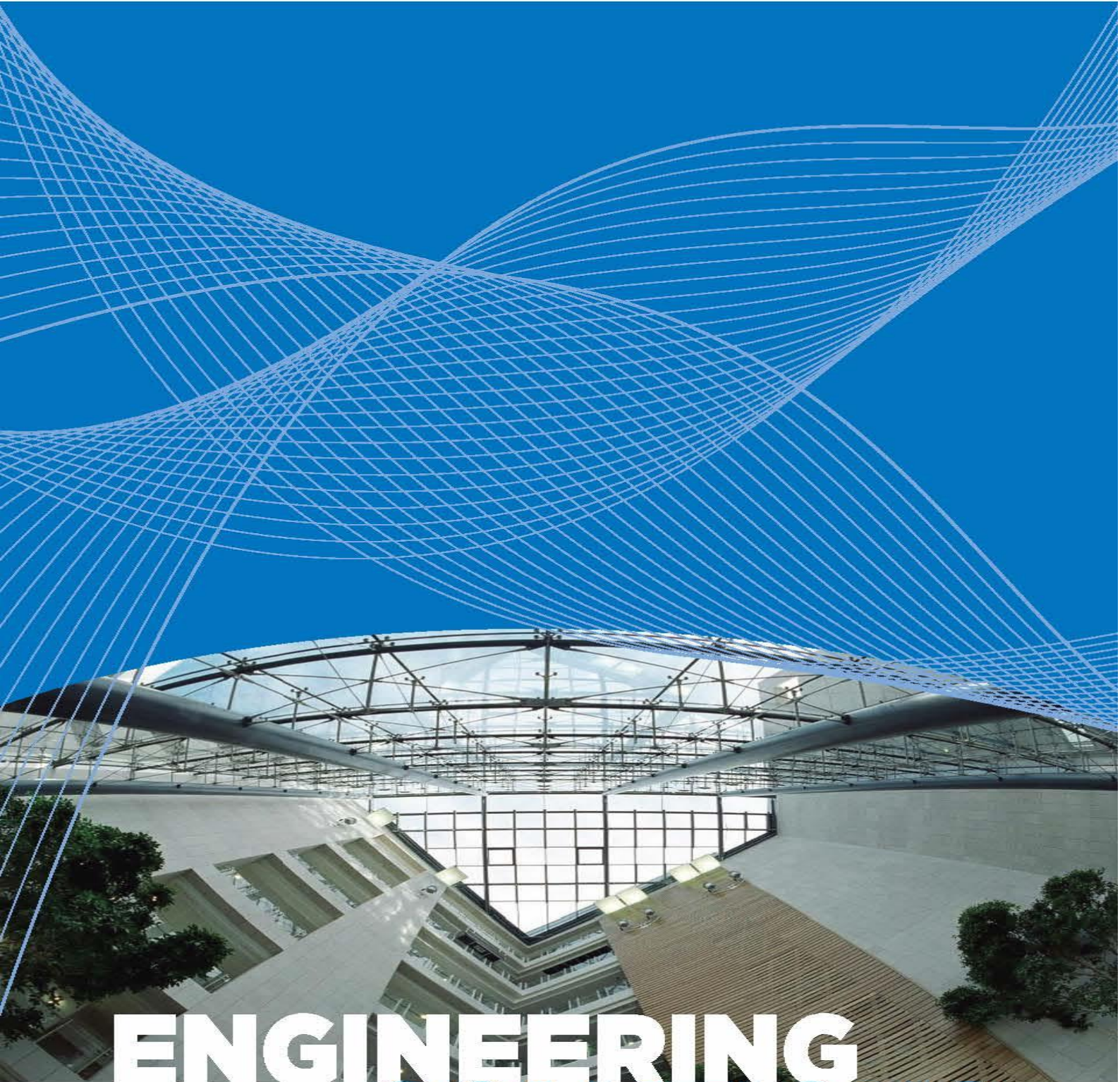


J. V. Tierney & Co.

Consulting Engineers & Project Managers



**ENGINEERING
SOLUTIONS**



**CLAREMONT DEVELOPMENT HOWTH
DAYLIGHTING & SUNCAST REPORT**

Completed By: Brian Wylie

Description	Rev. No.	Date	Done By:	Checked by:
Planning	7	22.11.2019	BW	RB

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Executive Summary

J.V.Tierney & Co. were commissioned to undertake a daylight and suncast shadow study for the proposed Claremont development in Howth Co. Dublin.

In general, the design meets with the principles of the BRE guide - *“Site Layout Planning for Daylight and Sunlight”* ⁽ⁱ⁾ and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development. Good levels of sunlight will also be available in the development’s amenity areas. In addition, the development will have little impact on the surrounding beaches or surrounding houses in terms of overshadowing.

BRE Guidelines

The purpose of this guide is to provide advice on a buildings site plan and layout to achieve good levels of daylighting and sun lighting. The guide provides calculation methodologies which aims to assist clients, consultants and planning officials make informed decisions on site layout to ensure no significant loss of light occurs. It should be noted that the guidance in this document should be seen as advice only and it should not constrain the design, *“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”*.

If this guidance is followed the end result is a site which is positioned and laid out in such a way which will provide adequate levels of sun lighting and daylighting while creating an ambience that will appeal to any building occupant.

Glossary

CIE - The standard CIE (Commission Internationale de L’Eclairage – International Commission on Illumination) overcast sky. The CIE Overcast sky is intended for two purposes; to be a universal basis for the classification of measured sky luminance distributions and to give a method for calculating sky luminance in daylighting design procedures.

ADF - Average Daylight Factor. This is the ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE Standard Overcast Sky.

Introduction

The proposed development at Claremont will consist of;

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation

of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

J.V.Tierney & Co. have undertaken the Daylight and Suncast Shadow study in support of the planning application for the proposed development at Claremont in Howth using the guidance set out in *“Site Layout Planning for Daylight and Sunlight”*⁽ⁱ⁾ by “Paul Littlefair”. This guide is a comprehensive revision of the 1991 edition of *“Site Layout Planning for Daylight and Sunlight: A guide to good practice”*⁽ⁱⁱ⁾.

A 3D geometric model of the site was created using software IES-VE and using Revit models issued by Henry J Lyons Architects. The analysis procedure takes into account the following daylighting and sun lighting calculation methodologies; (A) Suncast Shadow Analysis, (B) Average Daylight Factor (ADF) , (C) Garden and Open Spaces Sunlight and (D) Light from the Sky.

It should be noted that the guidance in this document should be seen as advice only and it should not constrain the design, *“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”*⁽ⁱ⁾.

The guidance from *“Site Layout Planning for Daylight and Sunlight”*⁽ⁱ⁾ should be seen as not being suitable for rigid application to all developments in the context of national and local policies for the consolidation and densification of urban areas.

The *“Urban Design Manual, A Best Practice Guide, 2009”*⁽ⁱⁱⁱ⁾ states that it may not always be possible to meet the criteria within *“Site Layout Planning for Daylight and Sunlight”*⁽ⁱ⁾ for urban areas. *“Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths”*⁽ⁱⁱⁱ⁾.

