windows and rooms. Daylight comes from the whole of the sky because the sun's light is reflected and diffused by the atmosphere and by clouds. Light from a bright cloudy sky is often as bright as direct sunlight, though different in character. In Dublin, there is, on average, direct sunshine only some 30% of the time. The rest of the time the sun is behind the

[1] Section 9.3, Volume 2, EIS.

clouds.

Daylight access within buildings can be predicted by graphical means, or by using digital or physical models. Graphical means, using drawings and diagrams, concentrate on measuring the amount of sky visible from windows. The use of computer modelling can allow more factors to be taken into account. The simplest graphical test for predicting daylight access is to measure what is called the 'Vertical Sky Component', which is a measure of the amount of sky visible straight opposite a window. Computer modelling can measure the 'Average Daylight Factor', which is the average daylight within a room expressed as a percentage of the daylight outdoors.

Vertical sky component is often recommended as a first test, because the amount of sky visible straight opposite a window is considered the most obvious source of daylight for that window. Measuring the vertical sky component alone can, however, lead to inaccurate results. It might be that there is an obstacle straight opposite a window, but that there is extensive sky visible either site. In such a circumstance the vertical sky component test might suggest inadequate daylight access for the window, whereas, in fact, daylight access might be generous. The vertical sky component test may also produce inaccurate results, in that it does not allow for light reflected off nearby buildings or the ground, for the width of the window, for the size or shape of the room or for light reflected within the room from the walls, floor or ceiling. On the other hand, measurement of average daylight factor using computer modelling does take all these factors into account.

Daylight Access Tests applied to Residential Areas near the Proposed National Paediatric Hospital

The residential areas nearest to the National Paediatric Hospital are the Leo Street Area and Eccles Street. These are, therefore, the areas where loss of daylight access, as a result of the existence of the proposed development, would be most likely to occur.

If the vertical sky component test is applied to windows in the Leo Street area, it becomes immediately apparent that very few windows the area face straight towards the proposed National Paediatric Hospital. The vertical sky component measured at windows that do not face straight towards the National Paediatric Hospital cannot be affected by it, and this applies to the huge majority of windows in the area. The only windows in the Leo Street area where the vertical sky component would be affected are at the rear of a small number of houses at west side of the south end of Leo Street. Even among this group, only windows at the rear of the two most southerly houses face directly towards the east end of the proposed National Paediatric Hospital, its nearest point to the Leo Street area. The few other windows that look directly at it, see it obliquely and receding away. The application of the vertical sky component test would suggest that the existence of the proposed National Paediatric Hospital would have very little affect on daylight access in the

Leo Street area. The vertical sky component test would suggest some loss of daylight to some rooms at low level in buildings opposite the proposed development on Eccles Street.

In order to test average daylight factor within rooms in the surrounding area, ARC Consultants constructed a digital model of the area, and included in that model digital models of typical rooms within houses in the Leo Street area and on Eccles Street. These typical rooms were based on measured surveys of rooms on the ground floors of two houses on Leo Street, and one on Eccles Street. Using specialised daylight analysis software, ARC analysed the existing average daylight factor within rooms tested, and the average daylight factor with the proposed National Paediatric Hospital in place. This analysis showed that in all cases the presence of the National Paediatric Hospital would result in a small reduction in average daylight factor. The lowest existing daylight factor found among the rooms analysed was 3.21% at the rear of No 2 Leo Street, the highest 7.58% at the front of No 1 Josephine Avenue. These average daylight factors fell to 2.79% and 7.32% respectively, a reduction of 13.1% in the case of No 2 Leo Street and 3.4% in the case on No 1 Josephine Avenue. These reductions are less than would usually be considered noticeable, and the resulting lowered daylight factors remain above the minimum recommended by accepted standards and guidelines. These results confirm that the likely impacts of the presence of the proposed National Paediatric Hospital on daylight access in the area would be very small.

4. Key Issues in relation to Sunlight Access[2]

In Dublin, the length of the day in mid summer is some 16.7 hours, and in mid winter some 7.4 hours. At the equinox in March and September, day and night are equal in length at 12 hours each. In mid summer, there is an average of some 6.4 hours of sunshine a day or 38% of the time, while in mid winter there is sunshine for only 1.7 hours a day or 23% of the time on average. In city centre areas, there is usually a dense shadow environment. There is a relatively dense shadow environment in the Leo Street area, because, even though many of the houses are only two storey, the streets are narrow and the back yards are small and surrounded by high walls. When a large new development is built, such as the proposed National Paediatric Hospital, it is likely to cast shadows and thereby add to the existing shadow environment. When a new development is built, the extent of its impact on sunlight access in the surroundings will depend in part on the shadows its casts, but also in large measure on the density of shadows that already exist in the area.

