

17 Daylight & Sunlight

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17.1 Introduction

This chapter of the EIAR has been prepared by IES Consulting.

IES Consulting have been commissioned to quantify the Sunlight / Daylight impact of the proposed Rent Strategic Housing Development on lands (c. 2.14ha) at Cornelscourt Village, Old Bray Road, Cornelscourt Dublin 18 on the existing neighbouring dwellings.

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 on to the neighbouring existing developments.
- **Daylight Analysis of Existing Buildings** - via consideration of Vertical sky component (VSC).
- **Sunlight to the existing and proposed amenity space** - via annual sunlight hours comparison.
- **Average Daylight Factors** – via average daylight factor calculations carried out across the site of the proposed development.

The analysis was completed using the IES VE software.

The assessment is based on recommendations given in BRE – Site Layout Planning for Daylight and Sunlight guide.

17.2 Study Methodology

Orientation

The model orientation has been taken from drawings provided by the Architect and the resulting angle shown below used in the analysis.



Figure 17. 1 Site Layout

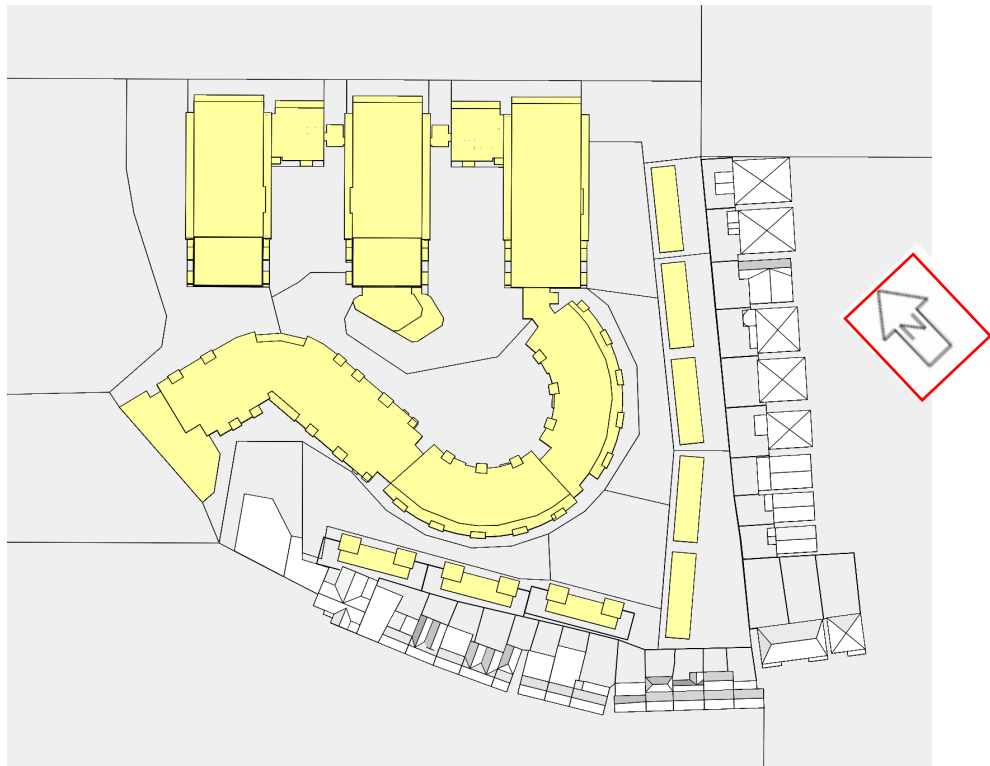





Figure 17.2 – VE Model Orientation

Potential Sensitive Receptors

To help understand the potential impact to surrounding buildings, potential sensitive receptors were identified as illustrated below.



	Bray Road – Residential
	Willow Grove – Residential
	South Park – Residential

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.

<p><i>Negligible adverse impact</i></p>	<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 limited area of open space losing light (within the guidelines)</i>
<p><i>Minor adverse impact (a)</i></p>	<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>
<p><i>Minor adverse impact (b)</i></p>	<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>
<p><i>Major adverse impact</i></p>	<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>

Table 17.1 -Impacts

Shadow Analysis

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

The following can also be shown:

- During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.3 hours sunlight each day (i.e. only 23% of potential sunlight hours).
- During June, Dublin receives a mean daily duration of 5.8 hours of sunlight out of a potential 15.9 hours sunlight each day (i.e. only 37% of potential sunlight hours).

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

This section will consider the shadows cast for the Existing and 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 'perfect sunny' conditions with no clouds and assumed that the sun is out for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

17.3 The Existing Receiving Environment (Baseline)

The existing site is an empty land bounded by residential settlements to the east and south, and the N11 road to the north.

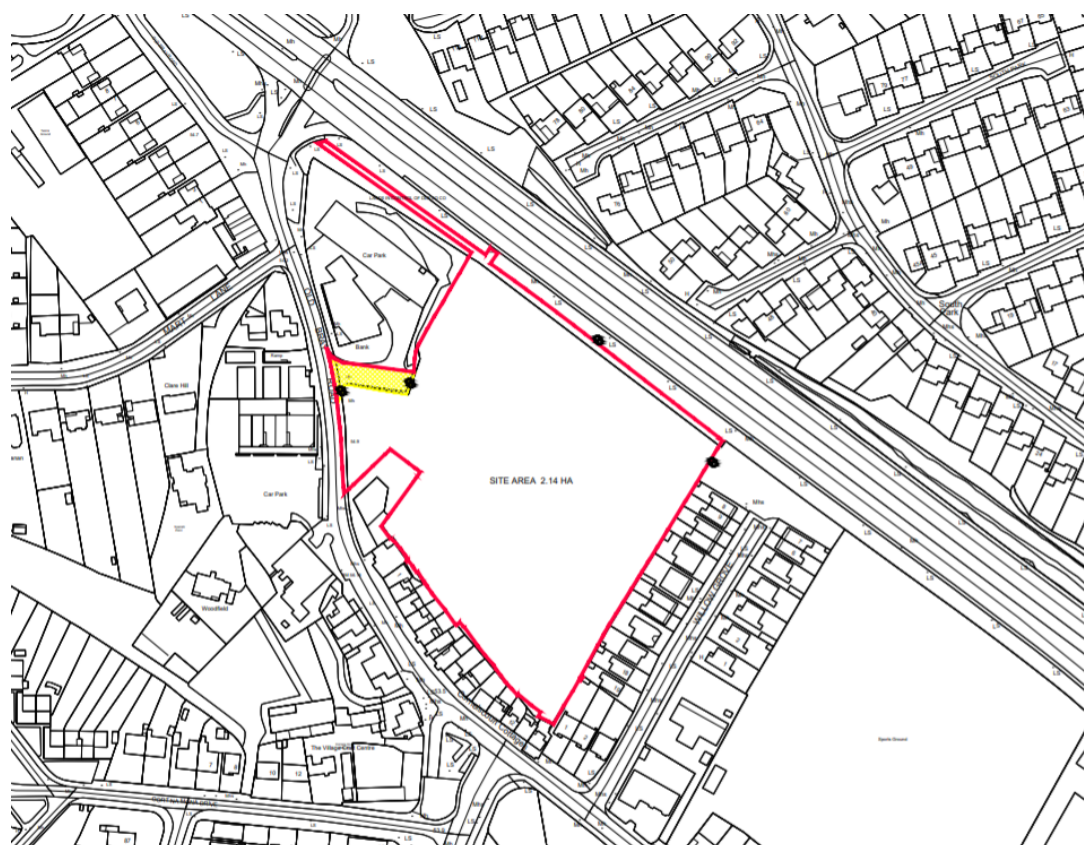


Figure 17.3- Site Boundary

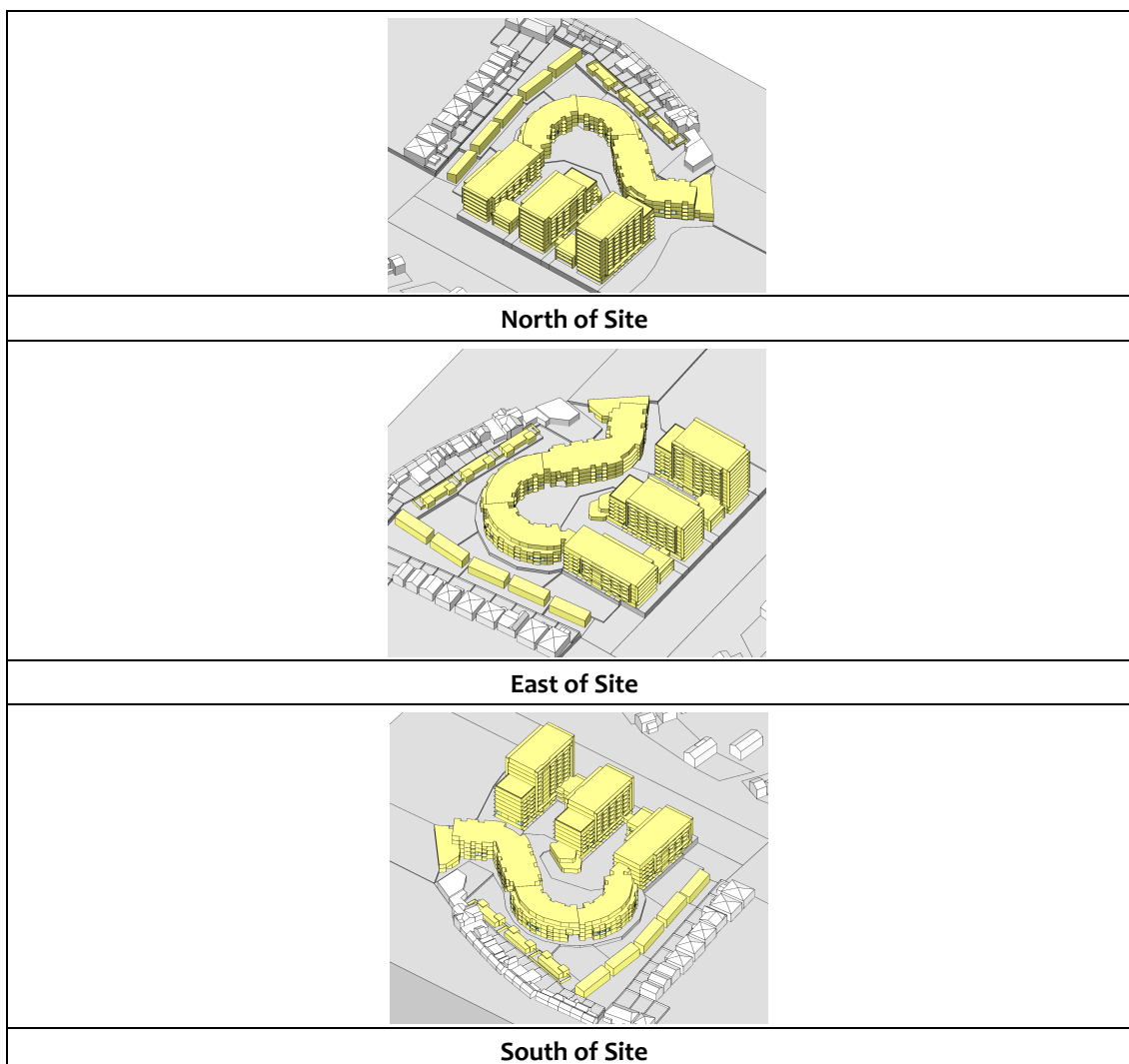
17.4 Characteristics of the Proposed Development

The current proposal provides for a Build to Rent development consisting:

- 468 residential units (452 apartments and 16 houses) as follow:
 - 41 no. studio apartment units,
 - 257 no. 1 bed apartment units,
 - 136 no. 2 bed apartment units;

- no. 3 bed apartment units;
- 10 no. 3 bed semi-detached house units; and
- 6 no. 1 bed bungalow units.
- A café / restaurant of c. 140 sq m; office space of 149 sq m; concierge of c. 149 sq m; and a residential tenant amenity space of c. 458 sq m is also proposed.
- 274 Car Parking Spaces (273 at basement level and 1 at surface level)
- 12 Motor Cycle Spaces
- 616 Bicycle Parking Spaces
- Public Open Space
- Vehicular Access
- Basement Areas
- Sub Stations and 3 Switch Rooms
- All Associated Site Development Works

Model Geometry - The following images show the models created for use on across various views.



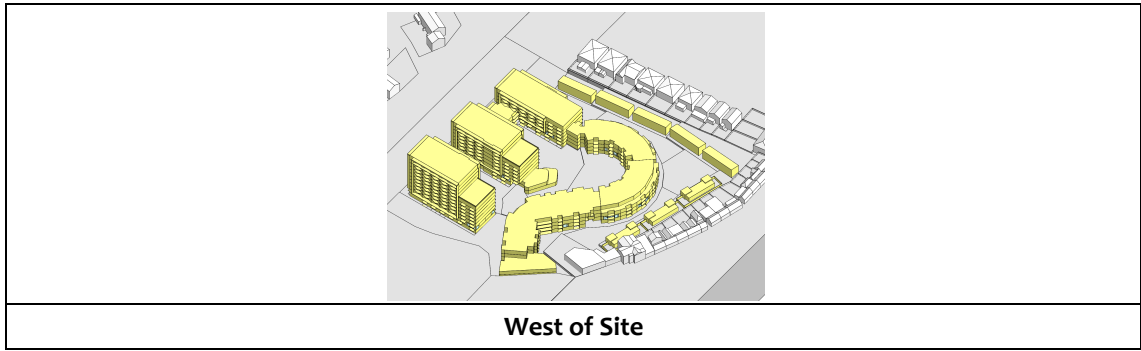


Figure 17.4 – Model Images

17.5 Potential Impact of the Proposed Development

Construction Phase

This section is not relevant to daylight/sunlight analysis.

Operational Phase

Shadow Analysis

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

The following can also be shown:

- During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.3 hours sunlight each day (i.e. only 23% of potential sunlight hours).
- During June, Dublin receives a mean daily duration of 5.8 hours of sunlight out of a potential 15.9 hours sunlight each day (i.e. only 37% of potential sunlight hours).

