

Report for: Longview Estates Ltd
Project No: 14566

Ballyvolane Cork

Daylight, Sunlight and Overshadowing Study



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Document created by:

Integrated Environmental Solutions Limited

International Sustainability Consulting Developers of the IES <Virtual Environment>

Issued For:	Prepared by:	Checked by:	
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Version:	Date:	Revision Details:	Approved by:
1	06/11/2019	Issue for Comment	John Gleeson
1	14/11/2019	Issue for Comment	John Gleeson
1	21/11/2019	Issue for Comment	John Gleeson
1	25/11/2019	Issue for Comment	John Gleeson

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Executive Summary

This report details the analysis undertaken to quantify the Sunlight / Daylight impact of the proposed development at Ballyvolane, a suburban location on the outskirts of Cork. The report focuses on measuring the daylight impact of the proposed development and concentrates on three particular neighbourhoods within the scheme. Neighbourhoods one, two and six. The following can be concluded based on the preliminary studies undertaken:

Shadow Analysis

The Shadow analysis shows different shadows being cast from proposed scheme at particular periods throughout the year.

There is no overshadowing noted in March and June to existing dwellings. The overshadowing noted in December from neighbourhood two is isolated to a few properties. As mentioned in section (5), overshadowing is less noticeable in the winter months and would have a minor impact to the existing dwellings.

Taking this into account and results from further analysis documented in this report, the development as a whole will have a negligible adverse impact on the adjacent properties exceeding the BRE guidelines.

Sunlight to Proposed Amenity Spaces

As mentioned above under Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight states that for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

On the 21st of March, almost 100% of the amenity area provision for the apartments within neighbourhood six would receive at least 2 hours of sunlight exceeding the BRE recommendations.

When considering the housing amenity provisions, 91% of the properties within neighbourhoods one and two are exceeding the BRE recommendations and would receive above the recommended levels of sunlight when compared to the minimum area provision.

The remaining 9% that were below the recommendations were retested in the month of June and results showed that these spaces would receive a high amount of sunlight during the summer periods when people use private amenity areas most.

Average Daylight Factors

Based on the results of the rooms tested on First and Fourth floors for the apartments in neighbourhood six and the six houses tested in neighbourhoods one and two, 97% of the spaces tested in the proposed scheme have an Average Daylight Factors (ADF) above the recommended values in line with the BRE guidelines.

Worst-case locations were chosen and as such, this number across the scheme would be expected to increase further if all of the upper rooms were included in the results.

Discussion

It should be noted the guidance in 'Site layout planning for daylight and sunlight: a guide to good practice' is not mandatory and the Report itself states 'although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design.

Whilst the results shown relate to the criteria as laid out in the BRE guidance targets it is important to note that the BRE targets have been drafted primarily for use in low density suburban development and should therefore be used with flexibility and caution when dealing with higher density developments. The site performs very well in relation to the metrics considered in this report.

Overall the results demonstrate that the proposed development performance exceeds BRE recommendations in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice' by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209.

2 Introduction

This report details the analysis undertaken to quantify the Sunlight / Daylight impact of the proposed development at Ballyvolane, a suburban location on the outskirts of Cork. The report focuses on measuring the daylight impact to surrounding dwellings when compared to the existing situation. It also considers the impact to daylight and sunlight when considering the proposed design itself.

The focus of the study considers the following items with respect to the proposed new development:

- **Shadow Analysis** - a visual representation analysing any potential changes that may arise from the proposed development to neighbouring properties within the development.
- **Sunlight Proposed Amenity Spaces** – via an annual sunlight hour's analysis.
- **Average Daylight Factors** – via average daylight factor calculations carried out for floor plans across the site of the proposed development.

The analysis was completed using IES VE software and the assessment based on recommendations given in BRE – Site Layout Planning for Daylight and Sunlight guide.

3 Methodology

3.1 Orientation

The model orientation taken from drawings provided by the Architect with the resulting angle shown below.



3.2 Model Geometry

3.2.1 Proposed Site Model

The following images show the models created from the architectural information provided and the use of google/bing maps where information was absent.



North



South



East



West

4 BRE – Site Layout Planning for Daylight and Sunlight (2nd edition)

Access to daylight and sunlight is a vital part of a healthy environment. Sensitive design should provide sufficient daylight and sunlight to new housing while not obstructing light to existing homes nearby.

The BRE Report, “Site layout planning for daylight and sunlight: a guide to good practice (BR209)”, advises on planning developments for good access to daylight and sunlight, and is widely used by local authorities to help determine the impacts of new developments.

Impact Classification Discussion

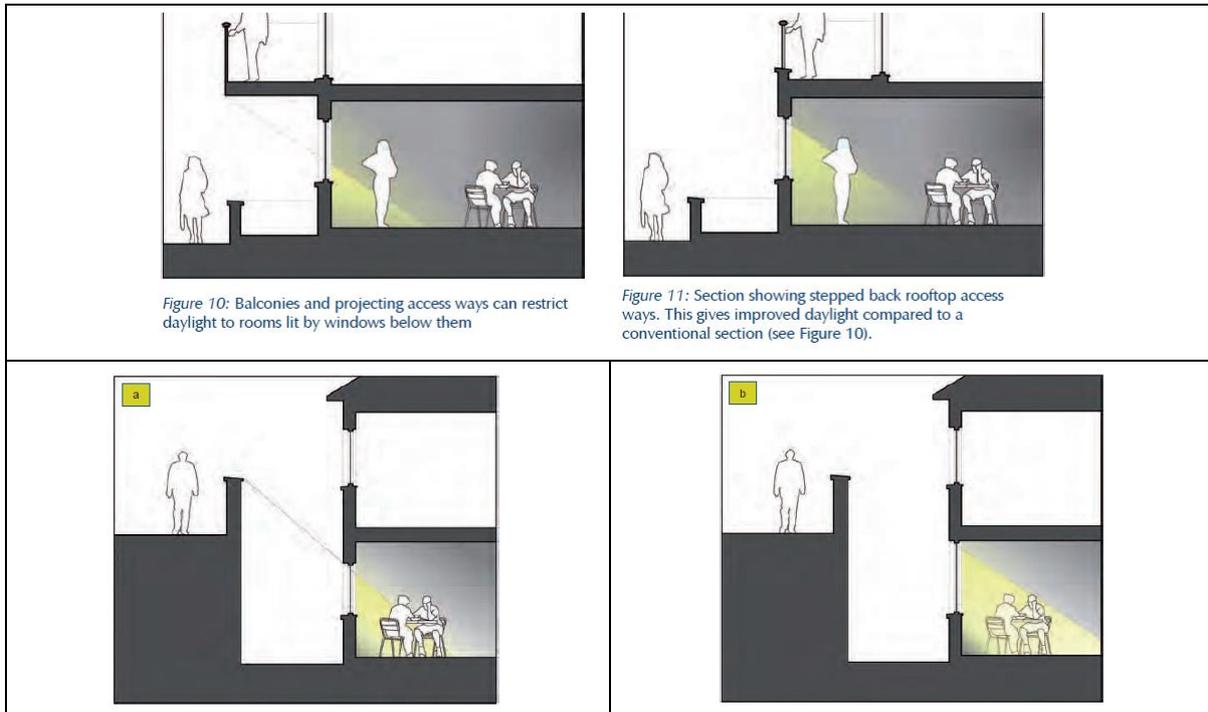
BRE guidance in Appendix I – Environmental Impact Assessment suggests impact classifications as minor, moderate and major adverse. It provides further classifications of these impacts with respect to criteria as follows;

Where the loss of skylight or sunlight fully meets the guidelines in the BRE guide, the impact is assessed as negligible or minor adverse. Where the loss of skylight or sunlight does not meet the BRE guidelines, the impact is assessed as minor, moderate or major adverse.

<i>Negligible adverse impact</i>	<ul style="list-style-type: none"> • <i>Loss of light well within guidelines, or</i> • <i>only a small number of windows losing light (within the guidelines) or</i> • <i>limited area of open space losing light (within the guidelines)</i>
<i>Minor adverse impact (a)</i>	<ul style="list-style-type: none"> • <i>Loss of light only just within guidelines and</i> <ul style="list-style-type: none"> ○ <i>a larger number of windows are affected or</i> ○ <i>larger area of open space is affected (within the guidelines)</i>
<i>Minor adverse impact (b)</i>	<ul style="list-style-type: none"> • <i>only a small number of windows or limited open space areas are affected</i> • <i>the loss of light is only marginally outside the guidelines</i> • <i>an affected room has other sources of skylight or sunlight</i> • <i>the affected building or open space only has a low level requirement for skylight or sunlight</i> • <i>there are particular reasons why an alternative, less stringent, guideline should be applied</i>
<i>Major adverse impact</i>	<ul style="list-style-type: none"> • <i>large number of windows or large open space areas are affected</i> • <i>the loss of light is substantially outside the guidelines</i> • <i>all the windows in a particular property are affected</i> • <i>the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight (living rooms / playground)</i>

Conventional Windows

The BRE Guide talks about Conventional window design based on the discussions around these it could be determined that this term refers to windows typical with a sill height of 800mm – 1000mm as shown in the images below.



5 Shadow Analysis

The statistics of Met Eireann, the Irish Meteorological Service, show the sunniest months in Ireland are May and June.

The following can also be shown:

- During December, Cork receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.6 hours sunlight each day (i.e. only 22% of potential sunlight hours).
- During June, Cork receives a mean daily duration of 5.8 hours of sunlight out of a potential 16.0 hours sunlight each day (i.e. only 36% of potential sunlight hours).

Therefore, the impact caused by overshadowing is generally most noticeable during the summer months and least noticeable during the winter months.

This section will consider the shadows cast for the Proposed development for the following dates:

- December 21st (Winter Solstice)
- March 21st / September 21st (Equinox)
- June 21st (Summer Solstice)

These images will show shadows cast for clear conditions with no clouds, assuming the sun is visible for every hour shown.