The nearest residential area to the proposed National Paediatric Hospital is the Leo Street Area. It is also located to the north east of the proposed building and is, therefore, likely to be impacted upon by shadows cast by the proposed building. Like any building, the proposed National Paediatric Hospital will cast shadows to the west in the morning and to the north in the middle of the day, then moving round to

[2] Section 9.2, Volume 2, EIS.

the north east and east. Therefore, shadows from the National Paediatric Hospital will not reach the Leo Street area until mid afternoon. For most of the day, throughout the year, shadows from the proposed NPH will be confined to within the Mater Hospital campus, and will, therefore, not impact on residential areas.
In mid summer, when the sun rises high in the sky, shadows from the National Paediatric Hospital will reach the backs of houses at the south end of Leo Street around 4pm, continuing eastwards as the evening progresses. About a quarter of the houses on Leo Street will be affected, and as the shadows move east they will not extend north of Leo Avenue.

At the equinox, when the sun is much lower than in mid summer, shadows from the National Paediatric Hospital will reach almost three quarters the way up Leo Street reaching the backs of houses on Leo Street around 3pm. The shadows will then move south along Leo Street and spread eastward. At the equinox, in March and September, the existing late afternoon and early evening shadows are already very extensive, cast by existing buildings within and surrounding the area. The presence of the National Paediatric Hospital will add to the existing shadows but only to a limited degree and for a limited time.

In mid winter, shadows from the National Paediatric Hospital will reach the backs of houses at the north end of Leo Street around 3pm. At present, shadows from existing buildings in the Mater Hospital Campus reach these buildings around 3.30pm, so the additional shadows arising from the presence of the National Paediatric Hospital will add to the shadow environment at the north end of Leo Street for only half an hour. After 3pm, the shadows cast by the National Paediatric Hospital will move south along Leo Street, but are unlikely to reach the houses at the extreme south end before sunset, which is just after 4pm.

As will be seen from the above, shadows cast by the proposed National Paediatric Hospital will have a significant impact on houses at the south end of the Leo Street area for a limited time on mid summer evenings. Moving towards the equinox and into winter, shadows from the National Paediatric Hospital will spread north through the Leo Street area; but because of the existing shadow environment and the reducing length of the day, the extent of the impact of these shadows will progressively reduce the further north they extend.

5. Submissions and Responses

The following persons made submissions or responses to the Board in relation to the issues of daylight and sunlight access:

MacEoin Architects;
Mary W Gallagher;
Rita A. White;
Terry Mallin;
Patricia Fennelly;

BLEND Residents' Association;
Clare Fallon;
The Heritage Council;
Desmond Duff;
Grangegorman Residents Alliance;
Patricia O'Connor, Frank D'Easaille;
Anne Coli;
Donnchadh M. O'Riordain;
Pascal Donohue TD / Cllr Ray McAdam; and,
Robert Foley, Robert M Foley & Associates.

The majority of these submissions include very general concerns about the extent of impact on sunlight and daylight access on adjoining residential areas. As the likely extent and character of impacts on sunlight and daylight access has already been discussed, I propose to move on now to the more specific issues raised by persons who made submissions.

Given that certain of the persons who made submissions dealt with similar issues, I propose to deal with those issues in turn.

5.1. Issue – Local Area Plan and Overshadowing

Submission:
A number of submissions[3] make reference to the following section of the overshadowing in the *Phibsborough / Mountjoy Local Area Plan*: *'Every effort must be made to ensure that increases in height will not have any negative overshadowing effects on adjoining properties or impact negatively on the settings of the protected structures, both on the site and on it's periphery'.* These submissions suggest that the proposed development does not comply with this section of the Local Area Plan.

Response:
First of all, it should be noted that, for a major piece of national infrastructure of large scale in an urban context, the impact of shadows cast by the proposed National Paediatric Hospital is surprisingly low with any potential negative impacts restricted to a very limited area to the north east of the site. As such, and allowing for the constraints imposed by the brief, it is my opinion that every effort has been made throughout the design process to prevent negative impacts on sunlight access.

