Section 13:
Daylight and Sunlight Impact

13.1 INTRODUCTION

AUREA Consulting was appointed by Dublin City Council to carry out a study to analyse sunlight and daylight issues for the proposed development at O' Devaney Gardens as part of the Environmental Impact Statement.

All information related to the proposed development and the surrounding areas was supplied to AUREA Consulting by Dublin City Council architects in electronic format. No other information has been used in this study. The study assumes that all information provided is accurate and that no omissions have been made.

13.2 METHODOLOGY

13.2.1 INTRODUCTION

The analysis presented in this report is based on 3D models and CAD drawings of the existing development, proposed development and surrounding buildings, provided by Dublin City Council architects.

The reference methods for calculations were the 1991 BRE document 'Site layout planning for daylight and sunlight-a guide to good practice' by PJ Littlefair, and the BS 8206: Part 2: 1992 section 5.6 (Minimum values of average daylight factor in dwellings).

While those analysis methods and their associated recommendations are used for the analysis in this report, it has to be noted that they are no mandatory regulatory standards. Although Dublin City Development Plan (both the current Development Plan and the Draft Dublin City Development Plan 2011 – 2017) requires the 1991 BRE document to be taken into account, the introduction of the BRE document itself states that:

"The advice given here is not mandatory and this document 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 because natural lighting is only one of many factors in site layout design. In special circumstances, the developer or the planning authority may wish to use different target values."

Section 13.2 of this chapter addresses the methodology employed for undertaking the assessment. Section 13.3 outlines the baseline environment. This chapter is then divided in three sections. Section 13.4 addresses the impact of the development to surrounding. Section 13.5 addresses the sunlight access to open spaces and Section 13.6 addresses internal daylight in apartments within the Phase 1A development.

13.2.2 METHODOLOGY FOR SUNLIGHT AND SKYLIGHT ACCESS STUDY ON SURROUNDING BUILDINGS

The skylight and sunlight indicators used in this report to assess potential access to skylight and sunlight are taken from the 1991 BRE document 'Site layout planning for daylight and sunlight-a guide to good practice' by PJ Littlefair.

The skylight and sunlight indicators represent a quantifiable method of study in which before and after scenarios can be seen to meet, or fail to meet, clear guidelines set out in the BRE document.

Selected points around the proposed development are chosen for the analysis of the impact on skylight and sunlight, representing windows at surrounding locations use where the proposed development could have the greatest impact on the reduction of skylight and sunlight levels.

Diagrams detailing the annual sunpath for the selected points derived from a 3-D model prepared for the development and surrounding areas are included for additional information in Appendix 13.1. Shadowing figures at representative times of the day for spring equinox and summer solstice are presented in Appendix 13.2.

Skylight Indicator

The Skylight Indicator measures the daylight access in terms of vertical sky component (in percentage) received at the reference point, located at the centre of the diagram. The BRE suggest a minimum vertical sky component of 27% as indicating potential for good daylighting.

'*If the vertical sky component, with the new development in place, is both less than 27% and 0.8 times its former value, then the occupants of the existing building will notice a reduction in the amount of skylight.'*

Each cross in the Skylight Indicator represents 0.5% vertical sky component. Obstructions such as walls and buildings surrounding the reference point are plotted on the indicator. The crosses unobstructed by surrounding buildings are then counted to ascertain the level of vertical sky component at the reference point.