5.1 Neighbourhood 1 - Plan and 3D View

5.1.1 March 21st - 8:00 AM



5.1.2 March 21st - 10:00 AM



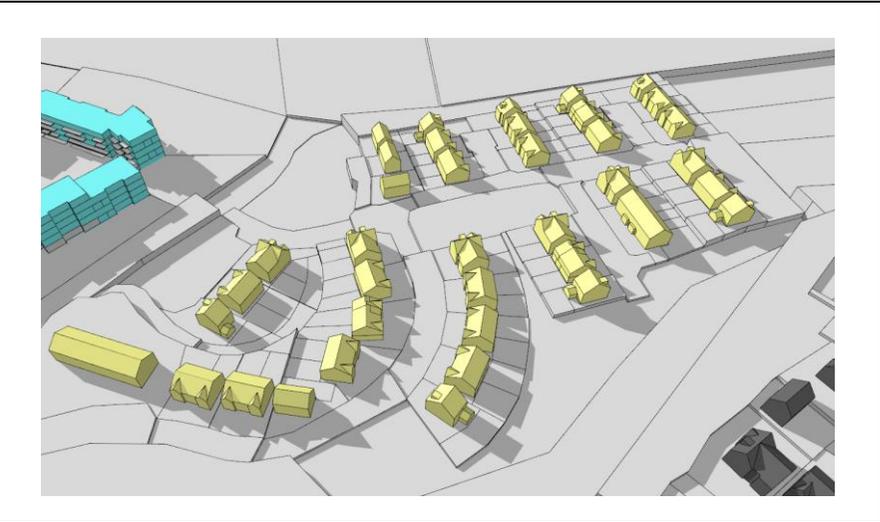
5.1.3 March 21st - 12:00 PM



5.1.4 March 21st - 14:00 PM



5.1.5 March 21st - 16:00 PM



5.1.6 June 21st - 8:00 AM



5.1.7 June 21st - 10:00 AM



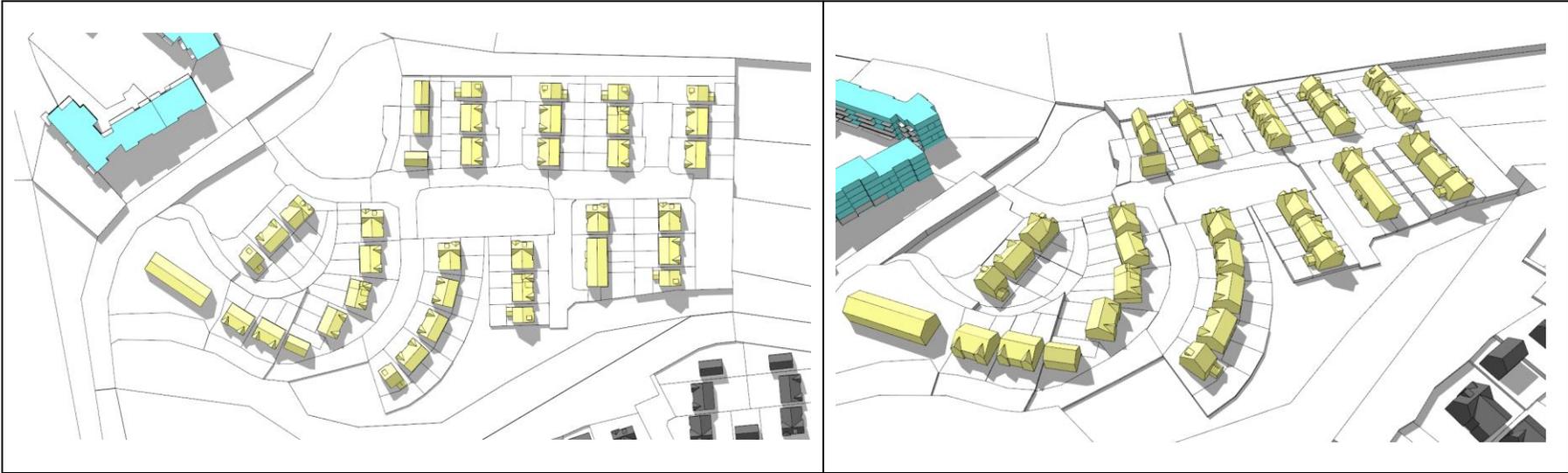
5.1.8 June 21st - 12:00 PM



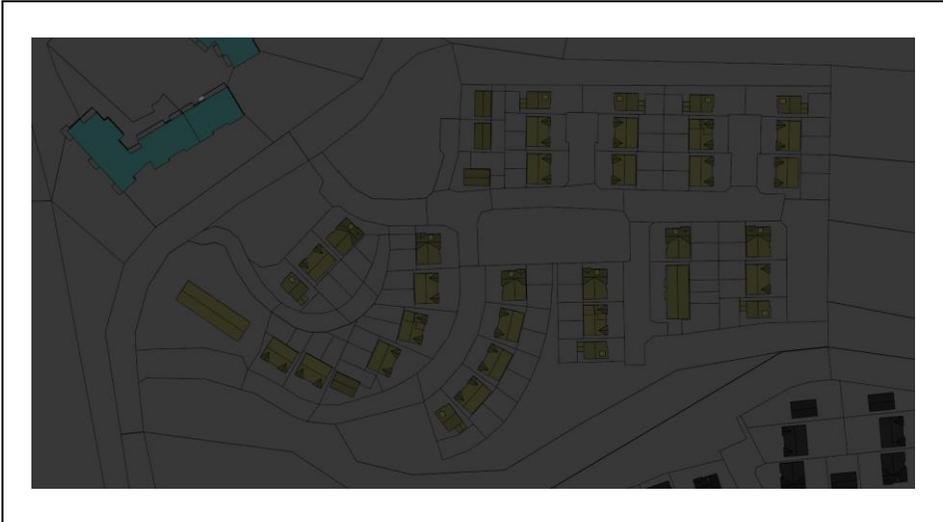
5.1.9 June 21st - 14:00 PM



5.1.10 June 21st - 16:00 PM



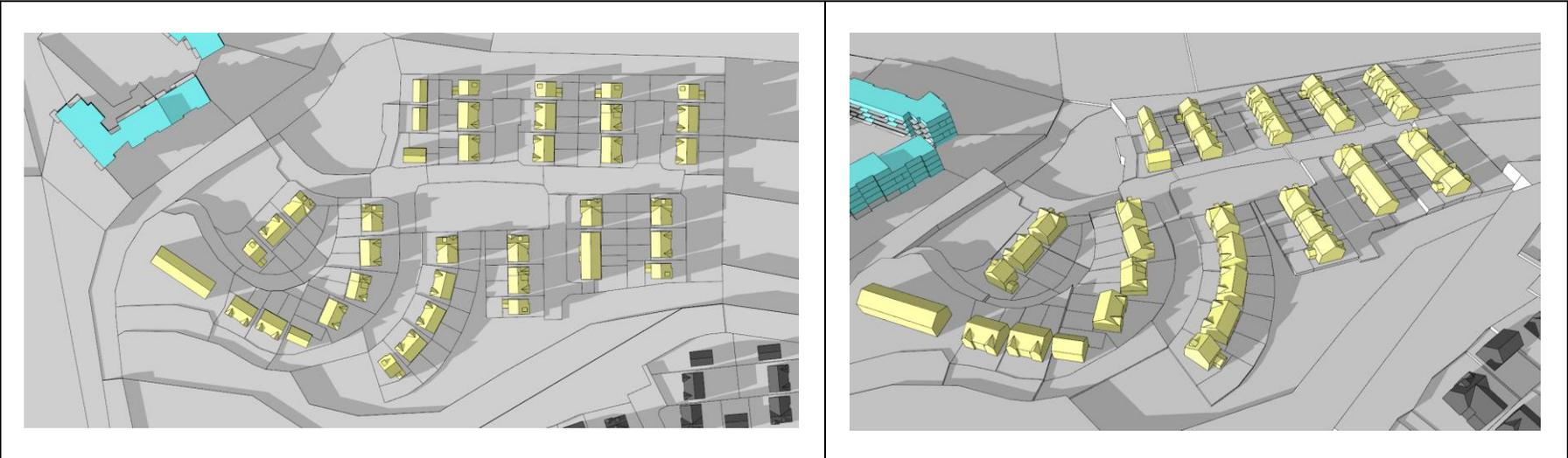
5.1.11 December 21st - 8:00 AM



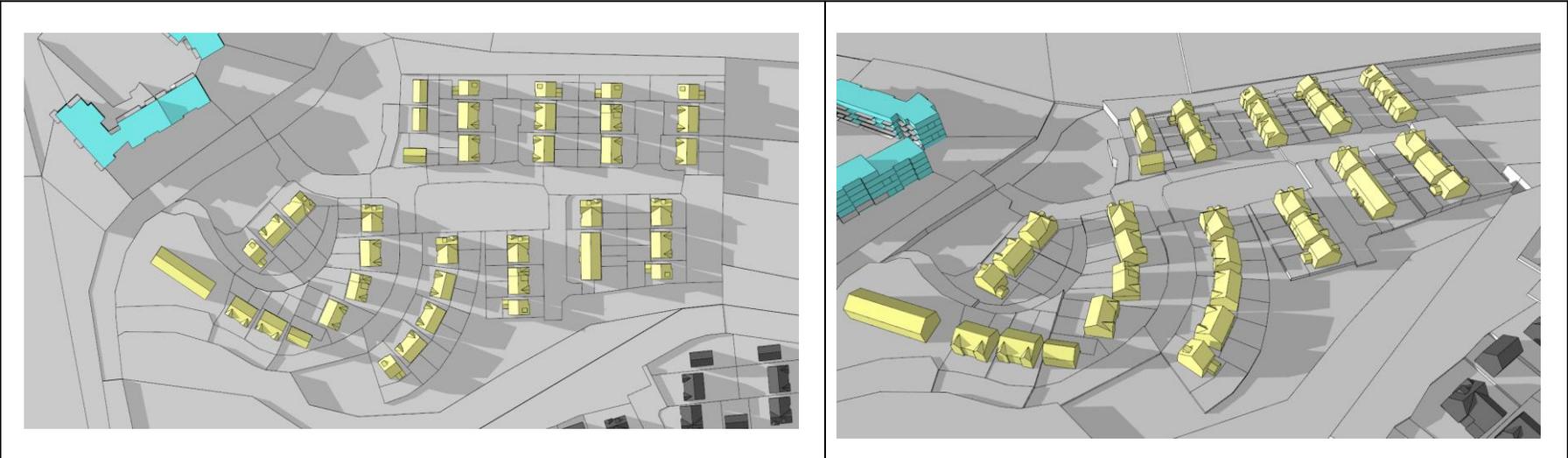
5.1.12 December 21st - 10:00 AM



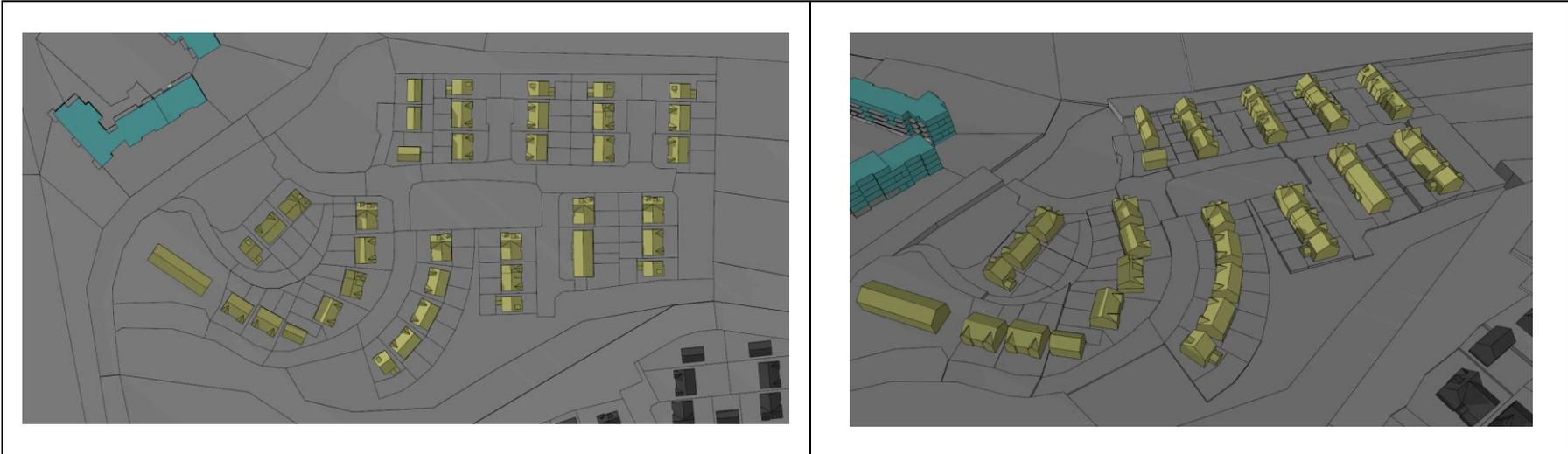
5.1.13 December 21st - 12:00 PM



5.1.14 December 21st - 14:00 PM

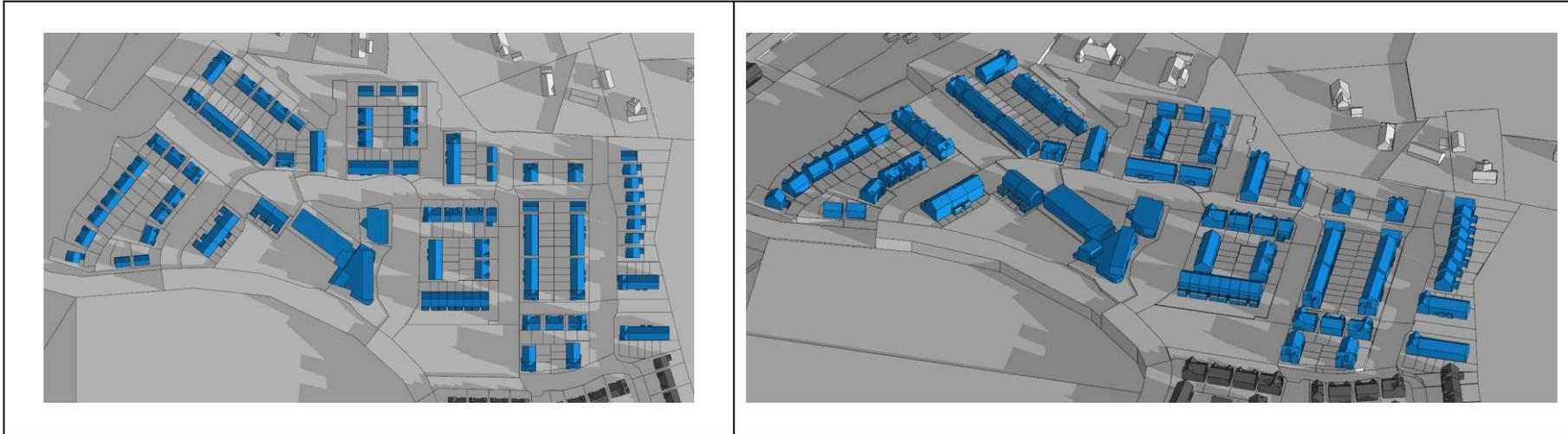


5.1.15 December 21st - 16:00 PM



5.2 Neighbourhood 2 - Plan and 3D View

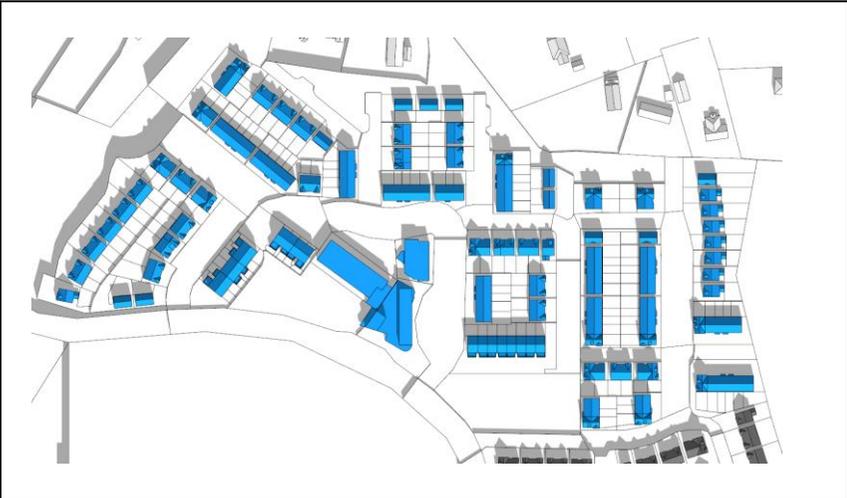
5.2.1 March 21st - 8:00 AM



5.2.2 March 21st - 10:00 AM



5.2.3 March 21st - 12:00 PM



5.2.4 March 21st - 14:00 PM



5.2.5 March 21st - 16:00 PM



5.2.6 June 21st - 8:00 AM



5.2.7 June 21st - 10:00 AM



5.2.8 June 21st - 12:00 PM



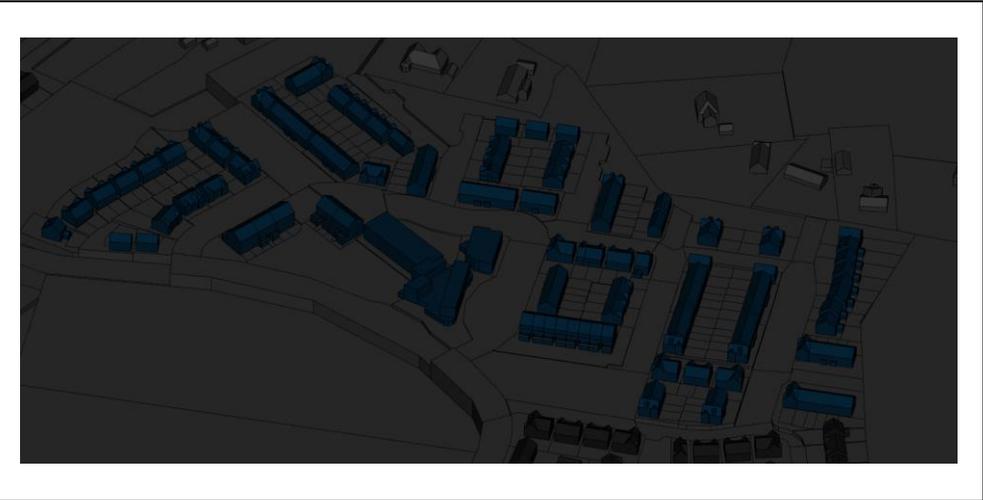
5.2.9 June 21st - 14:00 PM



5.2.10 June 21st - 16:00 PM



5.2.11 December 21st - 8:00 AM



5.2.12 December 21st - 10:00 AM



5.2.13 December 21st - 12:00 PM



5.2.14 December 21st - 14:00 PM

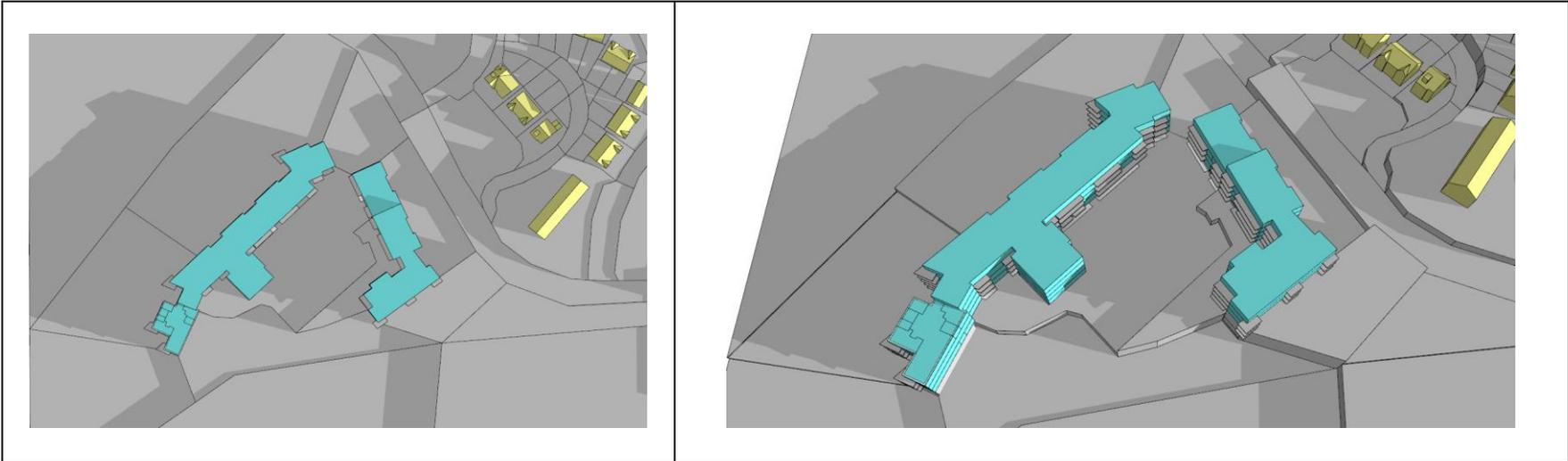


5.2.15 December 21st - 16:00 PM

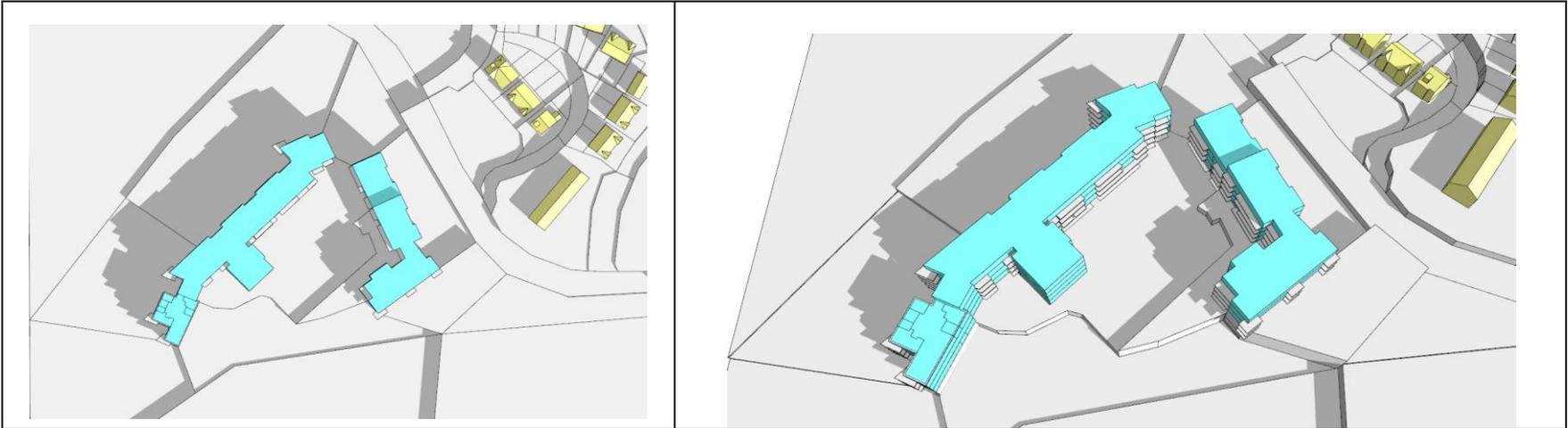


5.3 Neighbourhood 6 - Plan and 3D View

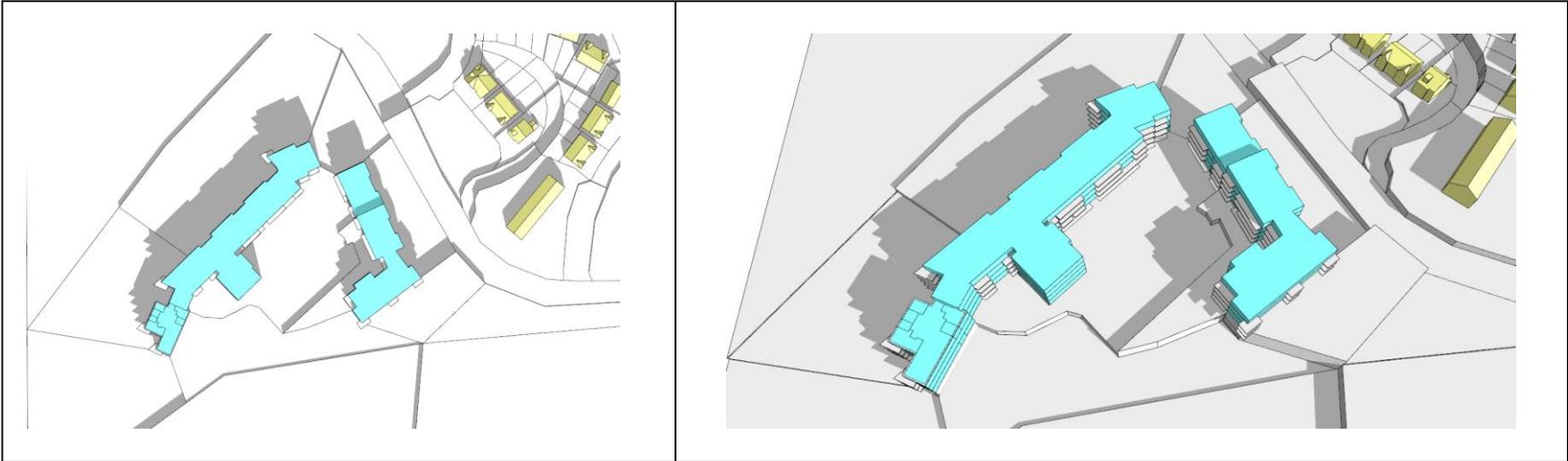
5.3.1 March 21st - 8:00 AM



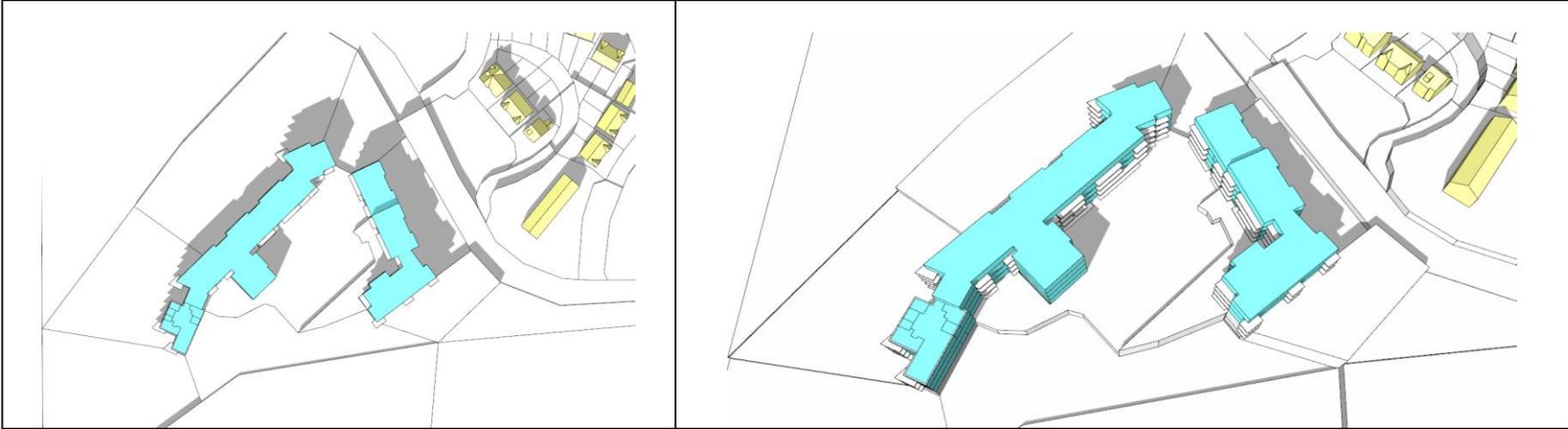
5.3.2 March 21st - 10:00 AM



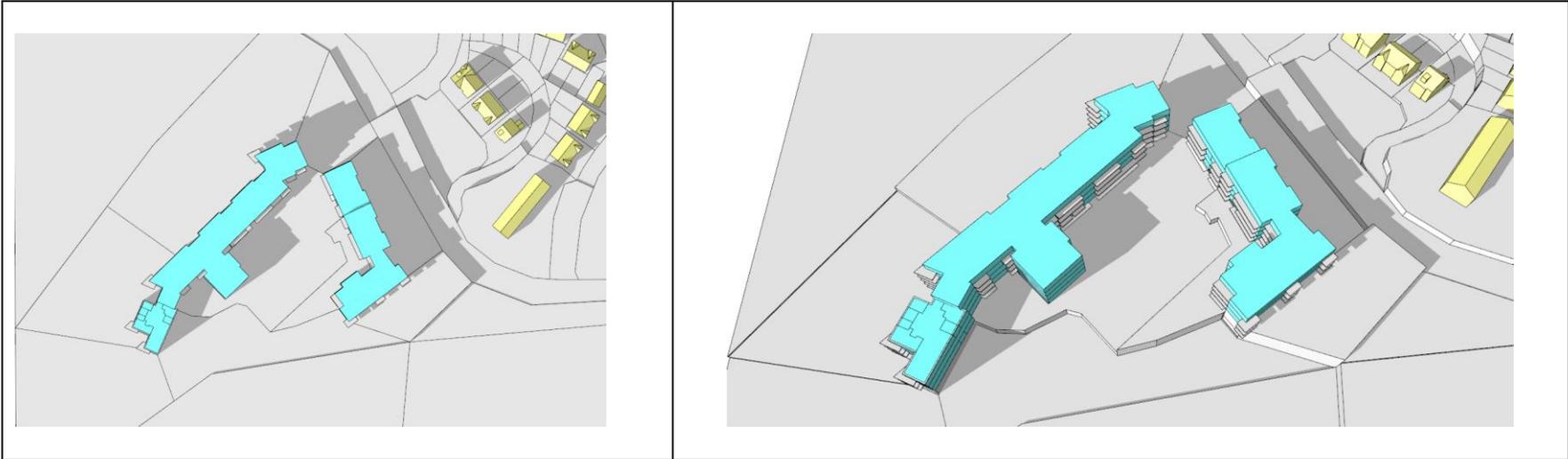
5.3.3 March 21st - 12:00 PM



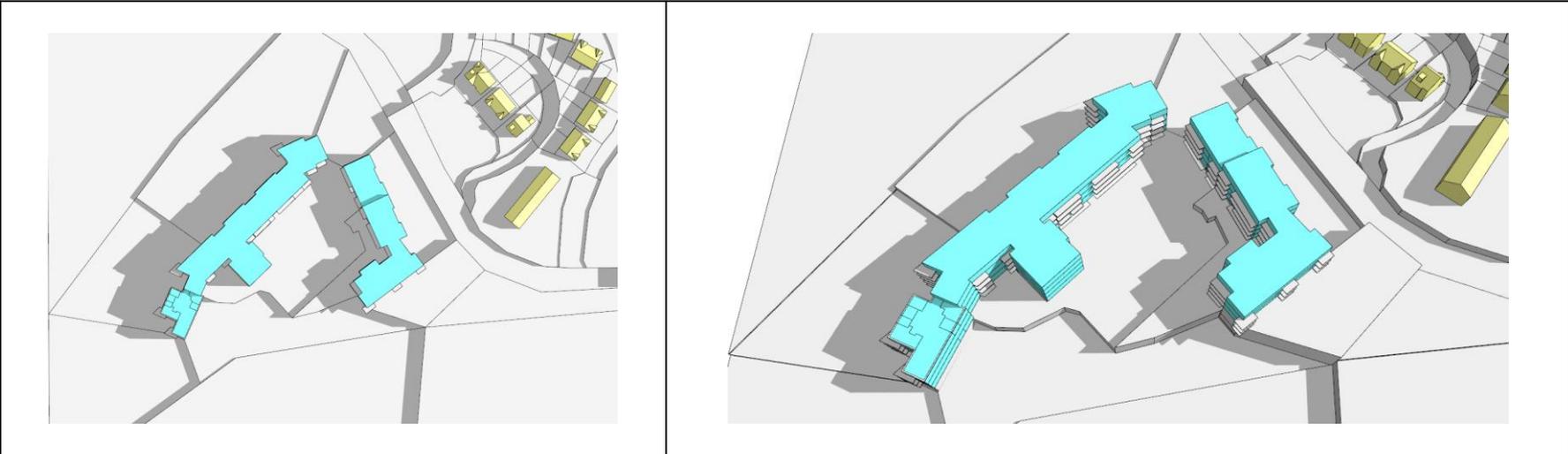
5.3.4 March 21st - 14:00 PM



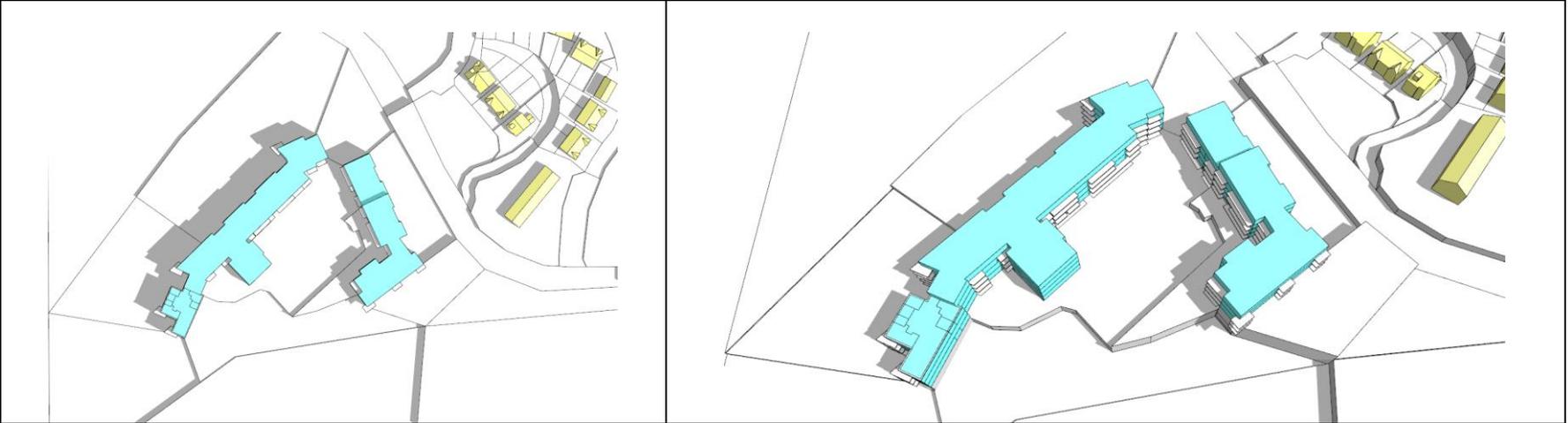
5.3.5 March 21st - 16:00 PM



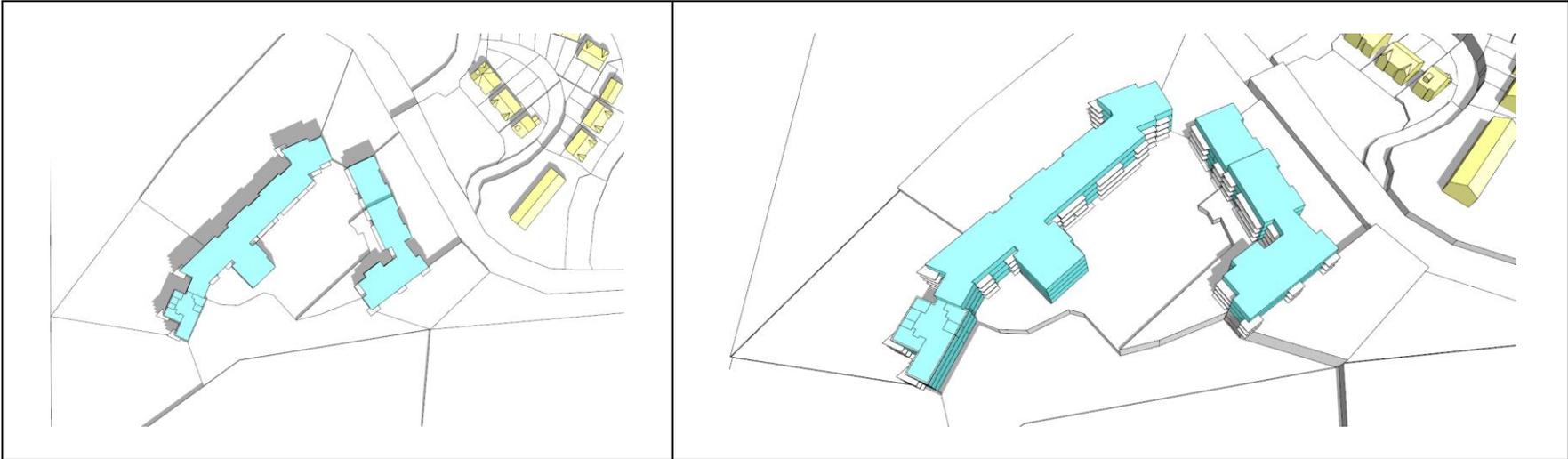
5.3.6 June 21st - 8:00 AM



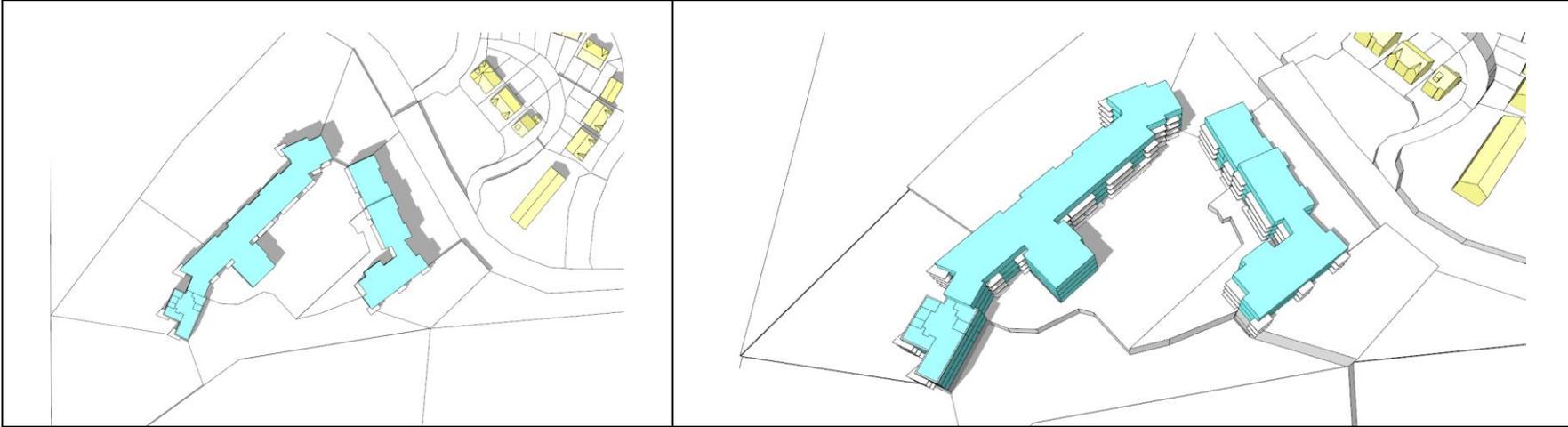
5.3.7 June 21st - 10:00 AM



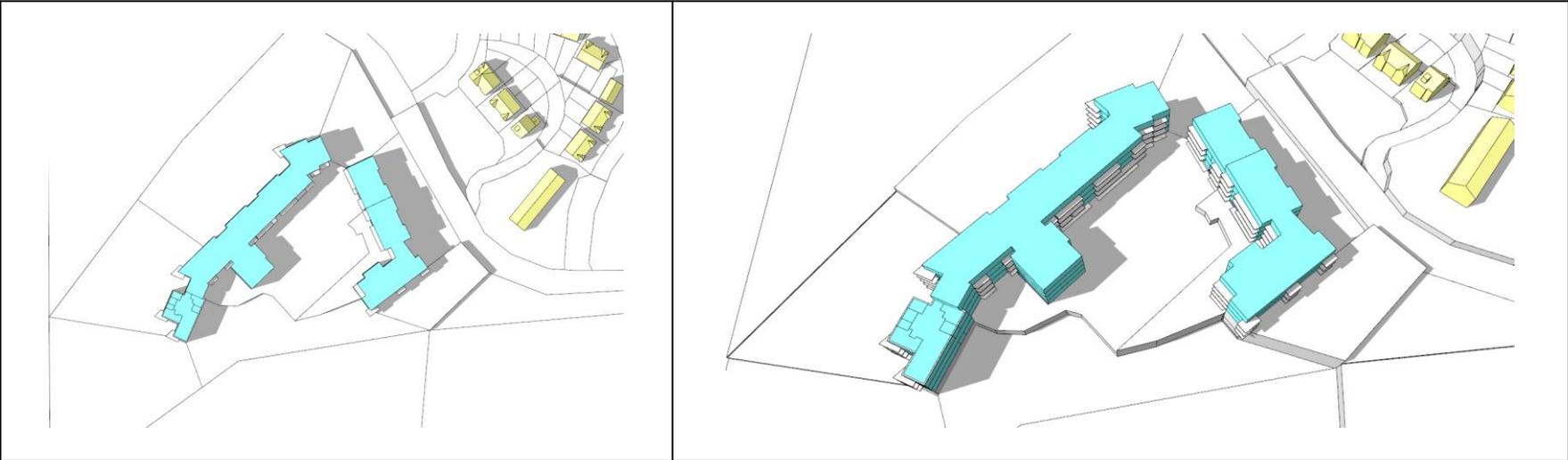
5.3.8 June 21st - 12:00 PM



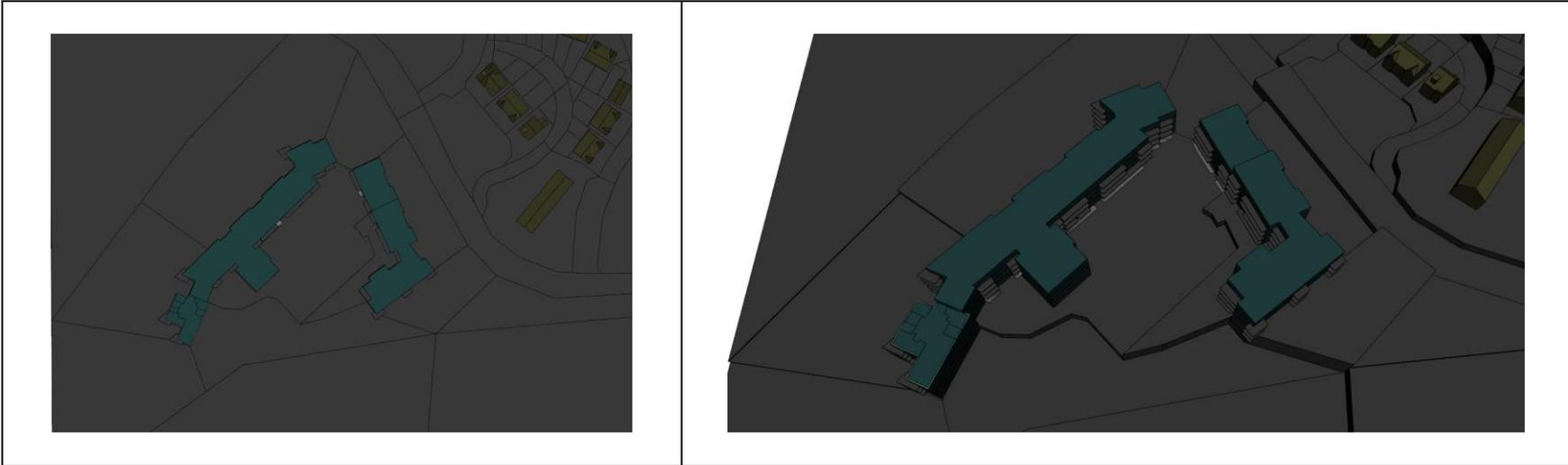
5.3.9 June 21st - 14:00 PM



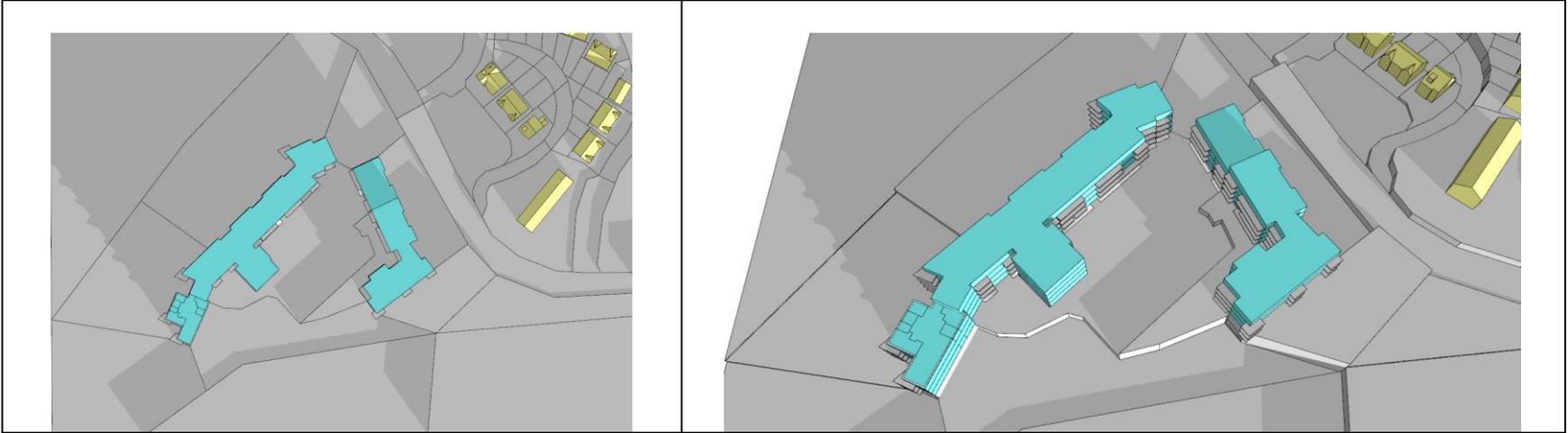
5.3.10 June 21st - 16:00 PM



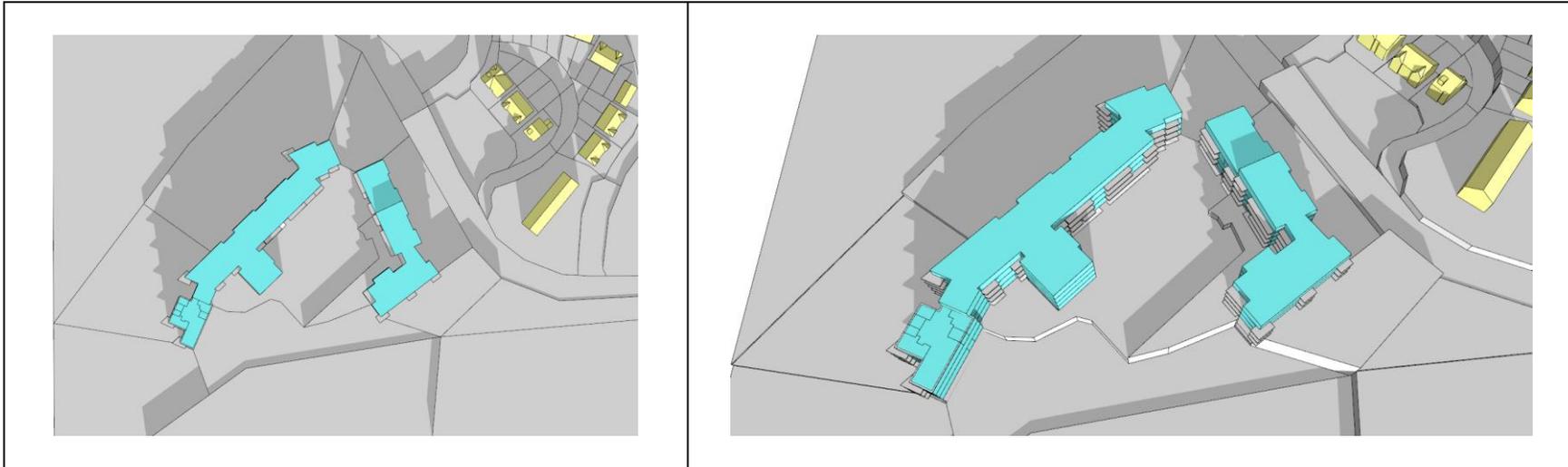
5.3.11 December 21st - 8:00 AM



5.3.12 December 21st - 10:00 AM



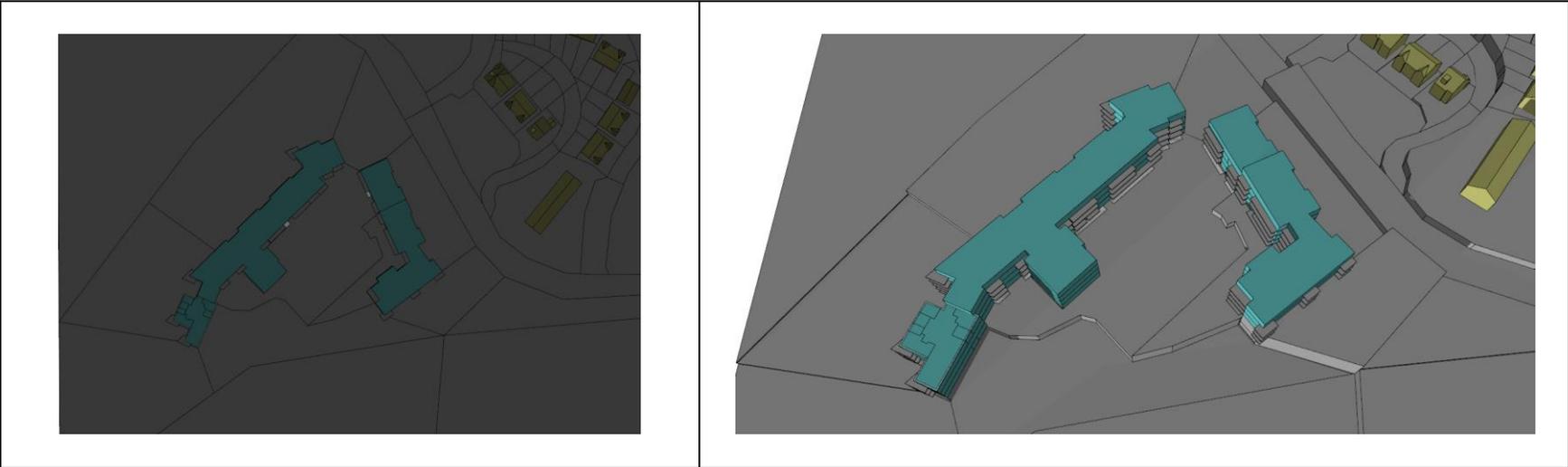
5.3.13 December 21st - 12:00 PM



5.3.14 December 21st - 14:00 PM