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

This section will consider the shadows cast for the Existing and 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 'perfect sunny' conditions with no clouds and assumed that the sun is out for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

Site Plan View - March 21st

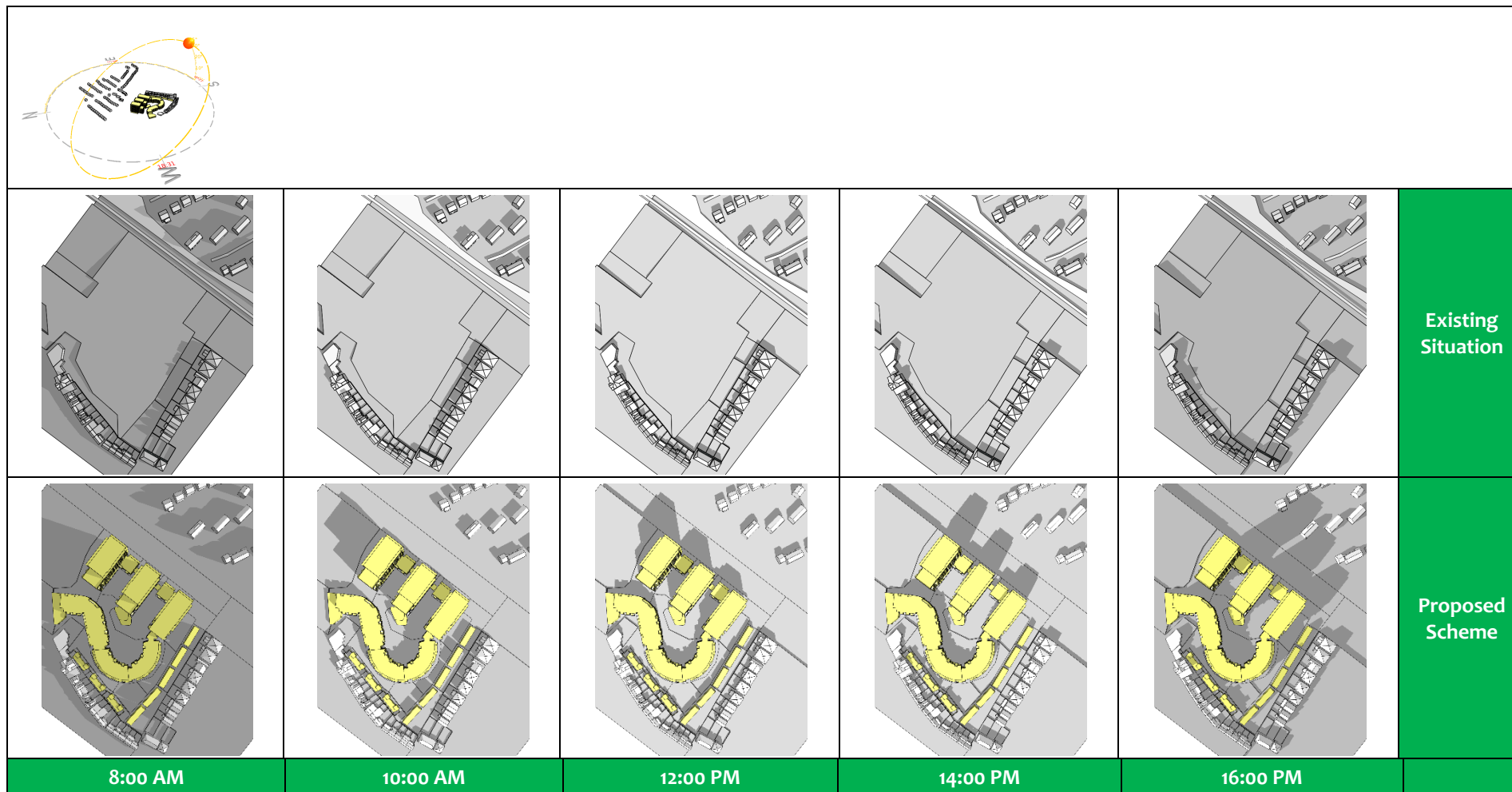


Figure 17.5 March 21st

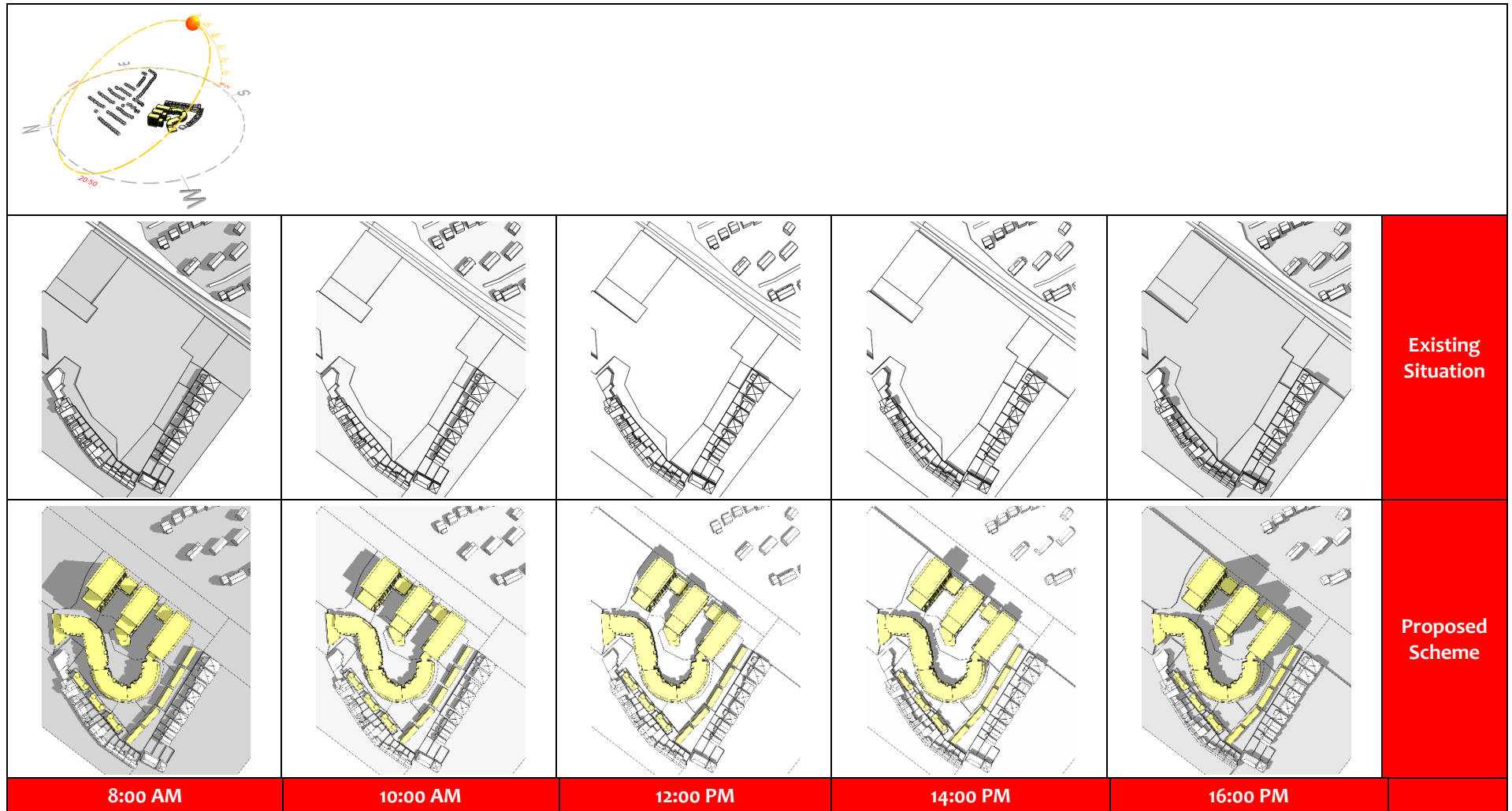


Figure 17.6 - June 21st

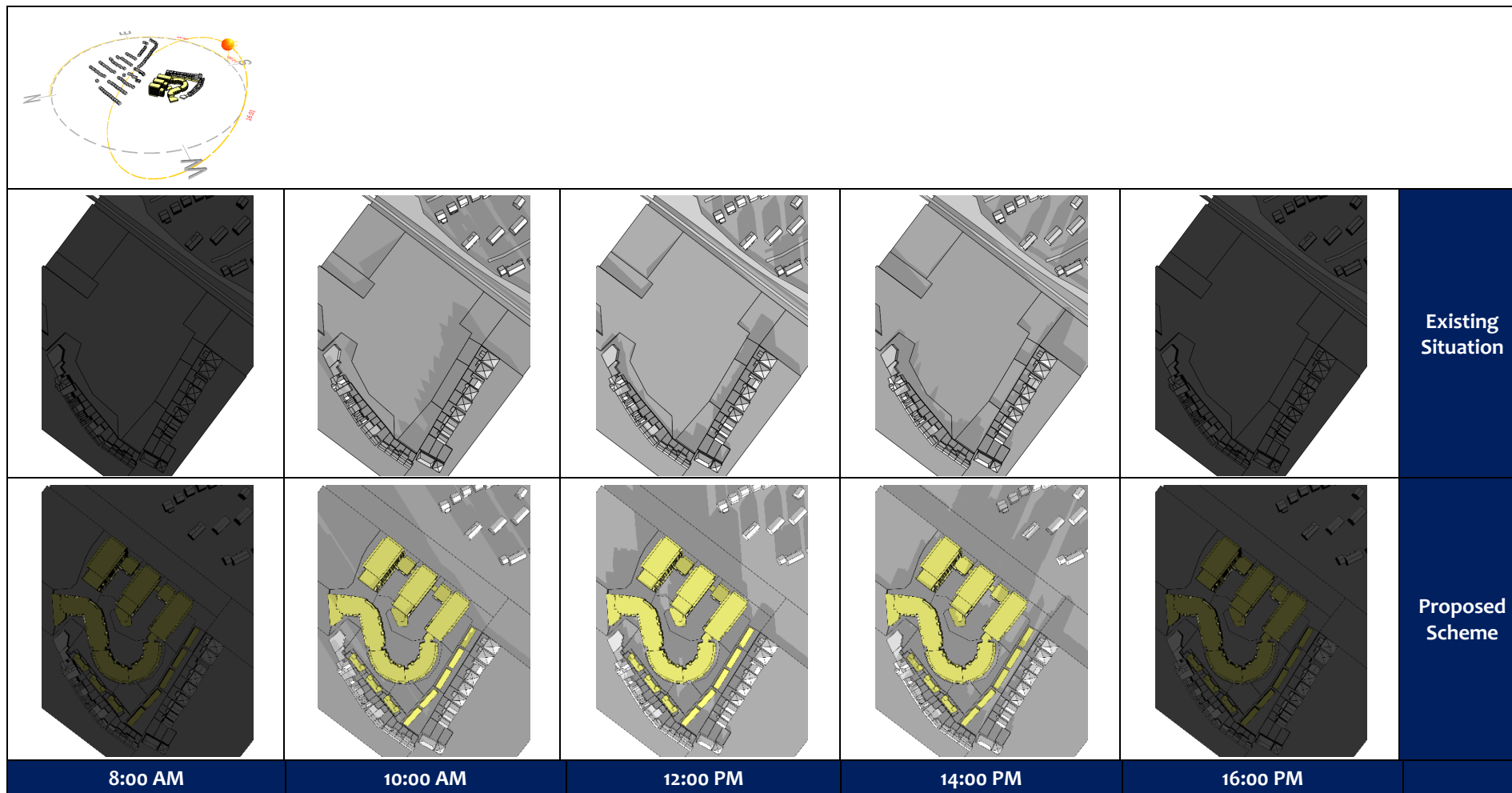


Figure 17.7 December 21st

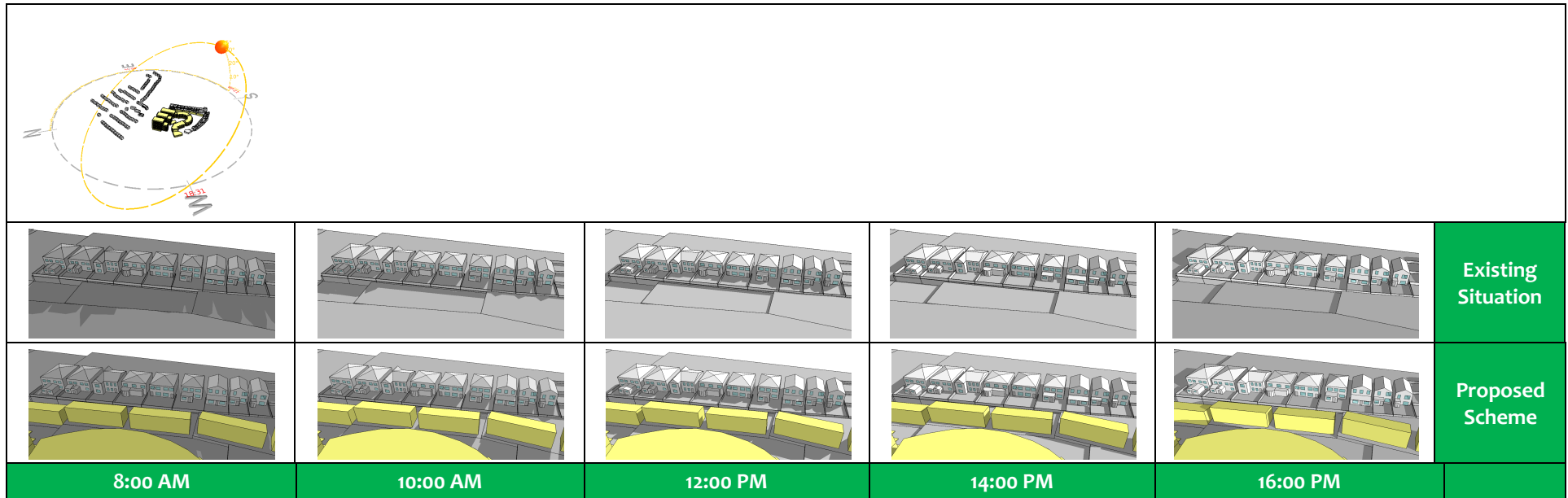


Figure 17.8 - View 01: Looking over Willow Grove - March 21st

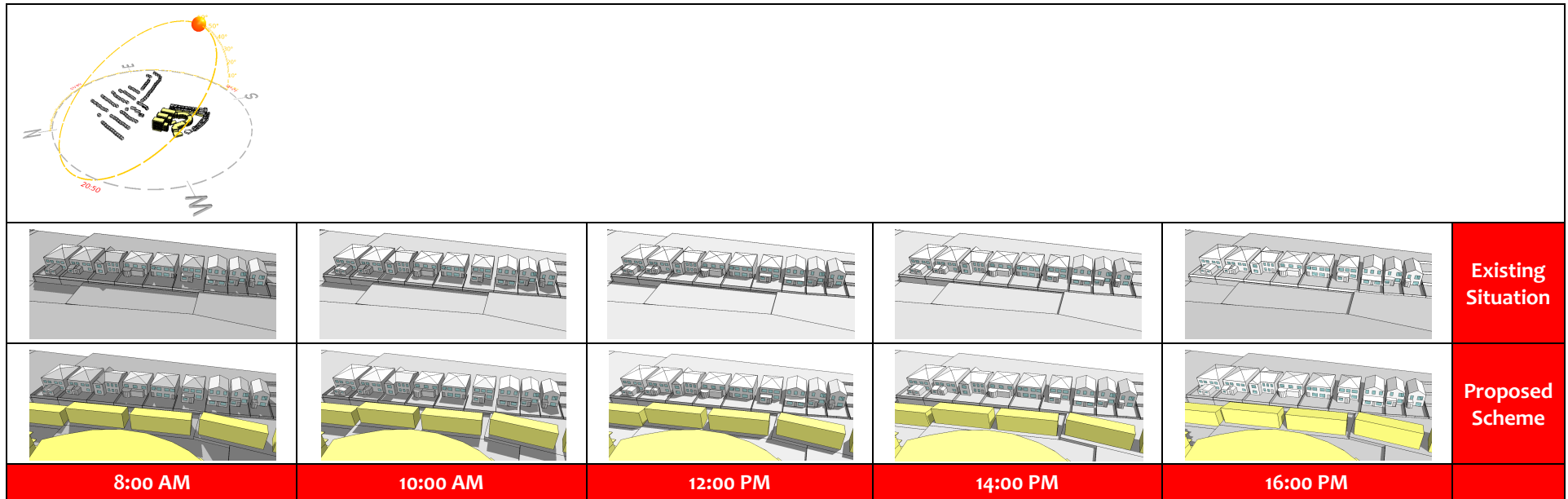


Figure 17.9 – June 21st

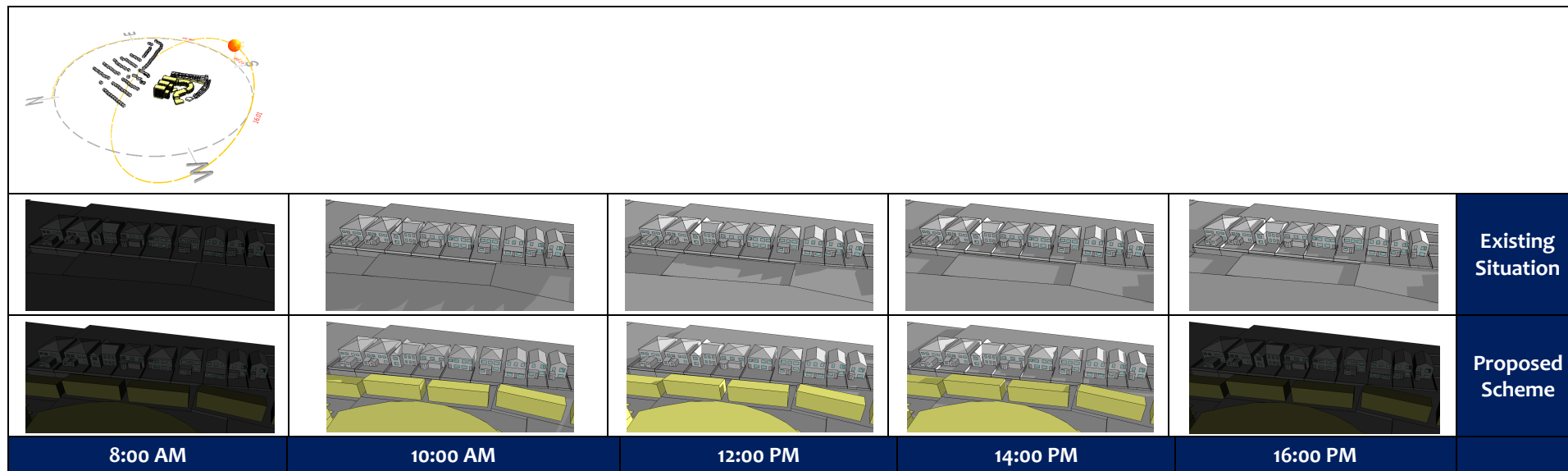


Figure 17.10 - December 21st

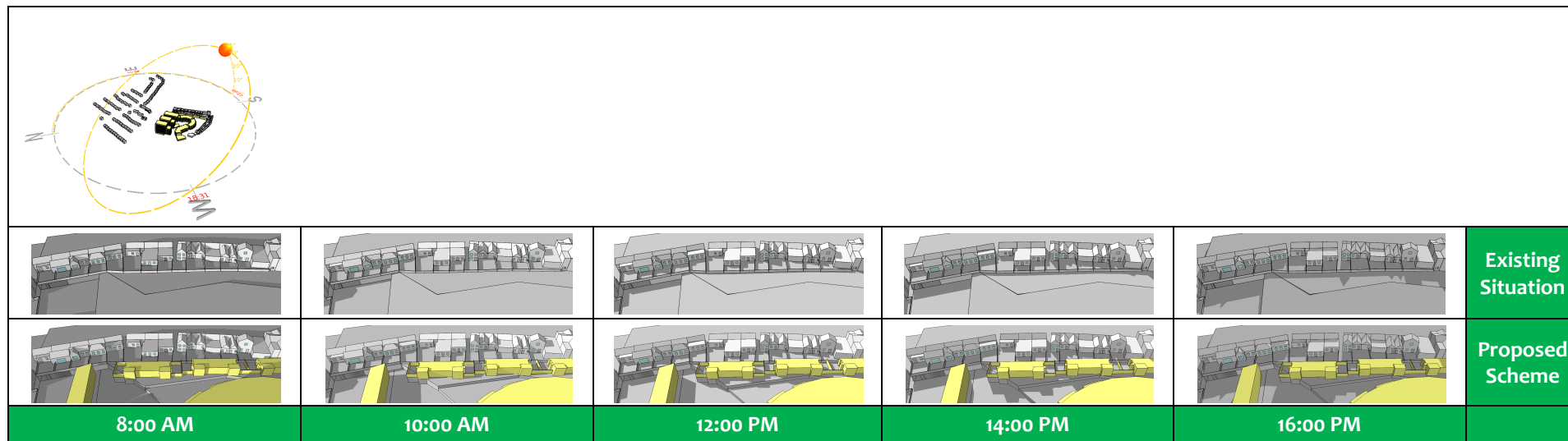


Figure 17.11 - View 02: Looking over Bray Road - March 21st

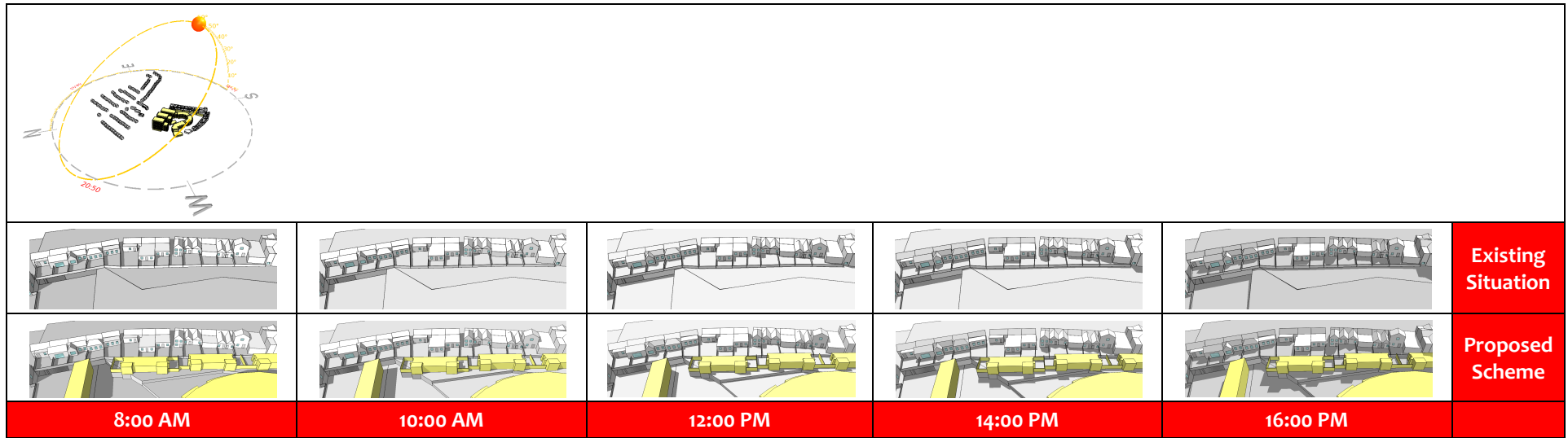


Figure 17.12 - June 21st

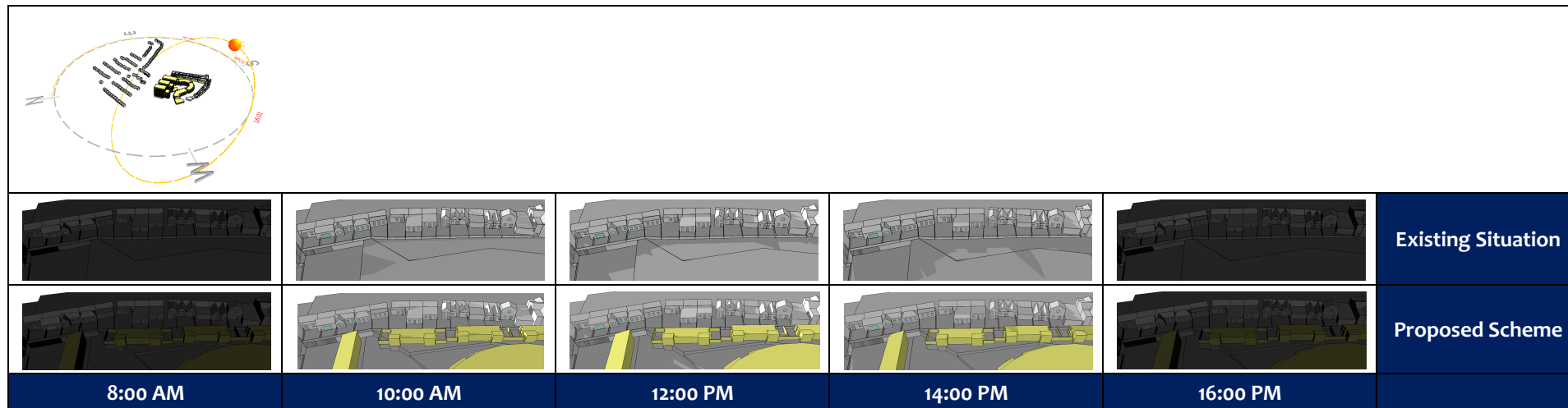
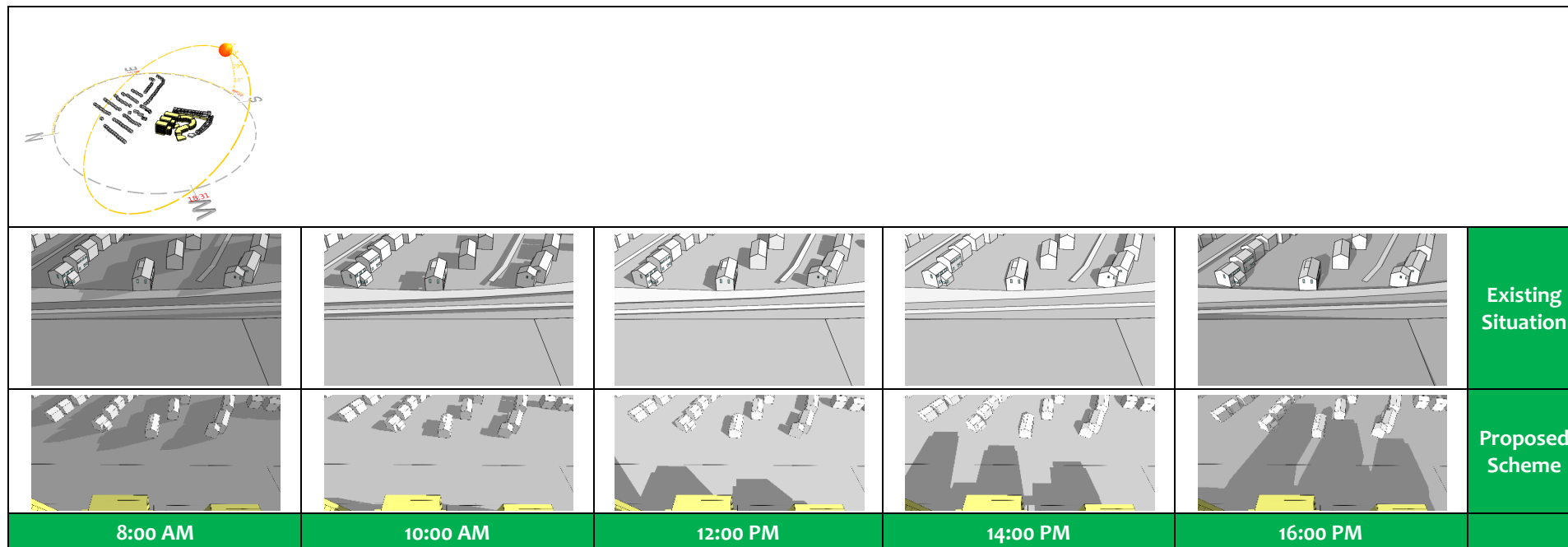


Figure 17.13 - December 21st

View 03: Looking over N11- March 21st