The *“Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018”*^(iv), also reiterates the point mentioned above and states that, *“High density apartment schemes in urban locations should include shadow analysis diagrams at application stage. While overshadowing is clearly not generally desirable, it must be accepted that there may inevitably be some element of overshadowing at certain times of the day and/or year, subject to orientation, layout etc., in order to achieve urban development. In assessing development proposals, planning authorities must weigh up the overall quality of the design and layout of the scheme and measures undertaken to avoid overshadowing, with the location of the site and the need to ensure an appropriate scale or urban residential development”*^(iv)

The *Height Guidelines*^(v) have been prepared in response to the publication of *“Project Ireland 2040”* and the *“National Planning Framework”*. The *Height Guidelines*^(v) state that *appropriate and reasonable* regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment’s *‘Site Layout Planning for Daylight and Sunlight’ (2nd edition)*⁽ⁱ⁾ or *BS 8206-2: 2008 – ‘Lighting for Buildings – Part 2: Code of Practice for Daylighting’*^(vi).

In line with the provisions of the Apartment Guidelines as discussed above, the *Height Guidelines*^(v) make allowances for where a proposal may not fully meet all requirements of daylight provisions. This

discretion should be applied where it is desired that a scheme meets wider planning objectives such as comprehensive urban regeneration. This is applicable to the subject scheme whereby the requirement to provide for a sustainable level of development results in a need for some discretion to be applied in terms of completely meeting performance standards.

Comments in relation to overshadowing from the “*Site Layout Planning for Daylight and Sunlight*”⁽ⁱ⁾ guide also state that some degree of overshadowing is to be expected. The guide states that, “*It must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected*”⁽ⁱ⁾.

In general, the design meets with the principles of the BRE guide and BS 8206-2 2008^(vi) and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development. Good levels of sunlight will also be available in the development’s amenity areas. In addition, the development will have little impact on the surrounding beaches or surrounding houses in terms of overshadowing.

References

- (i) Site Layout Planning for Daylight and Sunlight 2011: A Guide to Good Practice, Second Edition by Paul Littlefair
- (ii) Site Layout Planning for Daylight and Sunlight 1991: A Guide to Good Practice by Paul Littlefair
- (iii) Urban Design Manual, A Best Practice Guide, May 2009 as issued by Environment, Heritage and Local Government
- (iv) Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018
- (v) Urban Development and Building Heights: Guidelines for Planning Authorities (March 2019)
- (vi) BS 8206-2 2008 Code of Practice for Daylighting

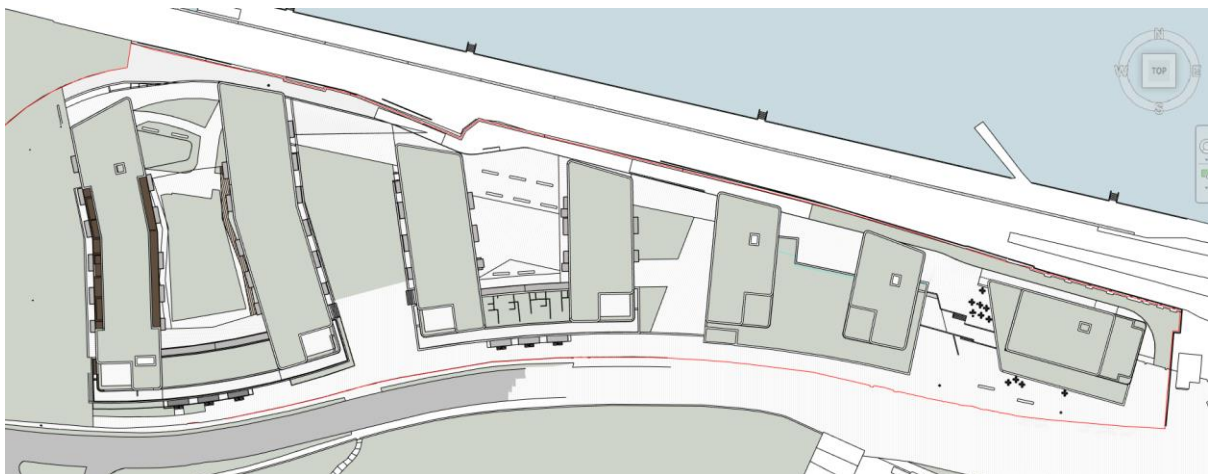


Figure 1 - Site Plan of Development

(A) Sunscast Shadow Analysis

The following diagrams are outlined for the development based on the date, time and location of the buildings and are based on Sunscast images taken on March 21st and June 21st at 08.00, 12.00, 16.00 and 18.00 hours. The outline of the beach areas has been determined from the Fingal County Council Development Plan 2017 – 2023 and other sources such as Google/ Bing maps.

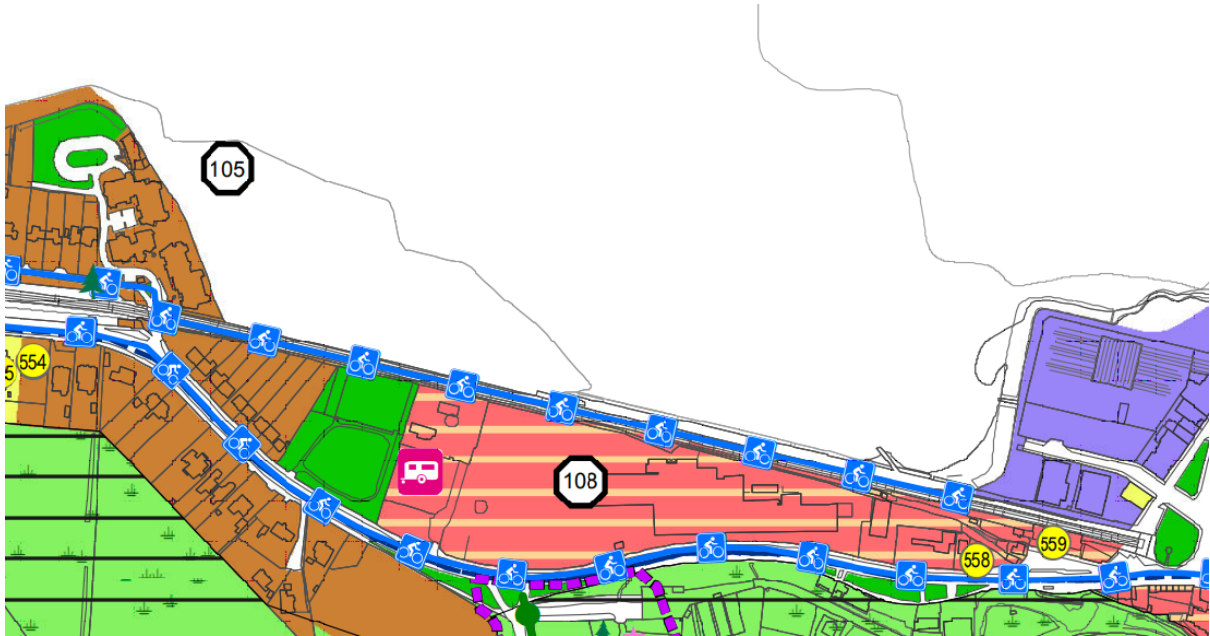


Figure 2 - Beach Area (FCC Development Plan)

