Daylight Analysis and Overshadowing

Caltragh LRD, Cornageeha, Sligo

09/04/2024

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Contents

1. Executive Summary

H3D were engaged to provide a report on the impact of the proposed residential development at Cornageeha, Sligo. H3D were instructed to conduct the following:

- To create a 3D computer analysis model of the scheme based upon planning drawings.
- Conduct a Daylight Provision analysis to investigate if each of the living spaces in the apartment blocks will achieve a required level of daylight.
- Conduct a study to investigate if the communal amenity areas achieve 2 hours of sunlight on March 21st.
- Conduct a study to investigate if the adjacent private amenity areas achieve 2 hours of sunlight on March 21st.
- Conduct a Vertical Sky Component (VSC) analysis on the adjacent windows facing the proposed development.
- Prepare shadow study images to show the existing scenario compared with the proposed scenario.
- Prepare a report setting out the analysis and the findings.

Methodology

The assessment of the proposed development was prepared using the methodology's set out in the British Standard: Lighting for Buildings – Part 2: Code for Practice for Daylighting, BRE 209, 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice', Third Edition 2022, by P. J. Littlefair and the Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018).

BRE Guide and Advisory Note

The numerical guidelines given in these documents are purely advisory. The BRE Guide states that:

> "The advice given here is not mandatory and the guide should not be an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."
>
> "It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location" (Section 1.6, p1)

Daylight to Proposed Development

The daylight standards are in a period of transition with various planning authorities referencing:

- BR 209 (Second Edition)
- BR 209 (Third Edition)
- BS 8205:2008
- BS EN 17037:2018.

As the BR 209 document (Third Edition) has been updated to reference the latest standard BS EN 17037:2018 the Daylight analysis was considered against this standard:

- BS EN 17037:2018

For the BS EN 17037:2018 standards 100% of rooms analysed met the target lux levels which were 100 lux for bedrooms and 200 lux for Kitchen/Living/Dining.

All 24 no. spaces assessed exceed the target levels in the BS EN 17037:2018 standard, so the proposed apartments are considered to provide an acceptable standard of amenity from a daylight perspective.

Amenity Overshadowing – Communal Amenity within Site

The BRE guideline requirement for amenity overshadowing is that at least 50% of communal amenity areas receive two hours on sunlight on March 21st. The analysis shows that all areas analysed for amenity overshadowing had results that were higher than the minimum required 50%.

Amenity Overshadowing – Private Amenity Adjacent to Site

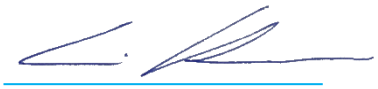
The BRE guideline requirement for amenity overshadowing is that at least 50% of private amenity areas receive two hours on sunlight on March 21st. The analysis shows that all areas analysed for amenity overshadowing in neighbouring garden areas had results that were higher than the minimum required 50%.

Vertical Sky Component (VSC)

Vertical Sky Component analysis was performed to investigate if windows of the adjacent dwelling facing the proposed development achieve 27% or failing that, do not reduce by more than 20% of the current value when the proposed development is completed. Of the 55 no. windows analysed all surpass the 27% level or do not reduce to less than 0.8 times the existing level thus conforming with the BRE guidelines for Vertical Sky Component.

Overall Conclusion.

After conducting a comprehensive daylight and sunlight assessment of the proposed development using simulation modelling and comparing results achieved against the BRE Guide and BS recommended guidelines, the proposed development passes the analyses conducted as per the BRE guidelines. The impact on the neighbouring rear garden amenity spaces or loss of access to sky for the windows facing the proposed development would be minimal.



Cian Heffernan
MSc, BEng (Hon) Civil, PgD

2. Daylight to Proposed Development

The purpose of this section is to investigate the percentage of units that achieve the recommended levels of daylight provision.

The daylight provision to the proposed development was assessed against the following standard.

- BS EN 17037:2018

Prior to 2018, Ireland had no standard for daylight. In 2018, the National Standards Authority of Ireland adopted EN 17037 to directly become IS EN 17037. It does not contain a national annex. It offers only a single target for new buildings (there are no space-by-space targets – e.g., a kitchen would have the same target as a warehouse or office). It does not offer guidance on how new developments will impact on surrounding environments. Most Development Plans do not reference the new BS EN 17037:2018 standard however Appendix 16 of a neighbouring planning authority's Dublin City Development Plan 2022-2028 recommends that:

"These limitations make it unsuitable for use in planning policy or during planning applications. BR 209 must still be used for this purpose."

It continues by stating that:

"The planning authority understand that, at present there is some ambiguity in what may be considered the appropriate standard to apply for daylight and sunlight assessments. There is a period of transition at present during which BS8206-2 has been superseded, but the relevant guidance within BR 209 has not yet been updated. This both BS 8206-2 and BS EN 17037 have relevance. As such, both for clarity and as an interim measure during this transition period, the planning authority will look to receive relevant metrics from BR 209, BS 8206-2, and BS 17037. If over the coming years, a revised version of BR 209 is to be issued, the guidance within this new version will take precedence."

The third edition of BRE 209 has been issued since the above development plan was released. This updated guidance now references BS EN 17037.

The following section summarise the various requirement of this standard.

<u>BS EN 17037:2018 National Annex</u>

In the UK, EN17037:2018 was adopted to form "BS EN 17037:2018". However, a "National Annex NA" was included which states:

"The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be

achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings."

Whereas IS EN 17037:2018 does not provide different illuminance targets for different space types, the BS EN 17037:2018 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 below. It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

Room type	Target illuminance E_T (lx)
Bedroom	100
Living room	150
Kitchen	200

Figure 1: Table NA.1 — Values of target illuminance for room types in UK dwellings

The BS National Annex also states:

"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."

Therefore, combined KLDs are to be assessed using a 200-lux target illuminance (E_T).

Finally, the BS National Annex also states that:

"It is the opinion of the UK committee that the recommendation in Clause A.2 – that a target illuminance level should be achieved across the entire (i.e., 95 %) fraction of the reference plane within a space – need not be applied to rooms in dwellings."

Therefore, when assessing the daylight provisions in residential dwellings in accordance with BS EN 17037:2018, only the target illuminance (ET) or target daylight factor (DT) will be assessed for Bedrooms, Living Rooms, Kitchens (or combined LKDs) on over 50% of the floor area over 50% of the available daylight hours. The minimum target illuminance (ETM) or minimum target daylight factor (DTM) will not be assessed.
Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e., IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table NA.1 of BS EN 17037:2018.

The following inputs were used in the study:

BS EN 17037:2018

Sky Conditions: Standard CIE overcast sky.
Time (24hr): 12:00
Date: 21 September
Weather File: Dublin.epw (15-year average)

Element	Value	Source/Description
Sky Conditions	CIE Overcast Sky	Software Climate File
Light Reflectance Values (LRV)		
Ceiling	85%	White Paint
Internal Walls	85%	White Paint
Floors	40%	Light Veneer
External Ground	20%	Paving
External Wall	30%	Brickwork
Window Properties:		
Visible Light transmission	70%	-
Average frame thickness	0.05m	-
Other Properties:		
Working plane height	0.85m	BS8206 Part 2: 2008 & BS EN 17037:2018
Area of interest (perimeter border depth)	0.50m	CIBSE Code for Interior Lighting
Window surface maintenance factor for cleaning	0.9	-
Grid size for assessment area	0.50m	-

Table 1: Analysis Input Data

Daylight Results

The following tables summarise the daylight provision results for the proposed development assessed against the BS EN 17037:2018 standard. Individual room results can be viewed in Table 4 below.

The purpose of the calculations is to quantify an overall percentage of rooms which exceed the recommendations of the various standards that were assessed. The objective of the design team is to maximise the number of units which exceed the recommendations.

As outlined previously, where there are combined Living/Kitchen/Dining areas (LKDs) within the development, these have been assessed as whole spaces against an initial 200 lx target. Studio spaces were also analysed as combined living spaces and were measures against the 200-lx target.

Two apartment blocks were analysed as the typical scenario BA01 (Nos. 5-8) & BA02 (Nos. 9-12). The results are summarised in the following tables:

Total for The Development

The overall daylight provision results for the tested spaces in the development under the various standards are summarised below. Under BS EN 17037:2018 a compliance rate of 100% is achieved also achieved. Overall, the quality of daylight provision across the development is excellent.

Rooms Tested	No. Rooms
Bedrooms	12
KLDs	8
Total Spaces Tested	20

Table 2: Room Breakdown - Summary

BS EN 17037:2018 Method 2 Assessment – National Annex				
Rooms	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
Bedrooms	12	100	0	0
KLDs	8	100	0	0
Total Spaces Tested	20	100	0	0

Table 3: BS EN 17037:2018 Daylight Results - Summary

Unit	Room		BS EN 17037:2018		
		Minimum Lux recommended in BS EN 17037:2018	Minimum Required Floor Area > ET (%)	Floor Area > ET (%)	Pass/Fail
01	Bedroom 1	100	50	100	Pass
	KLD	200	50	82.37	Pass
02	Bedroom 1	100	50	100	Pass
	KLD	200	50	100	Pass
03	Bedroom 1	100	50	100	Pass
	KLD	200	50	70.27	Pass
04	Bedroom 1	100	50	100	Pass
	KLD	200	50	100	Pass

Table 4: BS EN 17037:2018 Results – BA01

Unit	Room		BS EN 17037:2018		
		Minimum Lux recommended in BS EN 17037:2018	Minimum Required Floor Area > ET (%)	Floor Area > ET (%)	Pass/Fail
01	Bedroom 1	100	50	100	Pass
	Bedroom 2	100	50	100	Pass
	KLD	200	50	100	Pass
02	Bedroom 1	100	50	100	Pass
	Bedroom 2	100	50	100	Pass
	KLD	200	50	100	Pass
03	Bedroom 1	100	50	100	Pass
	Bedroom 2	100	50	100	Pass
	KLD	200	50	100	Pass
04	Bedroom 1	100	50	100	Pass
	Bedroom 2	100	50	100	Pass
	KLD	200	50	100	Pass

Table 5: BS EN 17037:2018 Results – BA02

More detailed individual room analysis results for the rooms can be found in Appendix 1.

3. Amenity Overshadowing – Communal

As per section 3.3 of 'Site layout Planning for daylight and Sunlight' by Paul Littlefair it is recommended that at least half of the amenity areas should receive at least two hours of sunlight on March 21st.

To investigate this, the area of sunlit amenity space is calculated as a percentage of the total area. Paragraph 3.3.11 states that if the area is poorly lit and does not achieve the minimum two hours but the value is no less than 0.8 times the current state then further loss of light would not be significant.

An analysis of the neighbouring garden amenity areas was conducted by calculating the area of sunlight that received a minimum of two hours of sunlight on March 21st. Below are results in numerical and graphical form.

It should be noted that the mature trees were omitted from the analysis to use a worst-case scenario for the proposed development.

Amenity Overshadowing						
Ref.	Garden Area (m^2)	Area receiving 2 hours of sunlight on March 21st (%)	Minimum area receiving 2 hours of sunlight on March 21st (%)	Area receiving 2 hours of sunlight on March 21st – (Existing) (%)	>0.8 times existing	Compliance Demonstrated
1	1281	96.96	50.0%	96.96	Yes	Yes
2	219	93.76	50.0%	93.76	Yes	Yes

Table 6: Amenity Overshadowing Results – Communal Areas within Site

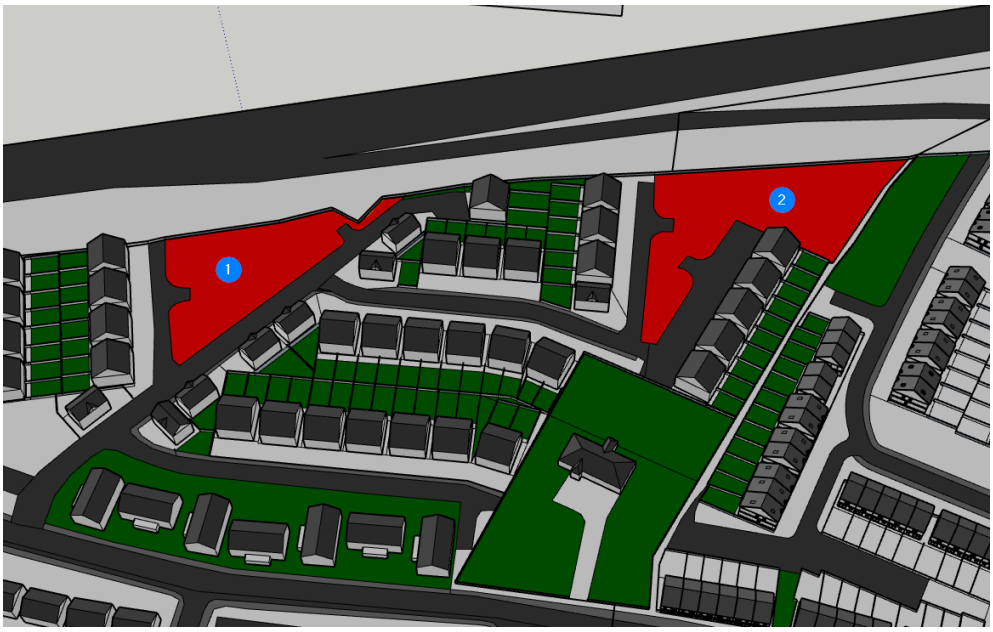


Figure 2: Amenity Overshadowing: Area Receiving Sunlight shown in Red > 2 hours.