5.3.15 December 21st - 16:00 PM



5.4 Discussion

Shading from the proposed development is summarised as follows based on the analysis of the neighbourhoods in preceding images

Neighbourhood 1 & 6 – All Year

- No additional shading visible on the existing residential dwellings to the north as they are situated a large distance away from the proposed neighbourhood's one and six.

Neighbourhood 2 - March & June

- No additional shading visible from the proposed development on the existing residential dwellings to the North.

Neighbourhood 2 - December

Minor additional shading visible from the proposed development on a few of the existing residential dwellings. Minor additional shading is to be expected on the existing residential dwellings during winter periods due to the low sun angle, which in turn creates long shadows. In addition, as noted at the beginning of this section (5), overshadowing is more noticeable in the summer months when sunlight is more prevalent.

Taking this into account and results from further analysis documented in this report, the development as a whole will have a negligible adverse impact on the adjacent properties exceeding the BRE guidelines.

6 Sunlight to Existing and Proposed Amenity Spaces

6.1 Requirements

The impact of the development proposal on the sunlight availability in the amenity areas will be considered to determine how they perform when assessed against the BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight which states the following in Section 3.3.17.

Summary

3.3.17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March.

BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight states in 3.3.17 that for a space to, appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least 2 hours of sunlight on 21st March.

The Guidance states in 3.3.3 that;

3.3.3 The availability of sunlight should be checked for all open spaces where it will be required. This would normally include:

- gardens, usually the main back garden of a house
- parks and playing fields
- children's playgrounds
- outdoor swimming pools and paddling pools
- sitting out areas such as those between non-domestic buildings and in public squares
- focal points for views such as a group of monuments or fountains.

Section 3.3.7 states that: "It is recommended that at least half of the amenity areas listed (in Section 3.3.3) should receive at least two hours of sunlight on 21 March".

The proposal complies with this guidance.