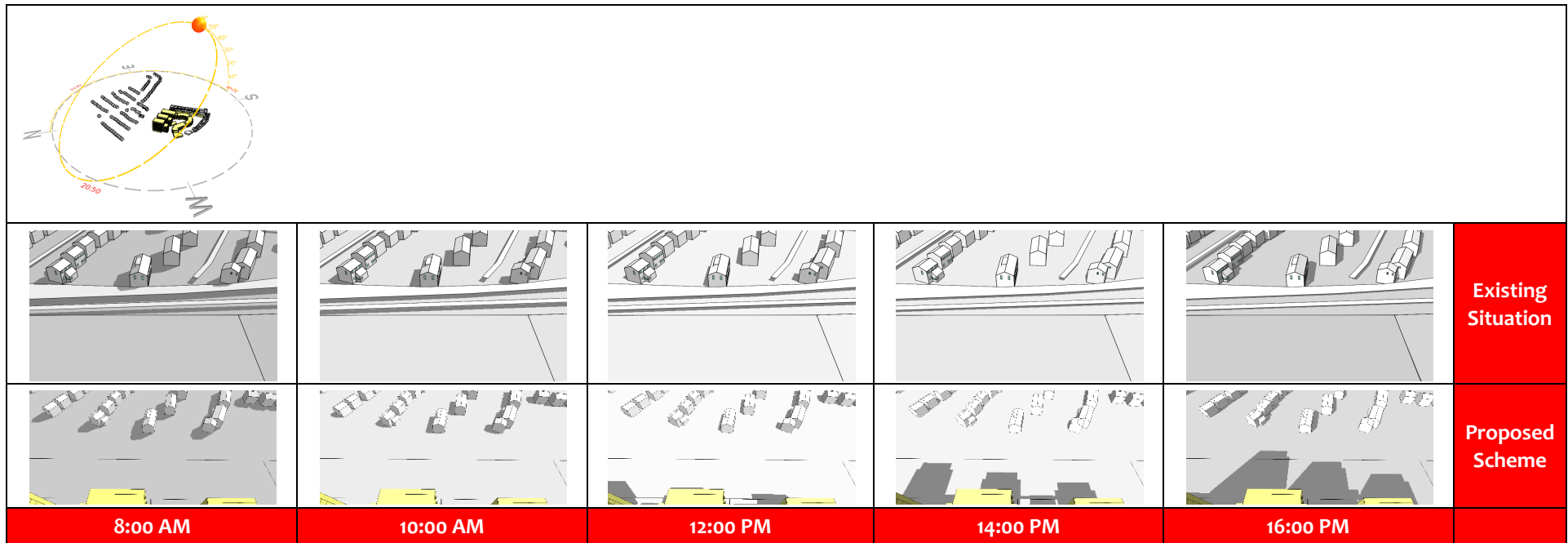


Figure 17.14 - June 21st

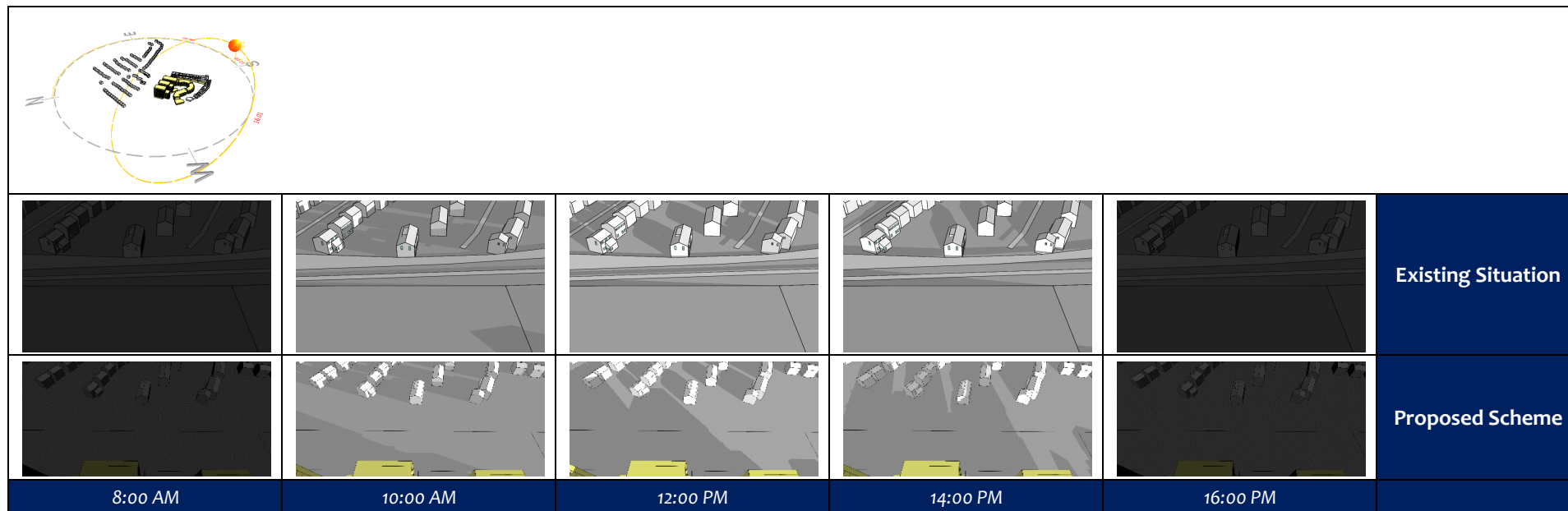


Figure 17.15 - December 21st

Discussion

Shading from the proposed development is summarised as follows based on the analysis of images above:

Morning (until 12h00)

- **Willow Grove & Bray Road Houses** – no additional shading visible from the proposed development on these existing residential dwellings, as they sit to the South of the development site.
- **South Park** – no additional shading visible from the proposed development on these existing residential dwellings, as the majority of the shadows cast by the proposed developments are contained within the site.

Midday (from 12h00 until 16h00)

- **Willow Grove & Bray Road Houses** – no additional shading visible from the proposed development on these existing residential dwellings, as they sit to the South of the development site.
- **South Park** – additional shading visible from the proposed development on these existing residential dwellings during December, as they sit to the North-east of the development site. No additional shading is visible during March and June.