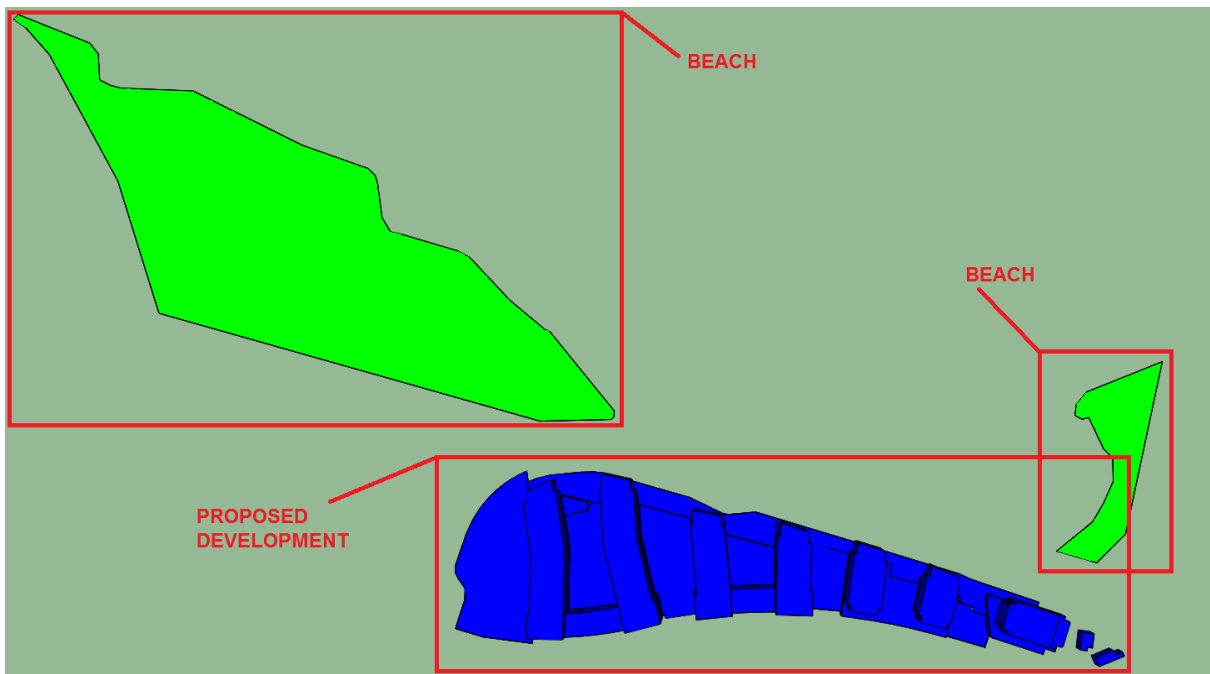


Figure 3 - Legend

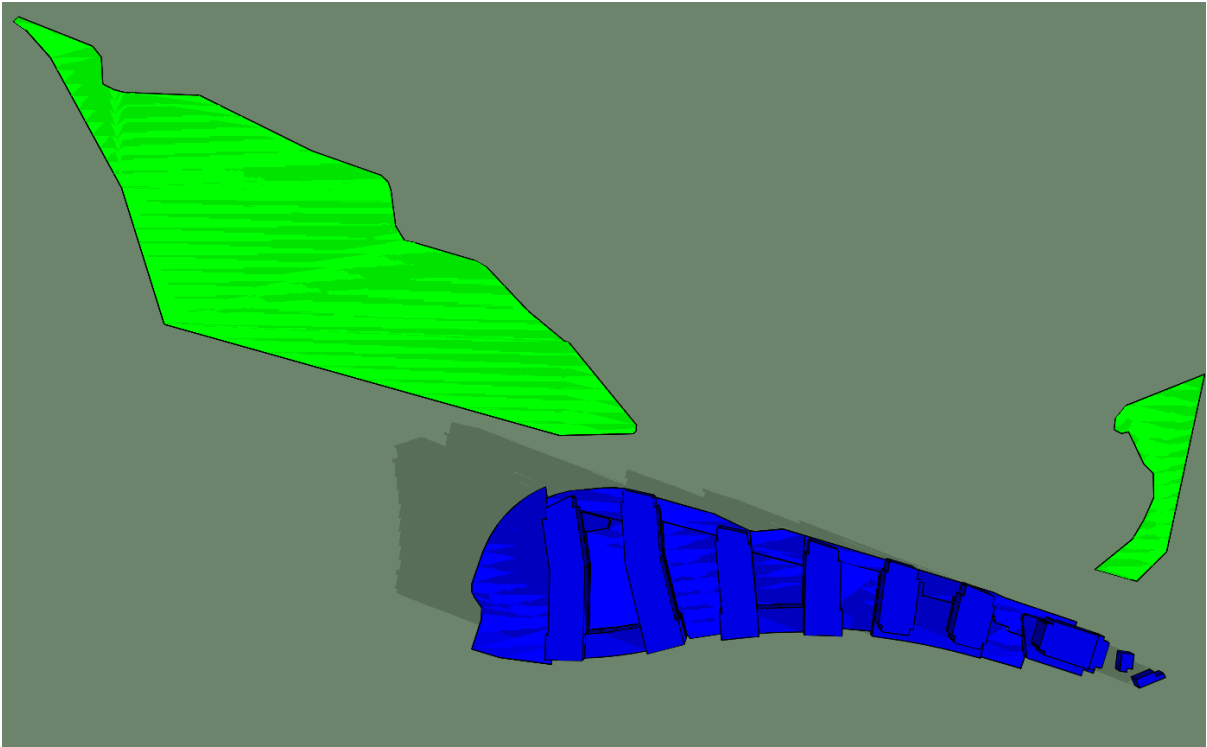


Figure 4 - March 21st 08.00 Am

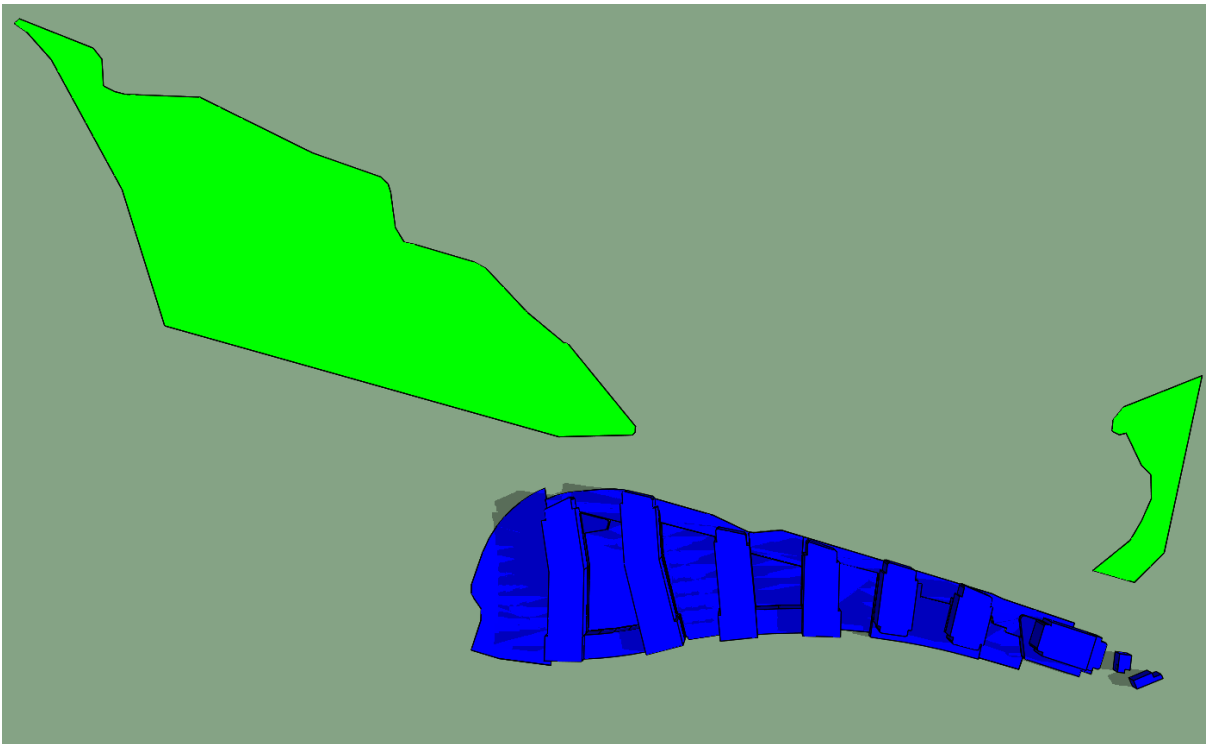


Figure 5 - June 21st 08.00 Am

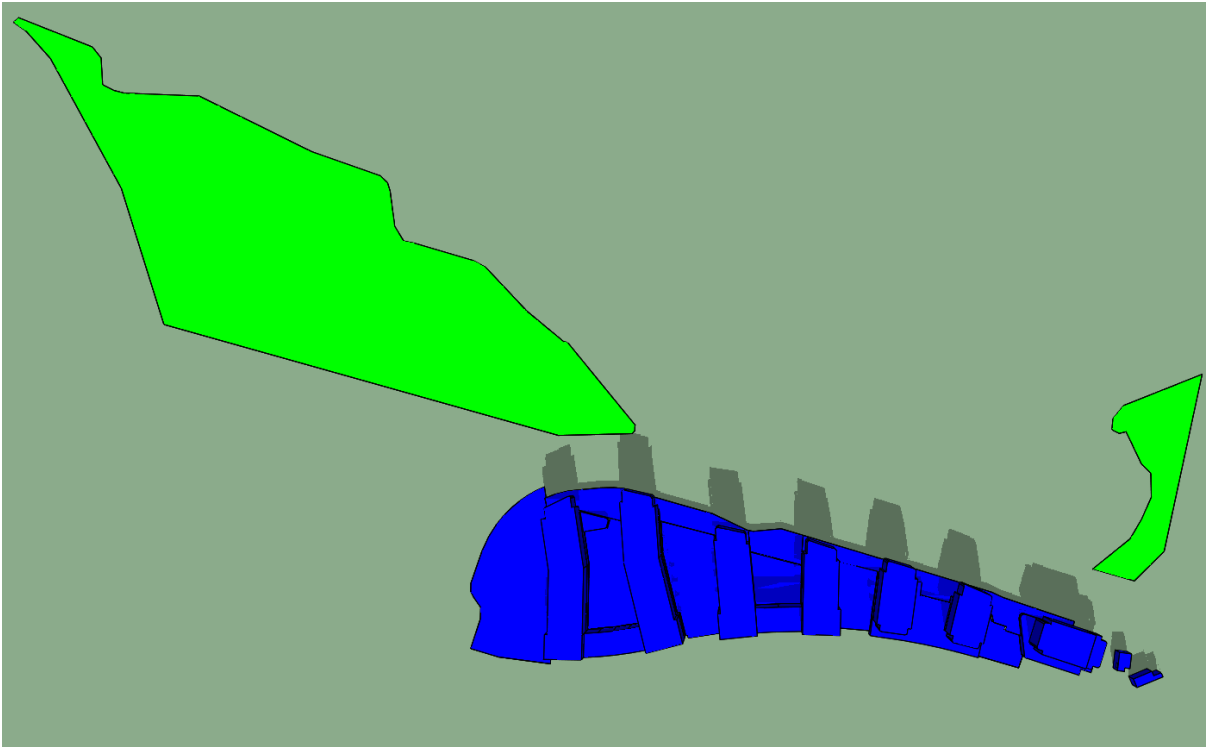


Figure 6 - March 21st 12.00 Noon

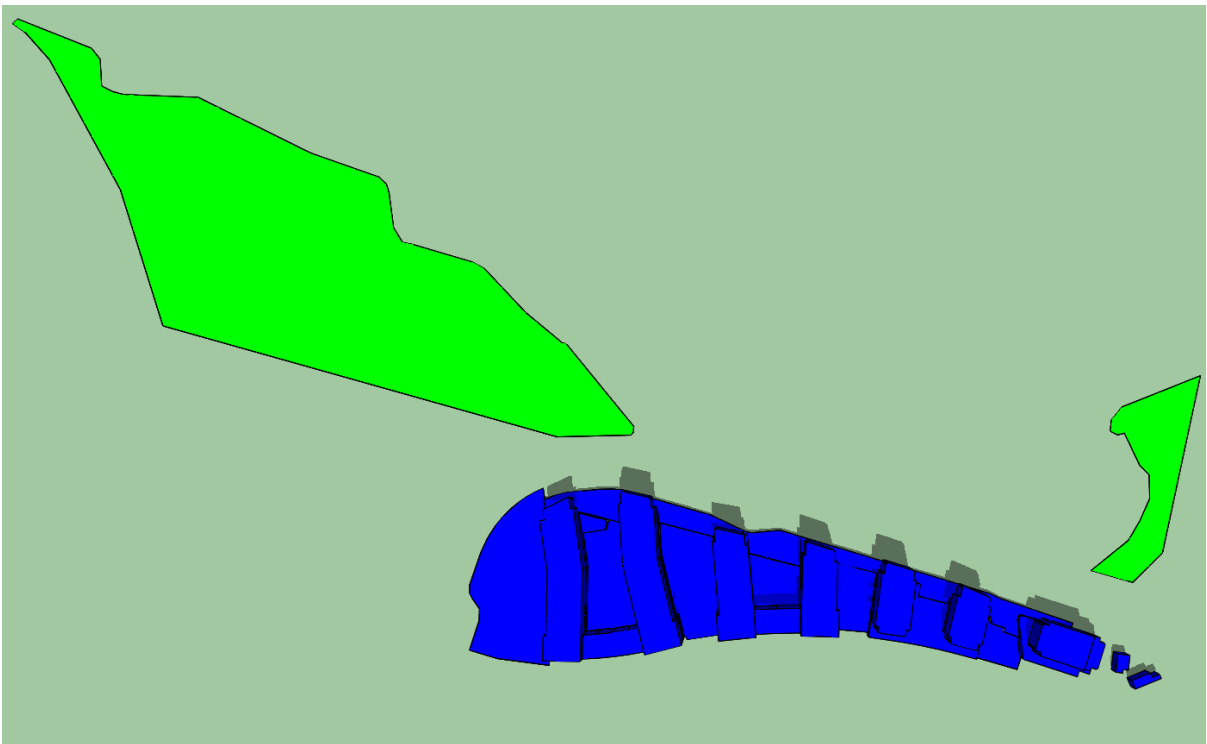


Figure 7 - June 21st 12.00 Noon

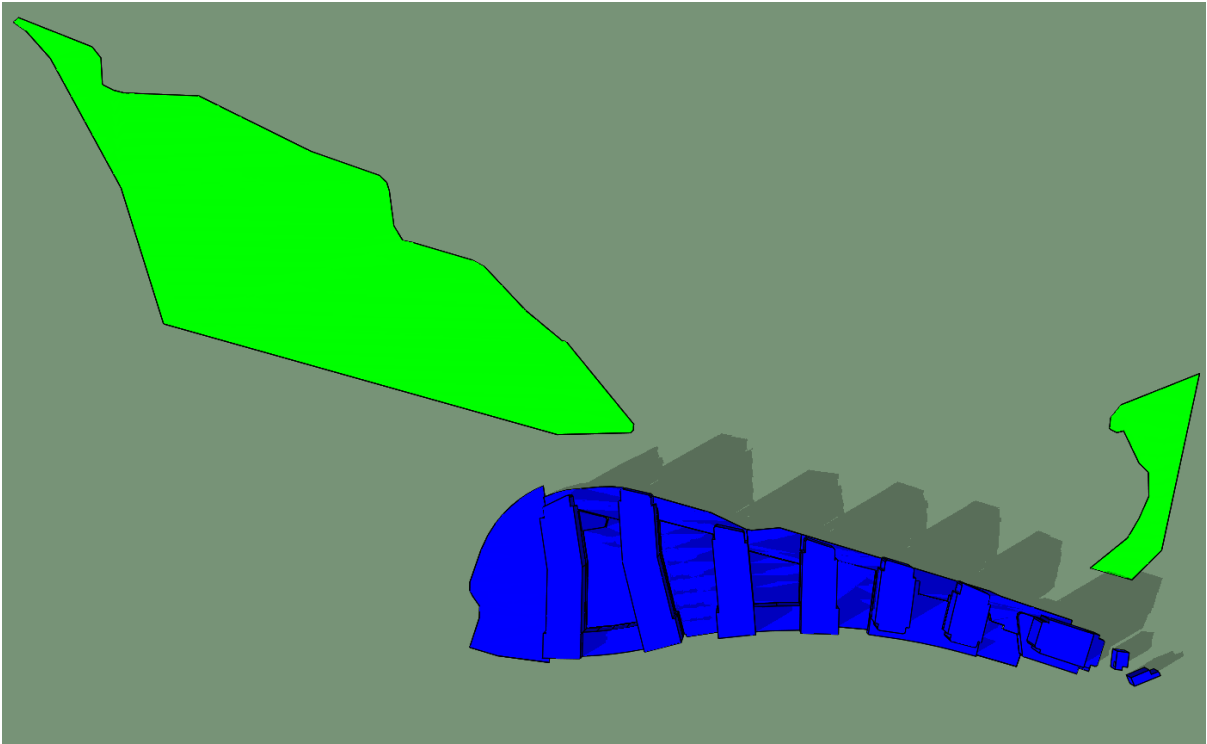


Figure 8 - March 21st 16.00

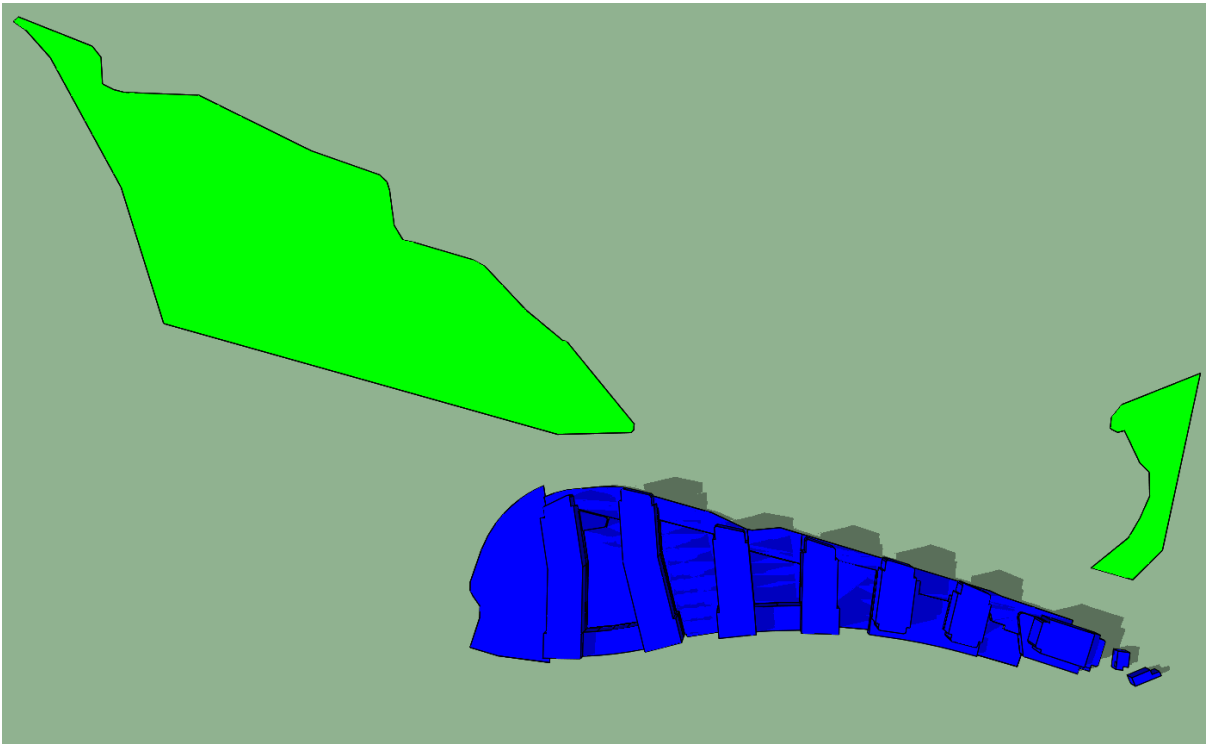