Discussion

Of the 2 no. communal amenity areas analysed all are predicted to surpass the 50% level of sunlight on March 21st or do not reduce to less than 0.8 times the existing value thus conforming with the BRE guidelines for Amenity Overshadowing.

4. Amenity Overshadowing – Adjacent Private Amenity

As per section 3.3 of 'Site layout Planning for daylight and Sunlight' by Paul Littlefair it is recommended that at least half of the amenity areas should receive at least two hours of sunlight on March 21st.

To investigate this, the area of sunlit amenity space is calculated as a percentage of the total area. Paragraph 3.3.11 states that if the area is poorly lit and does not achieve the minimum two hours but the value is no less than 0.8 times the current state then further loss of light would not be significant.

An analysis of the neighbouring garden amenity areas was conducted by calculating the area of sunlight that received a minimum of two hours of sunlight on March 21st. Below are results in numerical and graphical form.

It should be noted that any mature trees were omitted from the analysis to use a worst-case scenario for the proposed development.

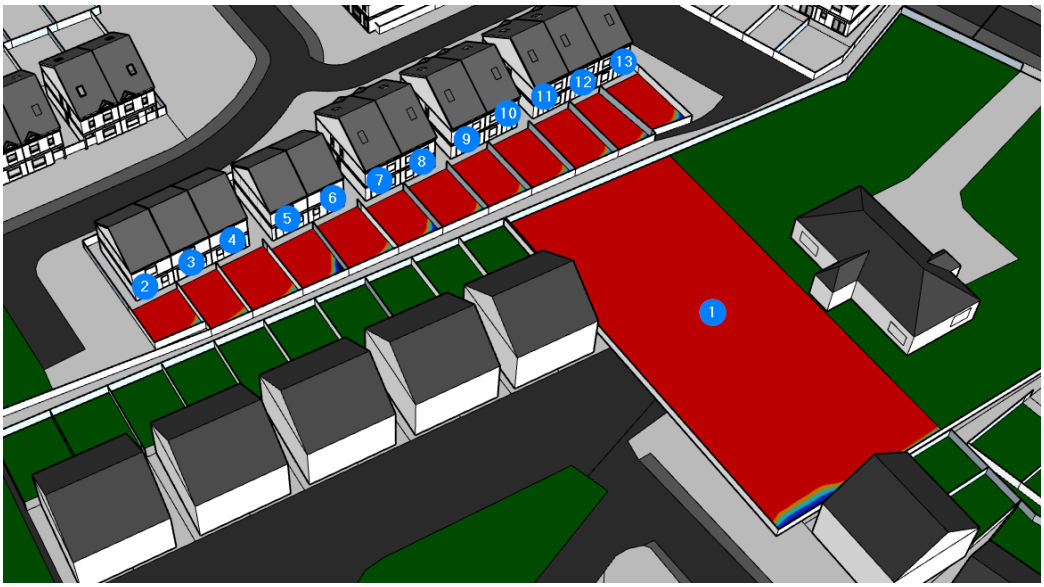


Figure 3: Amenity Overshadowing: Area Receiving Sunlight shown in Red > 2 hours.

Amenity Overshadowing						
Ref.	Garden Area (m^2)	Area receiving 2 hours of sunlight on March 21st (%)	Minimum area receiving 2 hours of sunlight on March 21st (%)	Area receiving 2 hours of sunlight on March 21st – (Existing) (%)	>0.8 times existing	Compliance Demonstrated
1	1361	97.87	50.0%	97.87	Yes	Yes
2	48.39	82.45	50.0%	82.45	Yes	Yes
3	51.38	86.71	50.0%	86.71	Yes	Yes
4	65.55	87.54	50.0%	87.54	Yes	Yes
5	59.20	82.96	50.0%	82.96	Yes	Yes
6	66.07	86.76	50.0%	86.76	Yes	Yes
7	58.97	82.30	50.0%	82.30	Yes	Yes
8	65.03	86.96	50.0%	86.96	Yes	Yes
9	65.55	86.84	50.0%	86.84	Yes	Yes
10	70.68	86.88	50.0%	86.88	Yes	Yes
11	74.22	87.94	50.0%	87.94	Yes	Yes
12	64.27	87.55	50.0%	87.55	Yes	Yes
13	72.68	87.71	50.0%	87.71	Yes	Yes

Table 7: Amenity Overshadowing Results – Communal Areas within Site

Discussion

The communal area analysed is predicted to surpass the 50% level of sunlight on March 21st or do not reduce to less than 0.8 times the existing value thus conforming with the BRE guidelines for Amenity Overshadowing.

5. Vertical Sky Component (VSC)

The BRE document definition of the Vertical Sky Component (VSC) is: Ratio of the part of illuminance, at a point on a given vertical plane, which 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 VSC is usually expressed as a percentage and the maximum value for a completely unobstructed window is slightly less than 40%. The recommendations set down in the BRE report,' Site layout for daylight and sunlight, a guide to good practice,' would indicate, for residential properties, that a VSC value of greater than 27% is acceptable. However, a 20% VSC is good for an urban area.

If a window does not achieve 27% a further investigation should be carried out to calculate the existing VSC. If the value of the predicted VSC is not more than 20% lower than the VSC in the existing scenario the windows pass for VSC according to BRE BR209.

It should be noted that the Guide itself, within the introduction, states that the advice given was not mandatory and the Guide should not be an instrument of planning policy, its aim being to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly.

Vertical Sky Component analysis was performed to investigate if windows of the adjacent dwelling facing the proposed development achieve 27% or failing that, do not reduce by more than 20% of the current value when the proposed development is completed. The precise locations of the windows are unknown so notional window locations were used. The locations of which were chosen based on the locations that would be most affected by the proposed development.

It should be noted that the mature trees were omitted from the analysis to use a worst-case scenario for the proposed development.

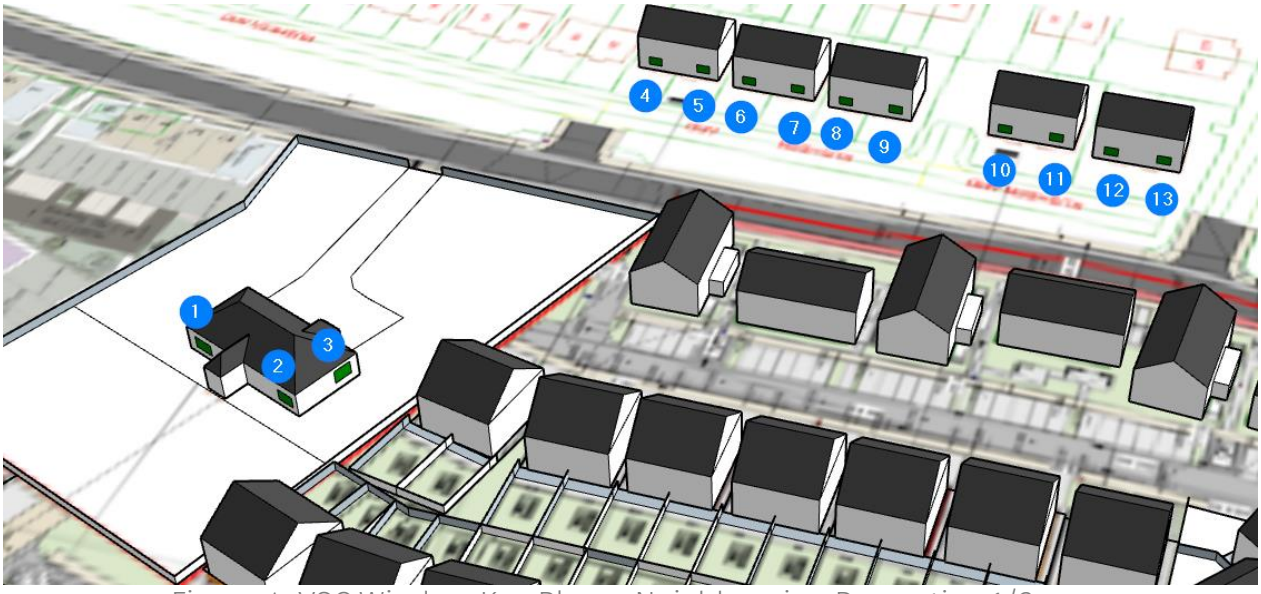


Figure 4: VSC Window Key Plan – Neighbouring Properties 1/3

Window	Proposed	<27% Yes/No	Existing	Difference	>0.8 Existing	Compliance Demonstrated
1	35.93	Yes	37.24	0.96	Yes	Yes
2	34.92	Yes	38.09	0.92	Yes	Yes
3	31.57	Yes	38.48	0.82	Yes	Yes
4	37.19	Yes	38.48	0.97	Yes	Yes
5	36.93	Yes	38.31	0.96	Yes	Yes
6	36.94	Yes	38.50	0.96	Yes	Yes
7	36.68	Yes	38.41	0.95	Yes	Yes
8	36.58	Yes	38.52	0.95	Yes	Yes
9	36.36	Yes	38.53	0.94	Yes	Yes
10	36.02	Yes	38.50	0.94	Yes	Yes
11	35.78	Yes	38.27	0.93	Yes	Yes
12	35.66	Yes	38.32	0.93	Yes	Yes
13	35.34	Yes	37.91	0.93	Yes	Yes

Table 8: VSC Results – Neighbouring Properties

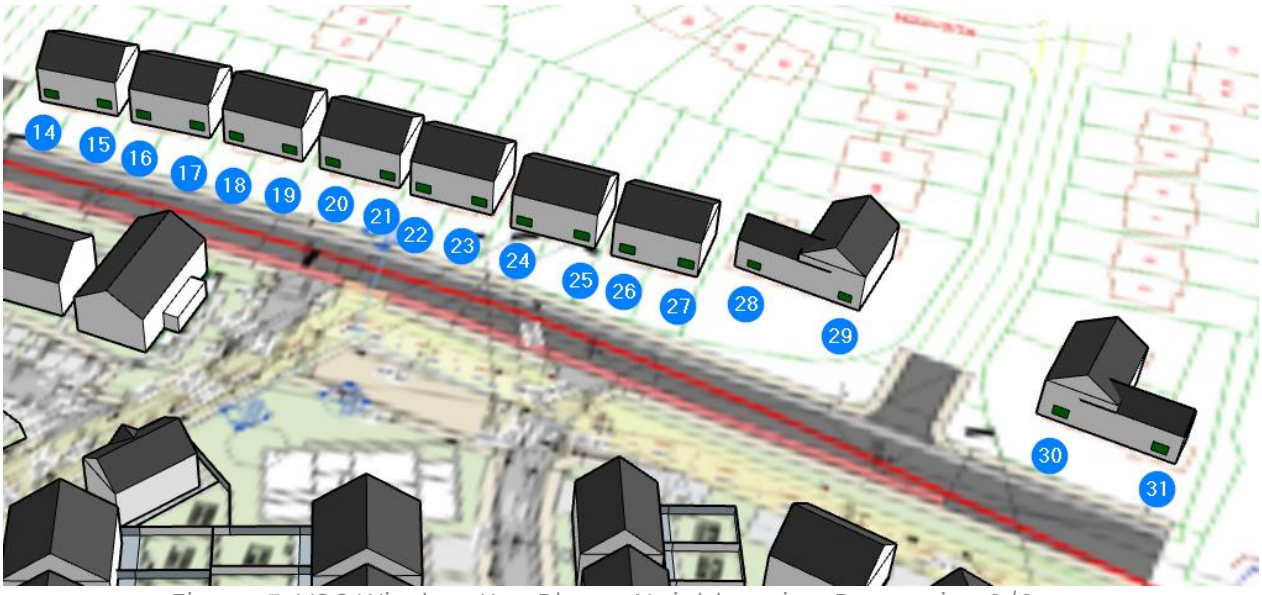


Figure 5: VSC Window Key Plan – Neighbouring Properties 2/3

Window	Proposed	<27% Yes/No	Existing	Difference	>0.8 Existing	Compliance Demonstrated
14	34.62	Yes	38.60	0.90	Yes	Yes
15	34.70	Yes	38.48	0.90	Yes	Yes
16	34.87	Yes	38.60	0.90	Yes	Yes
17	35.34	Yes	38.60	0.92	Yes	Yes
18	35.34	Yes	38.61	0.92	Yes	Yes
19	35.83	Yes	38.59	0.93	Yes	Yes
20	36.33	Yes	38.59	0.94	Yes	Yes
21	36.46	Yes	38.12	0.96	Yes	Yes
22	36.86	Yes	38.61	0.95	Yes	Yes
23	36.53	Yes	38.58	0.95	Yes	Yes
24	36.93	Yes	38.61	0.96	Yes	Yes
25	36.84	Yes	38.60	0.95	Yes	Yes
26	36.73	Yes	38.55	0.95	Yes	Yes
27	36.60	Yes	38.55	0.95	Yes	Yes
28	34.22	Yes	38.62	0.89	Yes	Yes
29	36.26	Yes	38.43	0.94	Yes	Yes
30	36.32	Yes	38.63	0.94	Yes	Yes
31	36.66	Yes	38.63	0.95	Yes	Yes