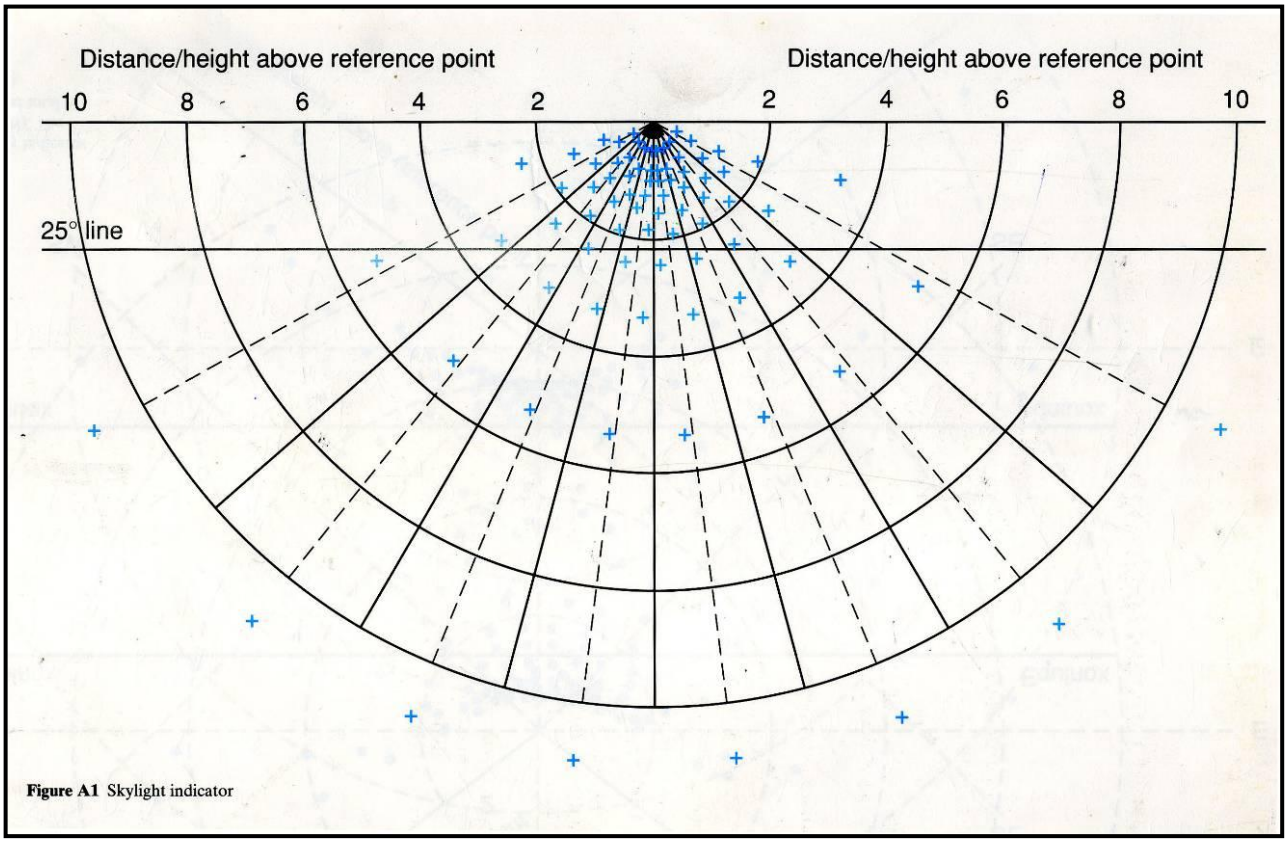


Figure 13.1: Typical Skylight Indicator

Sunlight Indicator

The Sunlight Indicator measures the probable sunlight hours received at the reference point, located at the centre of the diagram. Each dot on the diagram (see figure 13.2) represents 1% of annual probable sunlight hours. According to BS 8206: Part 2: 1992, at least 25% of annual probable sunlight hours should be available at the reference point, including 5% of annual probable sunlight hours in the winter months, between September 21 and March 21.

AUREA Consulting has used the Manchester sunlight indicator for this study, as it is considered the most representative of the examples given in the BRE document, in terms of climatic conditions, and in particular the potential sunlight hours.