Late Afternoon (from 16h00)

- **Willow Grove & Bray Road Houses** – no additional shading visible from the proposed development on these existing residential dwellings, as they sit to the South of the development site.
- **South Park** – additional shading visible from the proposed development on these existing residential dwellings during March, as they sit to the North-east of the development site. No additional shading is visible during December and June.

Overall, the overshadowing effect on the existing properties can be classed as a ‘Negligible adverse impact’ taking into consideration the overshadowing is limited to the late afternoon during March of South Park with no additional shading to Willow Grove or Bray Road as a result of the proposed development.

Daylight Analysis of Existing Buildings

Guidance Requirements

BRE Site layout planning for daylight and sunlight (Section 2.2)

When designing a new development, it is important to safeguard the daylight to nearby buildings. The BRE's 2011 guidance provide numerical values that are purely advisory. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints. Another issue is whether the Existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light. Any reduction in the total amount of skylight can be calculated by finding the vertical sky component at the centre of key reference points. The vertical sky component definition from the BRE's 2011 is described below;

Vertical sky component (VSC)

Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.

The maximum possible VSC value for an opening in a vertical wall, assuming no obstructions, is 40%. This VSC at any given point can be tested in the Radiance module of the IES VE software. For typical Schemes the BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight which states the following in Section 2.2.7

2.2.7 If this VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear more gloomy, and electric lighting will be needed more of the time.

As such this study will compare the Existing Scheme and Proposed Schemes and consider whether all of the points tested have a VSC above 27% or not less than 80% of their former in line with the BRE recommendations.

Assessment

Willow Grove – Residential

Based on the above, the following locations have been modelled



Willow Grove (A)

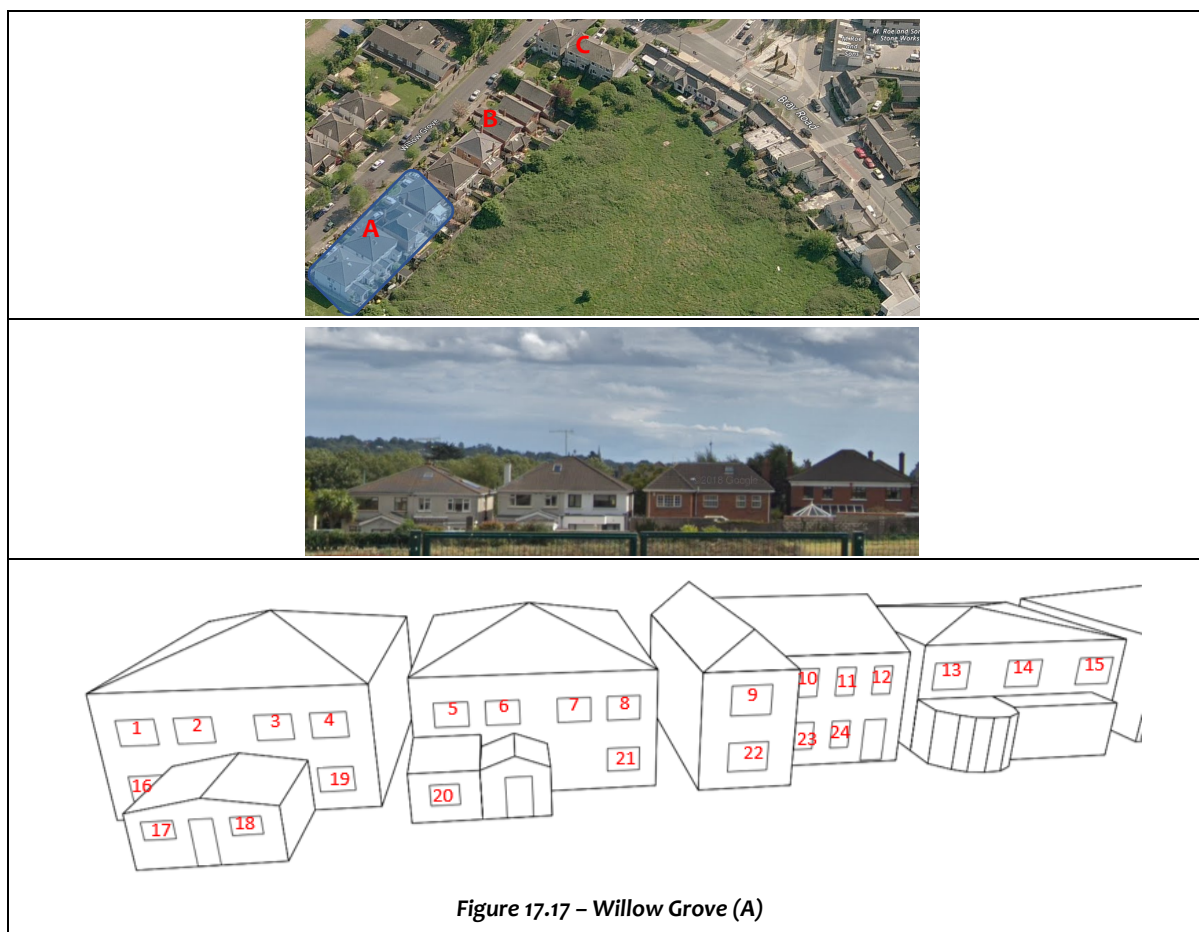


Figure 17.17 – Willow Grove (A)

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	38.91	32.39	83%	✓
2	39.02	32.16	82%	✓
3	38.97	31.95	82%	✓
4	38.78	31.9	82%	✓
5	38.6	32.08	83%	✓
6	38.79	32.38	83%	✓
7	38.88	32.45	83%	✓
8	38.74	31.97	83%	✓
9	38.92	32.64	84%	✓
10	33.07	28.76	87%	✓
11	37.44	31.59	84%	✓
12	38.31	32.71	85%	✓
13	38.06	32.45	85%	✓
14	38.57	33.42	87%	✓
15	38.5	33.62	87%	✓
16	32.47	27.18	84%	✓

17	38.76	28.01	72%	✓
18	38.79	28.54	74%	✓
19	31.66	25.31	80%	✓
20	38.47	29.15	76%	✓
21	37.4	29.42	79%	✓
22	38.48	30.44	79%	✓
23	29.52	23.49	80%	✓
24	35.6	28.15	79%	✓

Table 17.2 – VSC Results Willow Grove (A)

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

Willow Grove (B)

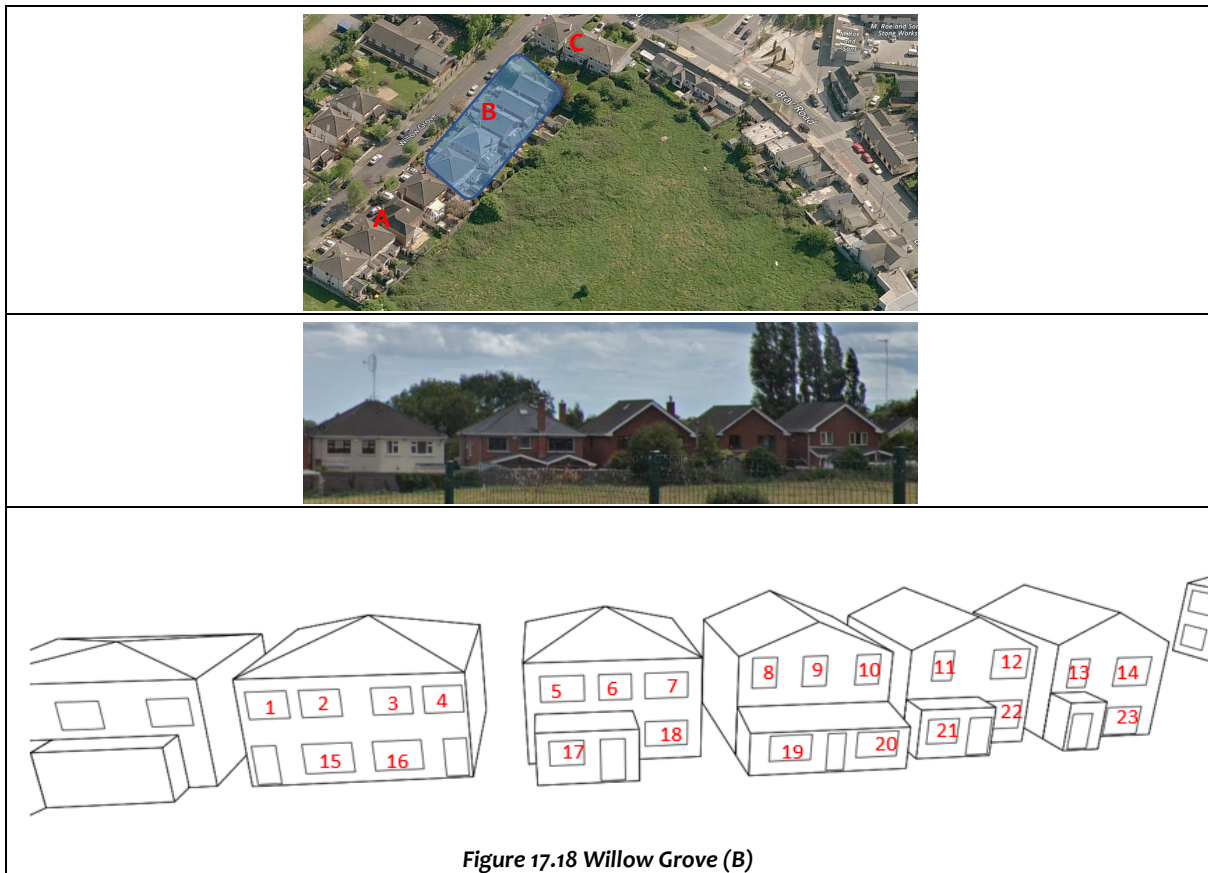


Figure 17.18 Willow Grove (B)

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	38.64	33.64	87%	✓
2	38.65	33.87	88%	✓
3	38.7	33.75	87%	✓
4	38.81	33.87	87%	✓
5	38.38	34.16	89%	✓
6	38.55	34.33	89%	✓
7	38.37	34.6	90%	✓
8	38.43	35.15	91%	✓
9	38.57	35.14	91%	✓
10	38.51	35.36	92%	✓
11	38.56	35.5	92%	✓
12	38.36	35.7	93%	✓
13	38.2	35.38	93%	✓
14	38.1	35.21	92%	✓
15	37.55	31.34	83%	✓
16	37.42	31.63	85%	✓
17	36.99	31.4	85%	✓

18	31.48	28.47	90%	✓
19	33.77	31.37	93%	✓
20	32.72	31.44	96%	✓
21	33.27	31.72	95%	✓
22	31.05	30.1	97%	✓
23	30.5	30.5	100%	✓

Table 17.3– VSC Results Willow Grove (B)

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

Willow Grove (C)

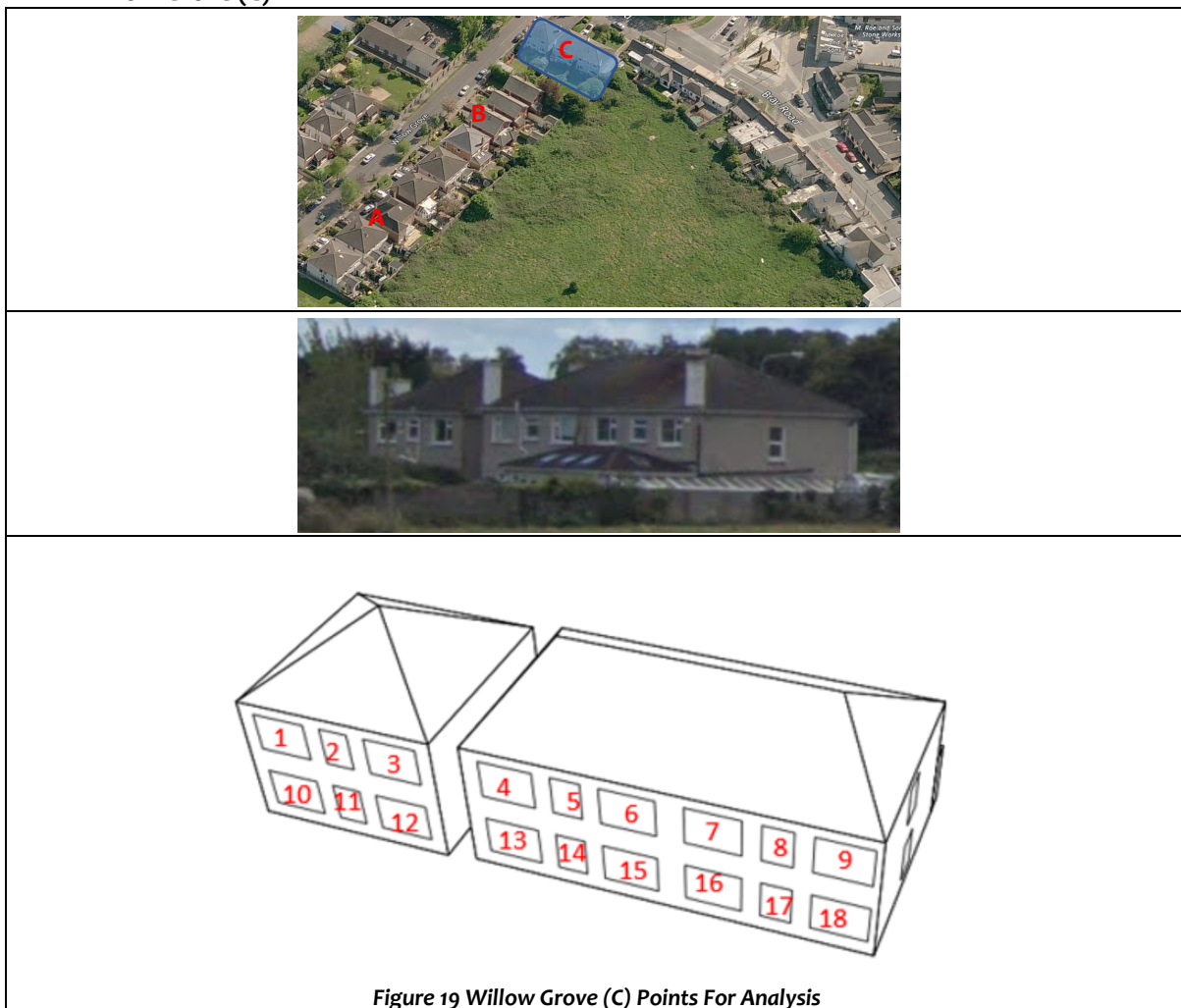


Figure 19 Willow Grove (C) Points For Analysis

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	38.15	37.67	99%	✓
2	38.21	37.4	98%	✓
3	38.12	37.39	98%	✓
4	38.15	37.01	97%	✓
5	38.25	36.63	96%	✓
6	38.1	36.51	96%	✓
7	38.12	36.5	96%	✓
8	38.35	36.42	95%	✓
9	38.32	36.47	95%	✓
10	36.92	36.27	98%	✓
11	36.8	35.85	97%	✓
12	36.58	35.75	98%	✓
13	36.26	35.04	97%	✓
14	35.97	34.9	97%	✓
15	35.84	35.08	98%	✓
16	35.47	34.9	98%	✓
17	34.89	34.89	100%	✓
18	32.67	32.67	100%	✓

Table 17.4 – VSC Results Willow Grove (C)

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

Bray Road – Residential



Bray Road Houses



Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	32.53	31.86	98%	✓
2	37.9	36.29	96%	✓
3	38.56	36.51	95%	✓
4	31.64	29.17	92%	✓
5	33.92	31.32	92%	✓
6	38.75	35.53	92%	✓
7	38.74	35.55	92%	✓
8	38.72	35.74	92%	✓
9	36.66	33.93	93%	✓
10	38.52	35.78	93%	✓
11	38.15	35.76	94%	✓
12	37.28	35.1	94%	✓
13	38.81	33.15	85%	✓
14	38.74	32.94	85%	✓
15	33.05	28.74	87%	✓
16	38.42	33.53	87%	✓
17	39.1	35.87	92%	✓
18	39.1	35.88	92%	✓
19	38.69	33.86	88%	✓
20	28.8	24.42	85%	✓
21	32.83	28.59	87%	✓
22	38.95	31.91	82%	✓
23	38.58	31.11	81%	✓
24	38.88	34.63	89%	✓
25	38.84	28.89	74%	✓