The second thing to note is that, given the proximity of the boundary of the Mater Hospital site to existing residential development and the location of the site to the southwest of the residential areas at Leo Street and environs, any development on the site of the proposed NPH would have a substantial overshadowing effects on

[3] This is raised in the submission by MacEoin Architects received by An Bord Pleanala on 12th September 2011 and the submission by Pascal Donohue TD / Cllr Ray McAdam received by An Bord Pleanala on 14th September 2011

adjoining properties.

5.2. Issue – Increased need for artificial lighting / Increased consumption of electricity

Submission:
With regard to any potential for impact on daylight access within buildings, a number of submissions[4] raised concerns to the effect that, following the development of the National Paediatric Hospital, residents may experience an increased need to use artificial lighting during the day and that this will lead to increased consumption of electricity. One submission[5] raised a concern that overshadowing caused by the proposed development might prevent the use of solar panels on affected homes.

Response:
Research into daylight access[6] in buildings suggests that a room will have a predominantly daylit appearance when the average daylight factor is between 2% and 5%, but that some supplementary artificial lighting is usually required at some stage during the day. It is further understood that a room with an average daylight factor of 5% would not normally require supplemental artificial lighting during the day.

ARC's analysis further indicated that the studied rooms in houses in the Leo Street area are likely to have average daylight factors of between 2.8% and 7.3%, both before and after the development of the proposed National Paediatric Hospital. Therefore, while these rooms likely to have sufficient daylight access to create a predominantly daylit appearance, some are likely to require supplemental artificial lighting for part of the day. ARC's analysis further indicated that ground floor rooms in houses on Eccles Street likely to achieve average daylight factors in excess of 5% (i.e., a predominantly daylit appearance) with and without the development of the National Paediatric Hospital. In the case of all rooms studied, ARC's analysis suggested that the impact of the proposed NPH on daylight access to these rooms was minor and unlikely to result in a significant change to the current need for supplemental artificial lighting.

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[4] This is raised in the submissions of Mary W. Gallagher (received by An Bord Pleanala on 12th September 2011), Rita A. White (received by An Bord Pleanala on 13th September 2011), Patricia Fennelly (received by An Bord Pleanala on 13th September 2011), Clare Fallon (received by An Bord Pleanala on 13th September 2011), Patricia O'Connor & Frank D'Easaille (received by An Bord Pleanala on 14th September 2011), Anne Coli (received by An Bord Pleanala on 14th September 2011) and Donnchadh M. O'Riordain (received by An Bord Pleanala on 14th September 2011).

[5] This is raised in the submissions of Terry Mallin (received by An Bord Pleanala on 13th September 2011)

[6] For example, see Lighting for Buildings - Code of Practice for Daylighting - British Standard 8206: Part 2: 2008

With regard to overshadowing and the potential to prevent use of solar panels, it should be noted that dwellings to the south of the subject site will not be overshadowed by the proposed NPH at any time. Some dwellings to the north east of the subject site will be overshadowed by the proposed development, but only for a limited part of the day and, for the most part, only at certain times of the year. Solar panels are most effective when the sun is high in the sky, and any overshadowing the may occur will be in the late afternoon or evening when the sun is low. It is my opinion that the level of impact of the proposed NPH on nearby residences is not such as would prevent the use of solar panels by those residences. The effect is not significant.

5.3. Issue – Impact on Sunlight & Daylight Access to the Adult Centre

Submission:
A number of submissions[7] raise the issue of the potential impact of the proposed National Paediatric Hospital on sunlight and daylight access to the recently constructed Adult Hospital.

Response:
With regard to daylight access, there are two areas of the Adult Hospital that are likely to be significantly impacted upon, to some degree. One is the south-facing facade of the four storey eastern section of the new Adult Hospital, which, I understand, is 19.2m north from the north facade of the proposed National Paediatric Hospital. The second is the southern end of the Phase 1A building, in particular the south-facing facade of that building, which is located very close to the proposed NPH.

With regard to sunlight access, the likely impacts are on the same two buildings. In the case of the Adult Hospital, the south-facing facade of the four-storey section is likely to be overshadowed by the NPH from lunchtime onwards in mid summer. For the rest of the year, it is likely to be overshadowed from late morning onwards. From approximately mid August to approximately the beginning of May, the shadows from the NPH will extend over the atrium in the centre of that four-storey building from early afternoon onwards. The south-facing facade of the Phase 1A building will be overshadowed by the NPH for almost all the day throughout the year. We are given to understand that the areas identified are not areas which require sunlight and the Mater Hospital has no concerns in respect of the effects operation in house.