6.2 Proposed Amenity Areas

For a space to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least 2 hours of sunlight on 21st March as noted in the BRE guidelines.

This analysis will be performed for the proposed amenity spaces as shown in the images below:

6.2.1 Neighbourhood 1



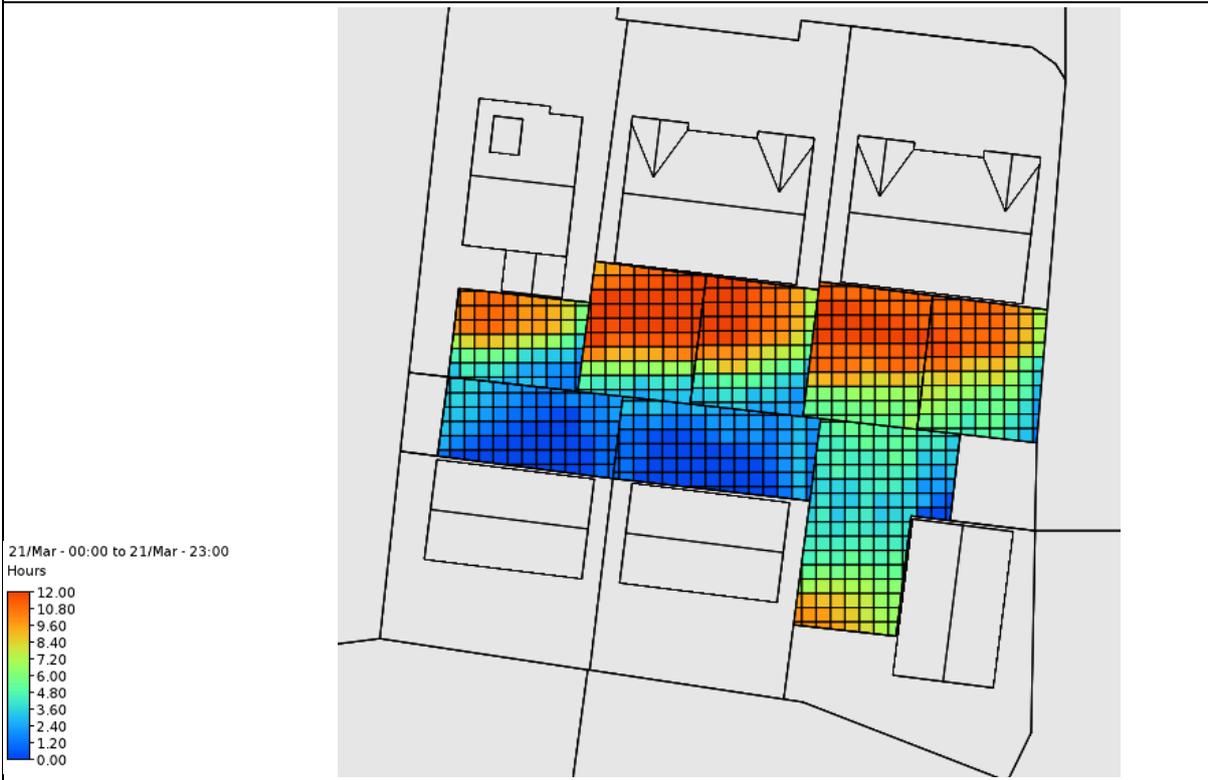
The following images shows the predicted results with respect to this space receiving the absolute hours of sunlight and at least 2 hours of sunlight on 21st March, across the gridded cells.

6.2.1.1 Houses Numbers from 1-8



House Name	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.1	114	120	60	95	100	✓
No.2	16.5	80	60	21	28	
No.3	12.7	68.3	60	19	21	
No.4	51.6	55.6	60	93	86	✓
No.5	70.1	70.8	60	99	100	✓
No.6	68.3	69.8	60	98	100	✓
No.7	74.3	74.3	60	100	100	✓
No.8	75.6	76.3	60	99	100	✓

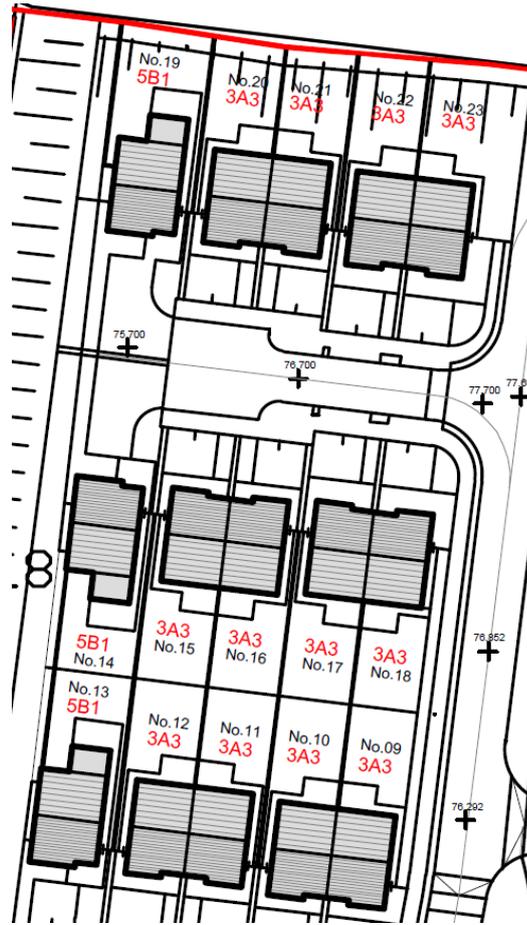
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

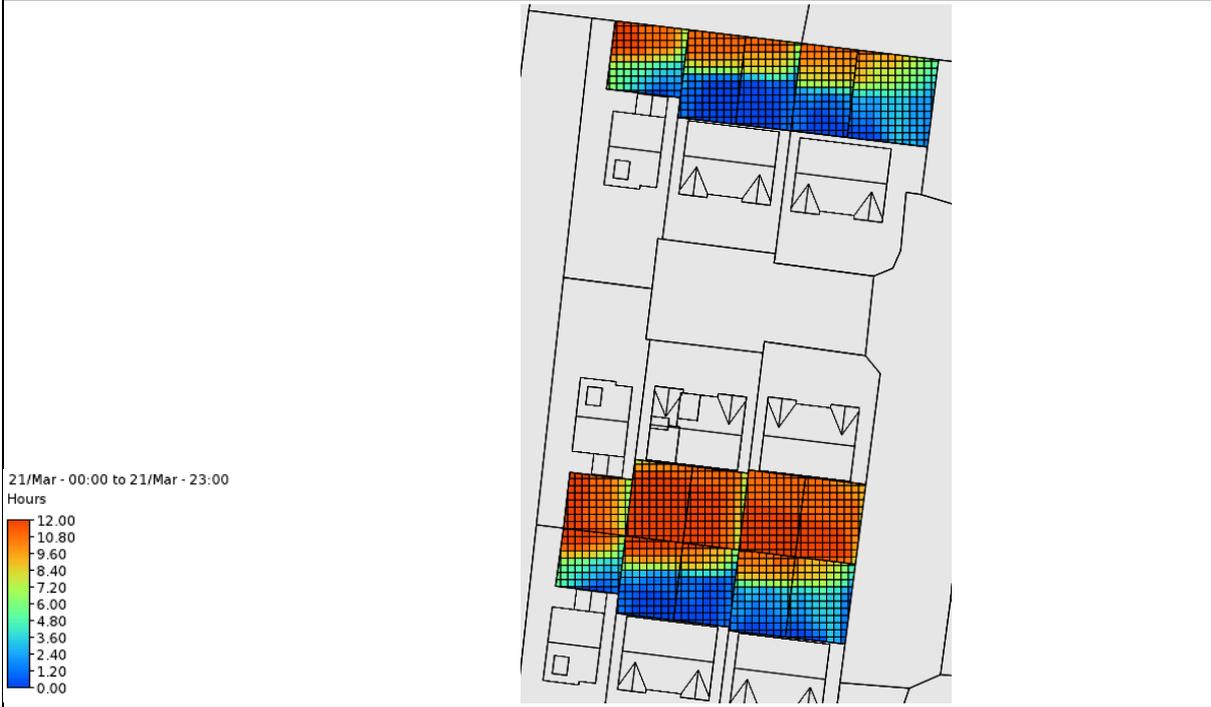


6.2.1.2 Houses Numbers from 9-23



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.09	71.2	95.4	60	75	100	✓
No.10	56.8	91.2	60	62	95	✓
No.11	33.5	87.1	60	38	56	✓
No.12	44.4	88.1	60	50	74	✓
No.13	62.8	72.8	60	86	100	✓
No.14	69.8	69.8	60	100	100	✓
No.15	87.8	87.8	60	100	100	✓
No.16	84.8	84.8	60	100	100	✓
No.17	90.1	90.1	60	100	100	✓
No.18	96.5	96.5	60	100	100	✓
No.19	90.7	100.1	60	91	100	✓
No.20	49.9	99.6	60	50	83	✓
No.21	45	97	60	46	75	✓
No.22	55.6	97.6	60	57	93	✓
No.23	113.9	140	60	81	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

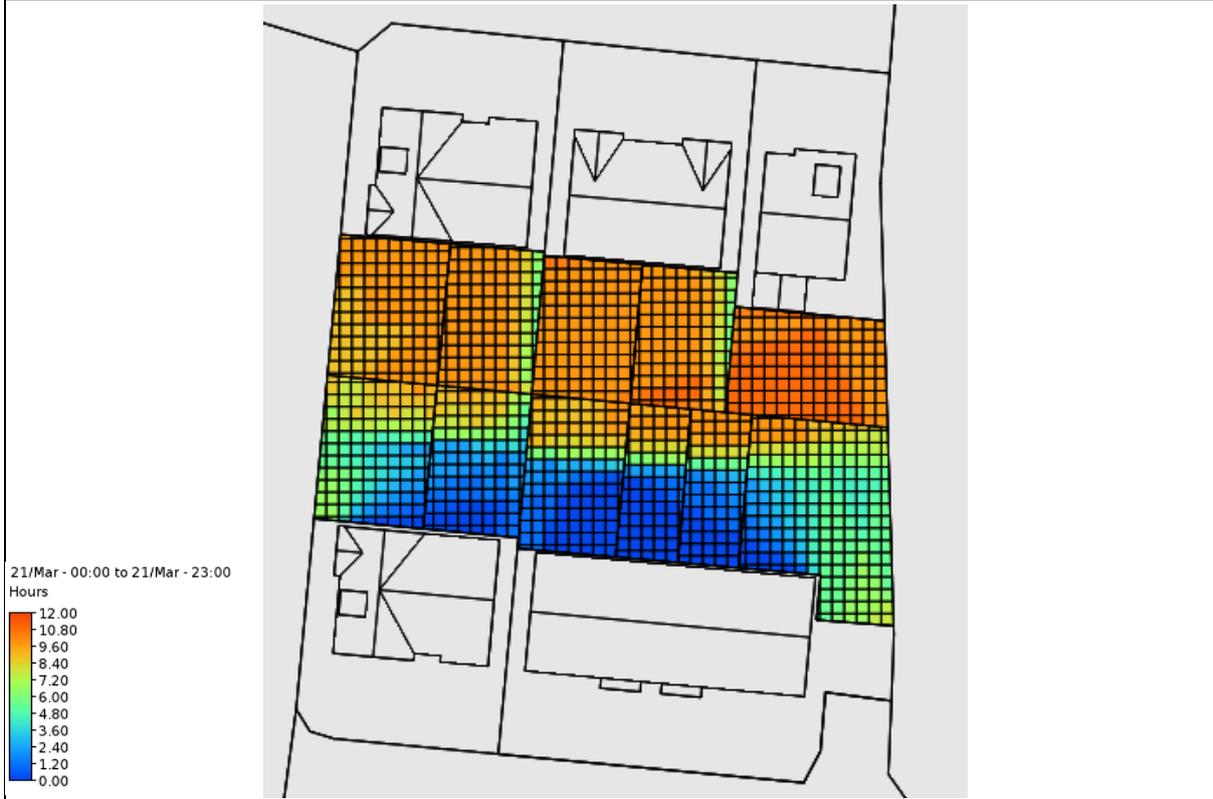


6.2.1.3 Houses Numbers from 24-34



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.24	106	106	60	100	100	✓
No.25	91.7	91.7	60	100	100	✓
No.26	93	93	60	100	100	✓
No.27	91.3	91.3	60	100	100	✓
No.28	112	112	60	100	100	✓
No.29	154.3	173.5	60	89	100	✓
No.30	28.7	63.9	48	45	61	✓
No.31	29.3	65.1	48	46	100	✓
No.32	48.1	103.5	60	46	80	✓
No.33	51.4	94.5	60	54	86	✓
No.34	93.7	108.7	60	86	100	✓

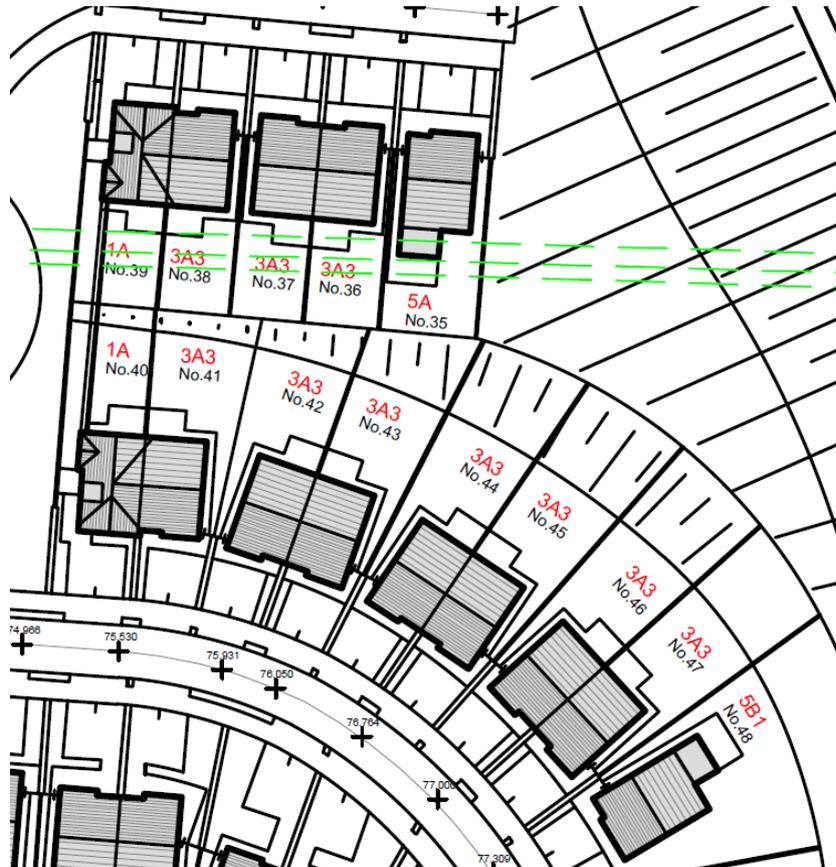
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

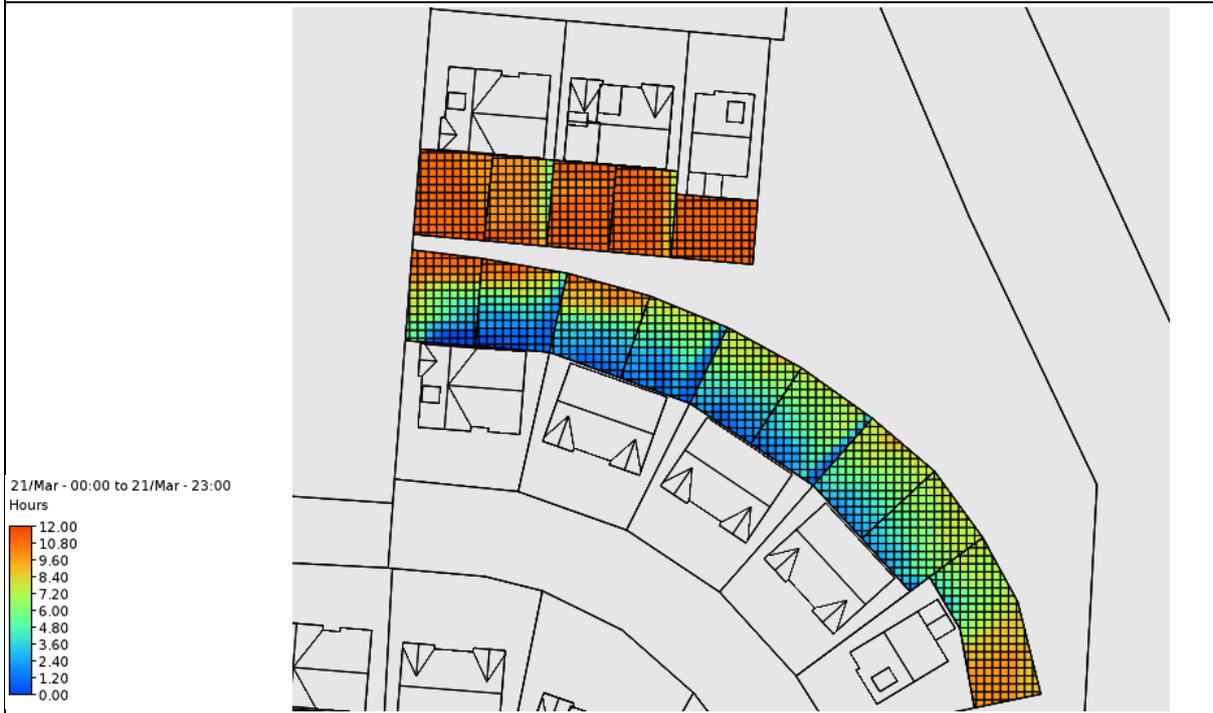


6.2.1.4 Houses Numbers from 35-48



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.35	84.5	84.5	60	100	100	✓
No.36	85.1	85.1	60	100	100	✓
No.37	86.7	86.7	60	100	100	✓
No.38	85.4	85.4	60	100	100	✓
No.39	100	100	60	100	100	✓
No.40	89.6	102	60	88	100	✓
No.41	70.8	108.7	60	65	100	✓
No.42	91.2	108.7	60	84	100	✓
No.43	79.4	107.5	60	74	100	✓
No.44	96.1	110	60	87	100	✓
No.45	103.4	115.3	60	90	100	✓
No.46	112.2	114.8	60	98	100	✓
No.47	113.6	116	60	98	100	✓
No.48	159.6	159.6	60	100	100	✓

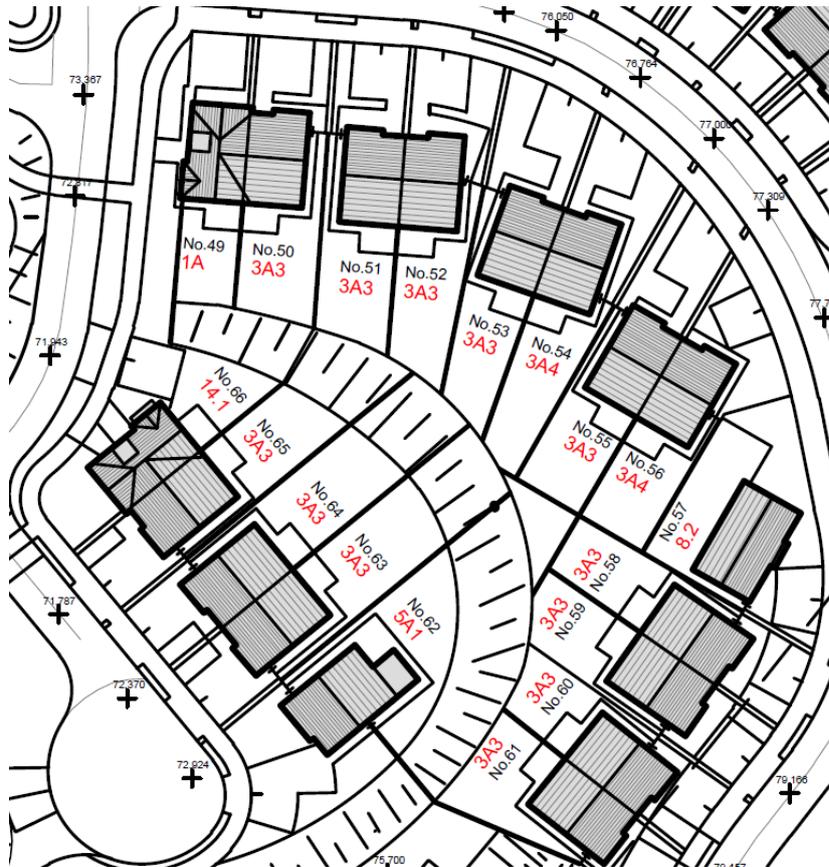
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