Figure 9 - June 21st 16.00

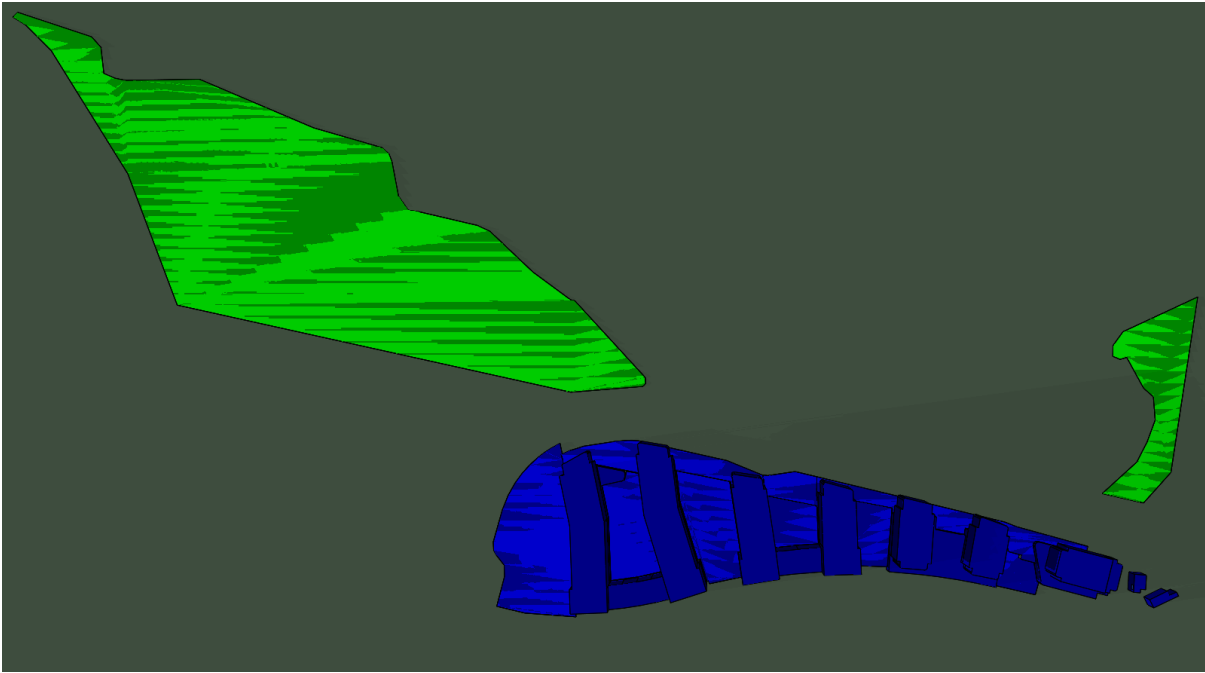


Figure 10 - March 21st 18.00

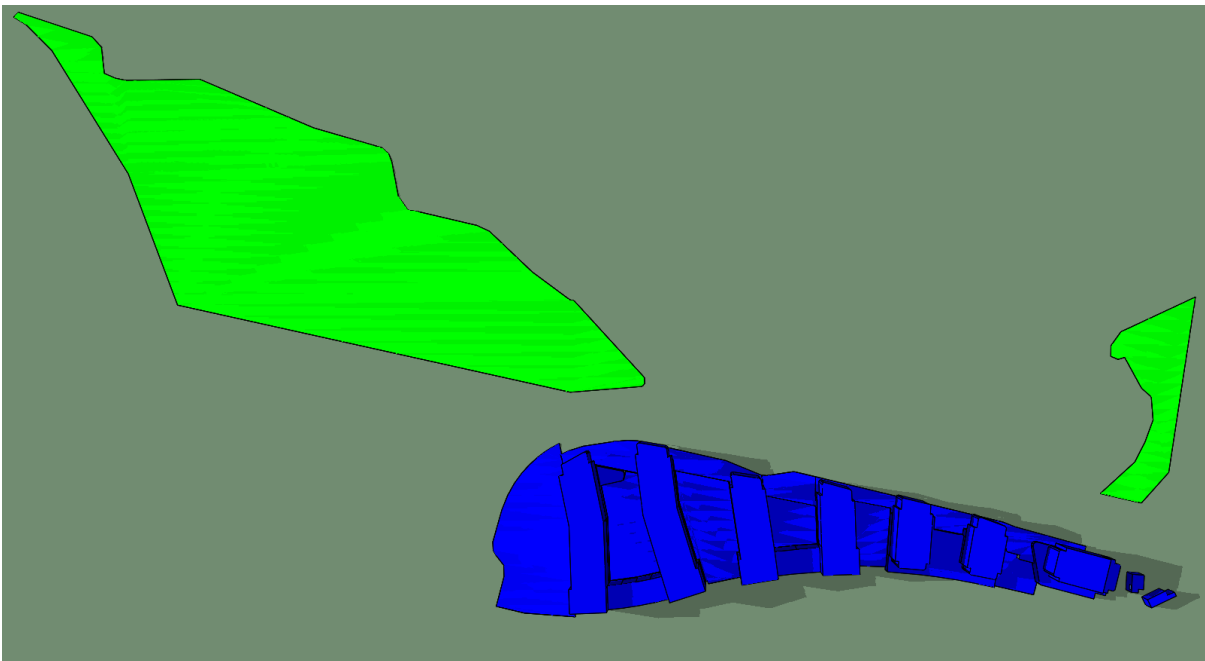


Figure 11 - June 21st 18.00

Summary

The development will have little impact on the surrounding beaches or surrounding houses in terms of overshadowing from a BRE perspective.

(B) Average Daylight Factor (ADF)

In order to assess the quality of daylight enjoyed within the proposed Claremont development an Average Daylight Factor (ADF) calculation was carried out on the habitable rooms in Blocks A to D. The Average Daylight Factor (ADF) is a ratio between indoor illuminance and outdoor illuminance expressed as a percentage. In housing, the following figures should be used to assess if there is a good level of natural light in a space;

Bedrooms = 1%

Living Spaces = 1.5%

As can be seen from the results in the tables below, a significant portion of the room's meet the criteria set out in the BRE guidelines and BS-8206-2 2008 and are also in line with the development standards for new apartments as set out by the Department of Housing.

When looked at as a total, the quantum of spaces meeting the daylight factor targets is greater than 80% which exceeds international environmental assessment standards such as BREEAM, which targets a figure of 80% and LEED, which targets a figure of 75% to award a credit under the daylighting criteria and demonstrates that the development has 'maximised the daylight' for the occupied spaces.