Table 17.5 - VSC Results Bray Road

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

South Park – Residential



Figure 17.22 South Park Residential

74 & 76 South Park Houses



Figure 17.23 - 74 & 76 South Park - Points For Analysis

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	38.78	34.77	90%	✓
2	38.34	35.28	92%	✓
3	38.36	35.42	92%	✓
4	38.15	35.62	93%	✓
5	37.58	35.68	95%	✓
6	37.8	35.69	94%	✓
7	37.82	35.83	95%	✓
8	37.77	35.98	95%	✓
9	29.44	25.77	88%	✓
10	26.61	22.05	83%	✓
11	36.53	33.43	92%	✓
12	35.18	33.57	95%	✓
13	35.78	33.81	94%	✓
14	35.94	33.72	94%	✓

Table 17.6 – VSC Results South Park

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

50 & 52 South Park Houses



Figure 17.24 – 50 & 52 South Park – Points For Analysis

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	38.92	38.09	98%	✓
2	38.84	38.06	98%	✓
3	39.01	37.94	97%	✓
4	38.05	37.4	98%	✓
5	38.11	37.29	98%	✓
6	38.26	37.08	97%	✓
7	38.44	37.14	97%	✓
8	38.45	31.87	83%	✓
9	38.45	32.31	84%	✓
10	36.05	34.83	97%	✓
11	38.86	35.29	91%	✓
12	38.32	37.72	98%	✓
13	38.12	37.5	98%	✓
14	37.98	37.38	98%	✓
15	37.38	37.02	99%	✓
16	36.86	36.05	98%	✓
17	36.89	35.96	97%	✓
18	36.55	35.61	97%	✓
19	35.86	35.34	99%	✓
20	35.39	34.83	98%	✓

Table 17.7 – VSC Results South Park

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

46 & 48 South Park Houses

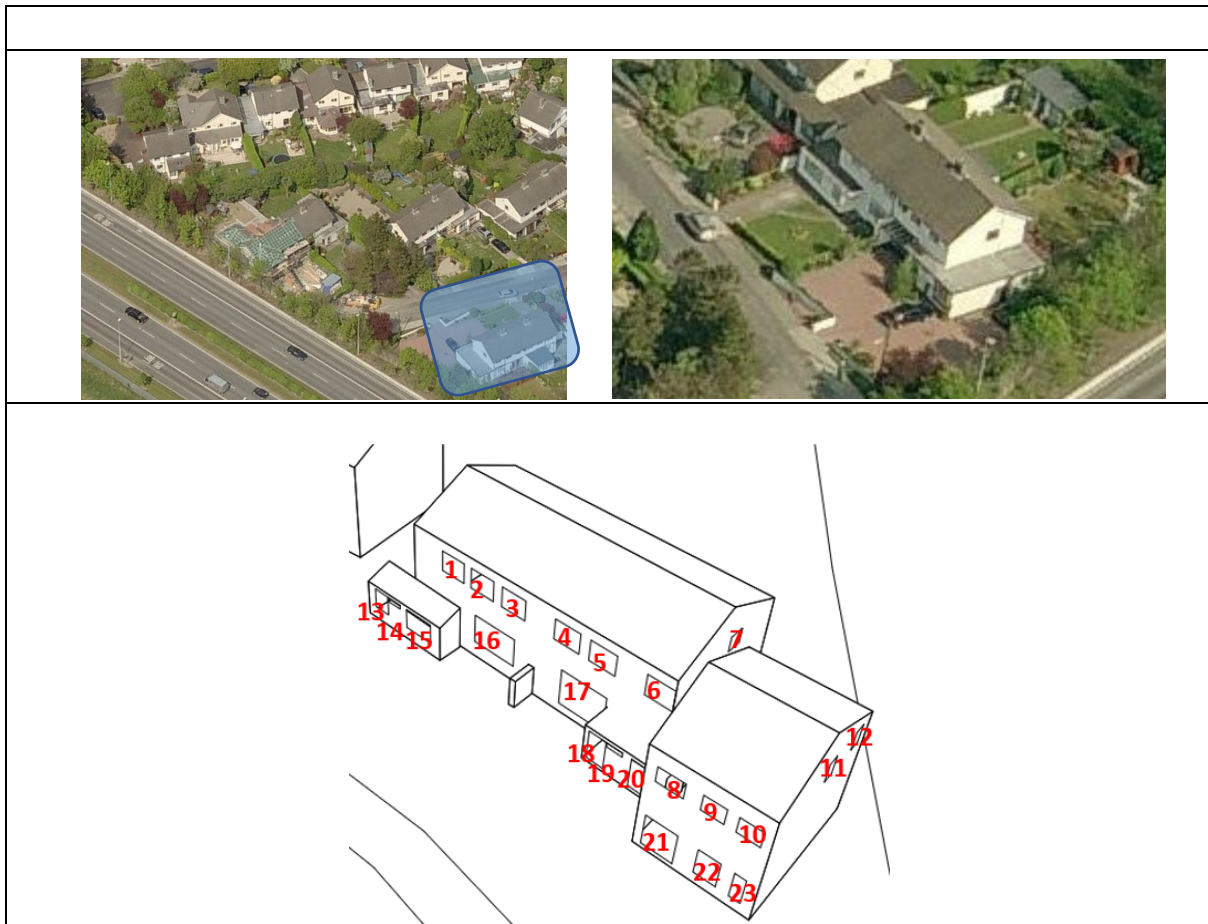


Figure 17.25- 46 & 48 South Park – Points For Analysis

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed VSC as % of Existing Scheme	Comment
1	37.71	37.13	98%	✓
2	37.64	37.17	99%	✓
3	37.54	37.03	99%	✓
4	37.28	37.02	99%	✓
5	36.73	36.71	100%	✓
6	31.53	31.42	100%	✓
7	32.45	30.63	94%	✓
8	37.58	36.76	98%	✓
9	37.73	36.67	97%	✓
10	37.75	36.84	98%	✓
11	38.66	34.44	89%	✓
12	38.65	34.2	88%	✓
13	34.99	34.4	98%	✓
14	35.35	34.81	98%	✓
15	34.95	34.67	99%	✓
16	35.34	34.6	98%	✓
17	33.13	32.84	99%	✓
18	33.07	33.1	100%	✓
19	32.34	32.31	100%	✓
20	24.72	24.81	100%	✓
21	35.08	33.97	97%	✓
22	35.26	34.72	98%	✓
23	35.27	34.65	98%	✓

Table 17.8– VSC Results South Park

The following conclusions can be made:

- ✓ All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

Discussion

For the following locations considered:

- Willow Grove Dwellings
- Bray Road Dwellings
- South Park Dwellings

All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

The results show that the impact of the proposed development can be classified under the BRE as a 'negligible to minor adverse impacts' considering the guidelines in the BRE report are fully met.

Sunlight to the Existing and Proposed Amenity Spaces

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.

Existing Amenity Areas

As stated above 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.

This analysis will be performed on the following existing amenity spaces shown in the images below:



Figure 17.26 – Existing Amenity Areas

Willow Grove and Bray Road Rear Gardens

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

Existing Situation: showing hours > 2 in red
(Any gridded cells area below 2 hours are shown as grey)



Proposed Scheme: showing hours > 2 in red
(Any gridded cells area below 2 hours are shown as grey)



Figure 17.27 – Solar Analysis Results

South Park Gardens

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

Existing Situation: showing hours > 2 in green

(Any gridded cells area below 2 hours are shown as grey)



Proposed Scheme: showing hours > 2 in green

(Any gridded cells area below 2 hours are shown as grey)



Figure 17.28– Solar Analysis Results

Willow Gardens and Bray Road Solar Amenity Results:

Amenity Area	Total Area Provided		Minimum Area Required	Existing Area > 2 Hrs	Proposed Area > 2 Hrs	% difference	Comment
1	399	199.5	319.2	399	397	1%	✓
2	70	35	38.4	48	46	4%	✓
3	52	26	31.2	39	38	3%	✓
4	59	29.5	33.6	42	42	0%	✓
5	88	44	43.2	54	52	4%	✓
6	56	28	34.4	43	42	2%	✓
7	58	29	24.8	31	30	3%	✓
8	41	20.5	23.2	29	29	0%	✓
9	116	58	77.6	97	93	4%	✓
10	79	39.5	38.4	48	48	0%	✓
11	58	29	26.4	33	33	0%	✓
12	59	29.5	20	25	25	0%	✓
13	41	20.5	14.4	18	17	6%	✓
14	62	31	32.8	41	41	0%	✓
15	191	95.5	110.4	138	135	2%	✓
16	170	85	90.4	113	113	0%	✓
17	172	86	106.4	133	132	1%	✓
18	75	37.5	48.8	61	59	3%	✓
19	72	36	36.8	46	44	4%	✓
20	71	35.5	43.2	54	53	2%	✓
21	128	64	71.2	89	87	2%	✓
22	131	65.5	89.6	112	105	6%	✓
23	108	54	68	85	84	1%	✓
24	110	55	68.8	86	86	0%	✓
25	99	49.5	63.2	79	74	6%	✓
26	81	40.5	33.6	42	40	5%	✓

Table 17.9 – Solar Amenity Results Willow Gardens and Bray Road

South Park Gardens Results:

Amenity Area	Total Area Provided		Minimum Area Required	Existing Area > 2 Hrs	Proposed Area > 2 Hrs	% difference	Comment
1	354	177	283.2	354	354	0%	✓
2	640	320	508.8	636	588	8%	✓
3	410	205	327.2	409	391	4%	✓
4	270	135	216	270	267	1%	✓

Table 17.10 Solar Amenity Results – South Park Gardens

Discussion

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.

The images above show the following:

- **Willow Grove and Bray Road:**

The results show, that with the Proposed Scheme in place, the existing amenity garden spaces would continue to receive at least 2 hours of sunlight on the 21st of March across half of the area in line with the BRE recommendations. It can also be noted that there is very little impact because of the proposed development.

The garden amenity areas highlighted below, in the existing situation, do not receive 2 hours of sunlight for over half of the amenity area. The reduction in sunlight for these two rear gardens in the proposed scenario is no more than 20% of the existing situation, in line with the BRE recommendations.

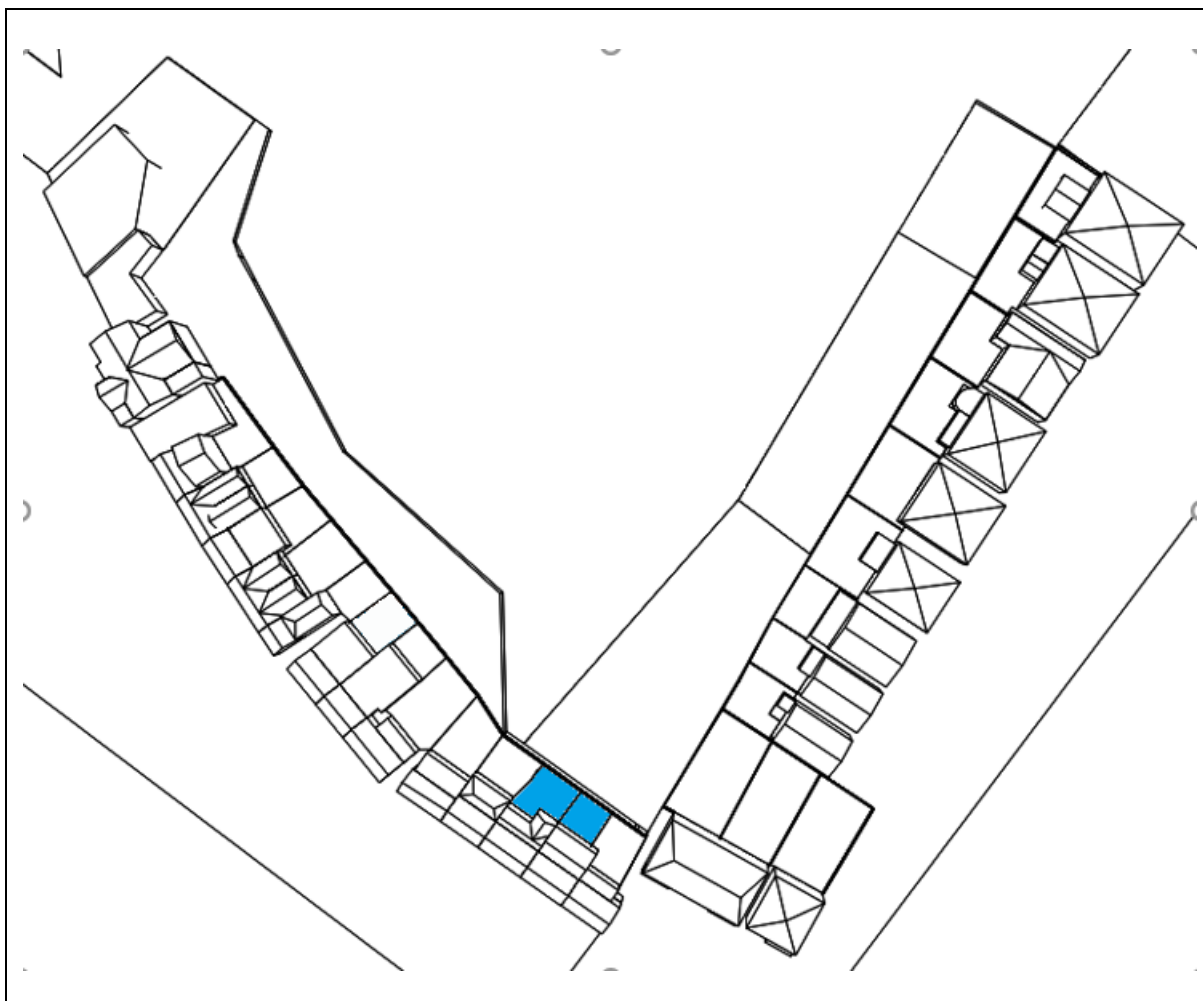


Figure 17.29 – Amenity Spaces below Requirement in Existing Situation

- **South Park:**

The results show, that with the Proposed Scheme in place, the existing amenity garden spaces would continue to receive at least 2 hours of sunlight on the 21st of March across half of the area in line with the BRE recommendations. It can also be noted that there is very little impact because of the proposed development.

Proposed Amenity Areas

As stated above 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.

This analysis will be performed on the proposed amenity spaces shown in the image below:

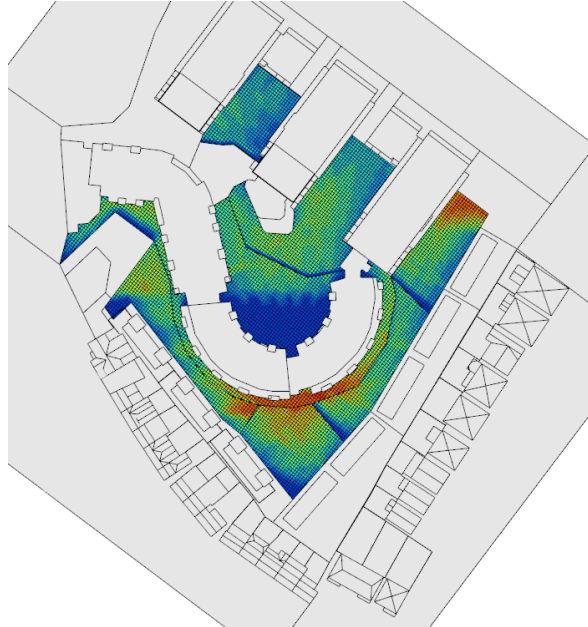
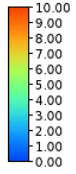


Figure 17.30 – Proposed Amenity Spaces

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

Absolute Scale showing all hours

21/Mar - 00:00 to 21/Mar - 23:00
Hours



Custom Scale - showing hours > 2 in red

(Any gridded cells area below 2 hours are shown as grey)

21/Mar - 00:00 to 21/Mar - 23:00
Hours

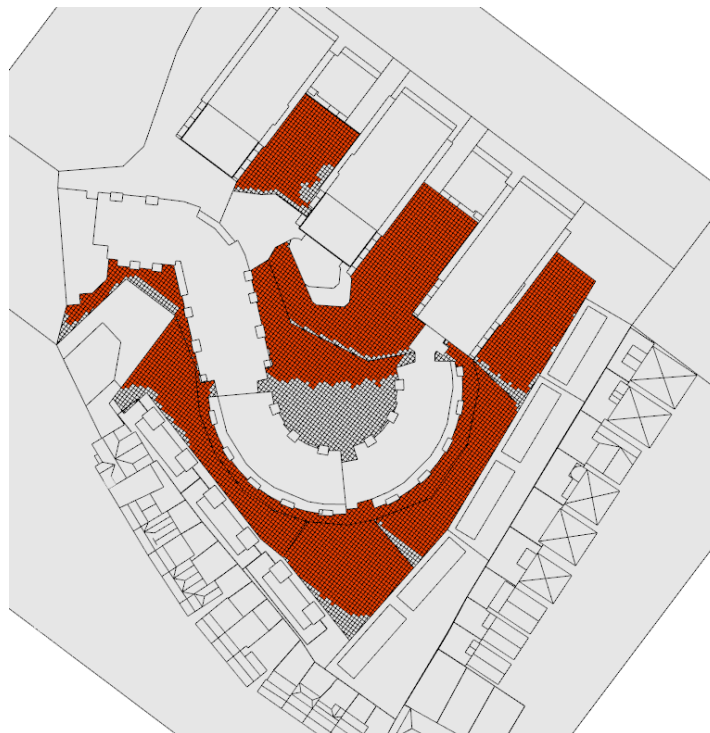
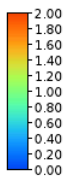


Figure 17.31 - Proposed Amenity Space Results

Discussion

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.