Table 9: VSC Results – Neighbouring Properties

Figure 6: VSC Window Key Plan – Neighbouring Properties 3/3

Window	Proposed	<27% Yes/No	Existing	Difference	>0.8 Existing	Compliance Demonstrated
32	30.99	Yes	37.04	0.84	Yes	Yes
33	31.97	Yes	38.45	0.83	Yes	Yes
34	31.22	Yes	36.73	0.85	Yes	Yes
35	31.91	Yes	38.41	0.83	Yes	Yes
36	31.85	Yes	38.36	0.83	Yes	Yes
37	30.93	Yes	36.89	0.84	Yes	Yes
38	31.33	Yes	37.08	0.84	Yes	Yes
39	32.11	Yes	38.37	0.84	Yes	Yes
40	32.17	Yes	38.32	0.84	Yes	Yes
41	31.45	Yes	36.92	0.85	Yes	Yes
42	32.34	Yes	37.06	0.87	Yes	Yes
43	33.02	Yes	37.99	0.87	Yes	Yes
44	33.34	Yes	37.93	0.88	Yes	Yes
45	33.24	Yes	37.15	0.89	Yes	Yes
46	34.32	Yes	37.06	0.93	Yes	Yes
47	34.90	Yes	37.88	0.92	Yes	Yes
48	35.24	Yes	37.77	0.93	Yes	Yes
49	35.01	Yes	37.02	0.95	Yes	Yes
50	35.55	Yes	36.91	0.96	Yes	Yes
51	35.94	Yes	37.68	0.95	Yes	Yes
52	35.75	Yes	36.38	0.98	Yes	Yes
53	36.13	Yes	37.53	0.96	Yes	Yes
54	36.35	Yes	37.50	0.97	Yes	Yes
55	35.96	Yes	36.69	0.98	Yes	Yes

Table 11: VSC Results – Neighbouring Properties

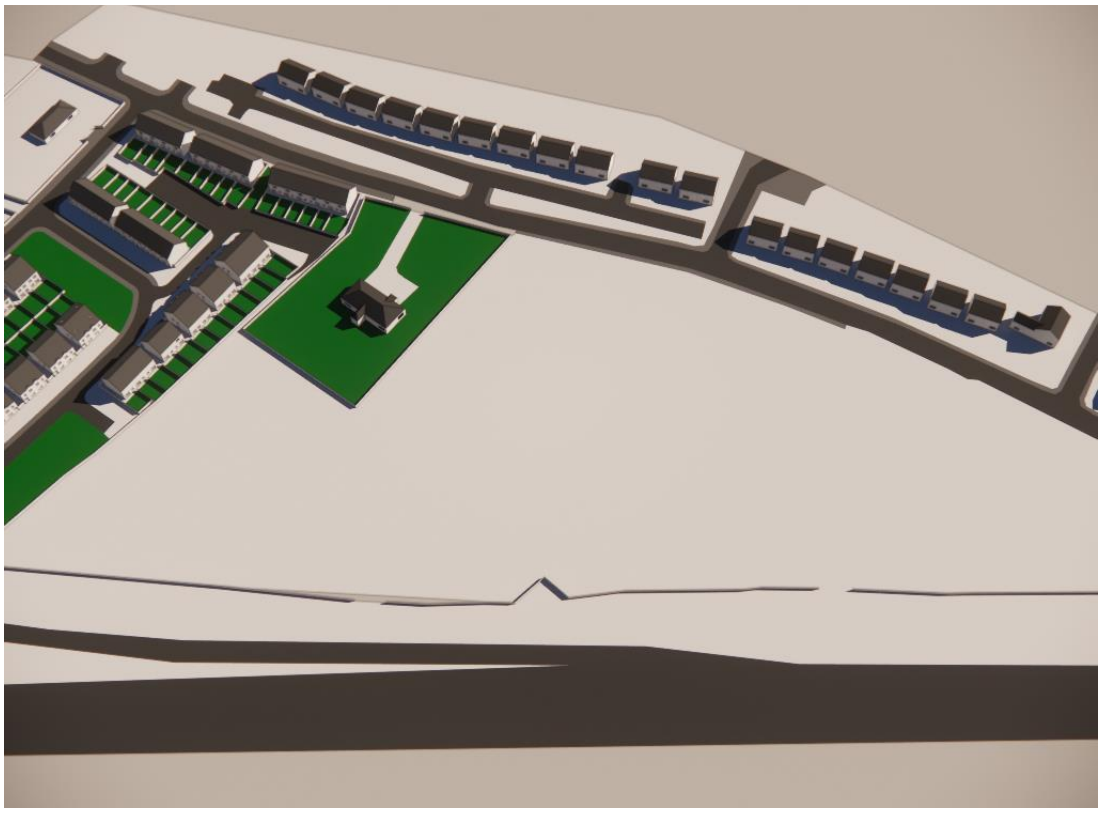
Discussion

Of the 55 no. windows analysed all are predicted to surpass the 27% level or do not reduce to less than 0.8 times the existing value thus conforming with the BRE guidelines for Vertical Sky Component.

6. Shadow Study

A shadow study was conducted to interrogate the levels of overshadowing affecting the neighbouring properties.

From Section 3 (Amenity Overshadowing – Communal) and Section 4 (Amenity Overshadowing - Adjacent Private Amenity) the analysis found that all neighbouring garden areas would still receive an excellent level of sunlight, exceeding the guideline levels set out in BRE BR209 and the windows facing the proposed development would all have adequate access to sky by conforming with the Vertical Sky Component Analysis as is demonstrated in Section 5 of this report.



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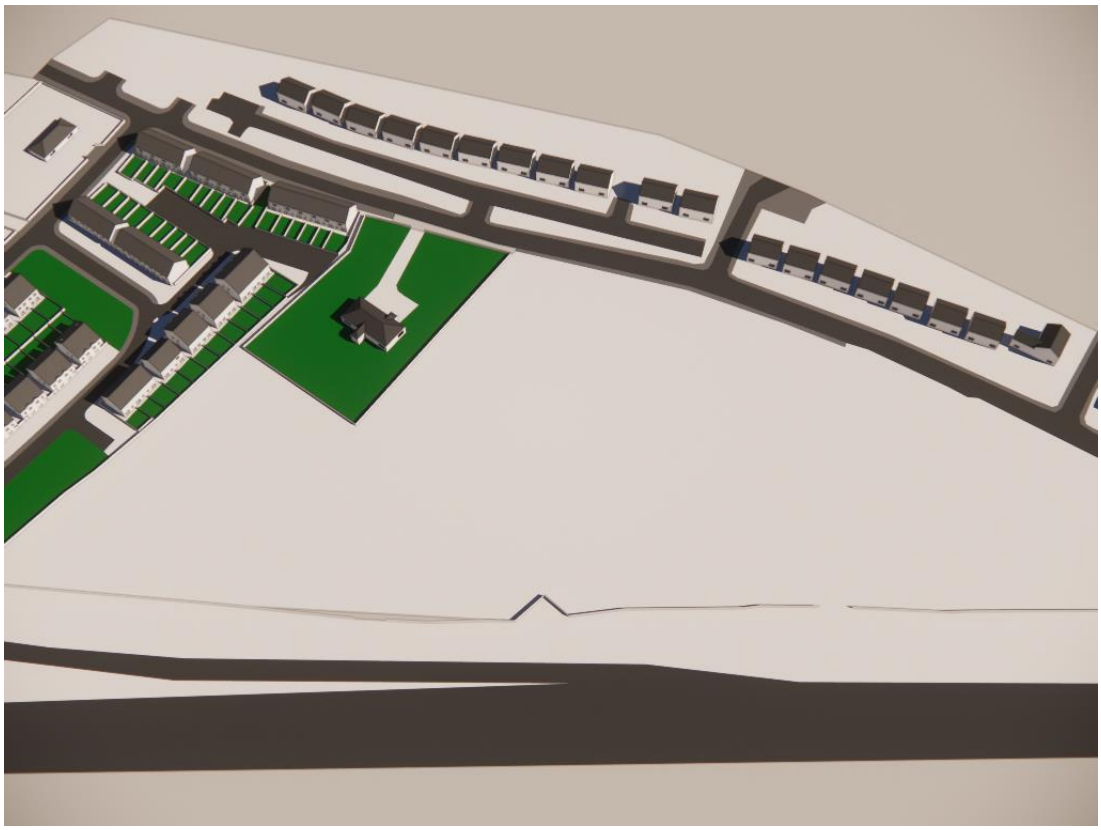
Proposed: March 21st, 10:00



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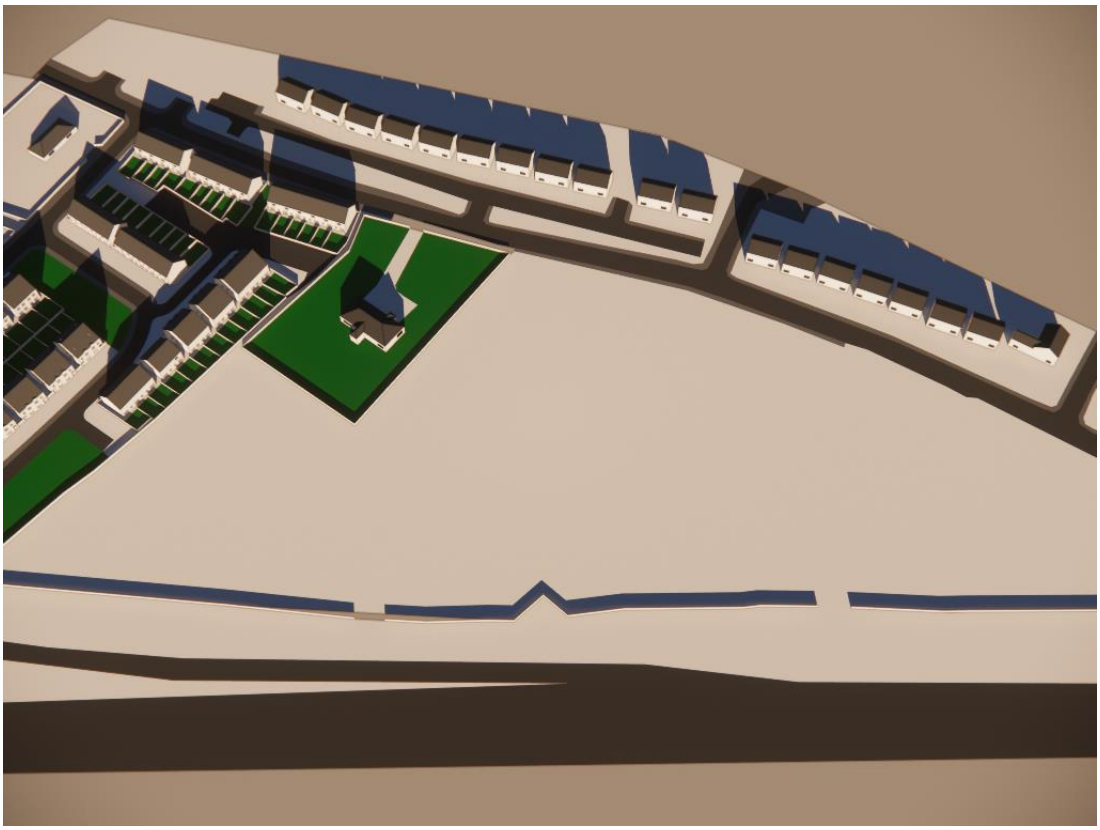
Proposed: March 21st, 12:00