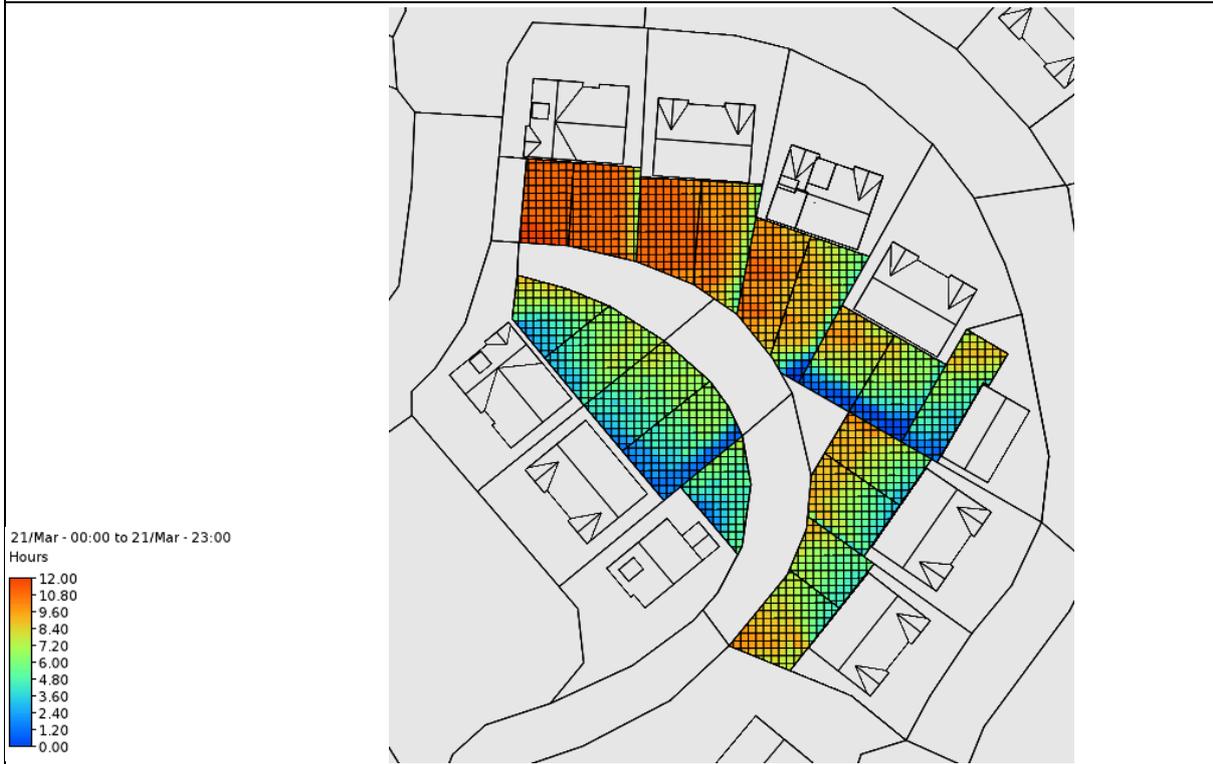


6.2.1.5 Houses Numbers from 49-66



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.49	73	73	60	100	100	✓
No.50	108.2	108.2	60	100	100	✓
No.51	101.4	101.4	60	100	100	✓
No.52	114.9	114.9	60	100	100	✓
No.53	103.5	103.5	60	100	100	✓
No.54	117	121.4	60	96	100	✓
No.55	78.9	93.9	60	84	100	✓
No.56	74.5	96	60	78	100	✓
No.57	90.6	100.4	60	90	100	✓
No.58	87.3	87.3	60	100	100	✓
No.59	93	93.5	60	99	100	✓
No.60	69.5	69.5	60	100	100	✓
No.61	99.2	99.2	60	100	100	✓
No.62	72.2	76.2	60	95	100	✓
No.63	90	123.5	60	73	100	✓
No.64	114	115.3	60	99	100	✓
No.65	103	103	60	100	100	✓
No.66	78.1	78.3	60	100	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



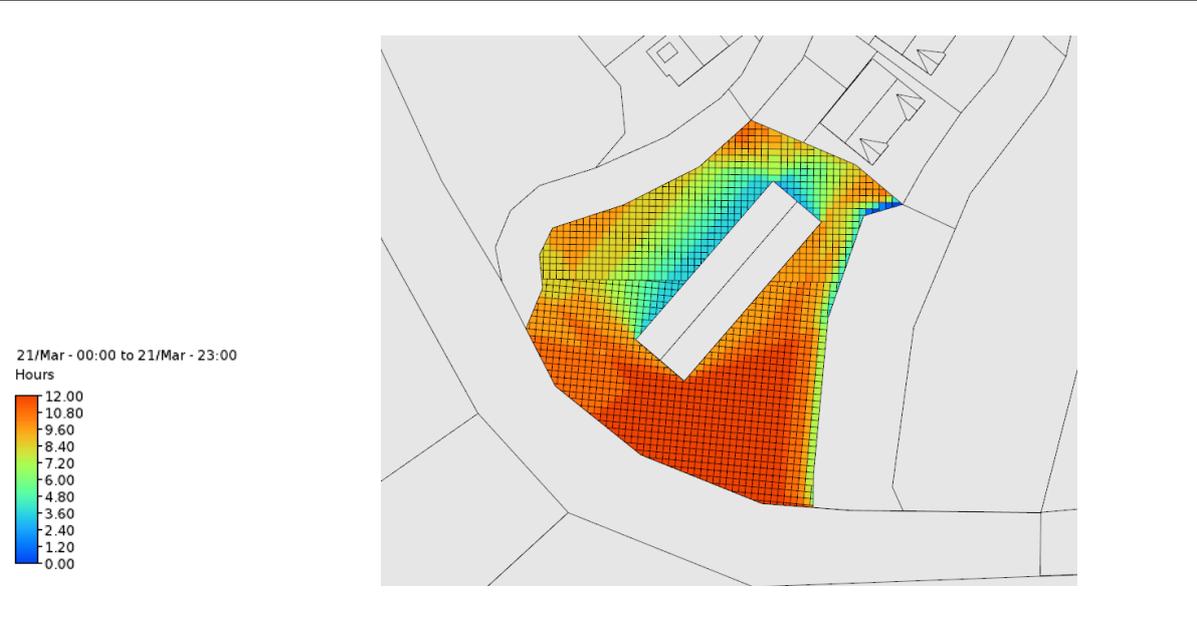
6.2.2 Neighbourhood 1 – Apartment Amenity



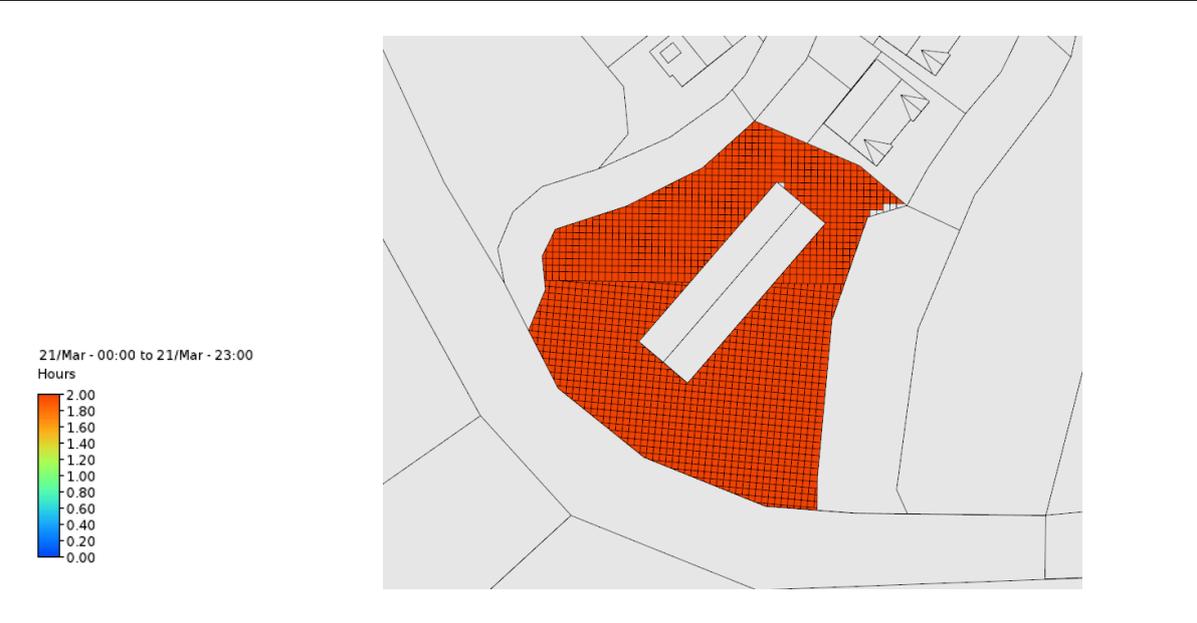
The following images shows the predicted results with respect to this space receiving the absolute hours of sunlight and at least 2 hours of sunlight on 21st March, across the gridded cells.

	Area > 2 Hrs	Total Area Provided	% of Total Area	Comment
Amenity Areas	2005	2011	99%	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



6.2.3 Neighbourhood 2



The following images shows the predicted results with respect to this space receiving the absolute hours of sunlight and at least 2 hours of sunlight on 21st March, across the gridded cells.

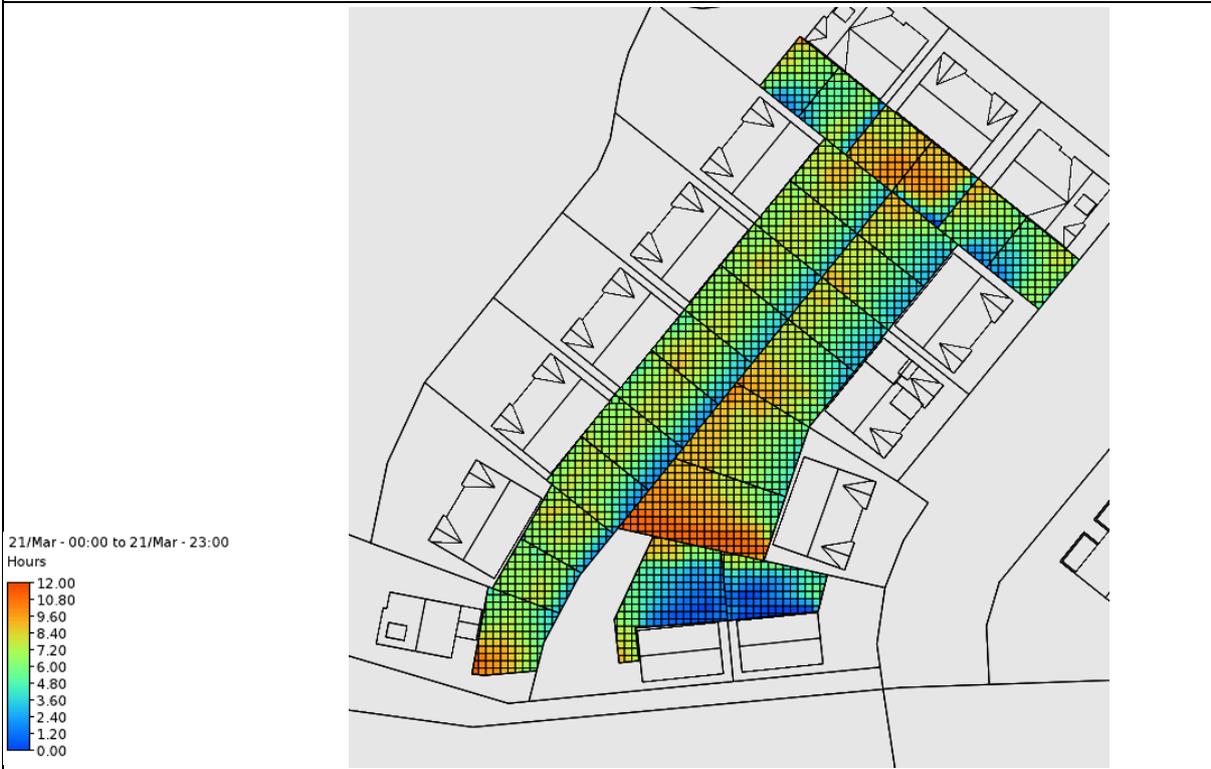
6.2.3.1 Houses Numbers from 13-37



House Name	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.13	103.875	153.375	60	68	100	✓
No.14	56.67	96.67	60	59	94	✓
No.15	184.456	184.456	60	100	100	✓
No.16	155.684	155.684	60	100	100	✓
No.17	119.818	119.818	60	100	100	✓
No.19	87.966	87.966	60	100	100	✓
No.20	85.108	85.108	60	100	100	✓
No.21	78.372	79.572	60	98	100	✓
No.22	73.081	74.081	60	99	100	✓
No.23	67.524	70.024	60	96	100	✓
No.24	69.741	69.741	60	100	100	✓
No.25	70.703	71.203	60	99	100	✓
No.26	57.291	58.791	60	97	95	✓
No.27	86.609	86.609	60	100	100	✓
No.28	89.246	89.246	60	100	100	✓
No.29	85.971	85.971	60	100	100	✓
No.30	91.37	91.37	60	100	100	✓
No.31	84.451	84.451	60	100	100	✓
No.32	88.89	91.39	60	97	100	✓
No.33	85.438	86.438	60	99	100	✓
No.34	88.862	89.362	60	99	100	✓
No.35	76.59	77.09	60	99	100	✓
No.36	66.589	66.589	60	100	100	✓

No.37	94.579	94.579	60	100	100	✓
No.38	120.987	121.487	60	100	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



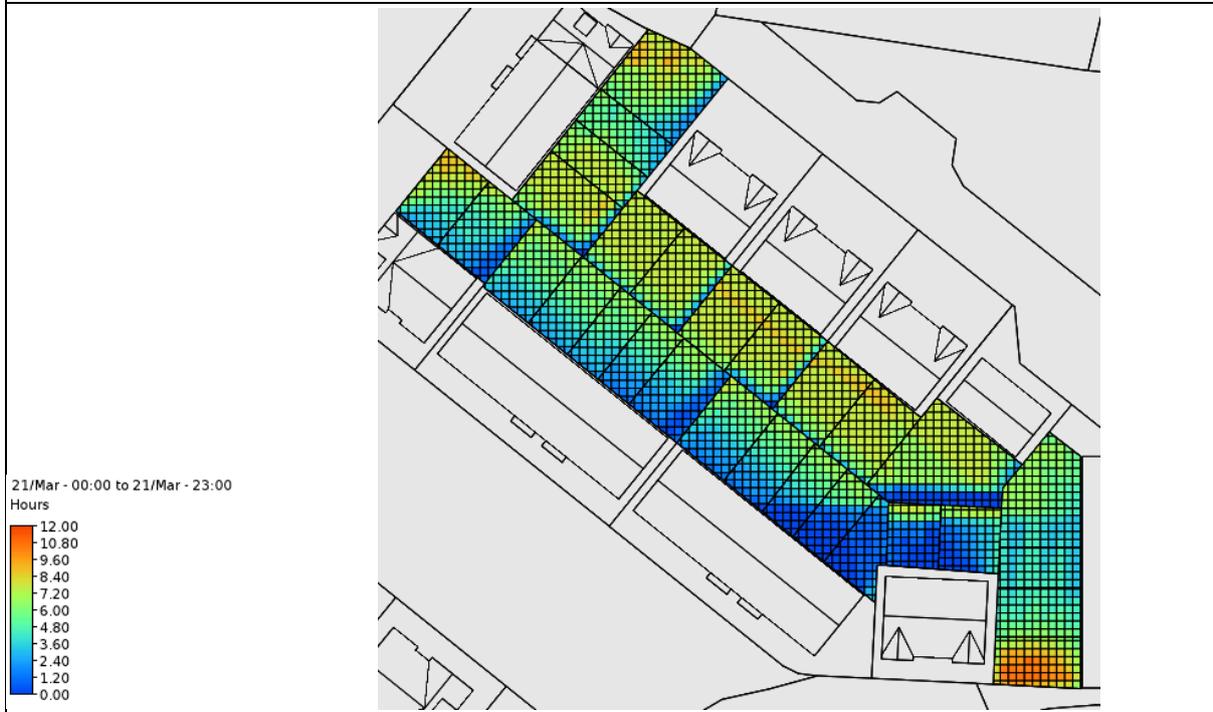
6.2.3.2 Houses Numbers from 38-67



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.39	56.815	57.315	48	99	100	✓
No.40	56.729	56.729	48	100	100	✓
No.41	84.586	89.586	60	94	100	✓
No.42	66.756	67.756	60	99	100	✓
No.43	60.494	77.494	60	78	100	✓
No.44	74.958	77.458	60	97	100	✓
No.45	64.564	66.564	60	97	100	✓
No.46	52.001	53.001	48	98	100	✓
No.47	46.454	53.454	48	87	97	✓
No.48	50.069	81.569	60	61	83	✓
No.49	69.228	80.228	60	86	100	✓
No.50	54.961	64.961	60	85	92	✓
No.51	37.721	54.221	48	70	79	✓
No.52	20	53.946	48	37	42	
No.53	4.5	54.492	60	8	8	
No.54	14.5	51.438	60	28	24	
No.55	38.739	60.739	60	64	65	✓
No.56	66.367	66.367	60	100	100	✓
No.57	64.302	64.302	60	100	100	✓
No.58	51.221	51.221	48	100	100	✓
No.59	48.854	48.854	48	100	100	✓
No.60	65.893	65.893	60	100	100	✓
No.61	128.11	155.11	60	83	100	✓
No.62	80.831	81.331	60	99	100	✓
No.63	80.768	81.518	60	99	100	✓
No.64	79.842	83.842	60	95	100	✓
No.65	80.653	80.653	60	100%	100	✓

No.66	79.505	82.505	60	96%	100	✓
No.67	78.467	79.467	60	99%	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