The images above show on the 21st of March for the proposed scheme amenity areas, over half of the amenity spaces would receive at least 2 hours of sunlight in line with the BRE recommendations.

Average Daylight Factors

This section addresses daylight to the proposed apartments.

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).

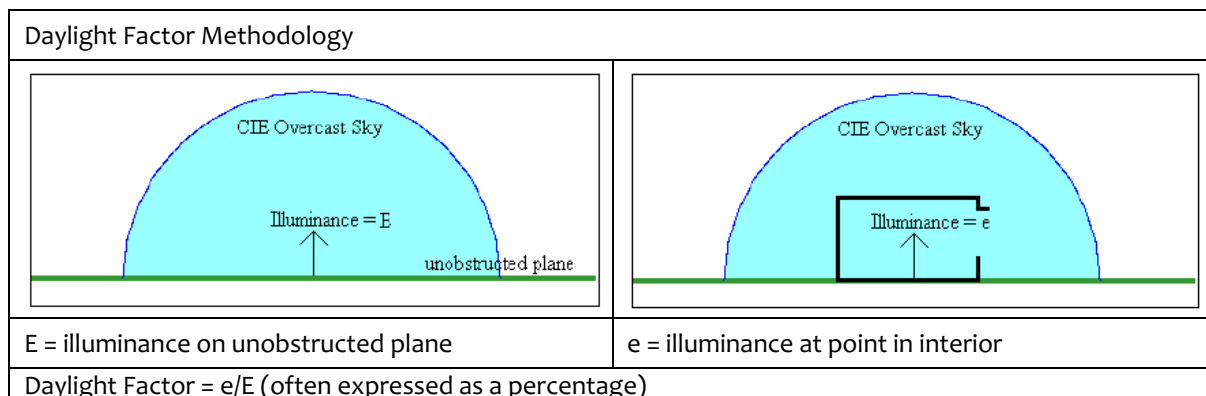
<p>C4 If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These additional recommendations are minimum values of ADF which should be attained even if a predominantly daylit appearance is not achievable.</p>
<p>From BRE’s 2011 guidance document Site Layout Planning for Daylight and Sunlight</p>

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.



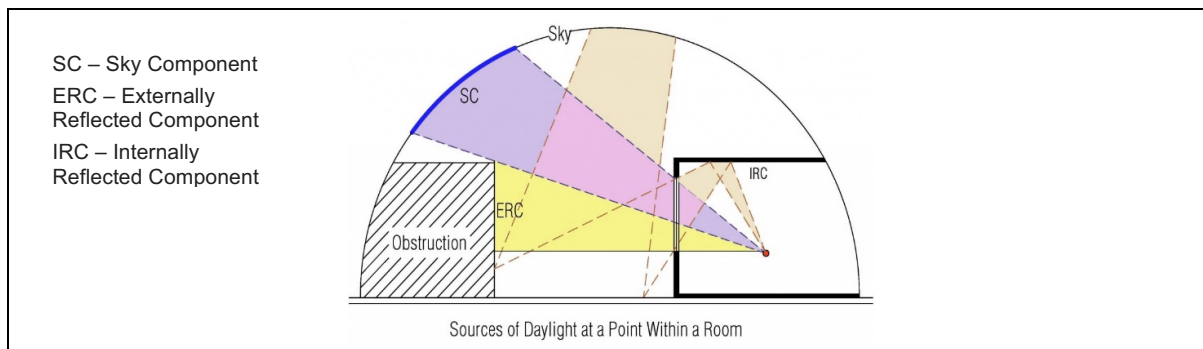


Figure 17.32 Daylight Factor Methodology

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.

Assumptions

The following assumptions are to be used in the study:

- Sky Conditions Standard CIE overcast sky
- Time (24hr) 12:00
- Date 21 September
- Working Plane 0.85m
- Ground Floor - Floor to Ceiling Height 2.70 m
- First Floor - Floor to Ceiling Height 2.45 m

The following surface reflectance's were used:

Material Surface	Reflectance
External Wall	0.50
Internal Partition	0.50
Roof	0.20
Ground	0.20
Floor/Ceiling (Floor)	0.20
Floor/Ceiling (Ceiling)	0.70

Glazing Transmittance:

- Light Transmittance 70%
- Assumed Window Frame thickness 50 mm

Average Daylight Factor Results

Block 1

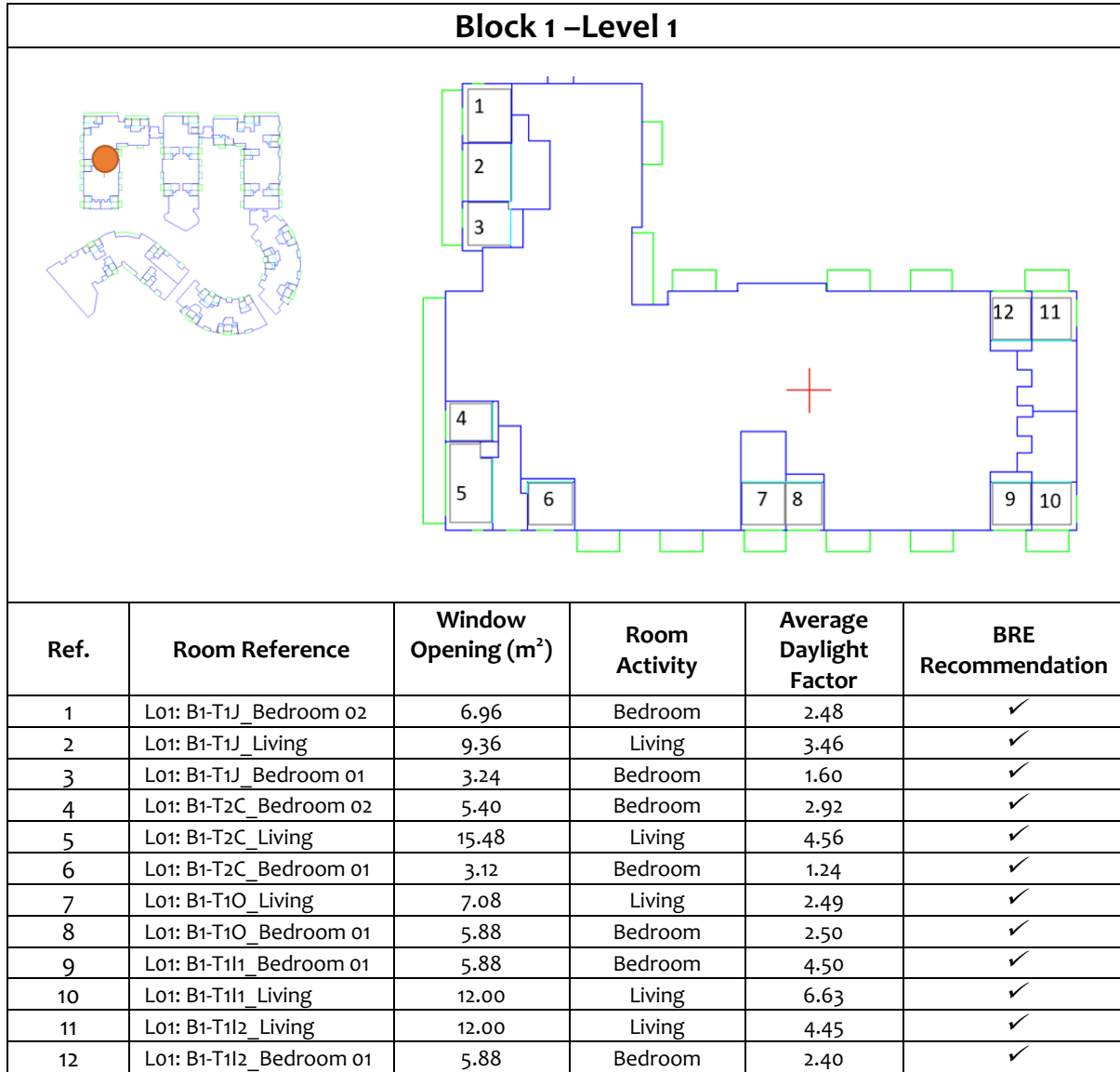


Table 17.11 - Average Daylight Factor Results Block 1, Level 1

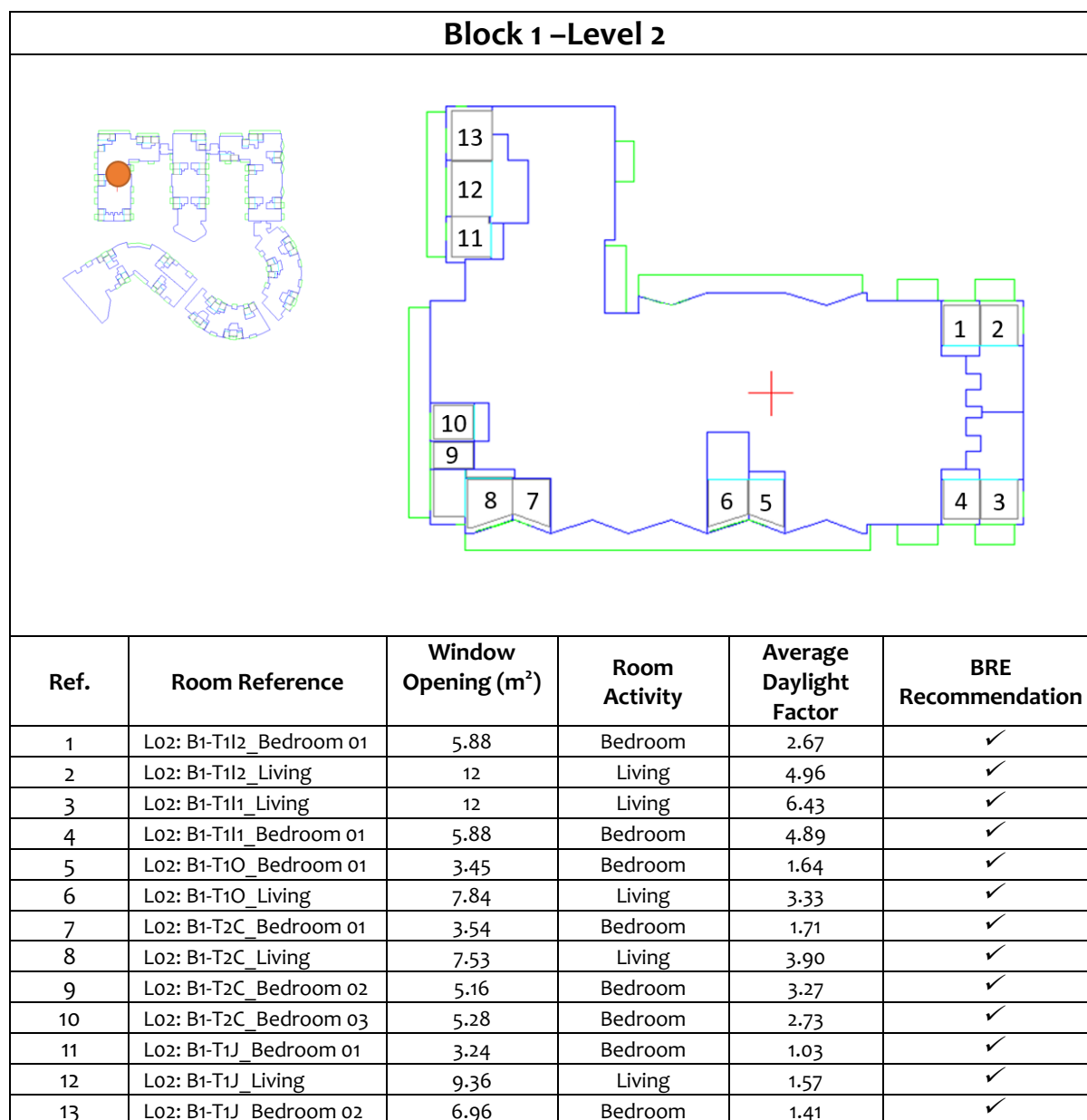


Table 17.12- Average Daylight Factor Results Block 1, Level 2

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

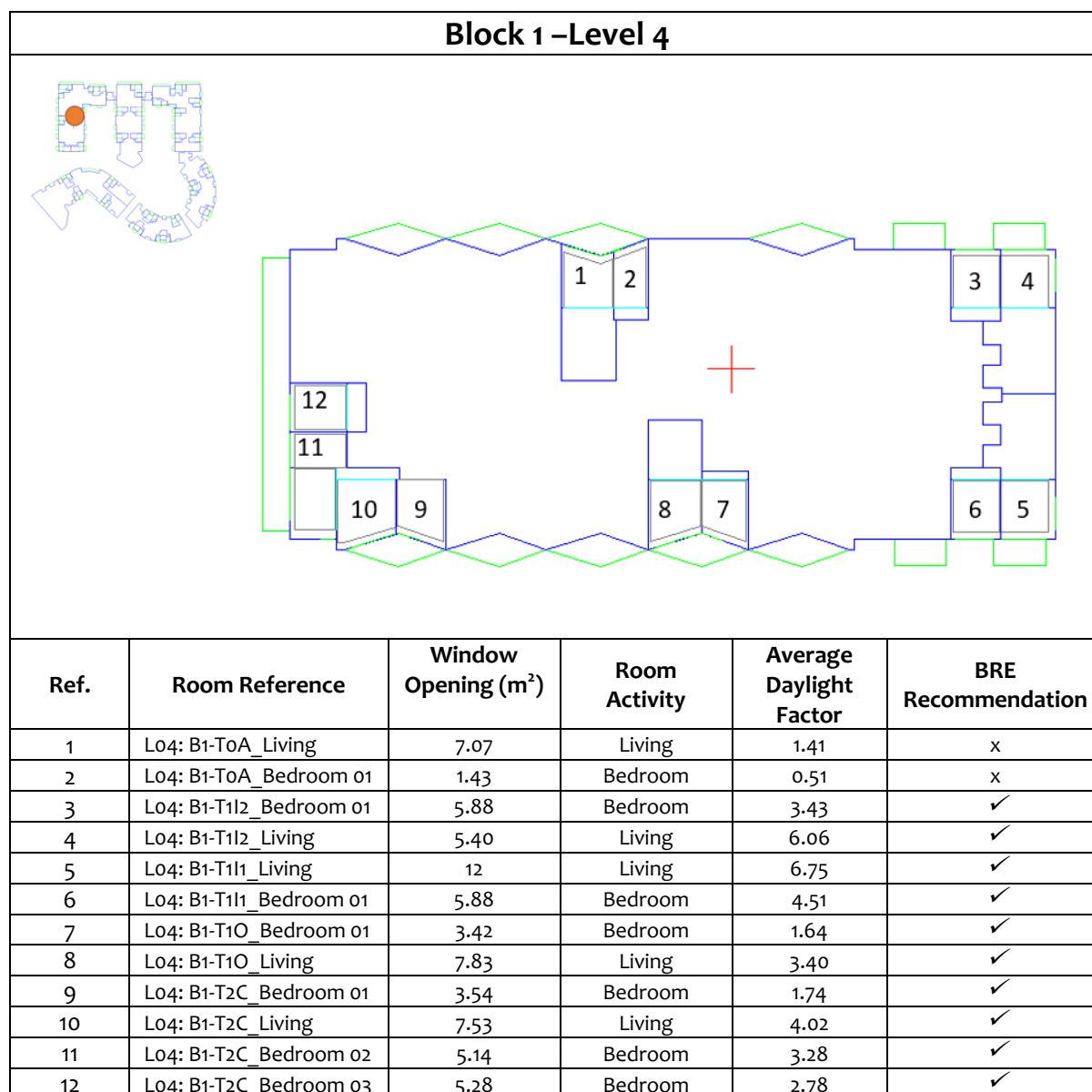


Table 17.13- Average Daylight Factor Results Block 1, Level 4

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 2

Block 2 – Level 01					
Ref.	Room Reference	Window Opening (m ²)	Room Activity	Average Daylight Factor	BRE Recommendation
1	L01: B2-T2S_Bedroom 01	4.80	Bedroom	2.62	✓
2	L01: B2-T2S_Living	10.56	Living	3.48	✓
3	L01: B2-T2S_Bedroom 02	3.00	Bedroom	0.27	x
4	L01: B2-T1A4_Living	6.96	Living	2.09	✓
5	L01: B2-T1A4_Bedroom 01	5.88	Bedroom	1.65	✓
6	L01: B2-T1A3_Bedroom 01	5.88	Bedroom	1.44	✓
7	L01: B2-T1A3_Living	6.96	Living	2.07	✓
8	L01: B2-T1A1_Bedroom 01	5.88	Bedroom	0.77	x
9	L01: B2-T1A1_Living	6.96	Living	0.67	x