Existing: March 21st, 14:00

Proposed: March 21st, 14:00



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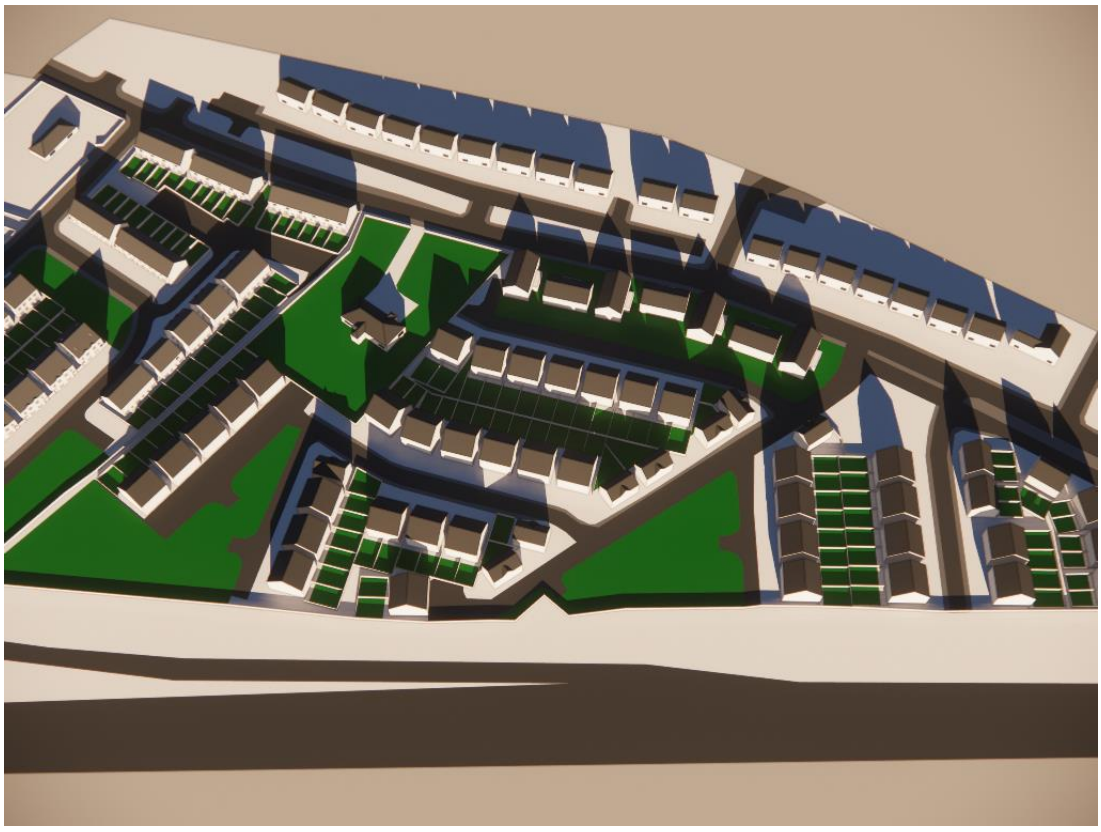
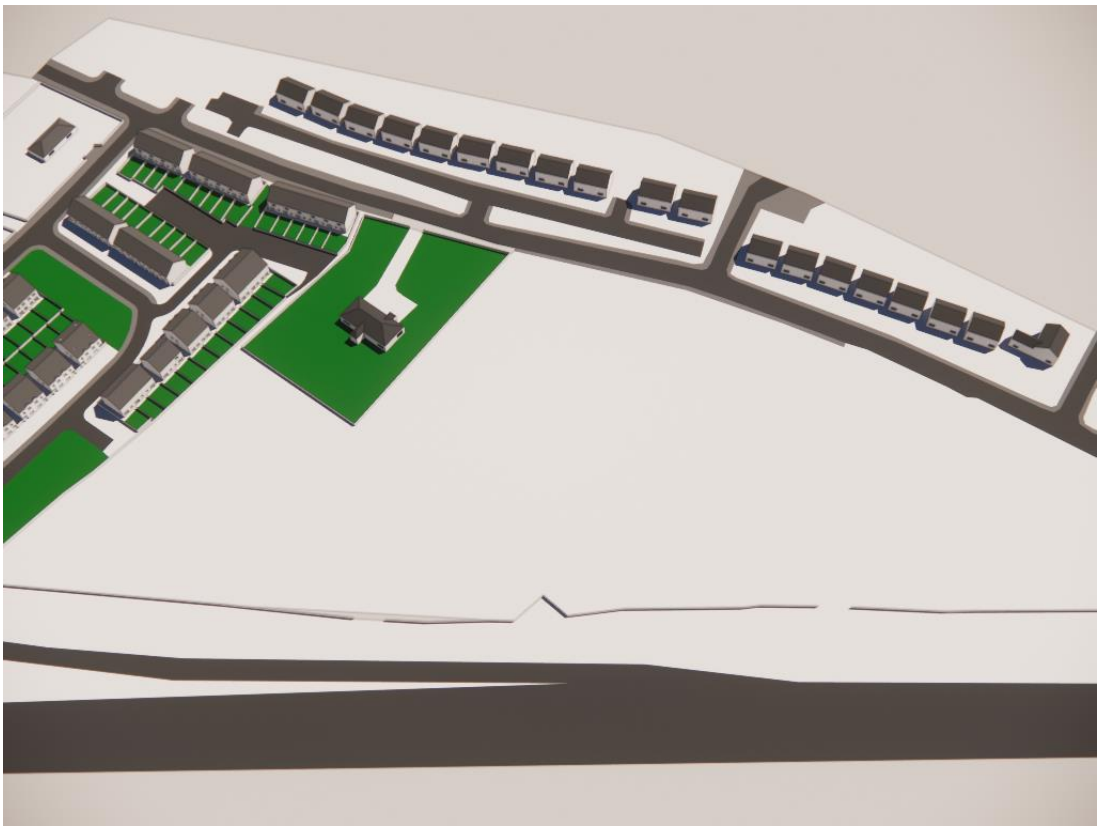
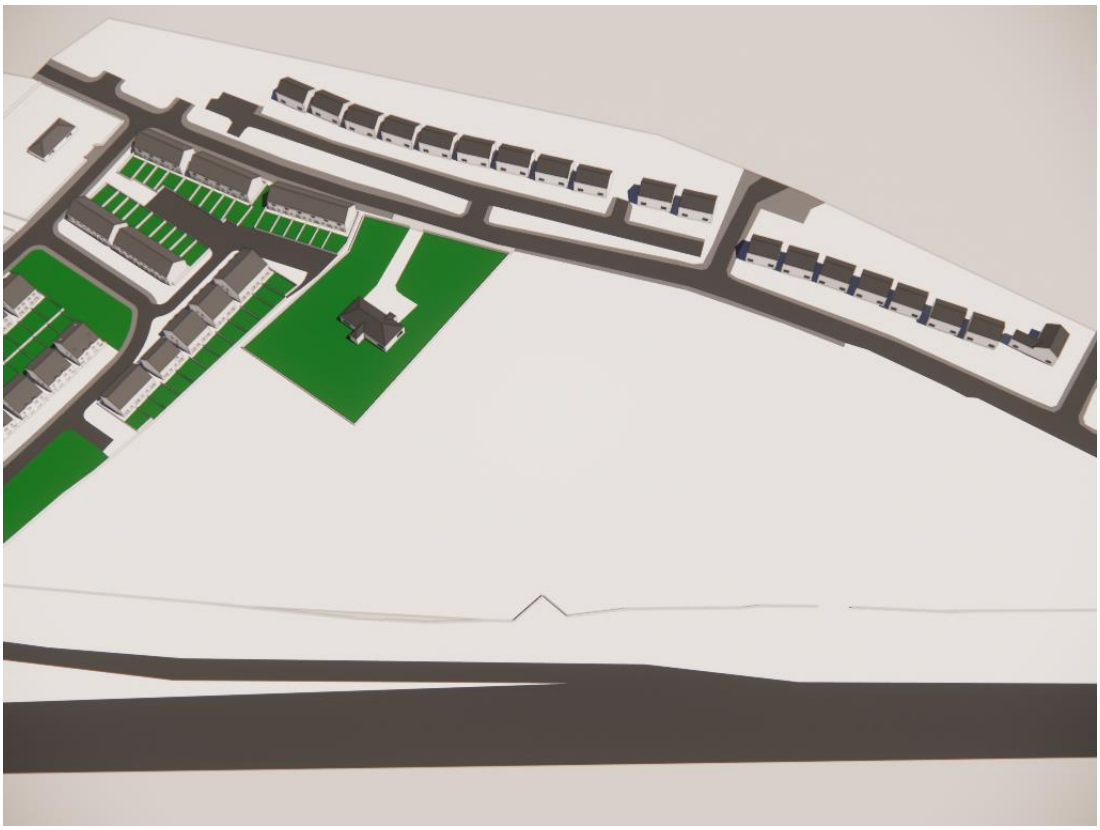