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[7] This is raised in the submission by the BLEND Residents Association received by An Bord Pleanala on 13th September 2011 and the submission by Dr. Desmond Duff received by An Bord Pleanala on 9th September 2011

5.4. Issue – Impact on Protected Structures

Submission:
One of the submissions[8] raises the issue of the impact of the proposed NPH as a result of overshadowing on protected structures, specifically those at 422-432 North Circular Road.

Response:
These protected structures are located at too great a remove to experience significant impacts as a result of impact on sunlight or daylight access. Around the time of the equinox, the proposed development will have an imperceptible to slight impact on sunlight access to protected structures at North Circular Road and Synott Place, for a short time before sunset. The effect is not significant.

6. Conclusion

The impacts of the presence of the proposed National Paediatric Hospital on daylight access in the area will be very small. For most of the day, throughout the year, shadows from the proposed NPH will be confined to within the Mater Hospital campus, and will, therefore, not impact on residential areas. Shadows cast by the proposed National Paediatric Hospital will have a significant negative impact on houses at the south end of the Leo Street area on mid summer evenings, for a limited period of time. Moving towards the equinox and into winter, shadows from the National Paediatric Hospital will spread north through the Leo Street area; but due to the existing shadow environment and the reducing length of the day, the extent of the impact of these shadows will progressively reduce the further north they extend.

[8] This is raised in the submission by the Heritage Council received by An Bord Pleanala on 13th September 2011

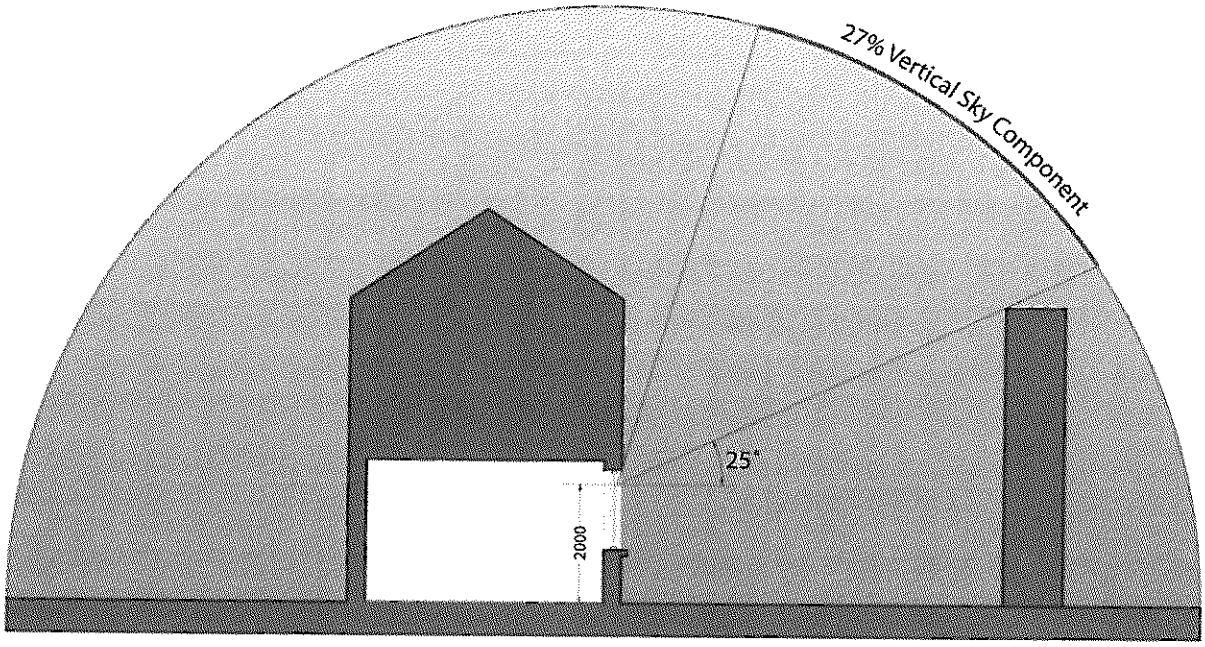

Figure 1: Vertical Sky Component