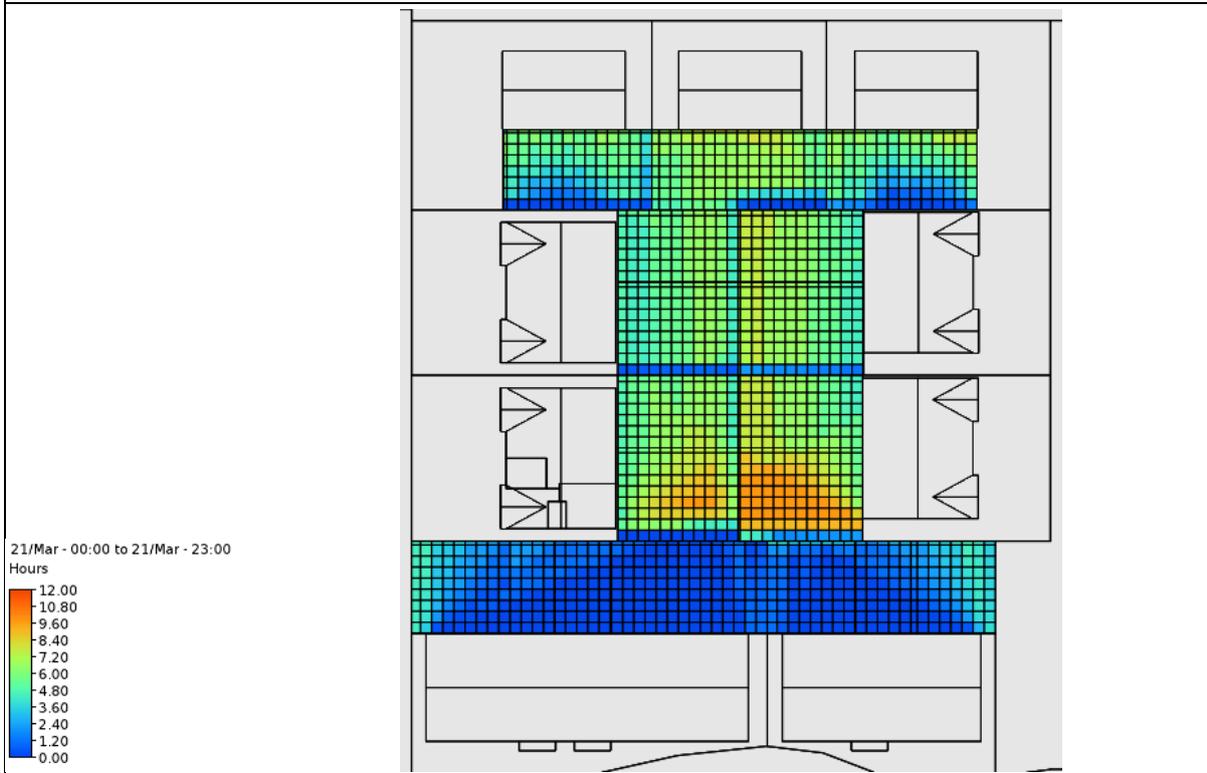


6.2.3.3 Houses Numbers from 103-121

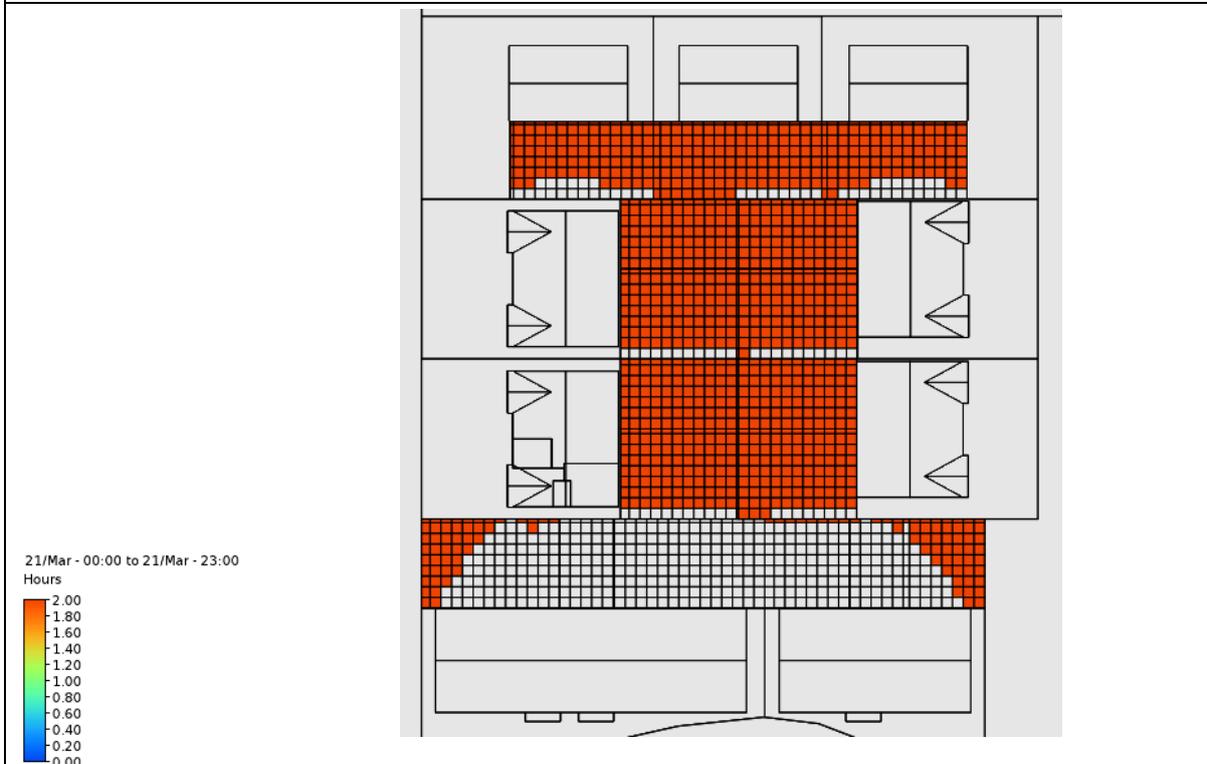


House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.103	77.554	97.054	60	80	100	✓
No.104	105.912	113.912	60	93	100	✓
No.105	79.241	98.241	60	81	100	✓
No.106	72.8	72.8	60	100	100	✓
No.107	84.64	94.64	60	89	100	✓
No.108	73.032	73.032	60	100	100	✓
No.109	86.218	94.218	60	92	100	✓
No.110	39.102	63.102	60	62	65	✓
No.111	2	41.796	48	5	4	
No.112	2	65.62	60	3	3	
No.113	0	66.425	60	0	0	
No.114	0	51.093	60	0	0	
No.115	0	41.476	48	0	0	
No.116	2	41.971	48	5	4	
No.117	34.028	65.028	60	52	57	✓
No.118	80.26	91.26	60	88	100	✓
No.119	70.74	70.74	60	100	100	✓
No.120	80.26	91.26	60	88	100	✓
No.121	70.2	70.2	60	100	100	✓

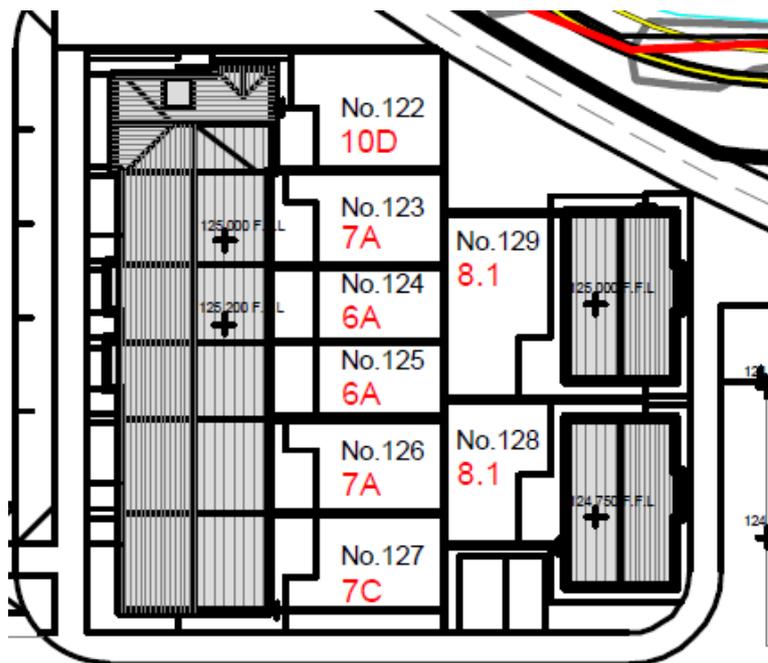
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

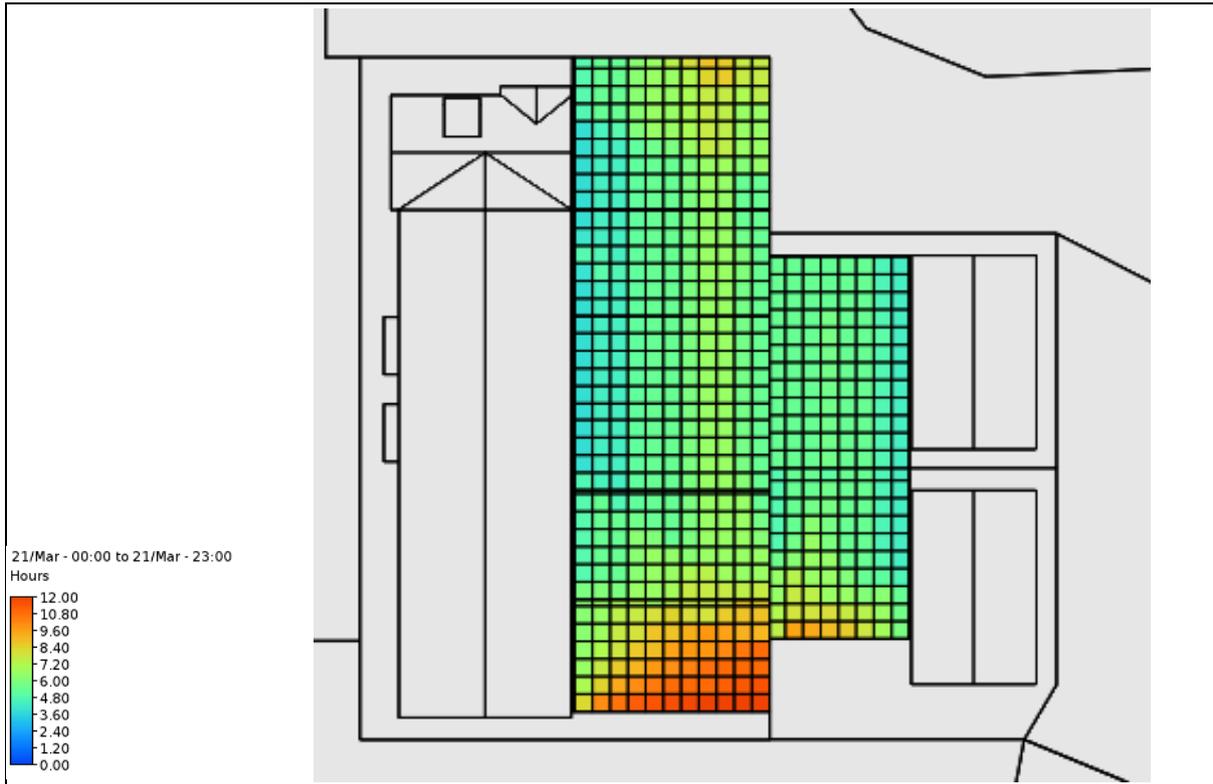


6.2.3.4 Houses Numbers from 122-129



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.122	95.809	95.809	60	100%	100	✓
No.123	67.569	67.569	60	100%	100	✓
No.124	55.277	55.277	48	100%	100	✓
No.125	54.727	54.727	48	100%	100	✓
No.126	68.981	68.981	60	100%	100	✓
No.127	70.9	70.9	60	100%	100	✓
No.128	76.516	76.516	60	100%	100	✓
No.129	95.093	95.093	60	100%	100	✓

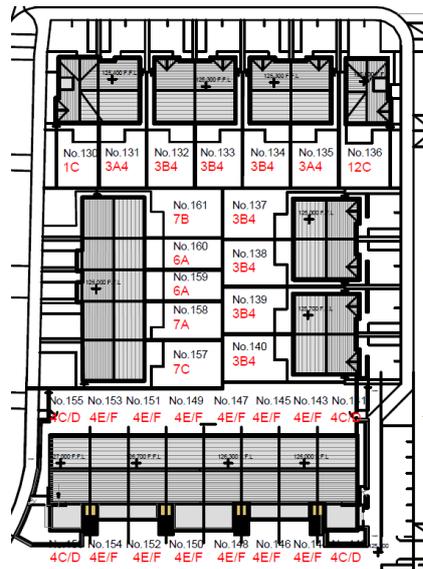
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

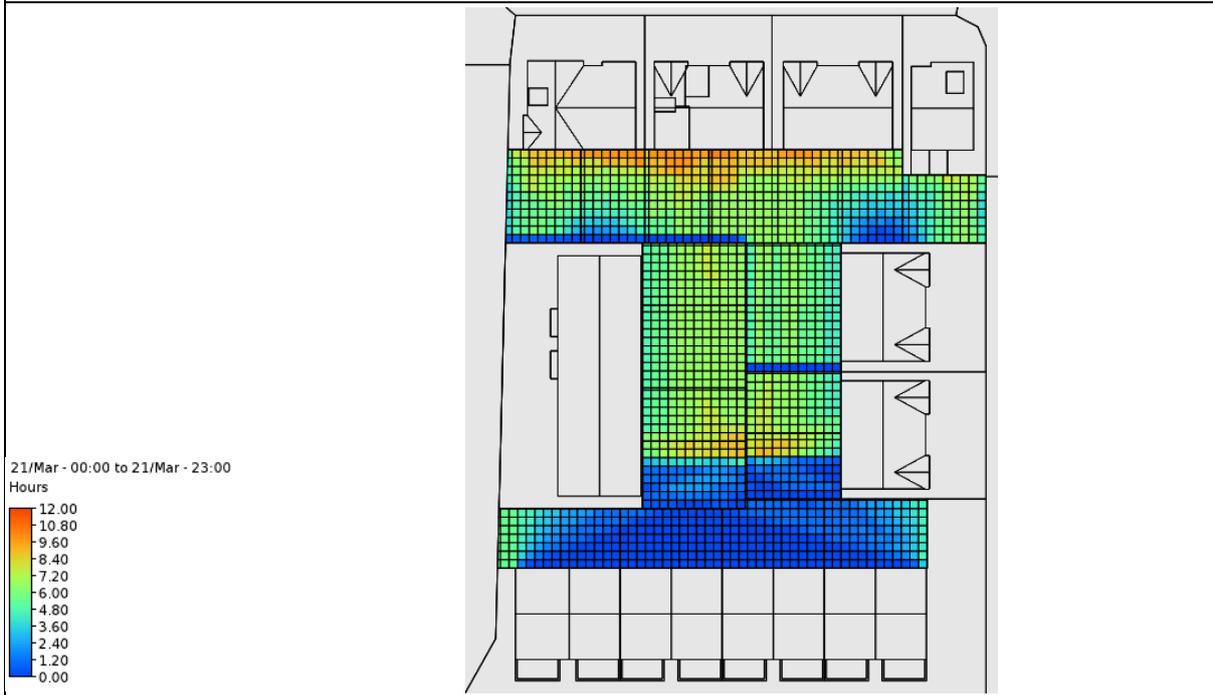


6.2.3.5 Houses Numbers from 130-161

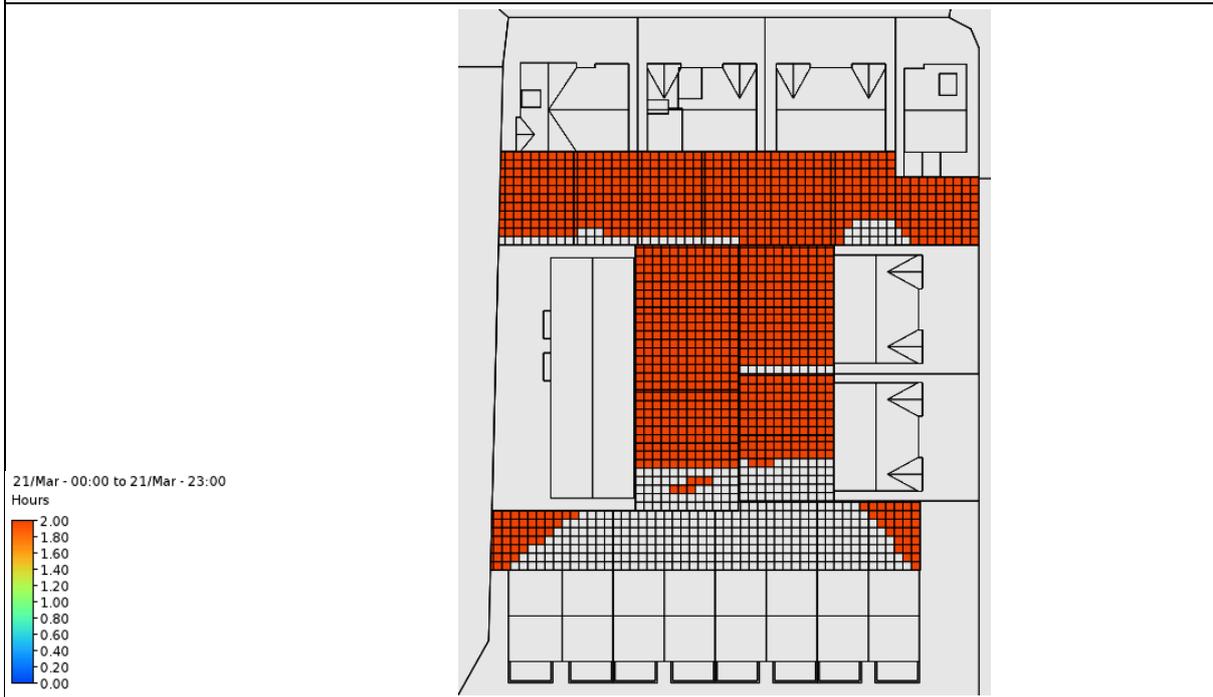


House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.130	85.407	94.907	60	90	100	✓
No.131	71.45	81.95	60	87	100	✓
No.132	75	82.5	60	91	100	✓
No.133	76.85	80.85	60	95	100	✓
No.134	84.7	84.7	60	100	100	✓
No.135	65.5	82.5	60	79	100	✓
No.136	75	78	60	96	100	✓
No.137	81.395	81.395	60	100	100	✓
No.138	76.527	87.527	60	87	100	✓
No.139	80.28	80.28	60	100	100	✓
No.140	33.912	86.412	60	39	57	✓
No.141	30.992	48.992	60	63	52	✓
No.143	1	48.333	60	2	2	
No.145	0	48.333	60	0	0	
No.147	0	45.304	60	0	0	
No.149	0	41.658	60	0	0	
No.151	0	41.658	60	0	0	
No.153	2	41.658	60	5	3	
No.155	39.8	57.8	60	69	66	✓
No.157	41.063	95.063	60	43	68	✓
No.158	75.143	75.143	60	100	125	✓
No.159	59.302	59.302	48	100	100	✓
No.160	57.501	57.501	48	100	100	✓
No.161	87.584	87.584	60	100	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

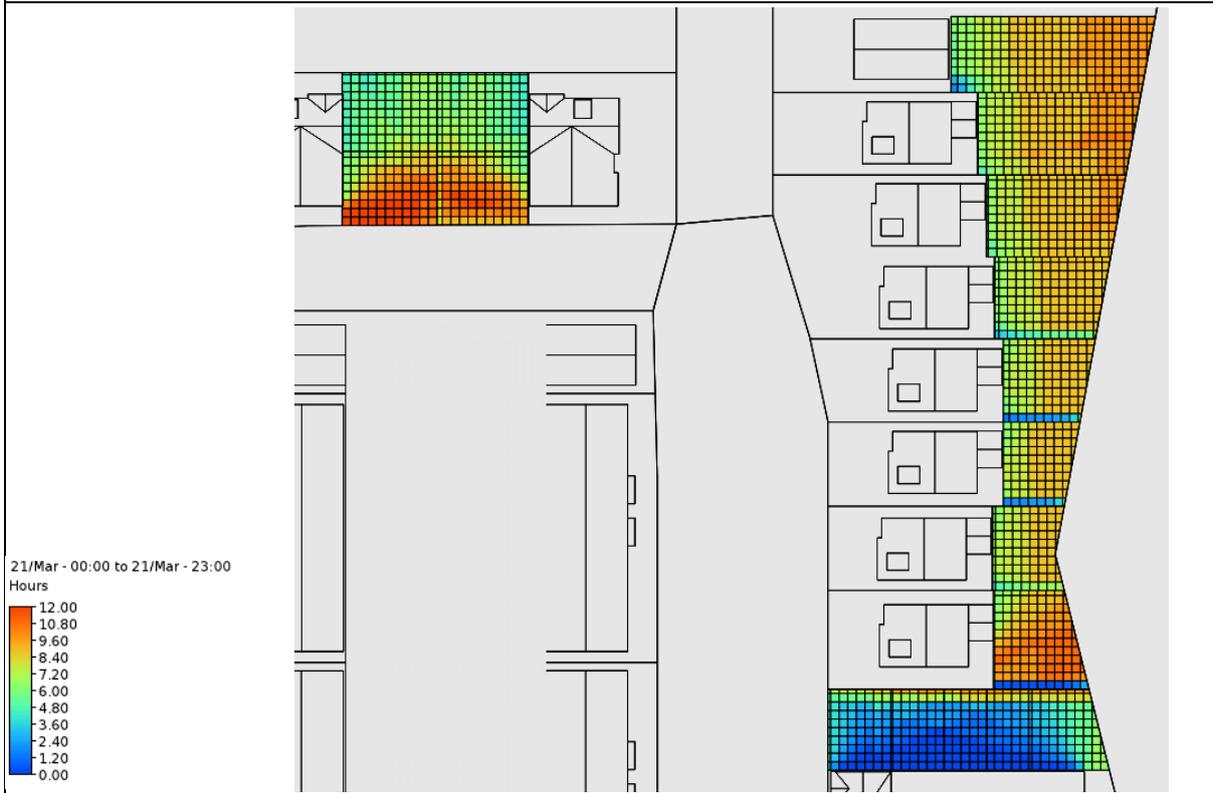


6.2.3.6 Houses Numbers from 162-174



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.162	95.246	95.246	60	100	100	✓
No.163	101.791	101.791	60	100	100	✓
No.164	98.153	98.153	60	100	100	✓
No.165	91.369	91.369	60	100	100	✓
No.166	202.92	203.92	60	100	100	✓
No.167	175.063	175.063	60	100	100	✓
No.168	146.868	146.868	60	100	100	✓
No.169	121.316	121.316	60	100	100	✓
No.170	90.545	95.545	60	95	100	✓
No.171	74.999	78.999	60	95	100	✓
No.172	77.101	77.101	60	100	100	✓
No.173	101.634	111.634	60	91	100	✓
No.174	41.184	69.184	60	60	69	✓
No.175	22.846	58.846	60	39	38	
No.176	12.978	46.978	48	28	27	
No.177	17.244	46.244	48	37	36	
No.178	63.547	77.547	60	82	100	✓

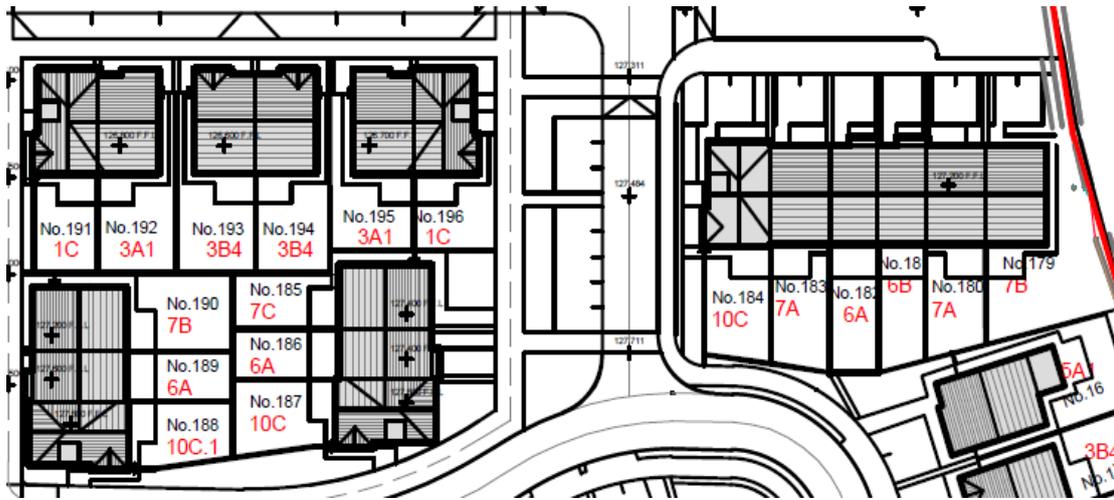
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