Proposed: March 21st, 16:00



Existing: June 21st, 10:00

Proposed: June 21st, 10:00



Existing: June 21st, 12:00

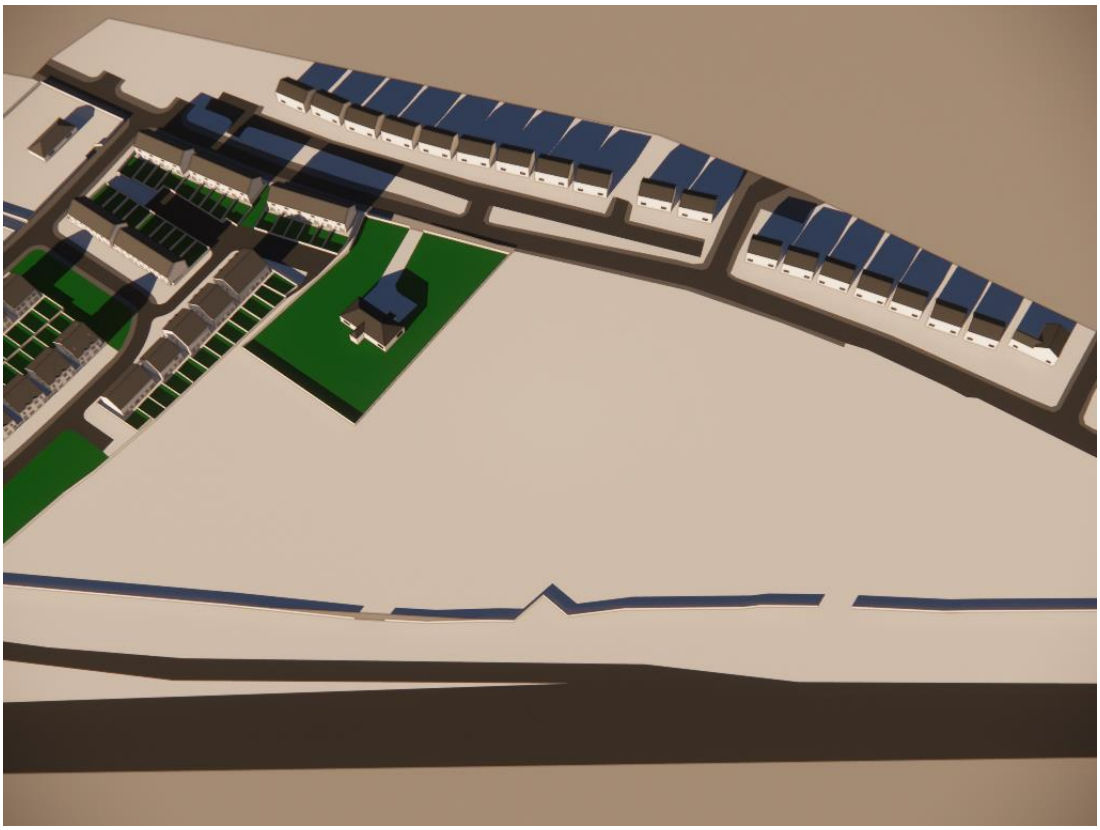
Proposed: June 21st, 12:00

Existing: June 21st, 14:00

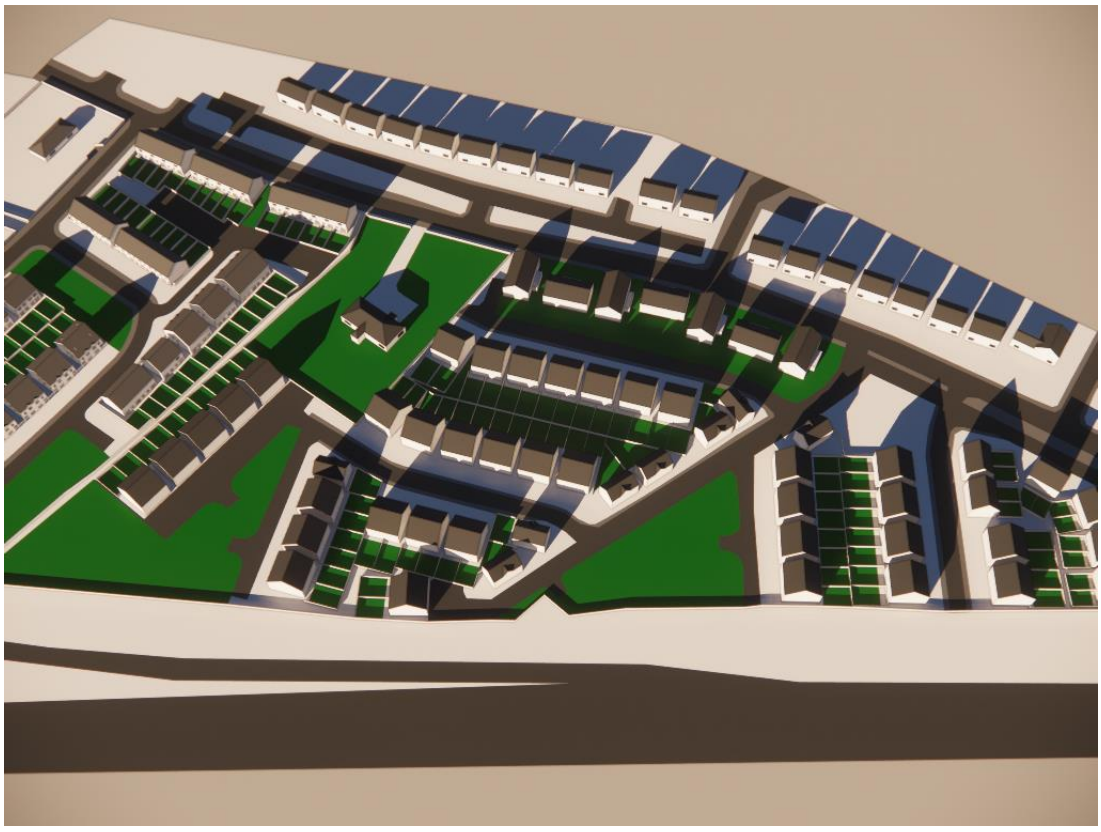
Proposed: June 21st, 14:00

Existing: June 21st, 16:00

Proposed: June 21st, 16:00



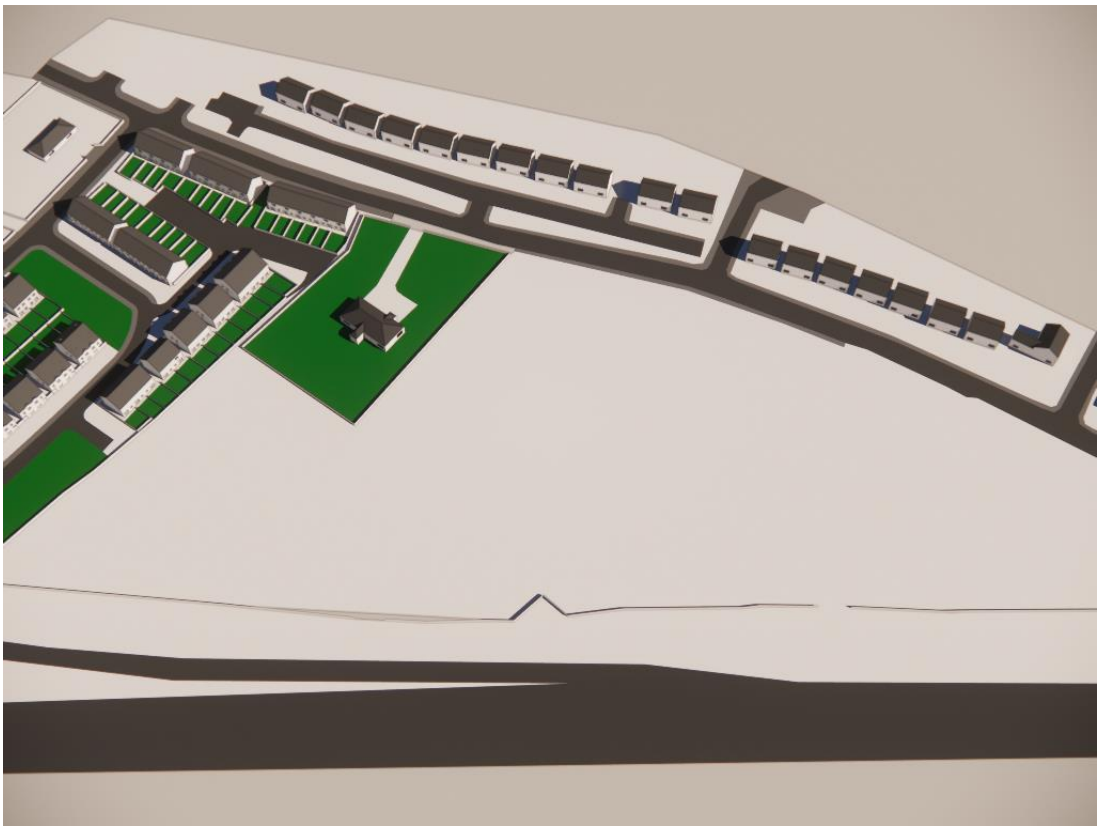
Existing: June 21st, 18:00



Proposed: June 21st, 18:00

Existing: September 21st, 10:00

Proposed: September 21st, 10:00



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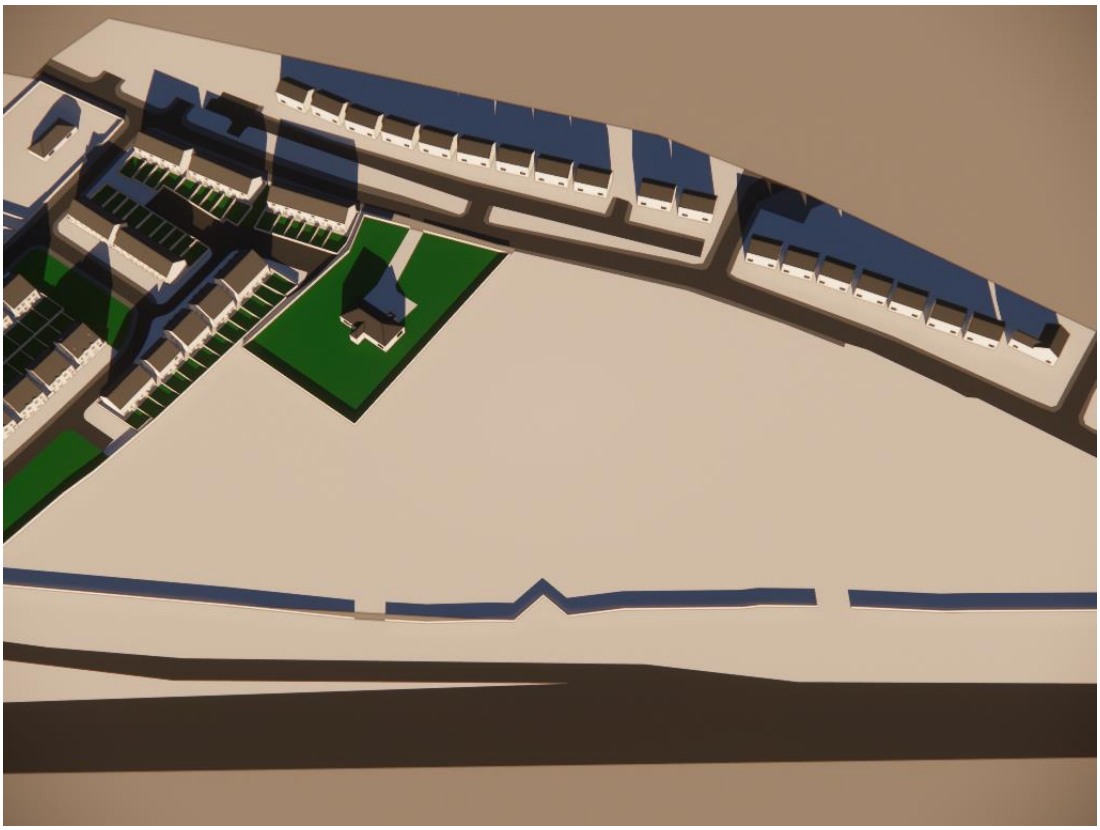
Proposed: September 21st, 12:00