To achieve the above targets, the design process considered a number of different iterations in relation to daylight/ sunlight within the proposed development scheme. Preliminary analysis, carried out in line with "*Site Layout Planning for Daylight and Sunlight*" ⁽ⁱ⁾ by "Paul Littlefair", informed the design team of a baseline performance in relation to the daylight received within the apartments comprising the scheme. Early discussions with the design team concluded that with some minor changes, the amount of natural light penetration into the scheme could be maximized. Following on from these discussions, the following changes were investigated;

- Separation distances
- Overall height
- Scale
- Massing
- Window size
- Window angle
- Floor to ceiling heights
- Balcony layouts

An example of the early stage testing carried out included testing the optimum window angle/ balcony layout for maximum daylight penetration. Please see plan and 3D model below which highlight the two window angles/ balcony layouts tested;

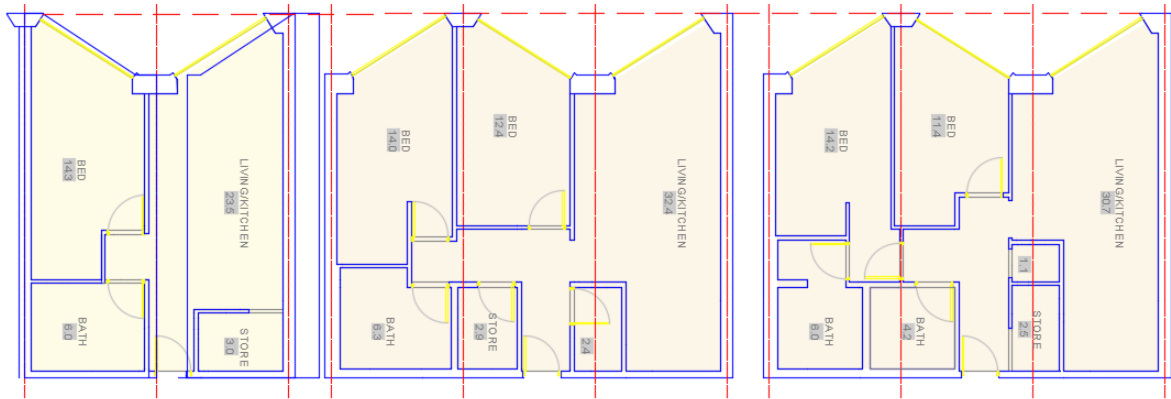


Figure 12 - Plans of Living Rooms and Bedrooms

*Note – Red dotted line indicates horizontal window position/ balcony layout used for testing.

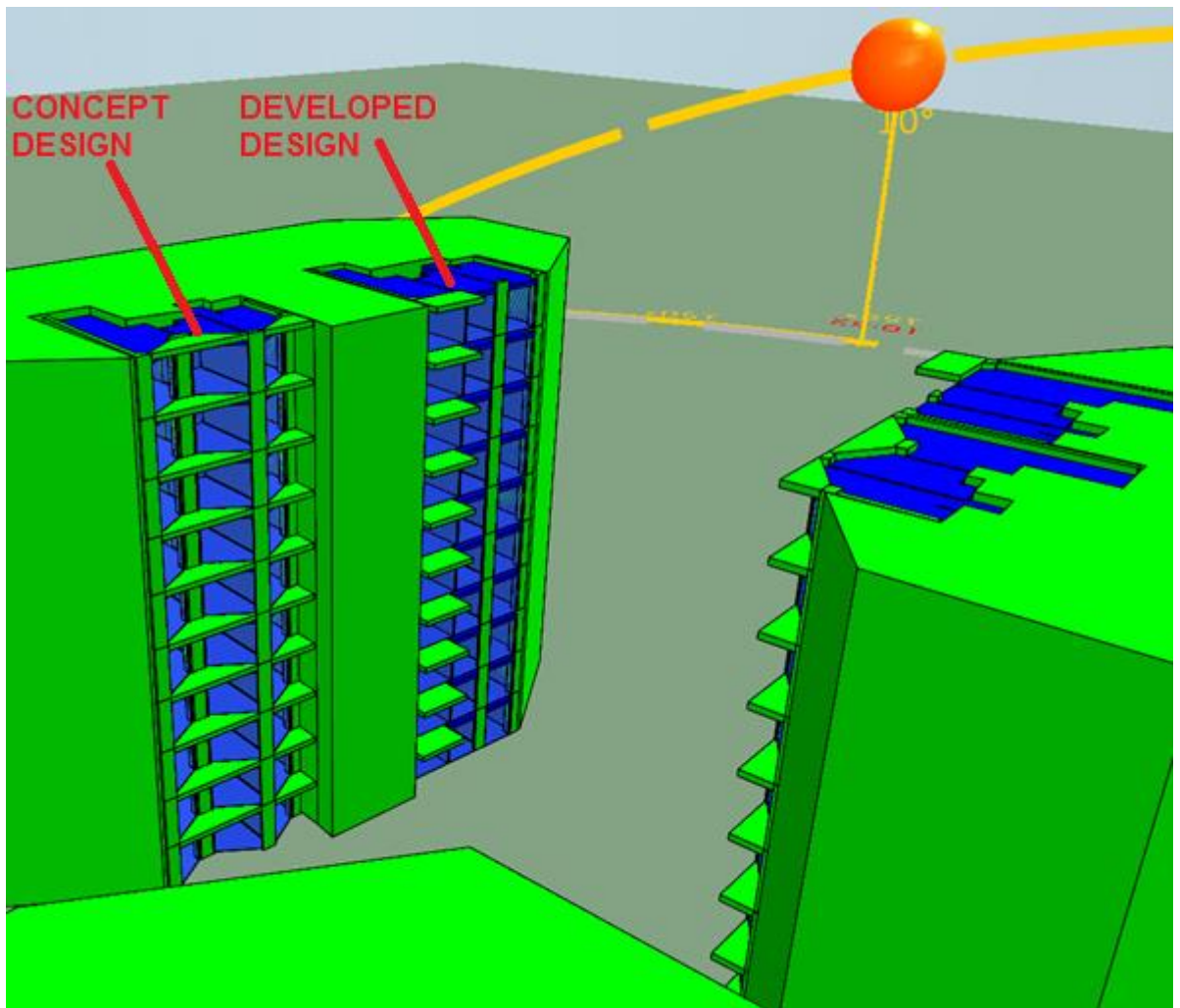


Figure 13 - 3D Model of Tested Rooms

The early stage testing concluded that the “developed design” maintained good Average Daylight Factors while optimizing the largest balcony area for living spaces.

Furthermore, in large scale developments it is common to see ground floor apartments receive lower amounts of daylight when compared to the upper levels. In order to combat this design constraint,

the lower level apartments have included for the maximum amount of glazing that is feasible to ensure that the development still receives good levels of light penetration. It is also important to note that while the lower level units have less access to daylight generally, this is compensated for in having direct access to terraces and the communal gardens. The impacts of balconies can further be seen on the second and third floors of Block A where a number of rooms are below the criteria. A design trade off has been applied here to allow users access to the outside via a balcony while still allowing some level of daylight penetration.