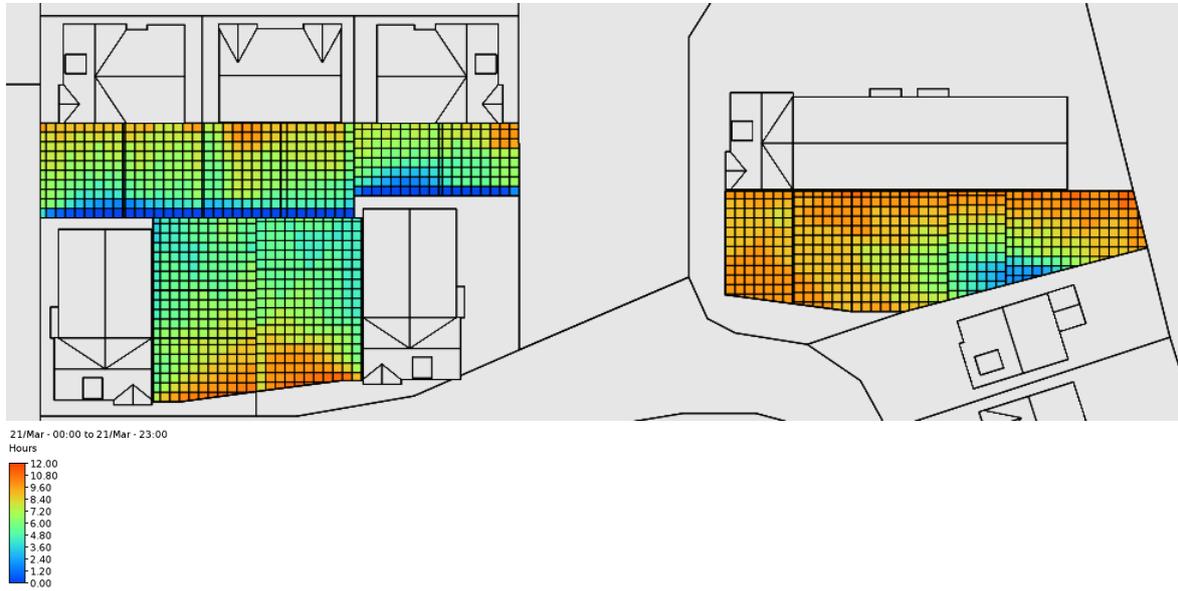


6.2.3.7 Houses Numbers from 175-196

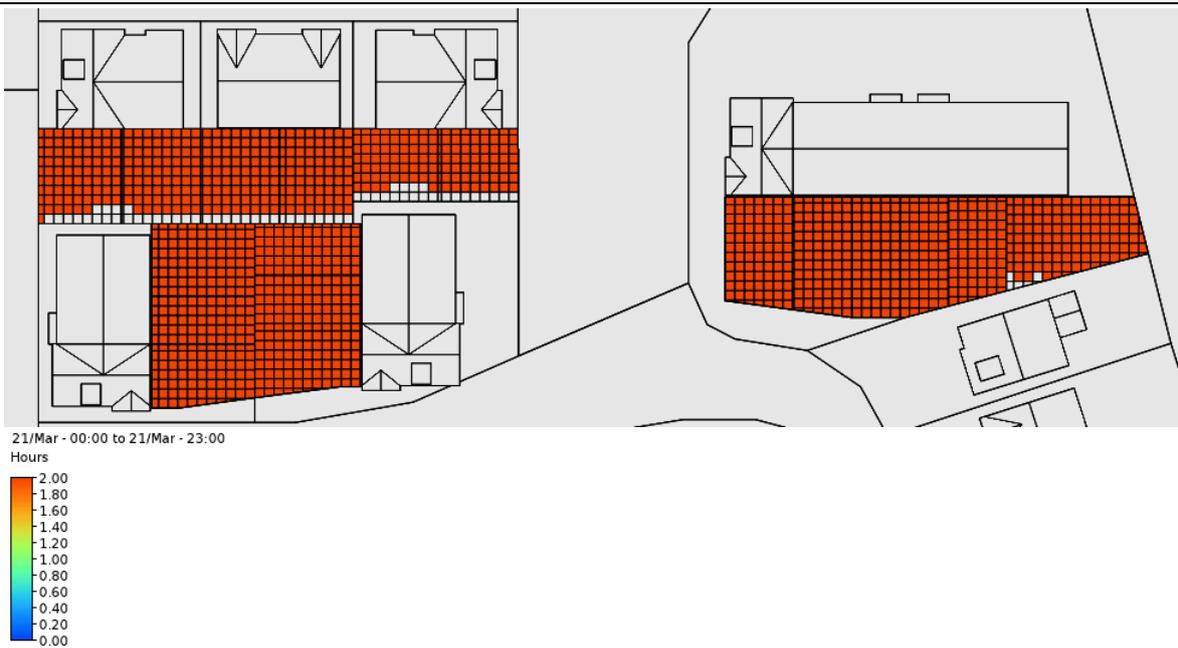


House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.179	108.769	112.269	60	97	100	✓
No.180	64.491	64.591	60	100	100	✓
No.181	60.25	60.25	48	100	100	✓
No.182	63.657	63.657	48	100	100	✓
No.183	75.129	75.129	60	100	100	✓
No.184	79.785	79.785	60	100	100	✓
No.185	59.204	59.204	60	100	99	✓
No.186	55.615	55.615	48	100	100	✓
No.187	78.133	78.133	60	100	100	✓
No.188	67.562	67.562	60	100	100	✓
No.189	53.668	53.668	48	100	100	✓
No.190	81.503	81.503	60	100	100	✓
No.191	73.955	85.455	60	87	100	✓
No.192	72.975	81.975	60	89	100	✓
No.193	73.332	81.482	60	90	100	✓
No.194	68.703	76.203	60	90	100	✓
No.195	54.423	67.423	60	81	91	✓
No.196	55.442	63.692	60	87	92	✓

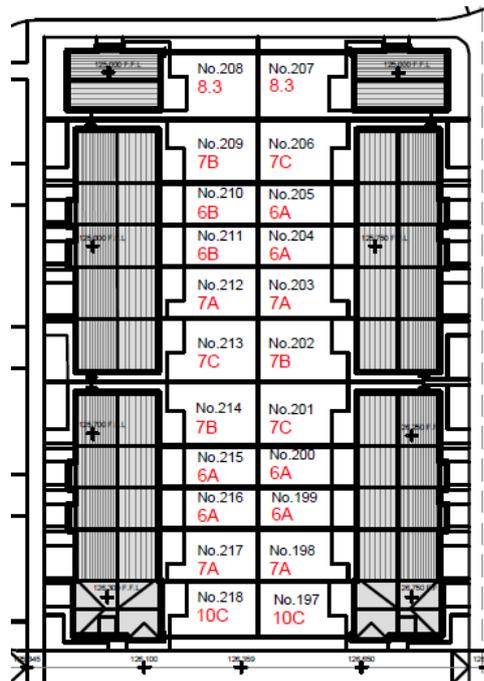
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

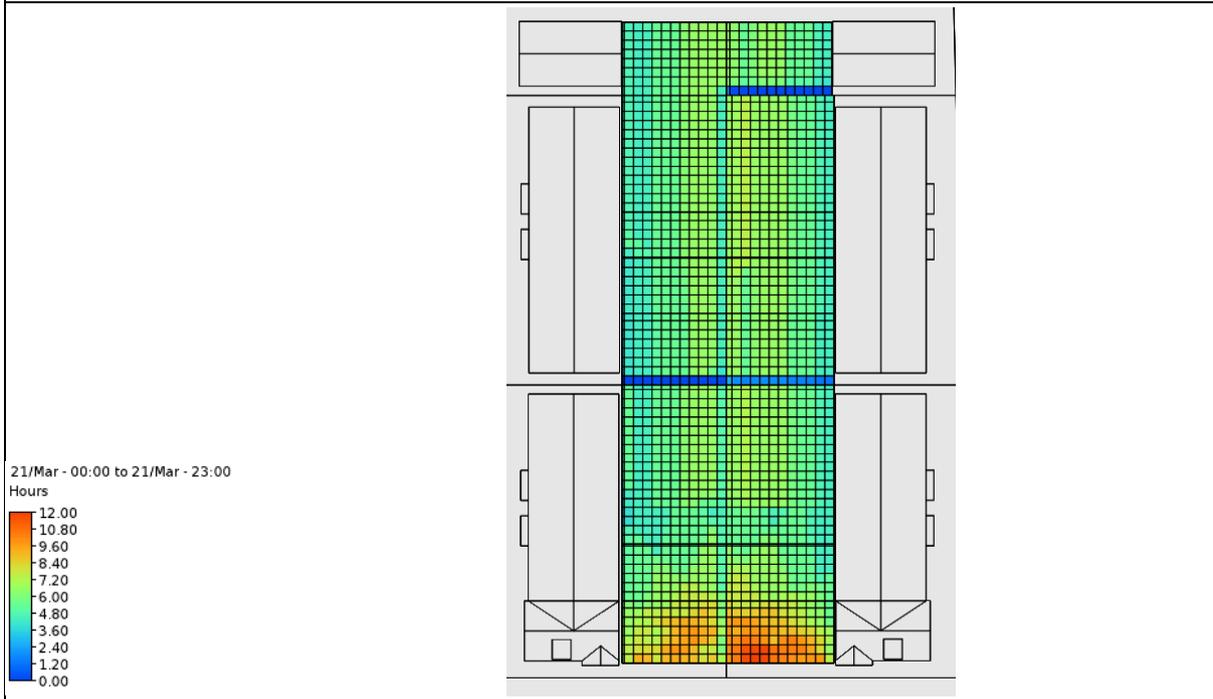


6.2.3.8 Houses Numbers from 197-218

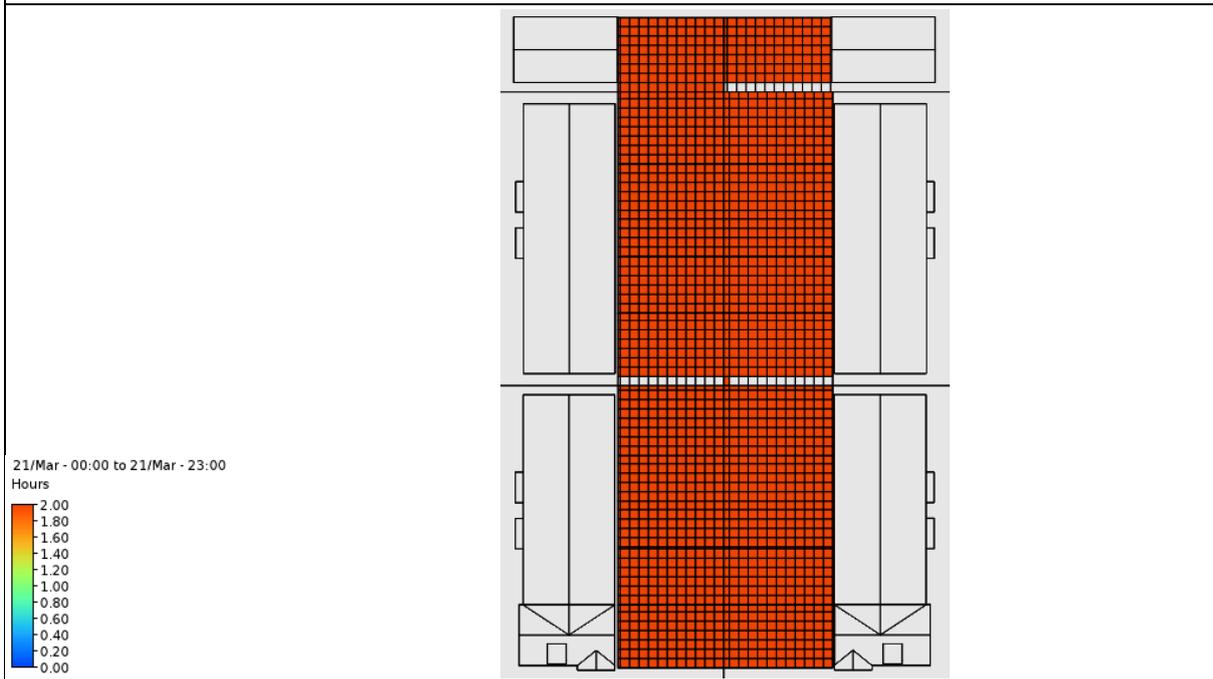


House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.197	78.328	78.328	60	100	100	✓
No.198	84.254	84.254	60	100	100	✓
No.198	71.911	71.911	60	100	100	✓
No.199	57.043	57.043	48	100	100	✓
No.200	56.631	56.631	48	100	100	✓
No.201	86.679	86.679	60	100	100	✓
No.202	79.367	90.367	60	88	100	✓
No.203	70.639	70.639	60	100	100	✓
No.204	57.043	57.043	48	100	100	✓
No.205	57.512	57.512	48	100	100	✓
No.206	89.645	89.645	60	100	100	✓
No.207	78.838	90.338	60	87	100	✓
No.208	89.279	89.279	60	100	100	✓
No.209	86.873	86.873	60	100	100	✓
No.210	55.733	55.733	48	100	100	✓
No.211	55.279	55.279	48	100	100	✓
No.212	68.455	68.455	60	100	100	✓
No.213	76.473	87.573	60	87	100	✓
No.214	83.999	83.999	60	100	100	✓
No.215	54.88	54.88	48	100	100	✓
No.216	55.279	55.279	48	100	100	✓
No.217	69.688	69.688	60	100	100	✓
No.218	75.906	75.906	60	100	100	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



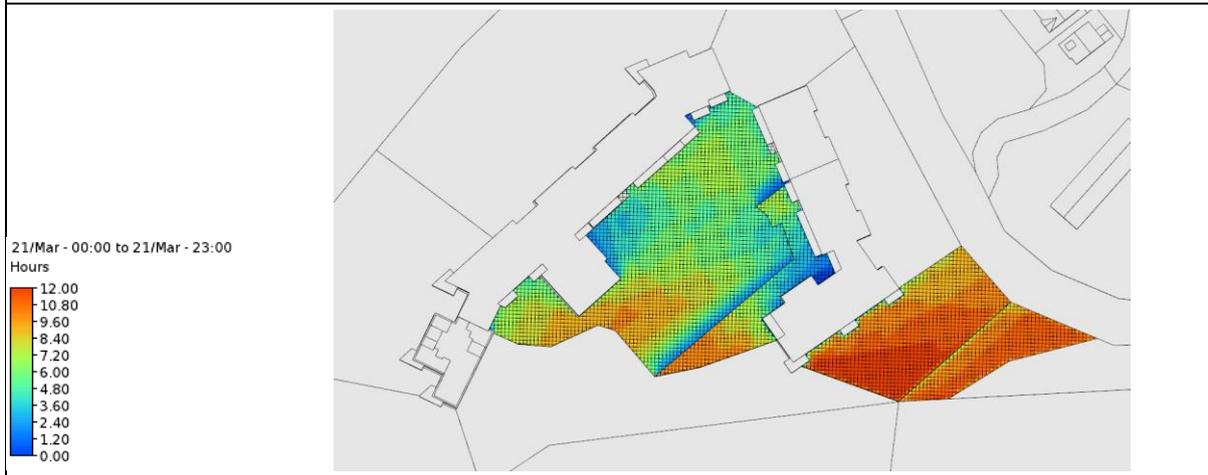
6.2.4 Neighbourhood 6



The following images shows the predicted results with respect to this space receiving the absolute hours of sunlight and at least 2 hours of sunlight on 21st March, across the gridded cells.

	Area > 2 Hrs	Total Area Provided	% of Total Area	Comment
Courtyard & Playground Amenity Areas	4510	4559	99%	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



6.2.5 Observations

As noted under Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight states for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

The images above highlight for neighbourhood six almost 100% of the amenity areas would receive at least 2 hours of sunlight exceeding the BRE recommendations.

The tables below summarise the results for the housing amenity areas provided:

Neighbourhood 1

Gardens Tested	66
Gardens Above Recommendations	64
Gardens Below Recommendations	2
	97%

Neighbourhood 2

Gardens Tested	163
Gardens Above Recommendations	145
Gardens Below Recommendations	18
	89%

Total Gardens Tested

Gardens Tested	229
Gardens Above Recommendations	209
Gardens Below Recommendations	20
	91%

For the garden areas that fall below the recommendations, further simulations were carried out to determine how they perform in summer months (June) when there is more likelihood of sunlight in better weather conditions and therefore when people make most use of amenity spaces. The results are noted in the next section of this report.

6.2.5.1 Neighbourhood 2 - June



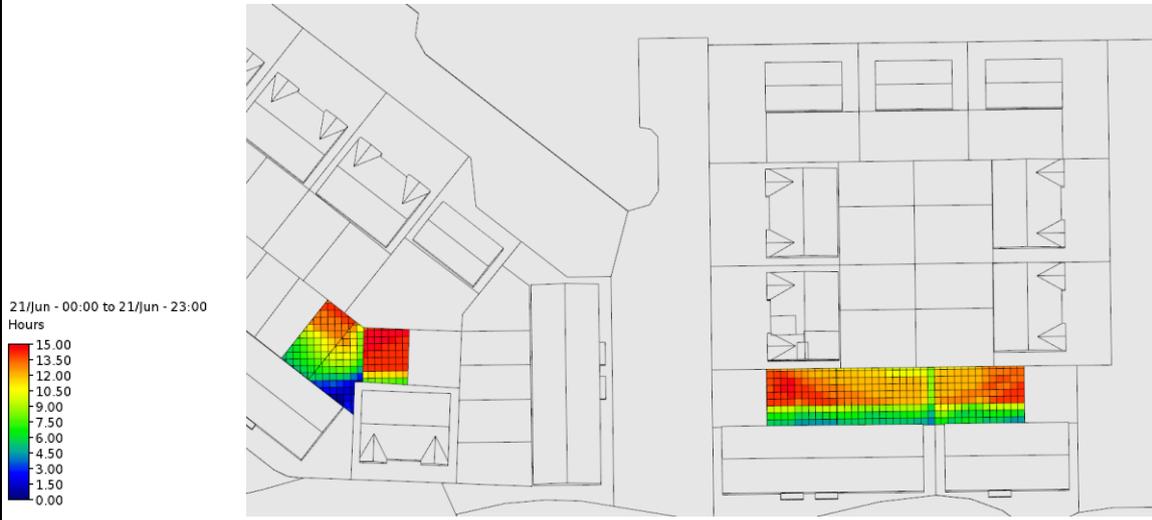
The following images shows the predicted results with respect to this space receiving the absolute hours of sunlight and at least 2 hours of sunlight on 21st June, across the gridded cells.