Existing: September 21st, 14:00

Proposed: September 21st, 14:00



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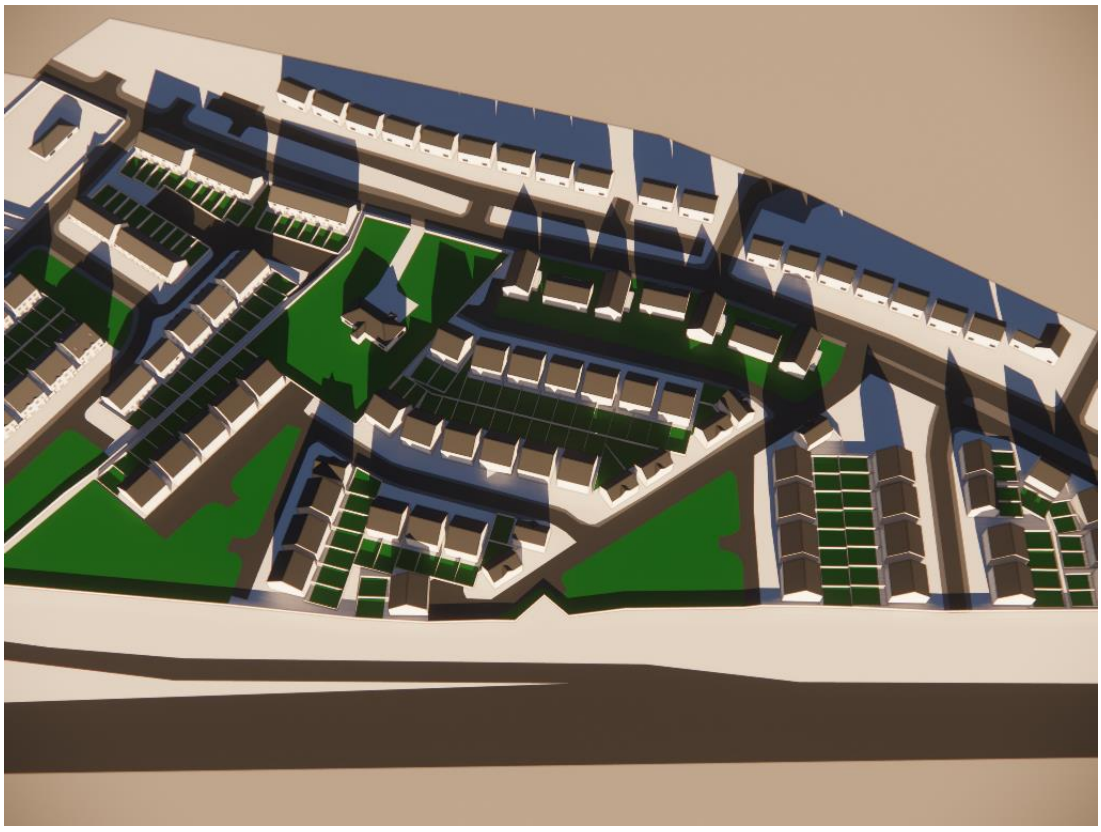
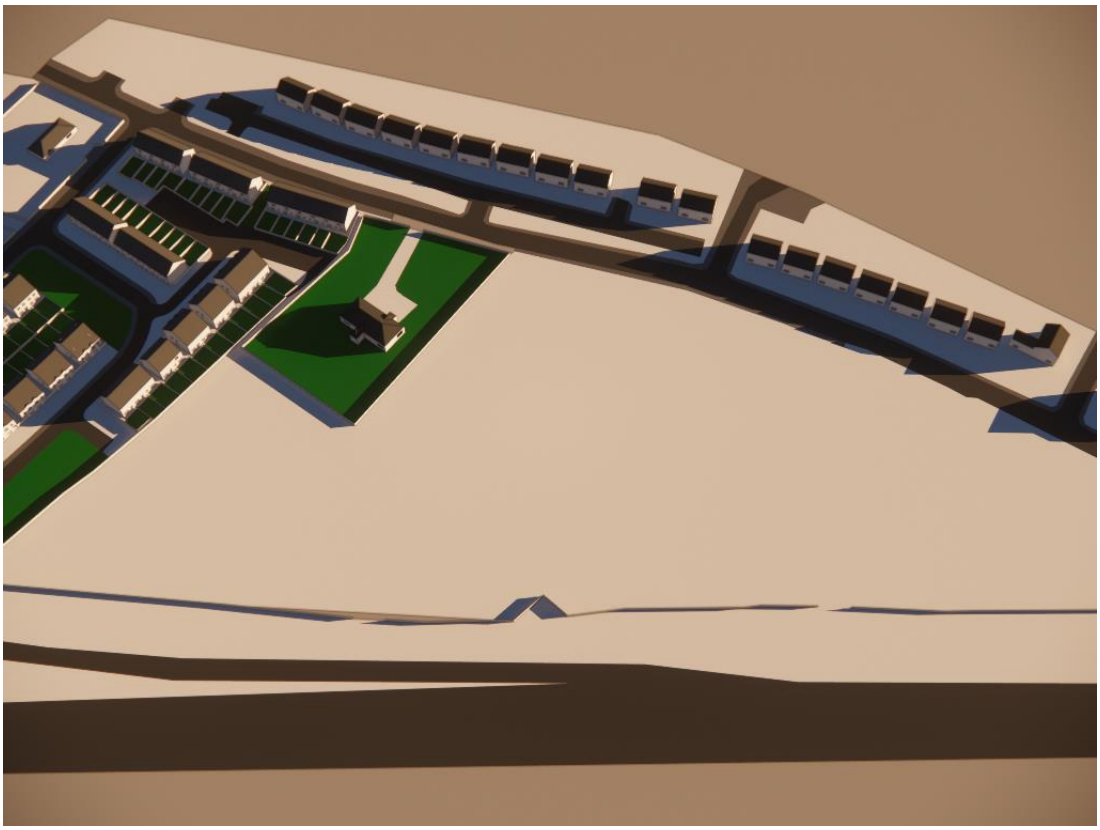
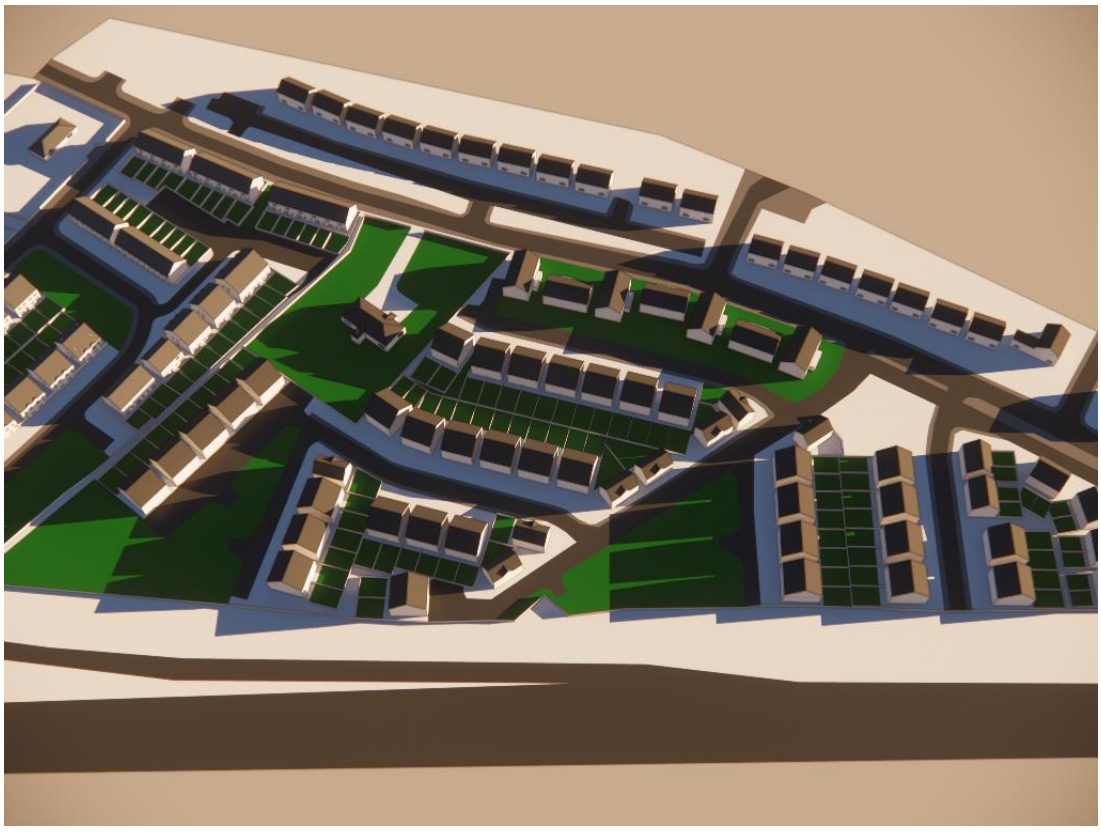


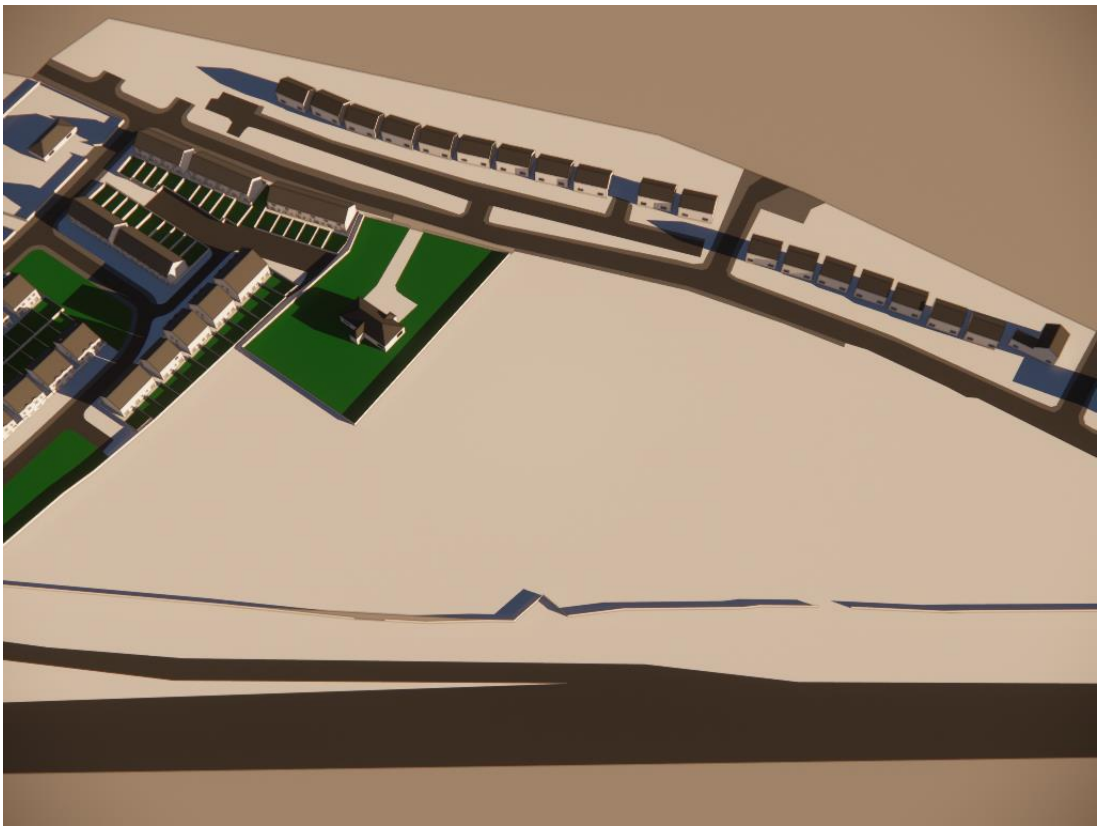
Proposed: September 21st, 16:00



Existing: December 21st, 10:00

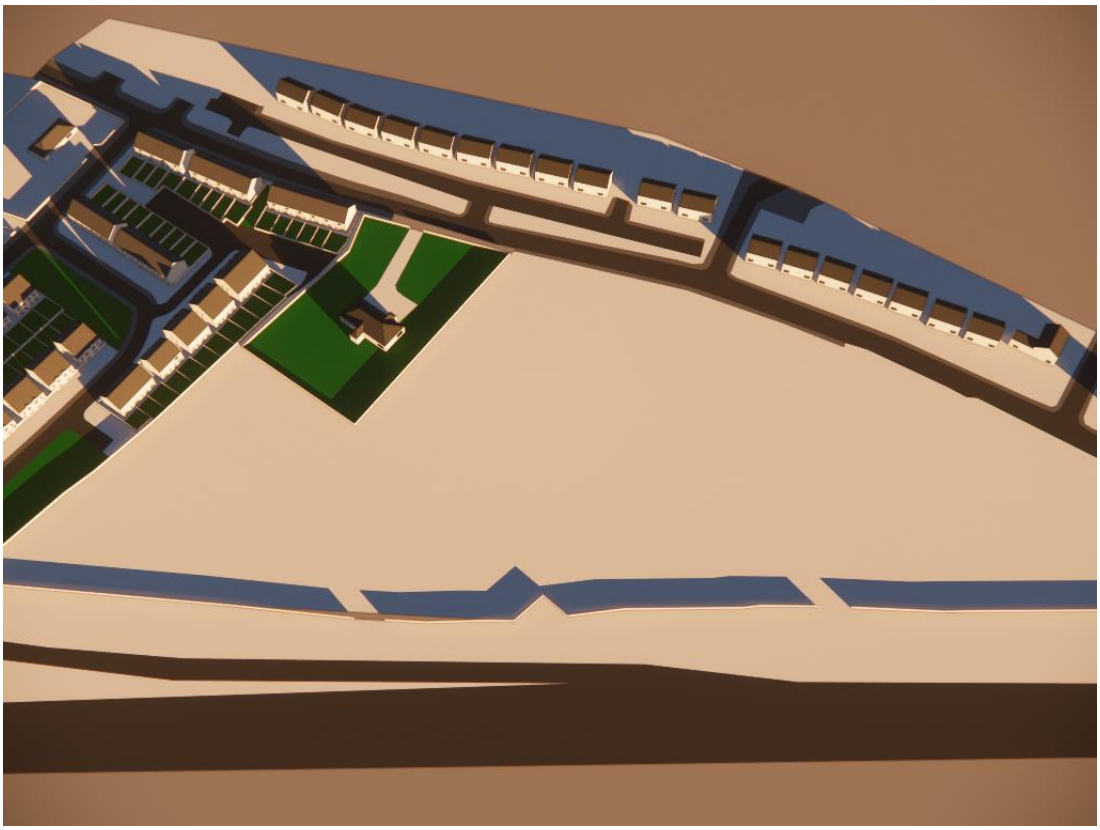


Proposed: December 21st, 10:00



Existing: December 21st, 12:00

Proposed: December 21st, 12:00



Existing: December 21st, 14:00

Proposed: December 21st, 14:00

7. Conclusion

Daylight to Proposed Development

The daylight standards are in a period of transition with various planning authorities referencing:

- BR 209 (Second Edition)
- BR 209 (Third Edition)
- BS 8205:2008
- BS EN 17037:2018.