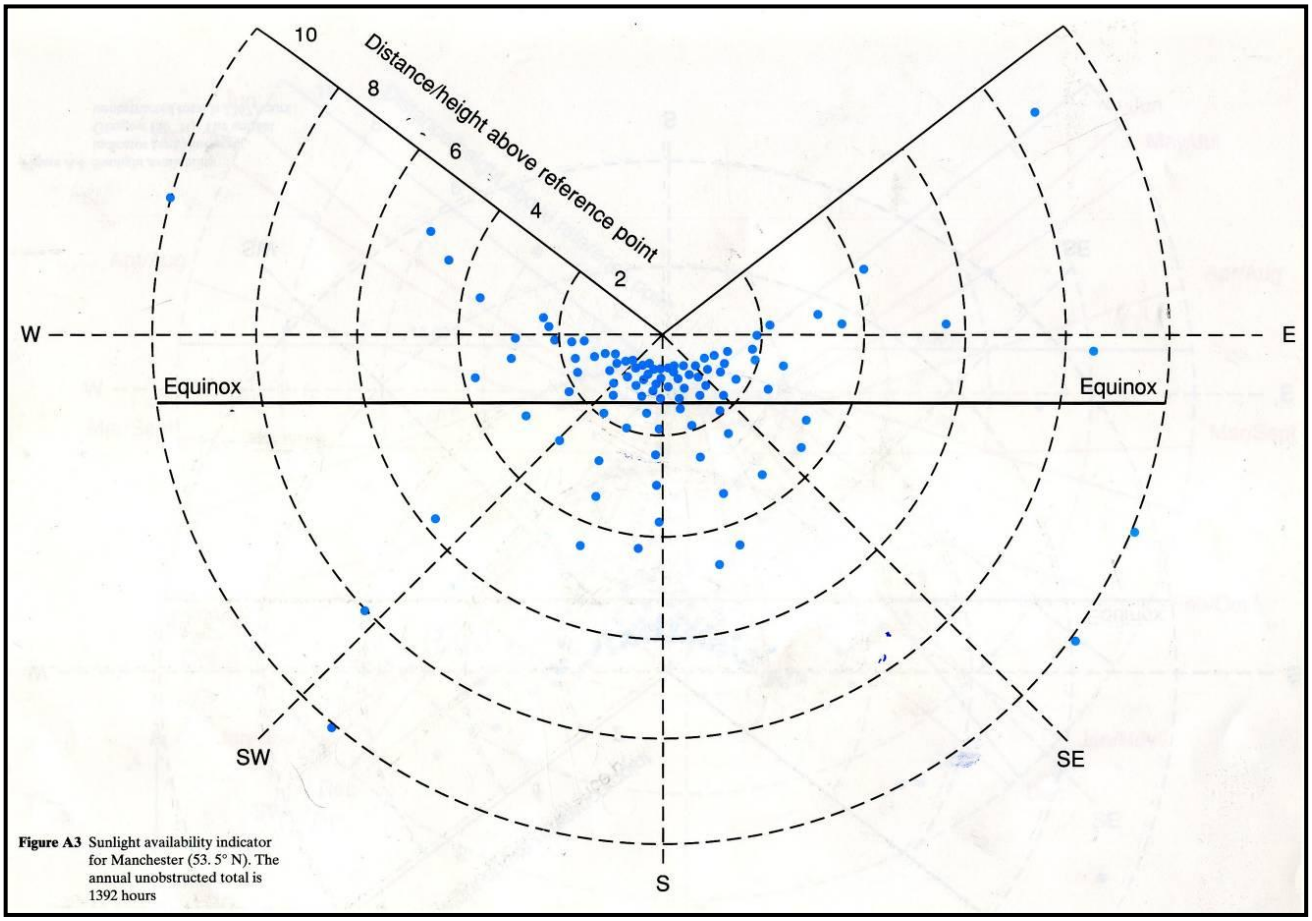


Figure 13.2: Typical Sunlight Indicator

13.2.3 METHODOLOGY FOR ASSESSMENT OF SUNLIGHT ACCESS WITHIN THE OPEN SPACE AREAS OF THE DEVELOPMENT

Sunlight access on open space areas within the proposed development is assessed in Section 13.4. Hours of sunlight on 21st of March are calculated and results compared with the recommendations from 1991 BRE document 'Site layout planning for daylight and sunlight-a guide to good practice' by PJ Littlefair.

13.2.4 METHODOLOGY FOR ASSESSMENT OF INTERNAL DAYLIGHT OF SELECTED APARTMENTS

Internal daylight on specific 'worse case scenario' rooms is analysed in section 13.5. The calculated internal daylight levels are compared with the minimum levels recommended in BS 8206: Part 2: 1992 section 5.6 (Minimum values of average daylight factor in dwellings).

Daylight factor

The daylight factor is the percentage of outdoor daylight penetrating the building. The minimum levels recommended in BS 8206: Part 2: 1992 section 5.6 (Minimum values of average daylight factor in dwellings) is 1.0% for bedrooms, 1.5% for living rooms and 2.0% for kitchen.

Methodology

Computer modelling was used to calculate the daylight levels for the internal spaces. The standard overcast sky defined by CIE (International Commission on Illumination) is used as a basis for the program calculations. The working plane for daylight calculations is considered 0.85 meters above the floor.

It should be noted that there are some limitations to the program used. For example, buildings or surfaces of different colours and textures have different light reflectance values. This can have an effect on the level of reflected daylight admission in buildings, but in the simulation model, a fixed value is given.

The values assigned for reflectance of internal surfaces, as well as transmission values from glazing systems are fixed as follows:

Table 13.1: Values for Reflectance of Internal Surfaces and Transmission Values from Glazing Surfaces[1]

Surfaces	Reflectance
Walls	0.6
Ceiling	0.7
Floor	0.5
External ground	0.2
External surfaces	0.3
Transmission	
Windows & transparent doors	0.7

[1] The correction factor for dirt on glazing surfaces is fixed at 0.9

13.3 BASELINE ENVIRONMENT

The social housing estate of O Devaney Gardens was constructed in the 1954 on a site of 4.62 ha. The estate was constructed on undeveloped institutional lands adjacent to St Bricin's Military Hospital and backed onto by housing on the west, north and north east sides.

Thirteen apartment blocks of four storey height were arranged on site between the northern section and southern section of the site. The original scheme consisted of 276 apartment units.

Currently, there are five blocks remaining at the northern end of the site and four at the southern end. Four apartment blocks and the two storey commercial block have been demolished under a previous Part VIII planning approval under the Planning and Development Regulations 2001 (as amended). The planning register reference for those demolition works is 3544/08.

In this assessment, the existing scenario refers to that scenario present on site prior to the demolition of these blocks, which were demolished to accommodate the new development. This approach is considered appropriate in order to ensure that the impact on surrounding residential properties in a context which reflects that which was present when the surrounding development was constructed.

It is considered that it would be inaccurate to assess the daylight and sunlight access to surrounding development based on the current state of the site, as this would reflect neither the urban location of the site nor the fact that the blocks removed were removed to accommodate new development.

13.4 SUNLIGHT AND SKYLIGHT ACCESS STUDY ON SURROUNDING BUILDINGS

Selected points representing situations where there is a potential impact on skylight and sunlight access to surrounding residential buildings have been selected. These points have been selected on a 'worse case' scenario basis. Figure 13.3 below shows a site plan of the proposed development, with location of the selected points:

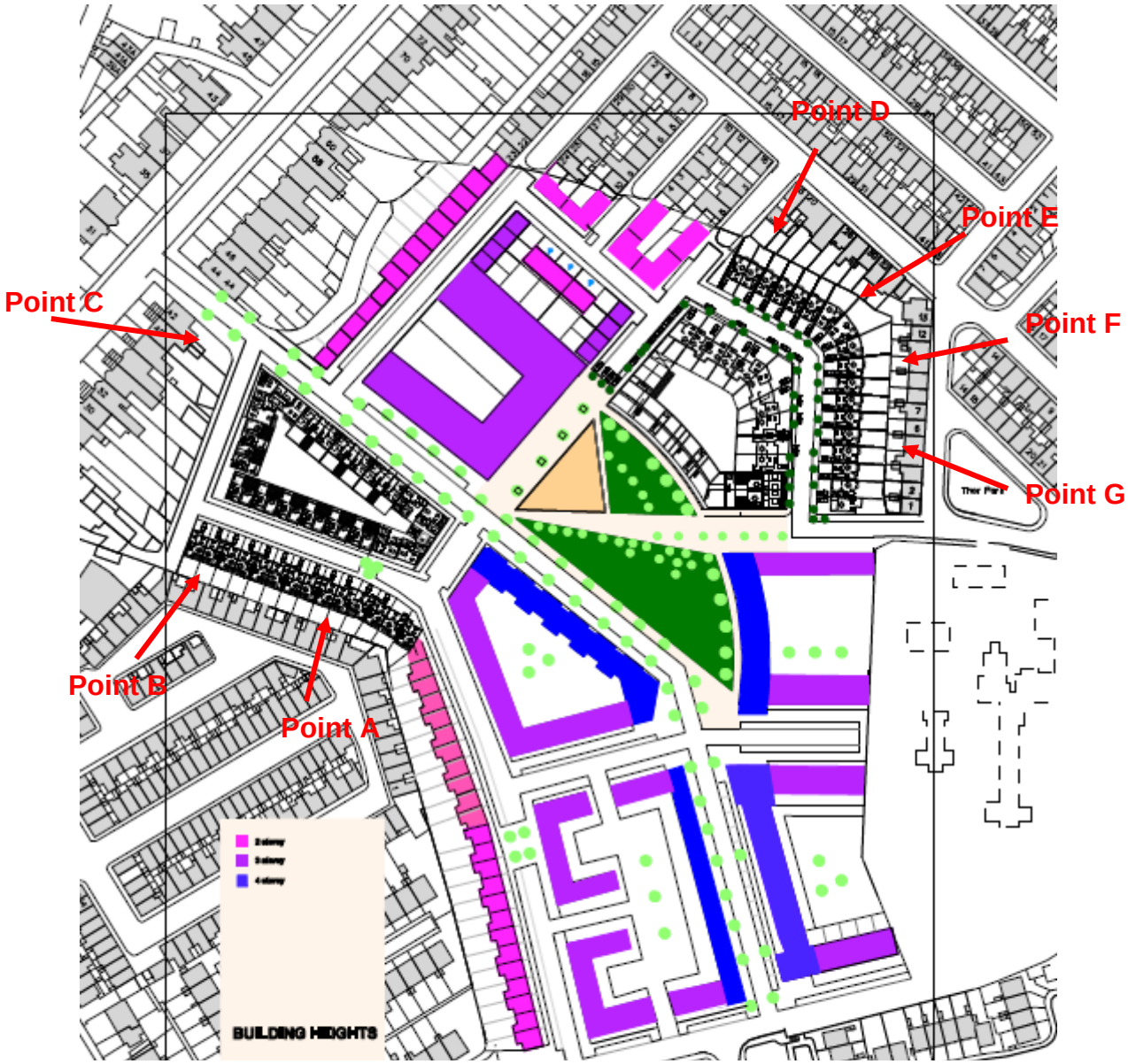


Figure 13.3: Model showing points for the analysis of the potential impact of the proposed development on surrounding buildings

Point A: situated at 2 meters height on the rear north-east façade of houses at Findlater St, representing windows facing the proposed development,

Point B: situated at 2 meters height on the rear north-east façade of houses at Findlater St, representing windows facing the proposed development.

Point C: situated at 2 meters height on the rear south-east façade of house at North Circular Road, representing windows facing the proposed development.

Point D: situated at 2 meters height on the rear south-western façade of houses at Ashford Street, representing windows facing the proposed development.

Point E: situated at 2 meters height on the rear south-western façade of houses at Ashford Street, representing windows facing the proposed development.

Point F: situated at 2 meters height on the rear south-western façade of houses at Thor Place, representing windows facing the proposed development.

Point G: situated at 2 meters height on the rear south-western façade of houses at Thor Place, representing windows facing the proposed development.

Two diagrams (see Appendix 13.1) have been used per observation point, to compare the proposed scenario with the existing.

The following results represent the existing scenario, the scenario after the proposed development, and the minimums recommended in the 1991 BRE document "Site layout planning for daylight and sunlight-a guide to good practice". The minimums considered are calculated according to those recommendations as follows:

- ***Skylight****: Both less than 27% and 0.8 times its former value*
- ***Sunlight****: Both less than 25% and 0.8 times its former value of annual sunlight hours, including 5% of winter sunlight hours.*

Table 13.2: Skylight and Sunlight Access Results

Point	Existing Values			Proposed Development Values			Minimum Recommended		
	%Skylight	% Sunlight		%Skylight	% Sunlight		% Skylight	% Sunlight	
		Year	Winter		Year	Winter		Year	Winter
A	32	13	1	27	11	1	27	10.5	1
B	35	12	1	27	11	1	27	9.5	3
C	36	68	24	34	65	21	27	25	5
D	34	69	21	35	71	24	27	25	5
E	35	73	24	34	74	24	27	25	5
F	36	47	13	35	45	12	27	25	5
G	34	45	12	29	39	11	27	25	5

This study has quantified the impact on skylight and sunlight at a number of points around the development which would be potentially affected by the proposed development.

The impact on skylight and sunlight access on surrounding dwellings complies with BRE recommendations for all the studied points.

Appendix 13.1 shows sunpath diagrams detailing the exact time of the day and period of the year where a certain point is shadowed by the proposed development, and also giving an indication on skylight access.

Appendix 13.2 shows shadow diagrams for O' Devaney Gardens, comparing the existing situation with the proposed development, including present and future Phases.