Table 17.14- Average Daylight Factor Results Block 2, Level 1

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 2 –Level 02					
Ref.	Room Reference	Window Opening (m ²)	Room Activity	Average Daylight Factor	BRE Recommendation
1	L02: B2-T2S_Living	12.1	Living	4.05	✓
2	L02: B2-T2S_Bedroom 02	4.55	Bedroom	1.1	✓
3	L02: B2-T1A2_Living	7.87	Living	1.8	✓
4	L02: B2-T1A2_Bedroom 01	3.4	Bedroom	1.09	✓
5	L02: B2-T1K1_Bedroom 01	3	Bedroom	1.44	✓
6	L02: B2-T1K1_Living	6.96	Living	1.85	✓
7	L02: B2-T1K2_Living	6.96	Living	1.81	✓
8	L02: B2-T1K2_Bedroom 01	3	Bedroom	1.43	✓
9	L02: B2-T1A1_Bedroom 01	3.53	Bedroom	0.62	x
10	L02: B2-T1A1_Living	7.9	Living	1.52	✓
11	L02: B2-T2S_Bedroom 01	5.4	Bedroom	2.91	✓

Table 17.15- Average Daylight Factor Results Block 2, Level 2

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 2 -Level 04					
Ref.	Room Reference	Window Opening (m ²)	Room Activity	Average Daylight Factor	BRE Recommendation
1	L04: B2-T2S_Living	13.68	Living	5.18	✓
2	L04: B2-T2S_Bedroom 02	3.48	Bedroom	1.10	✓
3	L04: B2-T1A2_Living	7.87	Living	2.88	✓
4	L04: B2-T1A2_Bedroom 01	3.4	Bedroom	1.3	✓
5	L04: B2-T1K1_Bedroom 01	3	Bedroom	1.80	✓
6	L04: B2-T1K1_Living	6.96	Living	2.62	✓
7	L04: B2-T1K2_Living	6.96	Living	1.66	✓
8	L04: B2-T1K2_Bedroom 01	3	Bedroom	1.26	✓
9	L04: B2-T1A1_Bedroom 01	3.5	Bedroom	0.80	x
10	L04: B2-T1A1_Living	7.9	Living	1.51	✓
11	L04: B2-T2S_Bedroom 01	5.4	Bedroom	2.93	✓

Table 17.16- Average Daylight Factor Results Block 2, Level 4

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 3

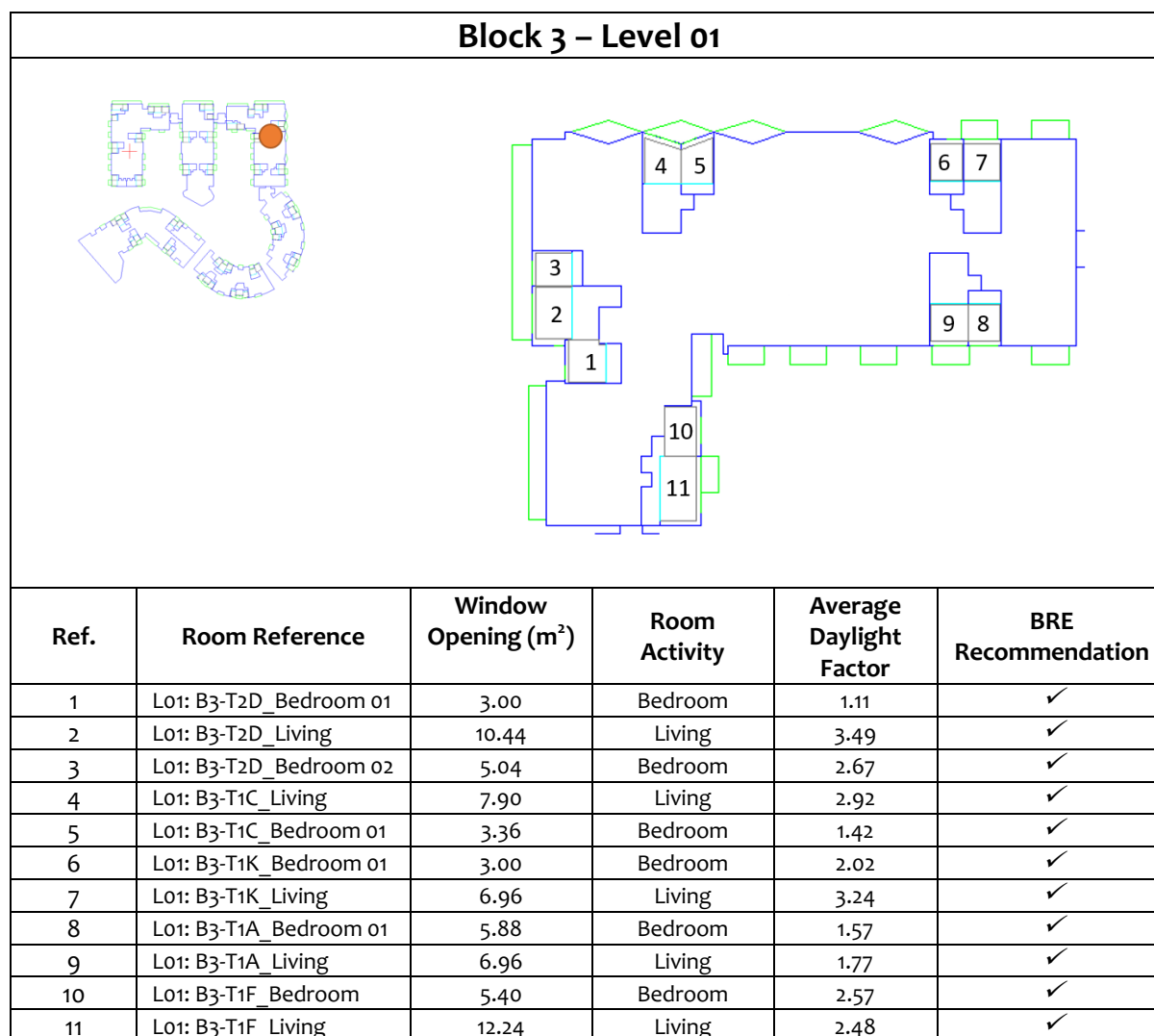


Table 17.17- Average Daylight Factor Results Block 3, Level 1

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 3 - Level 02					
Ref.	Room Reference	Window Opening (m ²)	Room Activity	Average Daylight Factor	BRE Recommendation
1	L02: B3-T1C_Living	7.9	Bedroom	3.23	✓
2	L02: B3-T1C_Bedroom 01	3.36	Living	1.56	✓
3	L02: B3-T1K1_Bedroom 01	3	Bedroom	1.93	✓
4	L02: B3-T1K1_Living	6.96	Living	2.91	✓
5	L02: B3-T1K2_Living	6.96	Bedroom	2.02	✓
6	L02: B3-T1K2_Bedroom 01	3.00	Bedroom	1.17	✓
7	L02: B3-T1F_Bedroom	5.4	Living	2.46	✓
8	L02: B3-T1F_Living	12.2	Bedroom	2.96	✓
9	L02: B3-T2D_Bedroom 01	3	Living	1.04	✓
10	L02: B3-T2D_Living	10.4	Bedroom	3.10	✓
11	L02: B3-T2D_Bedroom 02	5.04	Living	2.62	✓

Table 17.18- Average Daylight Factor Results Block 3, Level 2

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

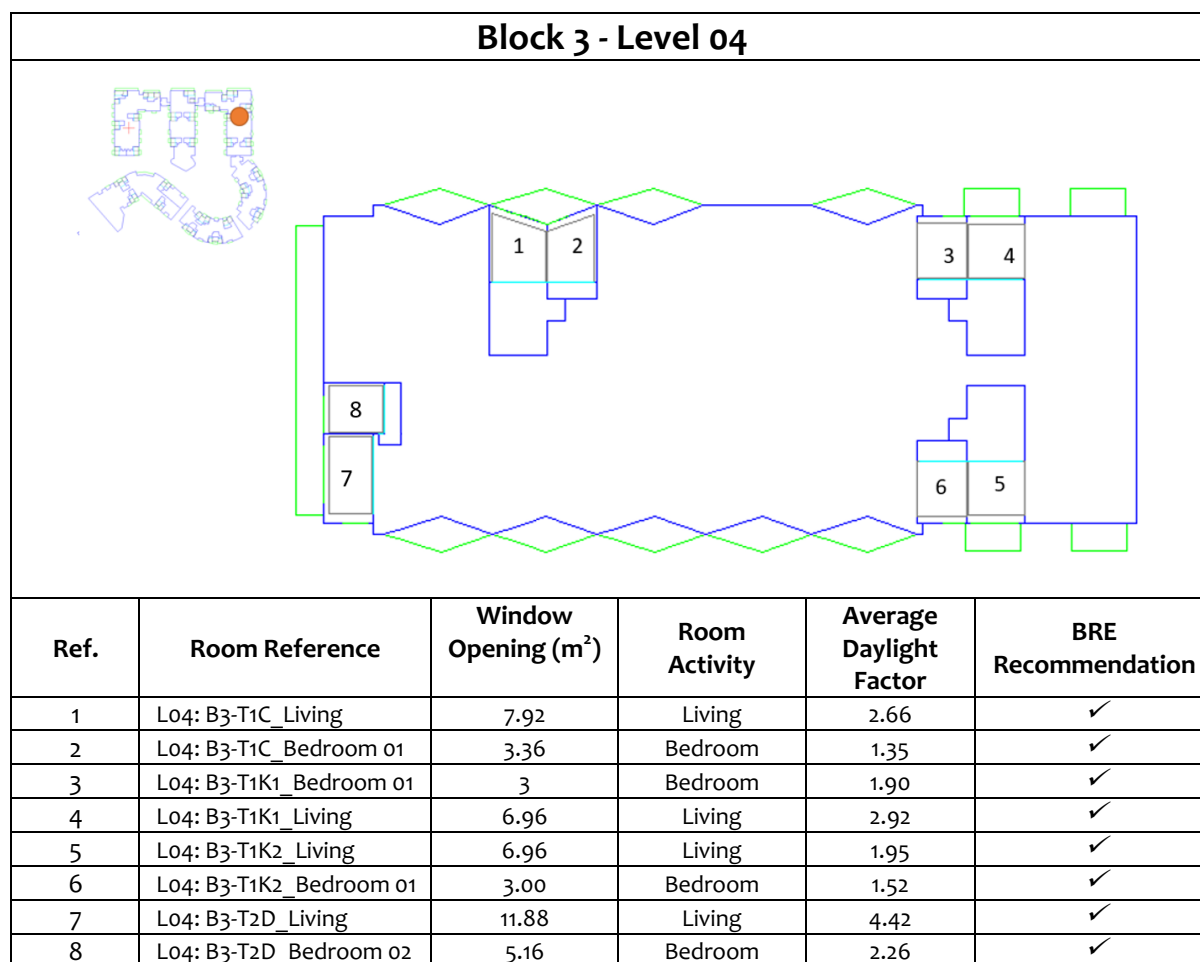


Table 17.19- Average Daylight Factor Results Block 3, Level 4

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE’s 2011 guidance document Site Layout Planning for Daylight and Sunlight. Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Block 4