Please see Average Daylight Factor results below;

Block A		
Floor	Criteria	
	Above	Below
0	38	40
1	84	14
2	78	34
3	83	28
4	83	9
5	75	9
6	40	5
Total	481	139

Block B		
Floor	Criteria	
	Above	Below
0	17	25
1	37	19
2	49	18
3	55	12
4	52	4
5	53	3
6	48	2
Total	311	83

Block C		
Floor	Criteria	
	Above	Below
1	23	5
2	32	8
3	32	8
4	39	1
5	35	2
6	18	1
Total	179	25

Block D		
Floor	Criteria	
	Above	Below
1	19	3
2	19	3
3	21	1
4	16	0
5	16	0
Total	91	7

Table 1 - Average Daylight Factor (ADF) Results for Blocks A - D

Block A, B, C and D		
Floor	Criteria	
	Above	Below
0	55	65
1	163	41
2	178	63
3	191	49
4	190	14
5	179	14
6	106	8
Total	1062	254

Table 2 - Average Daylight Factor (ADF) Results for All Blocks Combined

(C) Garden and Open Spaces Results

While providing good levels of daylight and sunlight in living spaces is important, it is also essential to apply the same mentality to outside spaces and amenity areas. An adequately lit garden or open space creates a rich ambience that any occupant would find appealing. A well-lit garden/open space will add value to a property, so it is essential that careful consideration is taken when assessing these spaces.

The basis of this calculation is to assess if 50% of the open space will achieve more than two hours' worth of sunlight during the equinox (21st March).

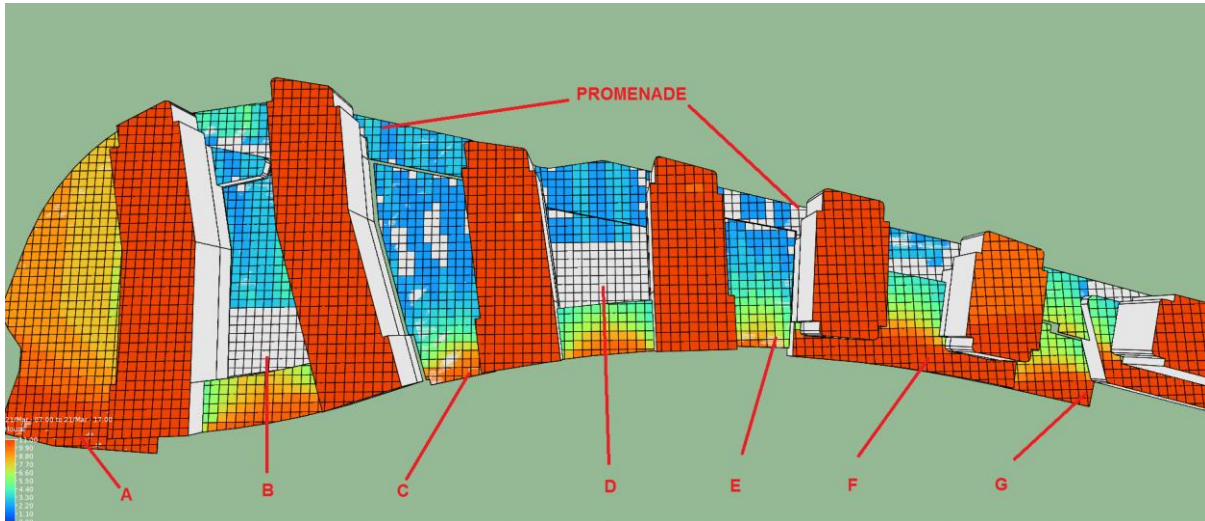


Figure 14 - Results for the 21st of March

General Information		Criteria			
Amenity Area	BRE Garden & Open Spaces Target [%]	Total Amenity Area [m2]	Total Amenity Area Receiving More Than 2 Hours [m2]	Percentage of Amenity Area Receiving 2 Hours [%]	Status
A	50	3736	3736	100.00	Meets Criteria
B	50	1541	991	64.31	Meets Criteria
C	50	1753	1459	83.23	Meets Criteria
D	50	1241	668.75	53.89	Meets Criteria
E	50	812	762	93.84	Meets Criteria
F	50	1032	1032	100.00	Meets Criteria
G	50	524	524	100.00	Meets Criteria
Promenade	50	3567	2206	61.84	Meets Criteria

Table 3 - Garden and Open Spaces Results for the 21st of March

(D) Light from the Sky

Surrounding houses have been tested in line with “*Site Layout Planning for Daylight and Sunlight*” and the analysis concluded that the houses to the east of the proposed development (A) will not be impacted by it. Houses towards the southerly end of the site (B) have also been analysed. No shadows will fall onto the southern side of the Howth Road, so as the residential amenity of these houses (B) are not affected by shadowing.



Figure 15 - Site Layout of Assessed Surrounding Houses

As an example, the window highlighted below, situated at “Site A” achieves a VSC result of 28.58% which is in excess of the requirements as stipulated in “*Site Layout Planning for Daylight and Sunlight*”.



Figure 16 - Site A Example Window

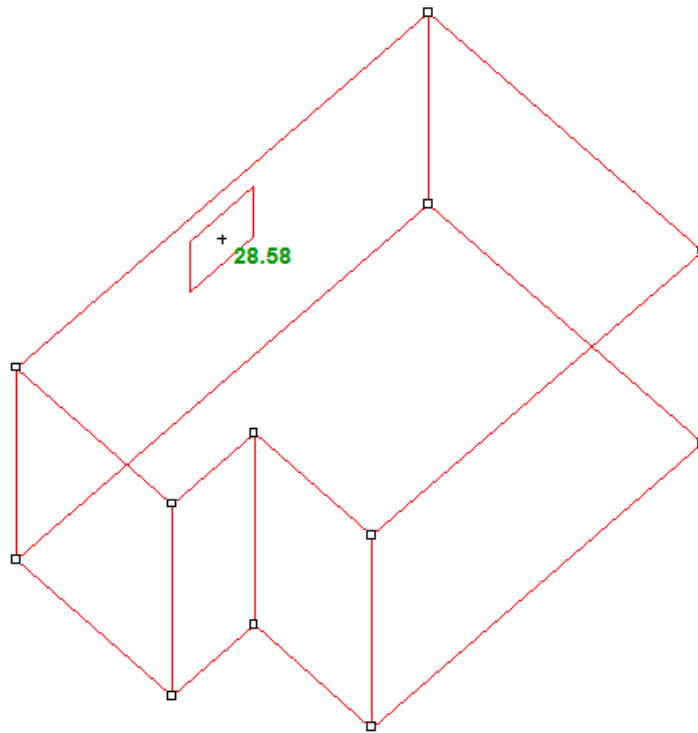


Figure 17 - Site A Example Window VSC Result

Conclusion

In general, the design meets with the principles of the BRE guide - *“Site Layout Planning for Daylight and Sunlight”* ⁽ⁱ⁾ and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development. Good levels of sunlight will also be available in the development’s amenity areas. In addition, the development will have little impact on the surrounding beaches or surrounding houses in terms of overshadowing.