13.5 SUNLIGHT ACCESS WITHIN THE OPEN SPACE AREAS

To analyse sunlight access within the open space areas in the proposed development, the percentage of area with some access to sunlight on 21st March has been calculated. The results for 21st March have been compared with the recommendations from the BRE document 'Site layout planning for daylight and sunlight-a guide to good practice', which as relevant read as follows:

"No more than 40% (preferably no more than 25%) of any garden or amenity area should be prevented by buildings from receiving any sun at all on 21st March".

This means that at least 60% of an open space area should have access to some sunlight on 21st March.

Figures 13.4 to 13.6 below displays the sunlight hours for the open spaces within the development, where the colour guide represents the cumulative number of hours of sunlight received by a grid point for the day.

More than 90% of the open space areas within the development have access to some sunlight for 21st March, which represents an excellent sunlight access.

Figure 13.4 Hours of sunlight in Block A courtyard, 21st March: Courtyard – Western Block

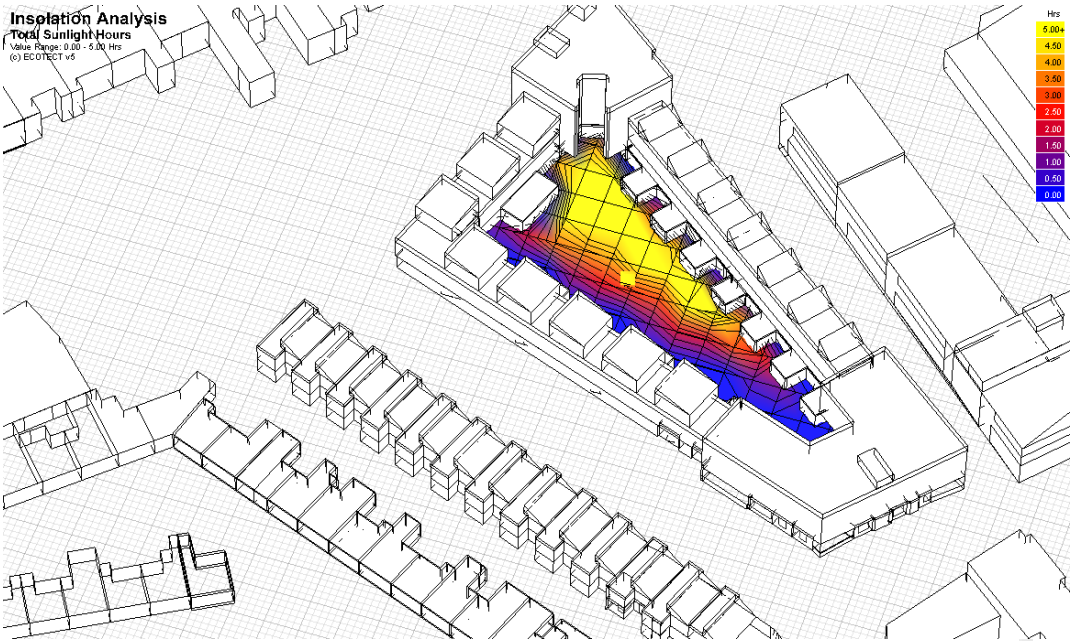


Figure 13.5 Hours of sunlight in Block B courtyard , open space areas, 21st March Courtyard –Eastern Block