6.2.5.2 Houses Numbers from 52-54 & 111-116



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.52	53.946	53.946	48	100%	100%	✓
No.53	49	54.492	60	90%	82%	✓
No.54	51.438	51.438	60	100%	86%	✓
No.111	41.796	41.796	48	100%	85%	✓
No.112	65.62	65.62	60	100%	86%	✓
No.113	66.425	66.425	60	100%	87%	✓
No.114	51.093	51.093	60	100%	87%	✓
No.115	41.476	41.476	48	100%	100%	✓
No.116	41.971	41.971	48	100%	100%	✓

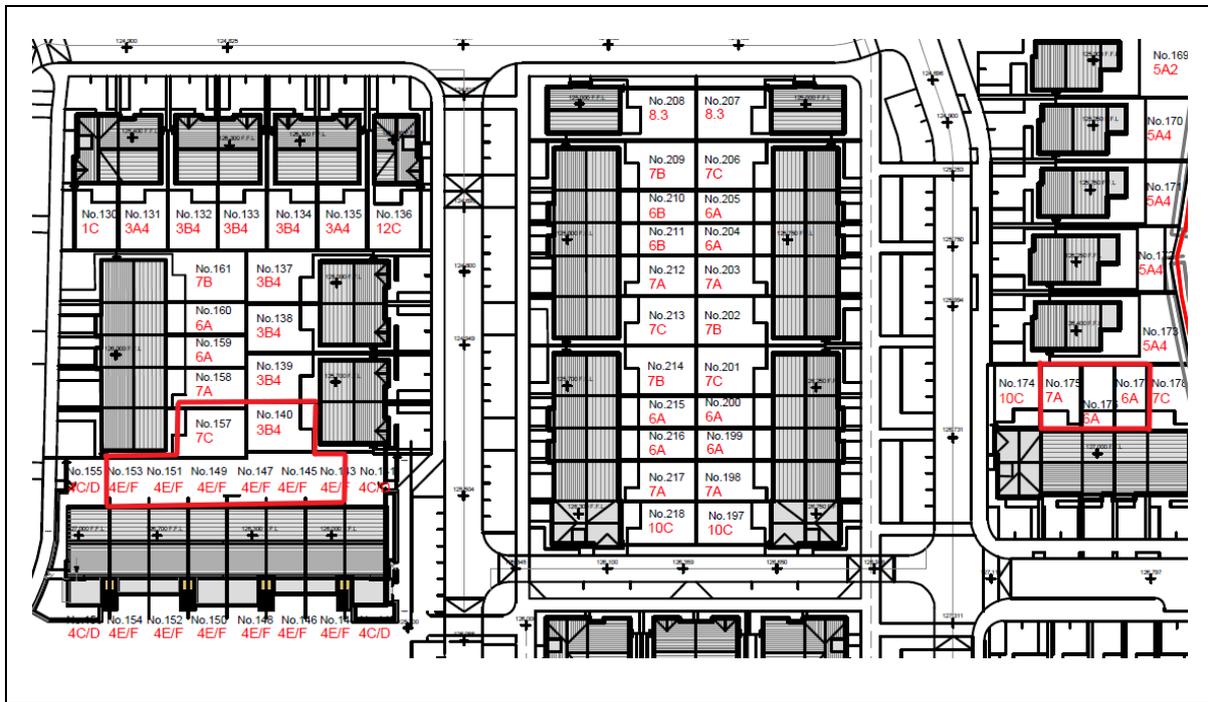
Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance

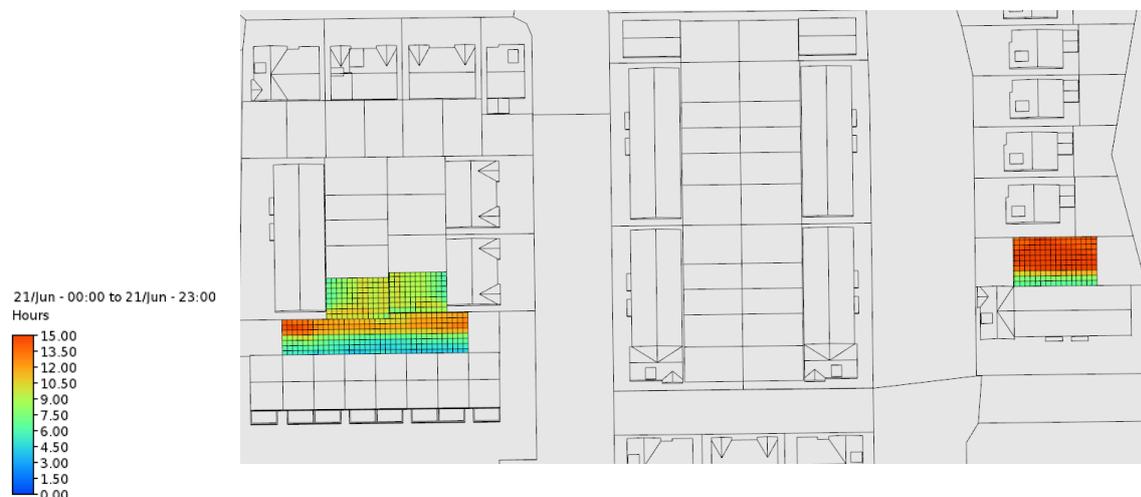


6.2.5.3 Houses Numbers from 140, 143-155 & 175-177



House Number	Area > 2 Hrs	Total Area Provided	Minimum Required Area	% of Total Area	% of Minimum Required Area	Comment
No.140	86.412	86.412	60	100%	100%	✓
No.143	48.333	48.333	60	100%	81%	✓
No.145	48.333	48.333	60	100%	81%	✓
No.147	45.304	45.304	60	100%	76%	✓
No.149	41.658	41.658	60	100%	69%	✓
No.151	41.658	41.658	60	100%	69%	✓
No.153	41.658	41.658	60	100%	69%	✓
No.157	95.063	95.063	60	100%	100%	✓
No.175	58.846	58.846	60	100%	98%	✓
No.176	46.978	46.978	48	100%	98%	✓
No.177	46.244	46.244	48	100%	96%	✓

Proposed Scheme: Absolute Scale showing all hours of sunlight received



Proposed Scheme: showing hours > 2 in red – In compliance with guidance



6.2.5.4 Discussions

The results highlight on the 21st of June of these space are receiving at least 2hrs of sunlight across 100% of the amenity areas. In addition, they are exceeding this threshold and receiving 6 to 12 hours of sunlight across the amenity spaces showing that these space will be in sunlight for the majority of the day. In addition, occupants will benefit from having access to further open spaces and play parks within each neighbourhood as well as a large park provided for the whole development.

7 Average Daylight Factors

This section addresses daylight to the proposed apartments and housing.

BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight states the following in Appendix C with respect to Average Daylight Factors (ADF).

C4 If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These additional recommendations are minimum values of ADF which should be attained even if a predominantly daylit appearance is not achievable.

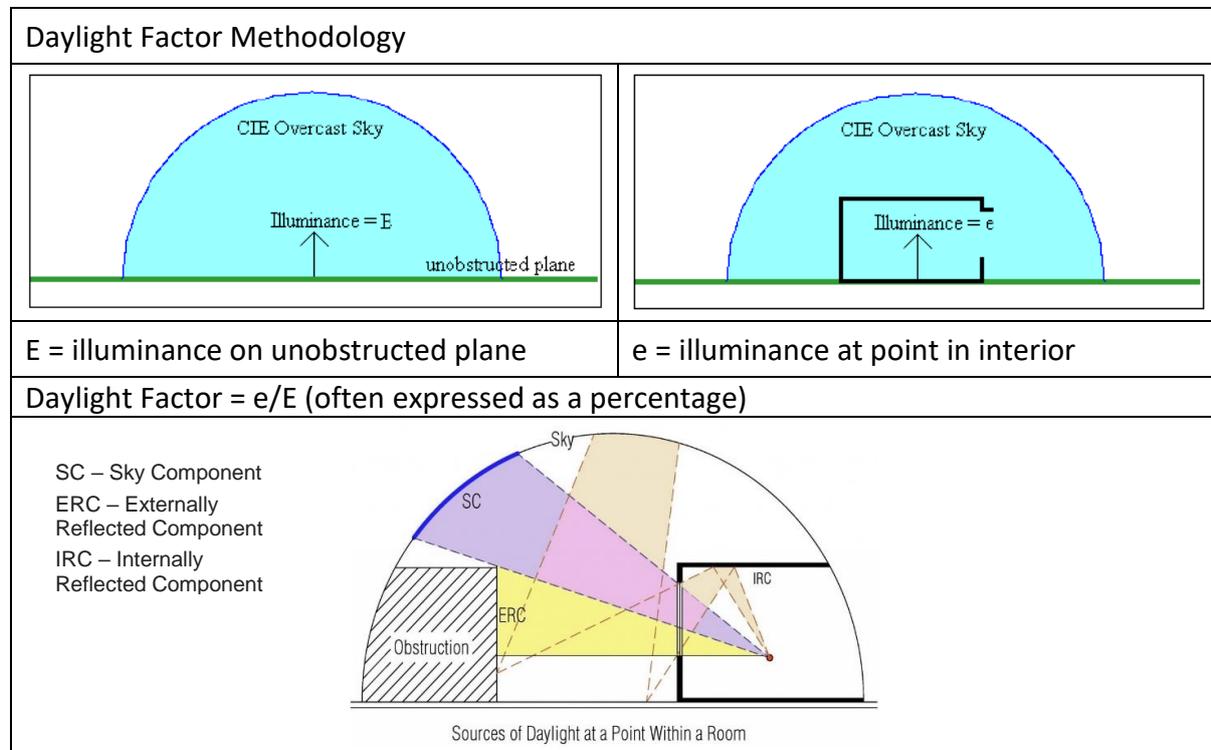
From BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight

From this the recommended Average Daylight Factors (ADF) are therefore:

- Bedrooms 1.0%
- Living Rooms 1.5%

This study will consider the predicted ADF to the proposed apartments. Analysis was performed using RadianceIES, a module of IES VE to quantify the following metrics.

ADF is the ratio of the indoor illuminance at the point in question to the outdoor unobstructed horizontal illuminance.



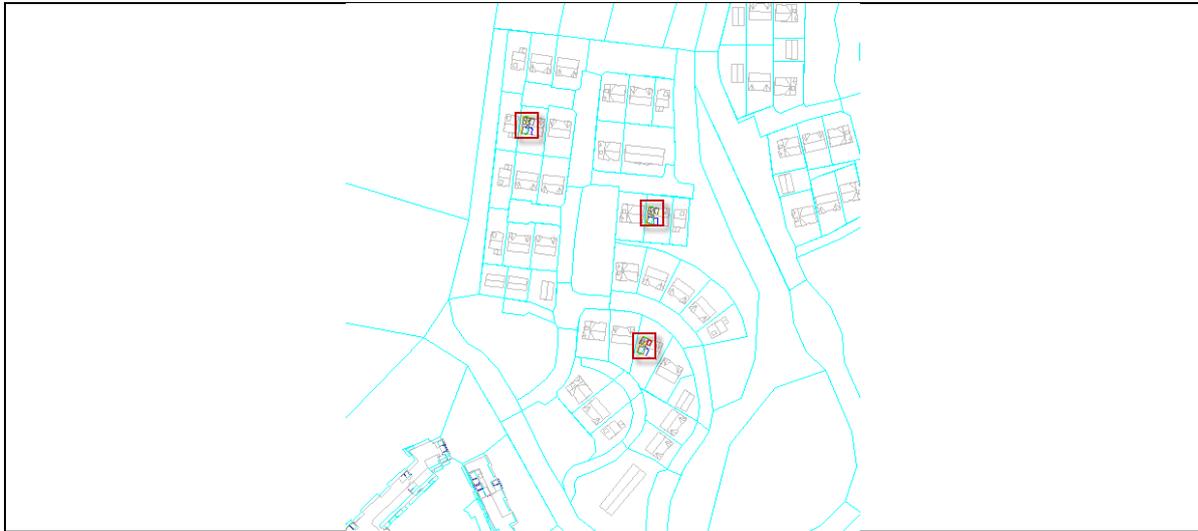
Both illuminances are measured under a CIE overcast sky. This represents a diffuse sky and no direct sunlight is accounted.

For ADF there are three possible paths along which diffuse light can enter the room through glazed windows:

- a) Light from the sky patch visible at the point considered, expressed as the sky component.
- b) Light reflected from opposing exterior surfaces and then reaches the point, expressed as the externally reflected component.
- c) Light entering through the window but reaching the point only after reflection from internal surfaces, expressed as the internally reflected component.

7.2 Rooms Considered for Analysis

7.2.1 Neighbourhood 1 - Houses



Room Reference	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation	Count
1	L01: B3_Bedroom 02A	Bedroom	2.16	1.40	✓	Bed
2	L01: B3_Bedroom 01A	Bedroom	2.15	1.07	✓	Bed
3	L01: B3_Bedroom 03A	Bedroom	1.25	1.62	✓	Bed
4	L01: B3_Bedroom 03B	Bedroom	1.25	1.56	✓	Bed
5	L01: B3_Bedroom 01B	Bedroom	2.15	1.13	✓	Bed
6	L01: B3_Bedroom 02B	Bedroom	2.16	1.33	✓	Bed
7	L01: B3_Bedroom 01C	Bedroom	2.145	1.12	✓	Bed
8	L01: B3_Bedroom 03C	Bedroom	1.25	1.56	✓	Bed
9	L01: B3_Bedroom 02C	Bedroom	2.16	1.29	✓	Bed
10	L00: B3_LivingA	Living	3.24	1.77	✓	Living
11	L00: B3_LivingB	Living	3.24	1.97	✓	Living
12	L00: B3_LivingC	Living	3.24	1.95	✓	Living

7.2.2 Neighbourhood 2 - Houses

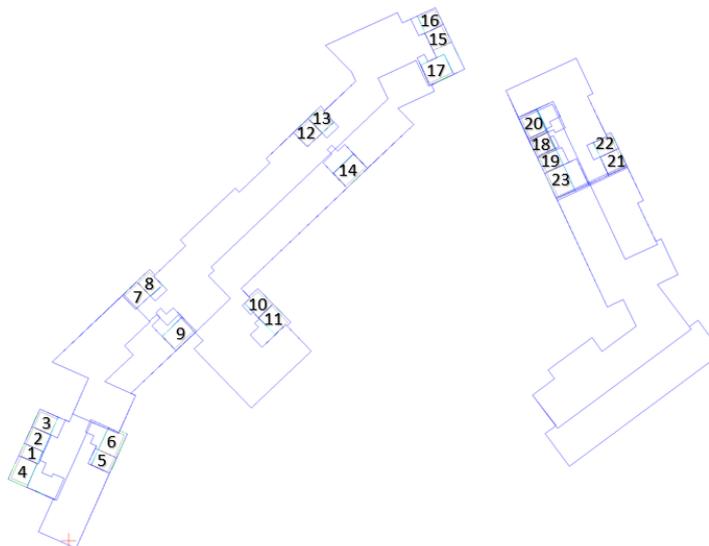


Room Reference	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation	Count
1	L01: B3_Bedroom 01D	Bedroom	2.15	1.08	✓	Bed
2	L01: B3_Bedroom 03D	Bedroom	1.03	1.57	✓	Bed
3	L01: B3_Bedroom 02D	Bedroom	2.16	1.39	✓	Bed
4	L00: B3_LivingD	Living	3.24	1.96	✓	Living
5	L01: B3_Bedroom 01E	Bedroom	2.15	1.09	✓	Bed
6	L01: B3_Bedroom 03E	Bedroom	1.03	1.63	✓	Bed
7	L01: B3_Bedroom 02E	Bedroom	2.16	1.39	✓	Bed
8	L00: B3_LivingE	Living	3.24	1.84	✓	Living
9	L01: B3_Bedroom 01F	Bedroom	2.15	1.10	✓	Bed
10	L01: B3_Bedroom 03F	Bedroom	1.03	1.56	✓	Bed
11	L01: B3_Bedroom 02F	Bedroom	2.16	1.35	✓	Bed
12	L00: B3_LivingF	Living	3.24	1.90	✓	Living

7.2.3 Neighbourhood 6 - Apartments

Level 01					
Room Reference	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L01: N1_Bedroom 01	Bedroom	2.64	2.52	✓
2	L01: N1_Bedroom 02	Bedroom	3.72	2.98	✓
3	L01: N1_Bedroom 03	Bedroom	3.72	2.99	✓
4	L01: N1_Living	Living	13.90	4.80	✓
5	L01: N2_Bedroom 01	Bedroom	7.20	3.21	✓
6	L01: N2_Living	Living	9.24	4.37	✓
7	L01: N3_Bedroom 01	Bedroom	3.84	3.05	✓
8	L01: N3_Bedroom 02	Bedroom	3.84	3.40	✓
9	L01: N3_Living	Living	7.20	0.92	x
10	L01: N4_Bedroom 01	Bedroom	3.84	1.84	✓
11	L01: N4_Living	Living	7.20	3.52	✓
12	L01: N5_Bedroom 01	Bedroom	3.84	2.81	✓
13	L01: N5_Bedroom 02	Bedroom	3.84	3.26	✓
14	L01: N5_Living	Living	7.20	1.62	✓
15	L01: N6_Bedroom 01	Bedroom	3.84	2.38	✓
16	L01: N6_Bedroom 02	Bedroom	3.36	3.01	✓
17	L01: N6_Living	Living	7.20	1.55	✓
18	L01: N7_Bedroom 01	Bedroom	3.84	2.21	✓
19	L01: N7_Living	Living	7.20	1.55	✓
20	L01: N8_Bedroom 01	Bedroom	3.84	2.80	✓
21	L01: N8_Bedroom 02	Bedroom	3.84	3.25	✓
22	L01: N8_Living	Living	7.20	1.61	✓

Level 03



Room Reference	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L03: N1_Bedroom 01	Bedroom	2.64	2.74	✓
2	L03: N1_Bedroom 02	Bedroom	3.72	3.31	✓
3	L03: N1_Bedroom 03	Bedroom	3.72	3.28	✓
4	L03: N1_Living	Living	13.90	9.05	✓
5	L03: N2_Bedroom 01	Bedroom	7.20	3.56	✓
6	L03: N2_Living	Living	9.24	5.26	✓
7	L03: N3_Bedroom 01	Bedroom	3.84	3.07	✓
8	L03: N3_Bedroom 02	Bedroom	3.84	3.43	✓
9	L03: N3_Living	Living	7.20	1.14	x
10	L03: N4_Bedroom 01	Bedroom	3.84	2.45	✓
11	L03: N4_Living	Living	7.20	4.45	✓
12	L03: N5_Bedroom 01	Bedroom	3.84	2.87	✓
13	L03: N5_Bedroom 02	Bedroom	3.84	3.38	✓
14	L03: N5_Living	Living	7.20	1.86	✓
15	L03: N6_Bedroom 01	Bedroom	3.84	2.48	✓
16	L03: N6_Bedroom 02	Bedroom	3.36	3.11	✓
17	L03: N6_Living	Living	7.20	1.91	✓
18	L03: N7_Bedroom 01	Bedroom	2.64	2.20	✓
19	L03: N7_Bedroom 02	Bedroom	3.84	2.99	✓
20	L03: N7_Living	Living	7.20	1.85	✓
21	L03: N8_Bedroom 01	Bedroom	3.72	2.77	✓
22	L03: N8_Bedroom 02	Bedroom	3.84	3.20	✓
23	L03: N8_Living	Living	7.20	4.45	✓

7.2.4 Observations

96% of the tested rooms in the proposed scheme are projected to have an Average Daylight Factors (ADF) above the recommended minimum Average Daylight Factors (ADF) in line with the BRE guidelines.

The 'worst' case locations have been tested on the first and fourth floors of the apartments in neighbourhood 6, i.e. rooms on the upper floors will generally have unobstructed views and should meet the BRE recommendations. As such, the percentage above the recommendations across the scheme would be expected to increase further if all of the upper rooms were included in the analysis.

These are summarised as follows:

Neighbourhood 1

Tested	12
Bedroom Passes	9
Living Room Passes	3
Below BRE recommendations	0
	100%

Neighbourhood 2

Tested	12
Bedroom Passes	9
Living Room Passes	3
Below BRE recommendations	0
	100%

Neighbourhood 6

Tested	45	
Bedroom Passes	29	
Living Room Passes	14	
Below BRE recommendations	2	1 Living/1 Bedroom
	96%	

Overall Summary Table:

Tested	69	
Bedroom Passes	47	
Living Room Passes	20	
Below BRE recommendations	2	1 Living/1 Bedroom
	97%	

8 Conclusion

The following can be concluded based on the studies undertaken.

8.1 Shadow Analysis

The Shadow analysis shows different shadows being cast from proposed scheme at particular periods throughout the year.

There is no overshadowing noted in March and June to existing dwellings. The overshadowing noted in December from neighbourhood two is isolated to a few properties. As mentioned in section (5), overshadowing is less noticeable in the winter months and would have a minor impact to the existing dwellings.

Taking this into account and results from further analysis documented in this report, the development as a whole will have a negligible adverse impact on the adjacent properties exceeding the BRE guidelines.

8.2 Sunlight to Proposed Amenity Spaces

As mentioned above under Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight states that for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

On the 21st of March, almost 100% of the amenity area provision for the apartments within neighbourhood one and six would receive at least 2 hours of sunlight exceeding the BRE recommendations.

When considering the housing amenity provisions, 91% of the properties within neighbourhoods one and two are exceeding the BRE recommendations and would receive above the recommended levels of sunlight when compared to the minimum area provision.

The remaining 9% that were below the recommendations were retested in the month of June and results showed that these spaces would receive a high amount of sunlight during the summer periods.

As noted previously, occupants will benefit from having access to further open spaces and play parks within each neighbourhood as well as a large park provided for the whole development.

8.3 Average Daylight Factors

Based on the results of the rooms tested on First and Fourth floors for the apartments in neighbourhood six and the six houses tested in neighbourhoods one and two, 97% of the spaces tested in the proposed scheme have an Average Daylight Factors (ADF) above the recommended values in line with the BRE guidelines.

Worst-case locations were chosen and as such, this number across the scheme would be expected to increase further if all of the upper rooms were included in the results.

8.4 Observations

It should be noted the guidance in 'Site layout planning for daylight and sunlight: a guide to good practice' is not mandatory and the Report itself states 'although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design.

Whilst the results shown relate to the criteria as laid out in the BRE guidance targets it is important to note that the BRE targets have been drafted primarily for use in low density suburban development and should therefore be used with flexibility and caution when dealing with higher density developments. The site performs very well in relation to the metrics considered in this report.

Overall the results demonstrate that the proposed development performance exceeds BRE recommendations in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice' by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209.



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