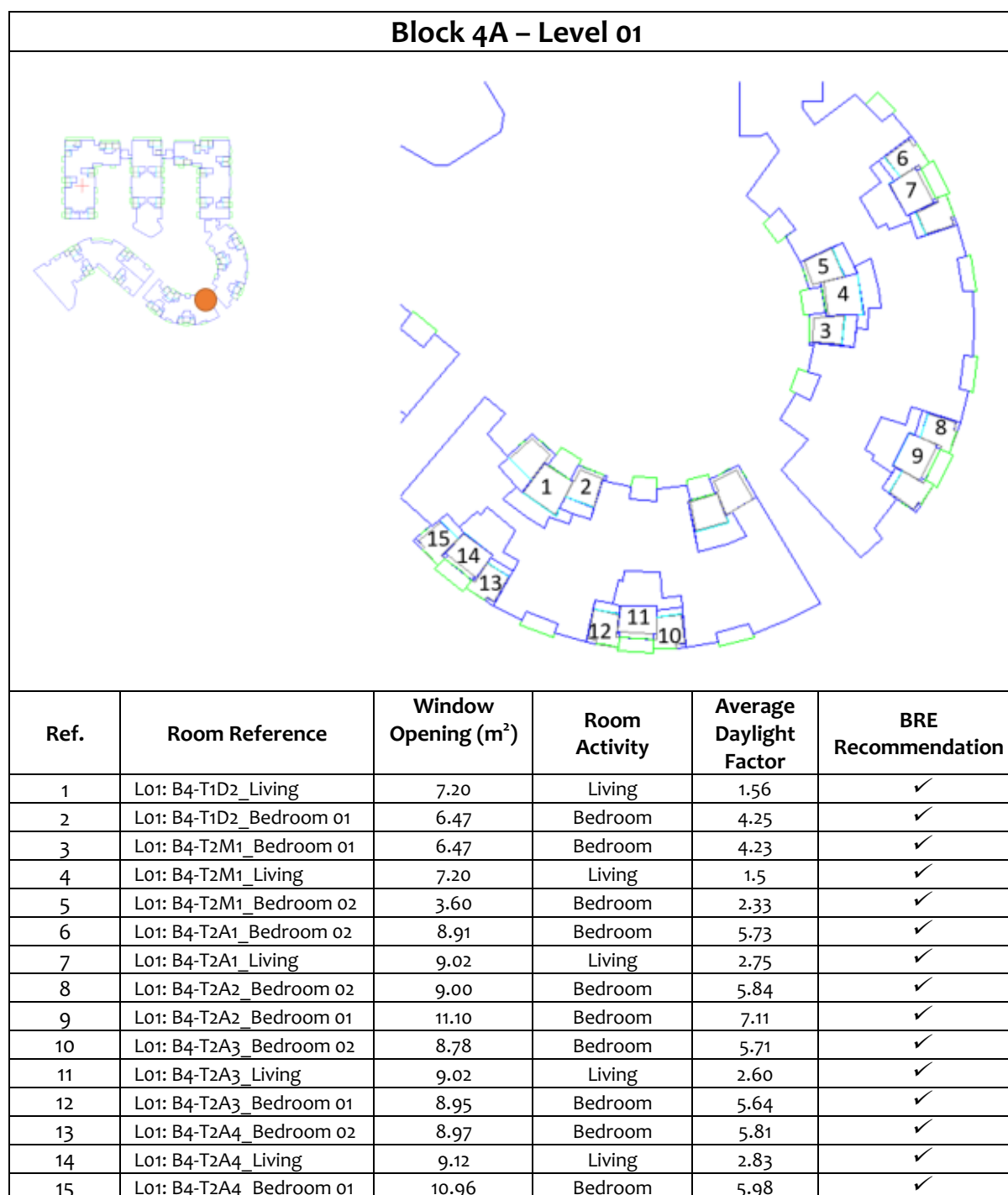


Table 17.20- Average Daylight Factor Results Block 4A, Level 1

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

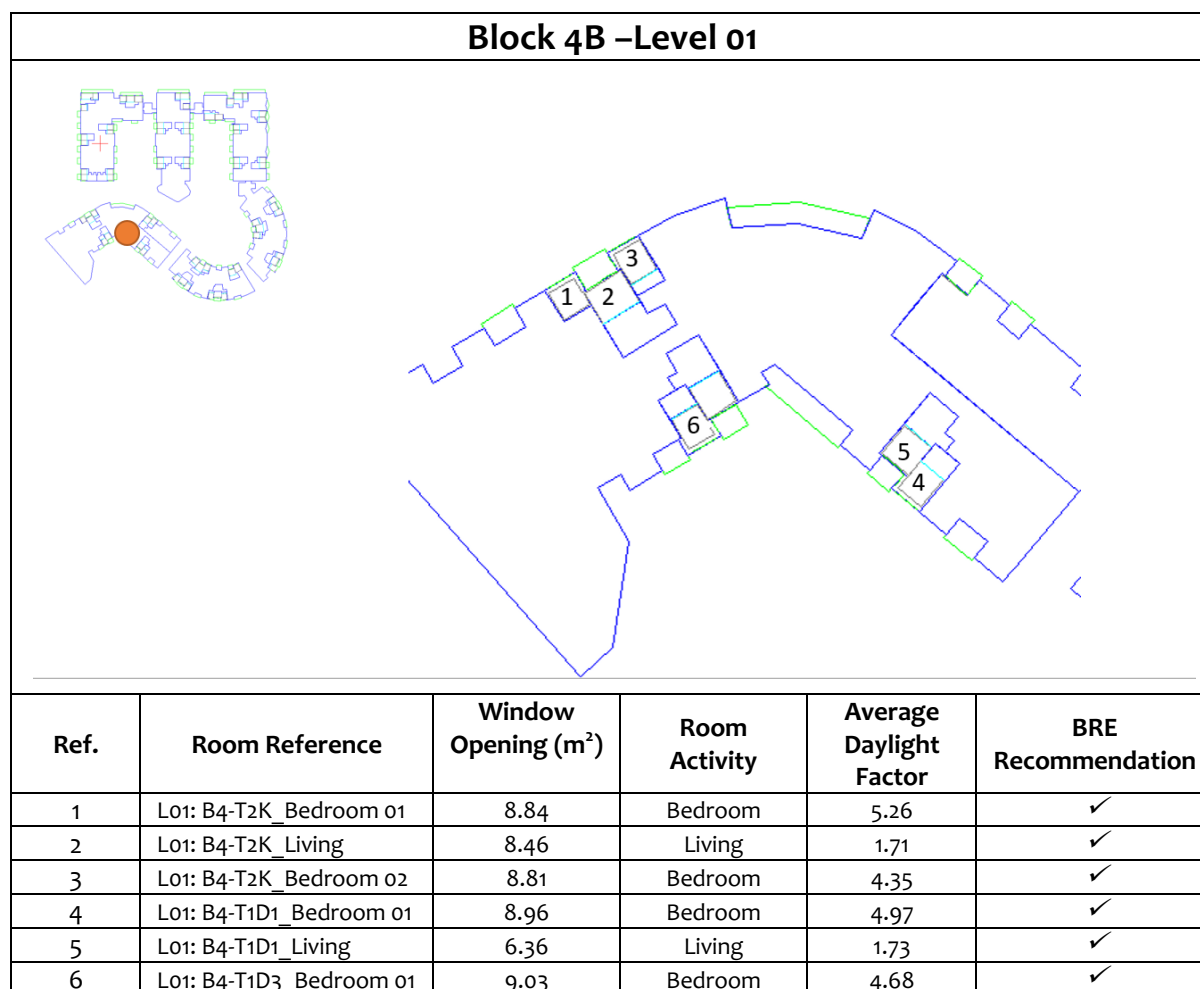


Table 17.21- Average Daylight Factor Results Block 4B, Level 1

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

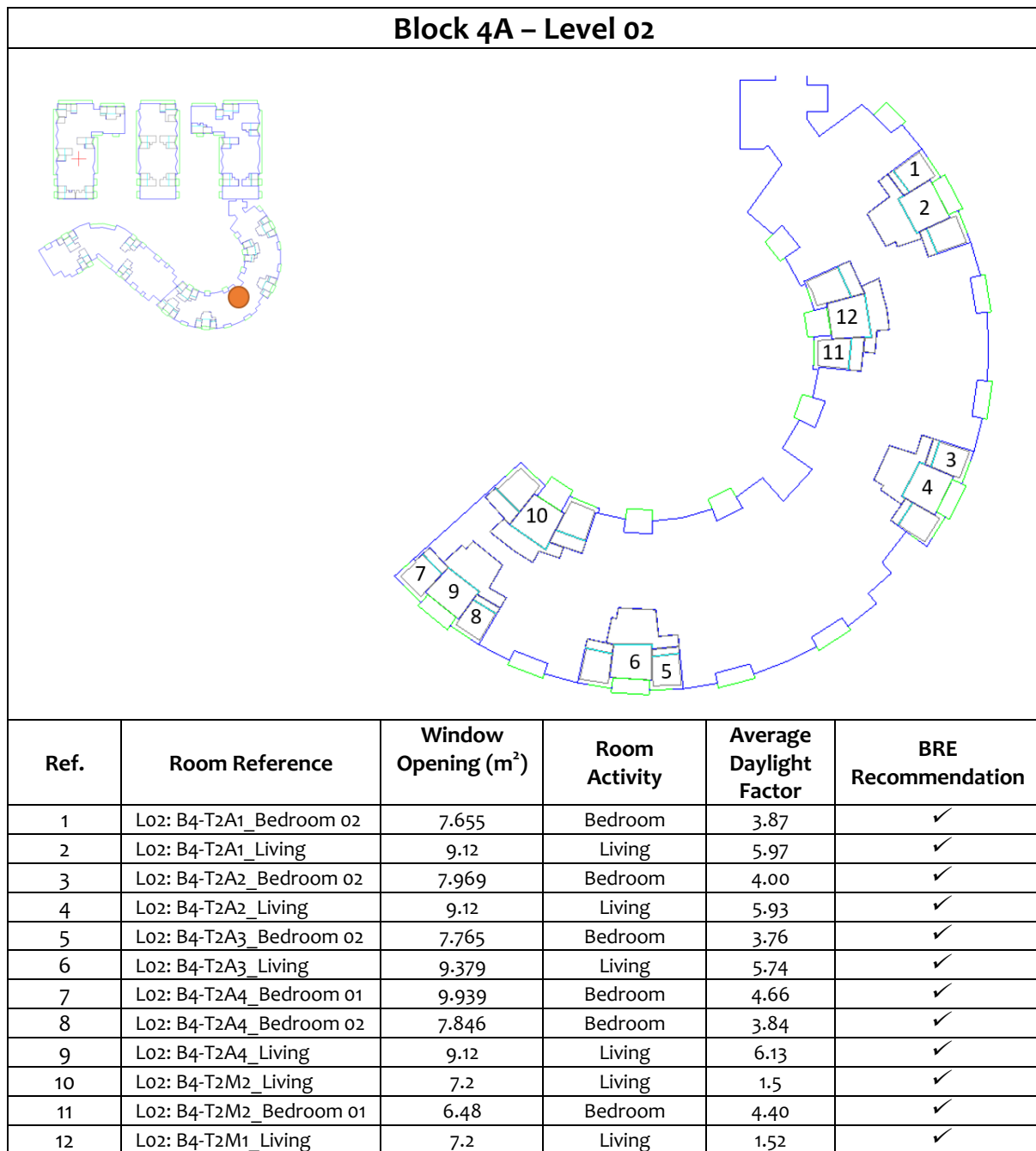


Table 17.22- Average Daylight Factor Results Block 4A, Level 2

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms). Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

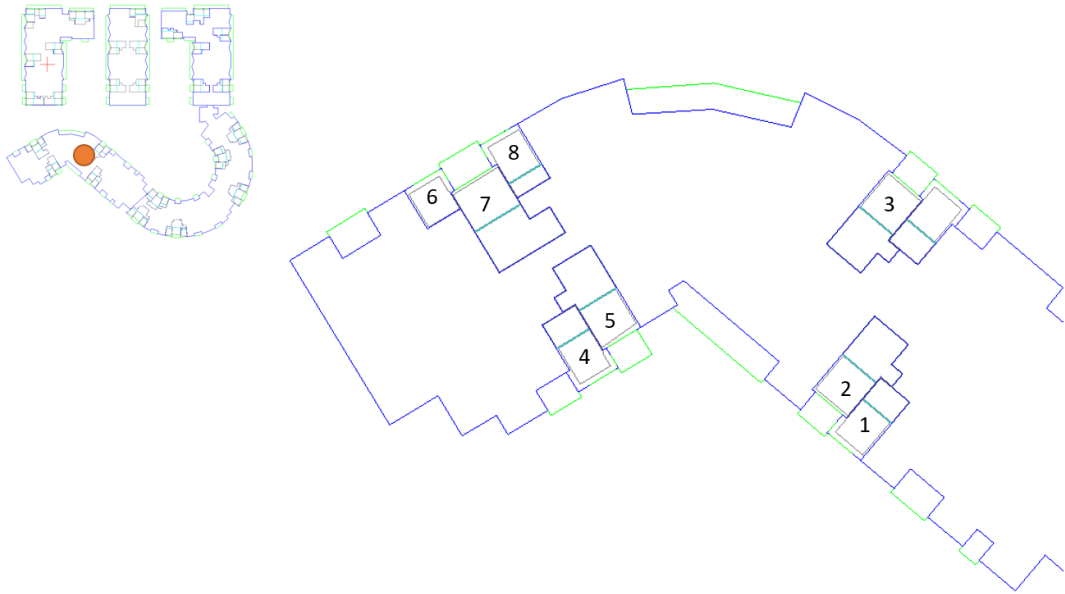
Block 4B – Level 02					
					
Ref.	Room Reference	Window Opening (m ²)	Room Activity	Average Daylight Factor	BRE Recommendation
1	L02: B4-T1D1_Bedroom 01	7.965	Bedroom	4.15	✓
2	L02: B4-T1D1_Living	6.36	Living	1.59	✓
3	L02: B4-T1D2_Living	6.36	Living	1.53	✓
4	L02: B4-T1D3_Bedroom 01	8.04	Bedroom	4.00	✓
5	L02: B4-T1D3_Living	6.36	Living	2.04	✓
6	L02: B4-T2K_Bedroom 01	7.838	Bedroom	4.28	✓
7	L02: B4-T2K_Bedroom 02	7.82	Bedroom	3.76	✓
8	L02: B4-T2K_Living	8.549	Living	1.50	✓

Table 17.23- Average Daylight Factor Results Block 4B, Level 2

- ✓ These rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight. Therefore, these rooms exceed BRE recommendations.
- X These rooms do not meet the BRE recommended minimum daylight factor values.

Observations

It should be noted that the ‘worst’ case locations have been tested i.e. those looking into elevations with obstructed views. Outwards facing rooms will generally have unobstructed views and should meet BRE recommendations. The overall results are summarised in the following table:

Tested	139
Bedrooms over BRE recommendations	79
Living rooms over BRE recommendations	60
Rooms below BRE recommendations	7
Percent Passing	95%

Overall, 95% of the rooms tested in the new development are achieving Average Daylight Factors (ADF) above the BRE guidelines. Since these rooms are sample spaces selected from the first, second and fourth floors, as well as being viewed as ‘worst case’ locations in some instances, it can be expected that the results from the development as a whole would increase as more of the upper levels were included within the total results.

17.6 Potential Cumulative Impacts

When considering daylight and sunlight potential cumulative impacts the proposed development has no impact on the existing surroundings.

17.7 Do Nothing Scenario

Overall the results demonstrate that the proposed development performance exceeds BRE recommendations in line with 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. As such, if the development were not be constructed, there would be little or no change to existing building daylight and sunlight levels.

17.8 Risks to Human Health

The development does not possess any risk to human health.

17.9 Mitigation Measures

Construction Stage

This is not relevant to daylight/sunlight analysis as the analysis is carried out on the potential final design.

Operational Stage

Additional mitigation features are not required in the operational phase of the development when considering daylight and sunlight.

17.10 Predicted Impacts of the Proposed Development

Construction Phase

This is not relevant to daylight/sunlight analysis as the analysis is carried out on the potential final design.

Operational Phase

Shadow Analysis

The analysis shows the different shadows cast at different times of the year for the proposed scheme. The images show what potential shadows could be cast and this is quantified in sections 17.5 of this report.

Overall, the overshadowing effect on the existing properties can be classed as a ‘Negligible adverse impact’ taking into consideration the overshadowing is limited to the late afternoon during March of South Park with no additional shading to Willow Grove or Bray Road as a result of the proposed development.

Daylight Analysis of Existing Buildings

All of the points tested have a VSC above 27% or not less than 80% of their former value (i.e. the Existing Scheme). Therefore, all points tested exceed BRE recommendations.

The results show that the impact of the proposed development can be classified under the BRE as a 'negligible to minor adverse impacts' considering the guidelines in the BRE report are fully met.

Sunlight to Existing and Proposed Amenity Spaces

Existing Amenity Spaces:

Willow Grove and Bray Road – The Proposed Scheme shows that on the 21st of March, the existing amenity rear gardens currently receiving 2 hours of sunlight for over half their area will continue to do so under the Proposed Scheme in line with the BRE recommendations.

The reduction in sunlight for the remaining x2 rear gardens amenity spaces currently receiving less than 2 hours of sunlight for over half their area is no more than 20%, in line with the BRE recommendations.

South Park – The Proposed Scheme shows that on the 21st of March over half of the existing amenity garden spaces would receive at least 2 hours of sunlight in line with the BRE recommendations.

Proposed Scheme Amenity Spaces:

The images above show on the 21st of March for the proposed scheme amenity areas, over half of the amenity spaces would receive at least 2 hours of sunlight in line with the BRE recommendations.

Average Daylight Factors

Overall, 95% of the rooms tested in the new development are achieving Average Daylight Factors (ADF) above the BRE guidelines. Since these rooms are sample spaces selected from the first, second and fourth floors, as well as being viewed as 'worst case' locations in some instances, it can be expected that the results from the development as a whole would increase as more of the upper levels were included within the total results.

Discussion

It should be noted that 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 other types of sites.

Despite the above, the site performs well in relation to the metrics considered in this report.

When assessing the proposed development impact on the neighbouring properties, the following can be concluded

- Shading on surrounding properties can be described as having a 'negligible to minor adverse impact' for the majority of the year.
- All resultant VSC values for the residential properties tested are in line with the BRE recommendations.

Also in terms of Sunlight to the Existing and Proposed Amenity Spaces, both the existing and proposed amenity areas are in line with the BRE recommendations.

Overall, the results demonstrate that the proposed development performs in line with the BRE recommendations in the BRE 'Site Layout Planning for Daylight and Sunlight' guide, sometimes referred to as BRE Digest 209.

17.11 Monitoring

Construction Phase

It is not recommended to monitor daylight/sunlight during construction. The analysis conducted within this report is done so based on the potential final design.

Operational Phase

It is not a requirement as long as there is no change to the proposed design or the glazing specification.

17.12 Reinstatement

There is no requirement for reinstatement with regards to daylight/sunlight.

17.13 Interactions

There are no interactions with other chapters of this report when considering daylighting and sunlight.

17.14 Difficulties Encountered

No difficulties were encountered in compiling this assessment.

17.15 References

BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice' by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209

British Standard Code of Practice for daylighting, BS 8206-2