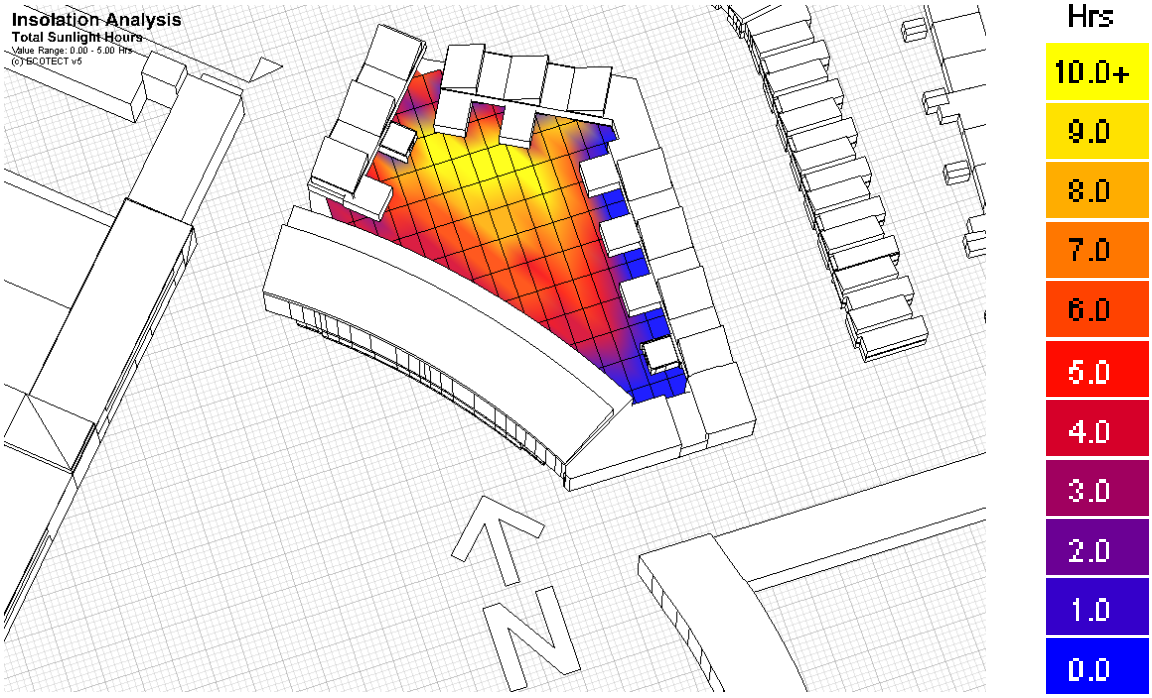
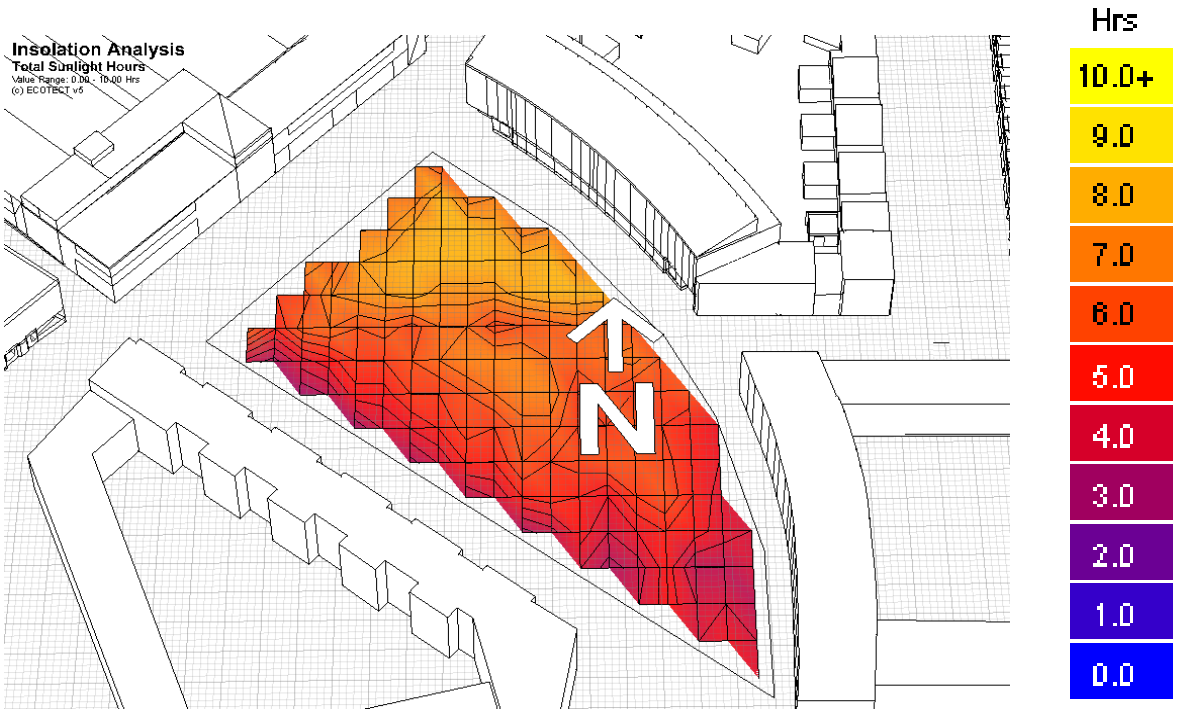


Figure 13.6 Hours of sunlight in central open space area, 21st MarchCourtyard –Eastern Block



13.6 INTERNAL DAYLIGHT ANALYSIS

This section of the report analyzes in detail internal daylight access for a number of the rooms in the proposed commercial & residential development.

The rooms selected have been identified as 'worse case scenarios', where the daylight could potentially be compromised. Rooms selected on the residential development are in the ground floor apartments and houses, facing courtyards or neighboring blocks, and in cases having large overhangs or balconies that could reduce the daylight availability.

Rooms selected are the sitting rooms & dining rooms (kitchen) and bedrooms in the ground floor in chosen units of block A, B, C and D.