As the BR 209 document (Third Edition) has been updated to reference the latest standard BS EN 17037:2018 the Daylight analysis was considered against this standard:

- BS EN 17037:2018

For the BS EN 17037:2018 standards 100% of rooms analysed met the target lux levels which were 100 lux for bedrooms and 200 lux for Kitchen/Living/Dining.

All 20 no. spaces assessed exceed the target levels in the BS EN 17037:2018 standard, so the proposed apartments are considered to provide an acceptable standard of amenity from a daylight perspective.

Amenity Overshadowing – Communal Amenity within Site

The BRE guideline requirement for amenity overshadowing is that at least 50% of a communal amenity area receives two hours on sunlight on March 21st. The analysis shows that all areas analysed for amenity overshadowing had results that were higher than the minimum required 50%.

Amenity Overshadowing – Private Amenity within Adjacent to Site

The BRE guideline requirement for amenity overshadowing is that at least 50% of private amenity areas receive two hours on sunlight on March 21st. The analysis shows that all areas analysed for amenity overshadowing in neighbouring garden areas had results that were higher than the minimum required 50%.

Vertical Sky Component (VSC)

Vertical Sky Component analysis was performed to investigate if windows of the adjacent dwelling facing the proposed development achieve 27% or failing that, do not reduce by more than 20% of the current value when the proposed development is completed. Of the 55 no. windows analysed all surpass the 27% level or do not reduce to less than 0.8 times the existing level thus conforming with the BRE guidelines for Vertical Sky Component.

Overall Conclusion.

After conducting a comprehensive daylight and sunlight assessment of the proposed development using simulation modelling and comparing results achieved against the BRE Guide and BS recommended guidelines, the proposed development passes the analyses conducted as per the BRE guidelines. The impact on the neighbouring rear garden amenity spaces or loss of access to sky for the windows facing the proposed development would be minimal.