Figure 13.7: Selected units in Block A

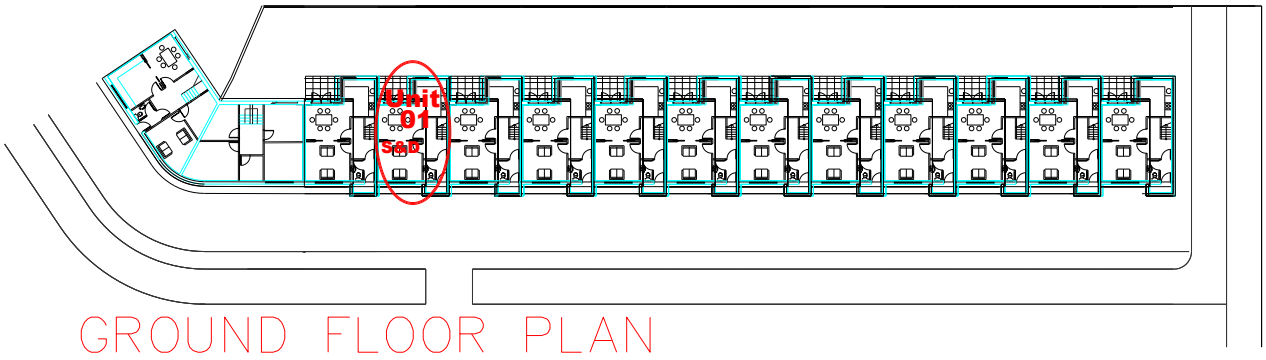


Figure 13.8: Selected units in Block B

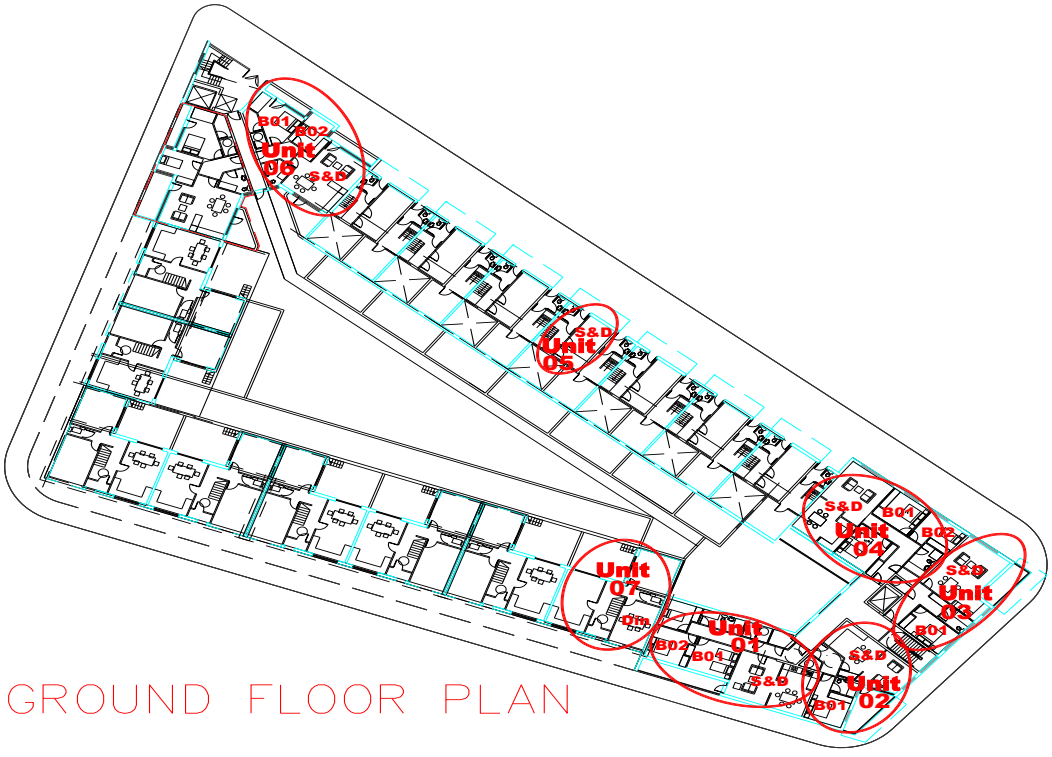
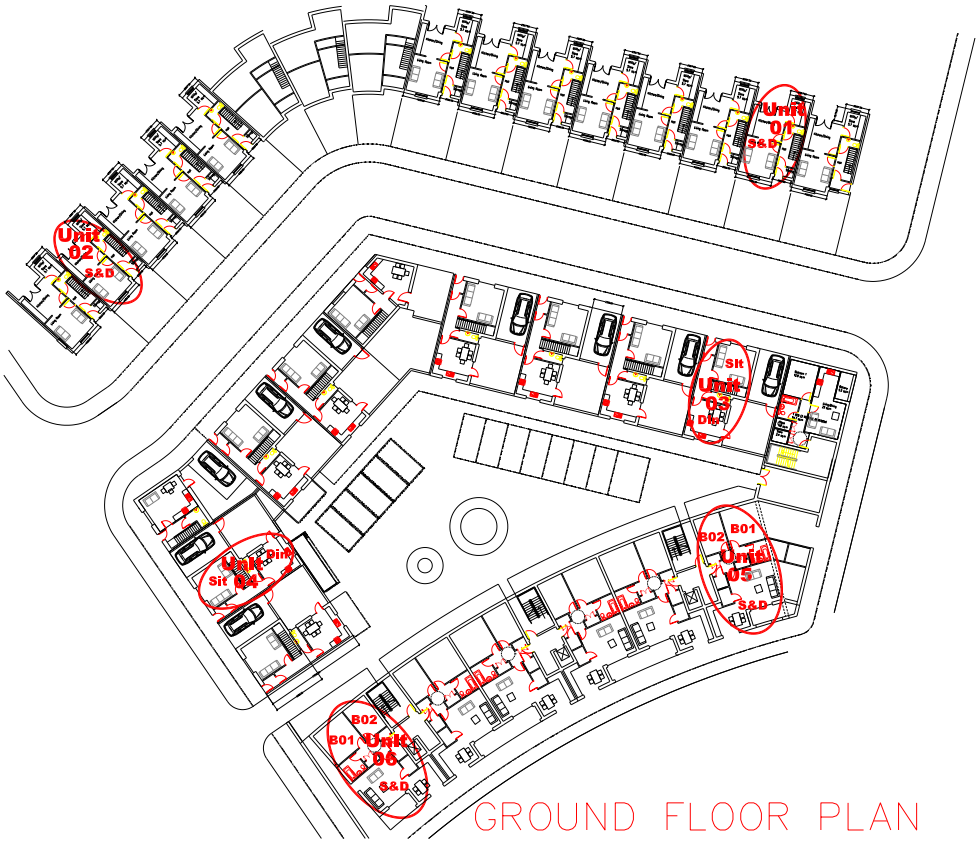


Figure 13.9: Selected units in Blocks C&D



As can be seen in Figures 13.7 to 13.9 above, all units named as Unit 01-07 are considered as the worst cases. Some of them face other blocks or courtyard and some have balcony above. The sitting, dinning room and the bedrooms in the ground floor of chosen units are highlighted and the internal average daylight factor results are generated after simulation.

Table 13.3 below shows internal daylight factor average values for the different room types on the selected unit. For each room type, the table also shows the minimum requirement of average daylight factor recommended in BS 8206-2:

Table 13.3: Internal Daylight Average Values for Selected Rooms

BLOCK A				BLOCK B				BLOCK C				BLOCK D			
Unit	Room ID	Average Daylight Factor, %	Minimum Recommended (BS 8206-2:1992)	Unit	Room ID	Average Daylight Factor, %	Minimum Recommended (BS 8206-2:1992)	Unit	Room ID	Average Daylight Factor, %	Minimum Recommended (BS 8206-2:1992)	Unit	Room ID	Average Daylight Factor, %	Minimum Recommended (BS 8206-2:1992)
U01	S&D	7.80	1.50	U01	S&D	7.45	1.50	U03	Sit	3.72	1.50	U01	S&D	4.17	1.50
					B01	4.09	1.00		Din	11.45	2.00	U02	S&D	6.38	1.50
					B02	3.05	1.00	U04	Sit	6.06	1.50				
				U02	S&D	4.48	1.50		Din	9.55	2.00				
					B01	2.91	1.00	U05	S&D	4.63	1.50				
				U03	S&D	4.26	1.50		B01	3.41	1.00				
					B01	4.18	1.00		B02	3.84	1.00				
				U04	S&D	3.05	1.50	U06	S&D	5.27	1.50				
					B01	2.46	1.00		B01	4.86	1.00				
					B02	2.50	1.00		B02	5.54	1.00				
				U05	S&D	3.36	1.50								
				U06	S&D	4.60	1.50								
					B01	5.98	1.00								
					B02	3.35	1.00								
				U07	Din	7.83	2.00								

The calculated internal daylight in rooms selected as 'worse case' scenarios within the development, have daylight access well above recommendations from BS 8206-2: 1992. All the selected rooms are on the ground floor. In the upper floors, as the amount of skylight obstructed by opposite buildings is reduced, internal daylight factors would further improve. Based on this, a good daylight access for all internal spaces in the development can be predicted.

Detailed internal daylight diagrams for each of the rooms are presented in Appendix 13.3.

13.7 CUMULATIVE IMPACTS

In accordance with Schedule 6, Part 2(c) of the Planning and Development Regulations 2001, this chapter has considered the cumulative impact of the proposed Phase 1A development in conjunction with future phases of development. This relates to the cumulative impact on the subject site itself and on surrounding sites.

The European Commissions report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

It is noted that the Scoping Response received from An Bord Pleanala indicates that:

"An assessment of the impact of Phase 1 within the Master Plan area, and the cumulative impact of Phase 1A, Phases 1B and 2 on the surrounding fringe areas bordering the master plan site, should be provided within the EIS".

Phase 1A of the proposed development comprises of:

110 residential units in four blocks A to D
Open Space Neighbourhood Park 4,680 sq.m.

Future phases of development, which will be subject to separate applications for development envisage the following:

Phase 1B	Mixed Use Neighbourhood Centre 1,090 sq.m. supermarket 790 sq.m. ancillary retail units 1,280 sq.m. community and office space 48 elderly housing units
Phase 2	Option 1: 240 residential units Option 2: 120 residential units, 8,000 commercial uses, public open space 1,100 sq.m.

These figures are approximate and are subject to change as the Masterplan for the area progresses during future phases of development. The location of each Phase of development is indicated on the submitted Masterplan prepared by Dublin City Council.

With regard to the cumulative impact of proposed future phases on daylight and sunlight, as the future phases are still in the design development stage, it is not possible to accurately assess the impact that future phases may have. As there are as of yet no internal layouts, no assessment of internal daylight access can be undertaken. However an outline assessment has been undertaken with regard to the block layout Masterplan for future phases.

Notwithstanding that future phases have no design detail, it is worth commenting that the Masterplan heights for Phase 1B are significantly lower in scale than the present 4 storey apartment blocks on site. Also the proposals for Phase 2 include 2 storey buildings with rear gardens on boundaries which adjoin the institutional grounds. In this context it is considered that there is minimal adverse shadow impact.

13.8 MITIGATION MEASURES AND RESIDUAL IMPACT

There are no mitigation measures which would be effective in increasing the sunlight and daylight access to the proposed Phase 1A development. Aurea Consulting has worked in conjunction with Dublin City Council architects in the design development in order to ensure that sunlight and daylight access is maximised, whilst also ensuring that the proposed Phase 1A development achieves its objectives in making the most appropriate use of this urban brownfield site.

13.9 REINSTATEMENT

There are no reinstatement measures proposed in relation to daylight and sunlight impact.

13.10 DIFFICULTIES ENCOUNTERED

No significant difficulties were encountered in compiling this chapter.