Appendix A

Figure A.1: Daylight Provision – BA01 – Unit 1 - Bedroom 1

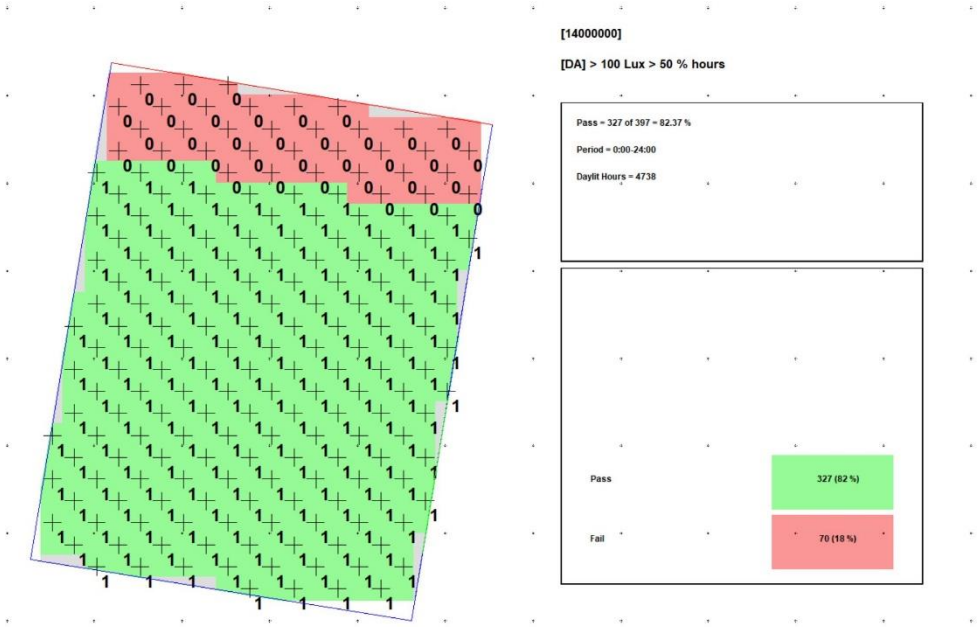


Figure A.3: Daylight Provision – BA01 – Unit 1 - KLD

Figure A.4: Daylight Provision – BA01 – Unit 2 – Bedroom 1

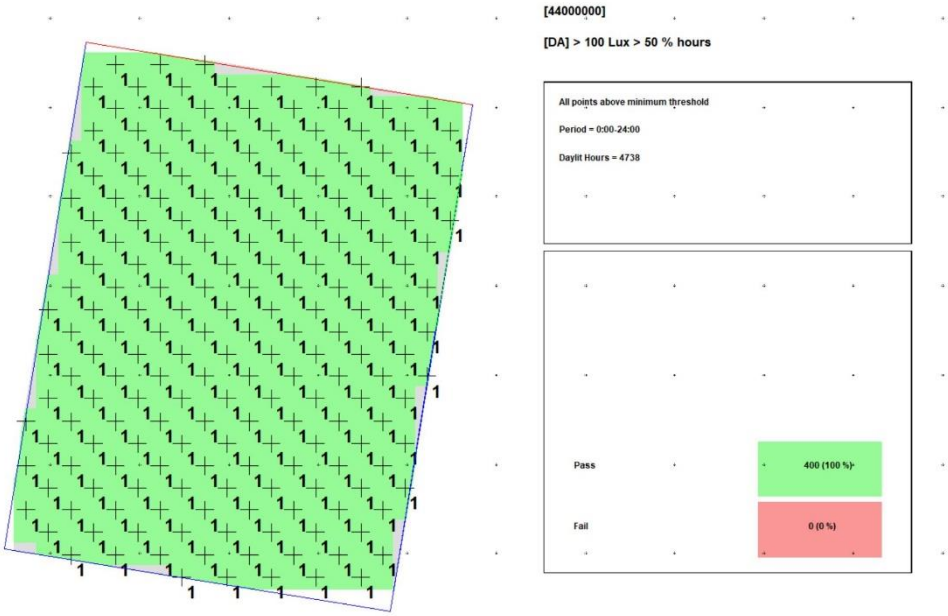


Figure A.6: Daylight Provision – BA01 – Unit 2 – KLD

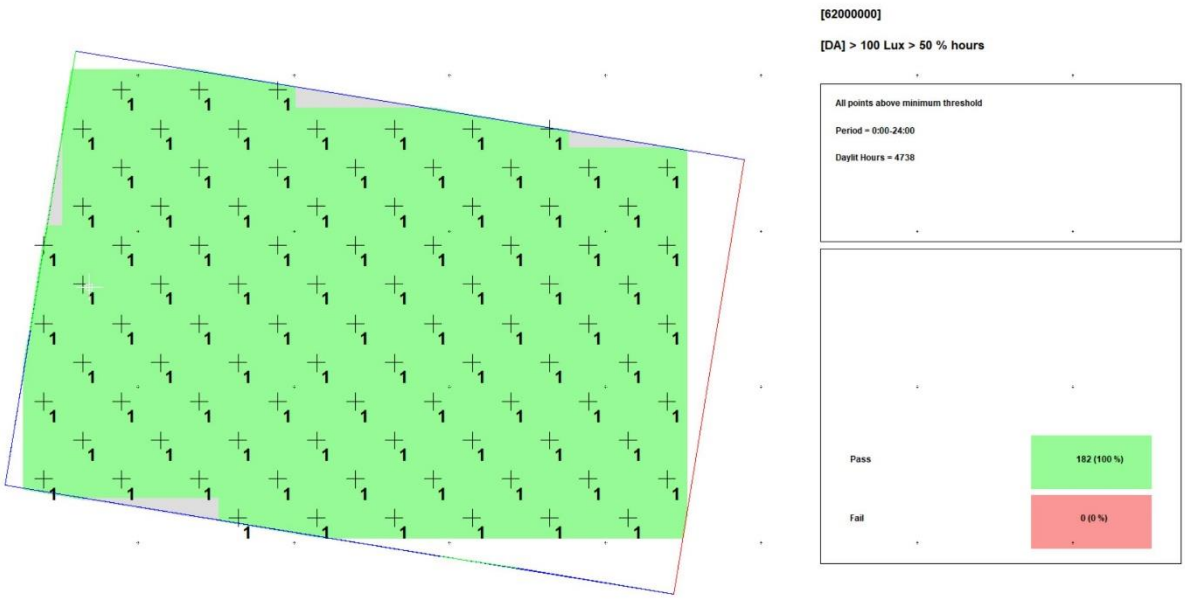


Figure A.7: Daylight Provision – BA01 – Unit 3 - Bedroom 1

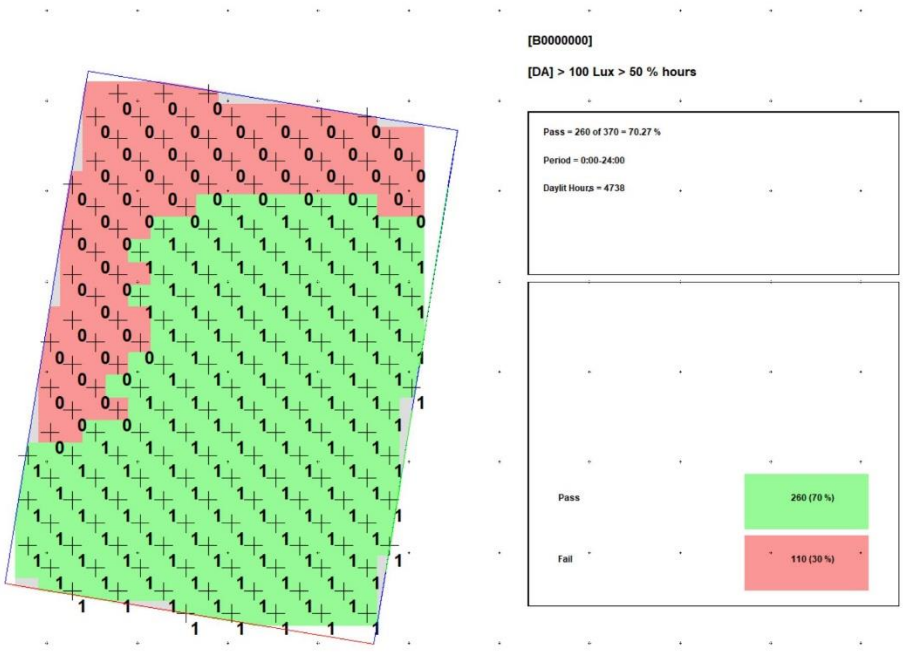


Figure A.9: Daylight Provision – BA01 – Unit 3 - KLD

Figure A.10: Daylight Provision – BA01 – Unit 4 – Bedroom 1

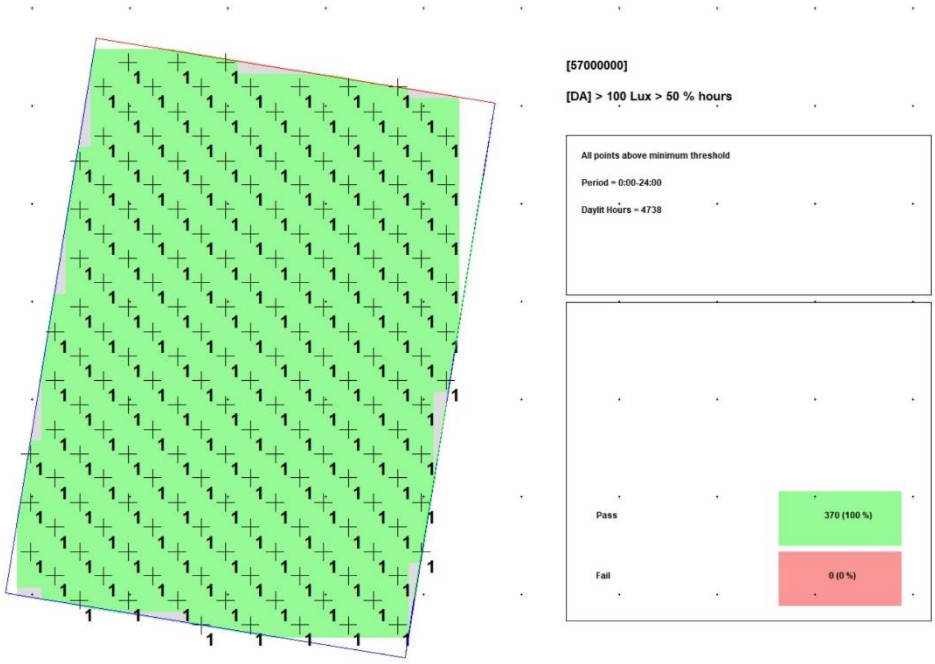


Figure A.12: Daylight Provision – BA01 – Unit 4 – KLD

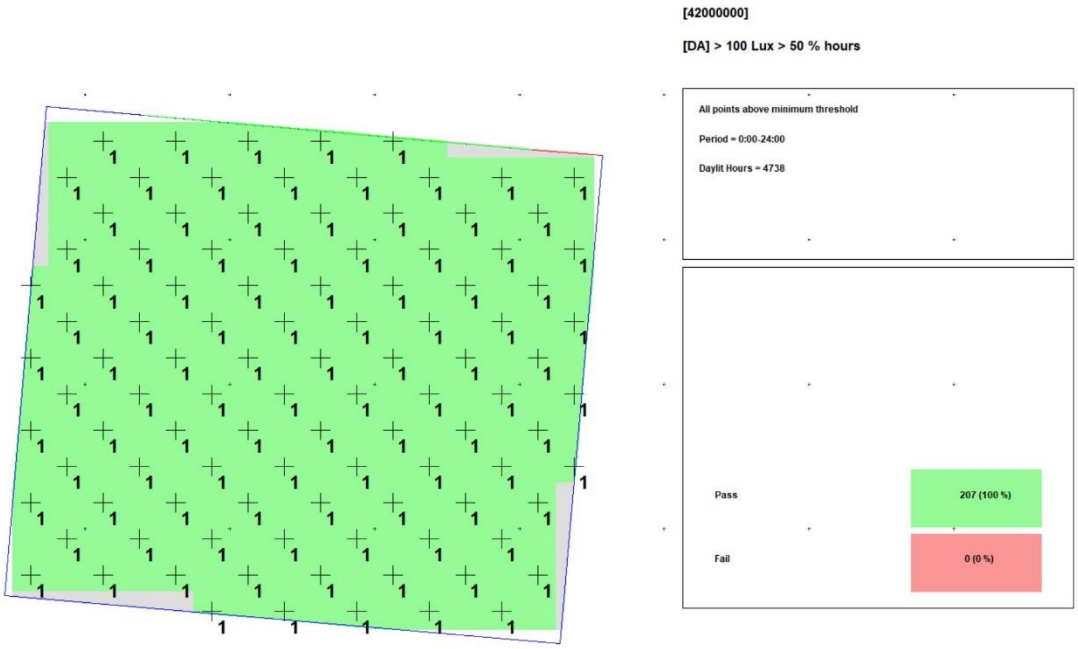


Figure A.13: Daylight Provision – BA02 – Unit 1 - Bedroom 1

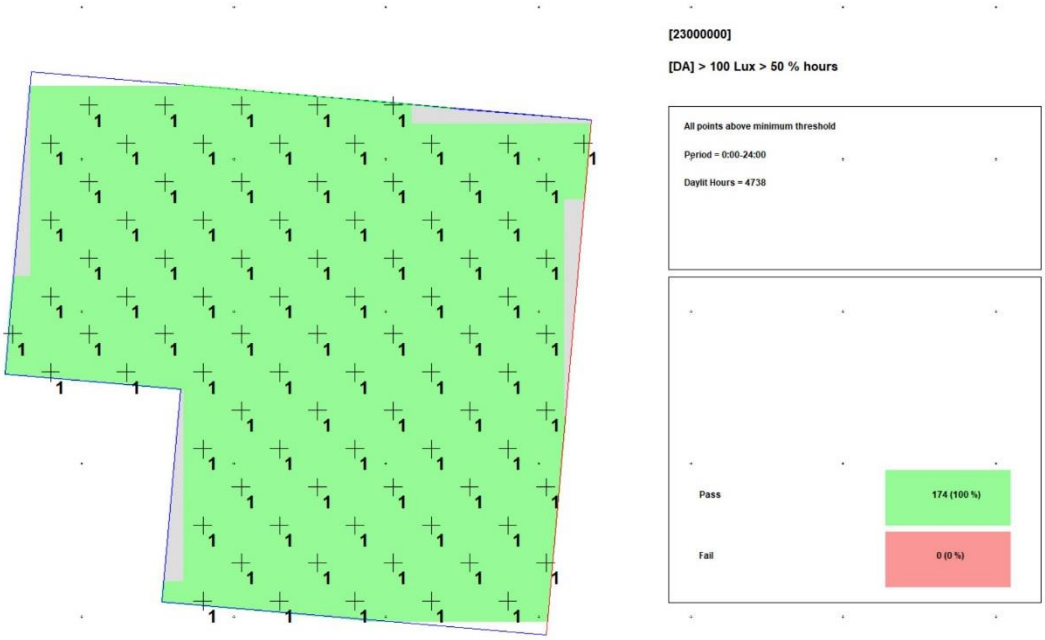


Figure A.14: Daylight Provision – BA02 – Unit 1 - Bedroom 2

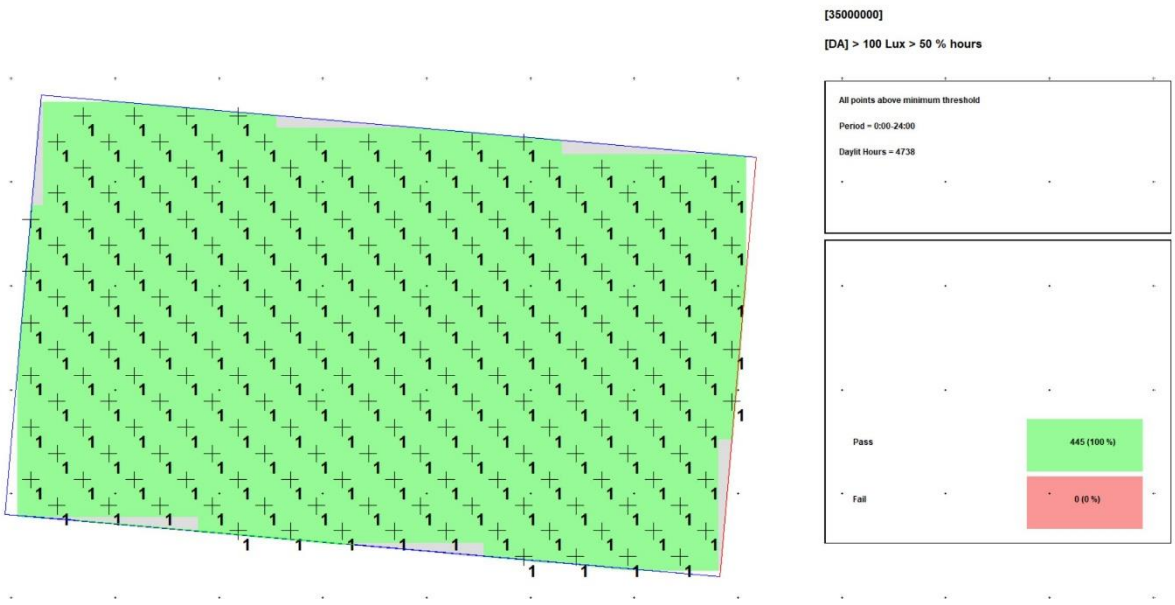


Figure A.15: Daylight Provision – BA02 – Unit 1 - KLD

Figure A.16: Daylight Provision – BA02 – Unit 2 – Bedroom 1

Figure A.17: Daylight Provision – BA02 – Unit 2 – Bedroom 2

Figure A.18: Daylight Provision – BA02 – Unit 2 – KLD

Figure A.19: Daylight Provision – BA02 – Unit 3 - Bedroom 1

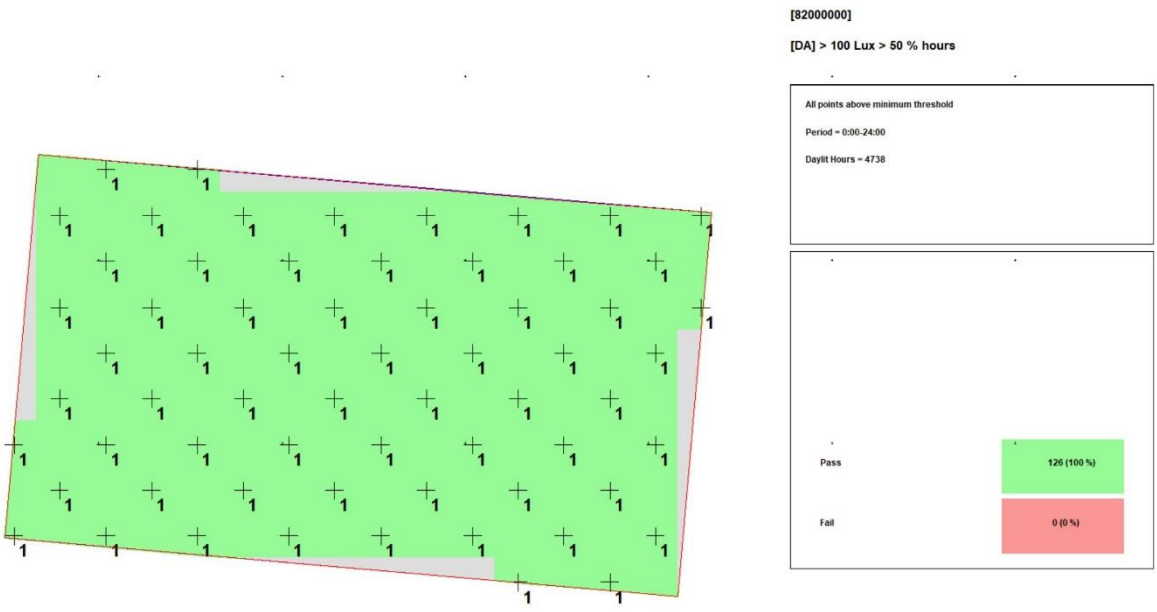


Figure A.20: Daylight Provision – BA02 – Unit 3 - Bedroom 2

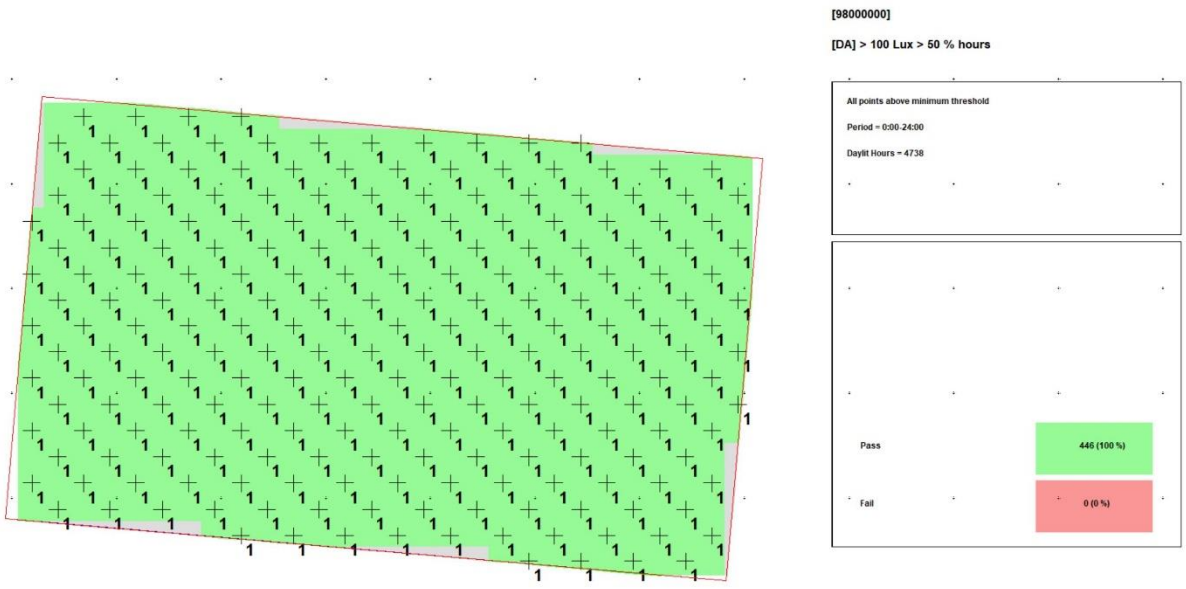


Figure A.21: Daylight Provision – BA02 – Unit 3 - KLD

Figure A.22: Daylight Provision – BA02 – Unit 4 – Bedroom 1

Figure A.23: Daylight Provision – BA02 – Unit 4 – Bedroom 2

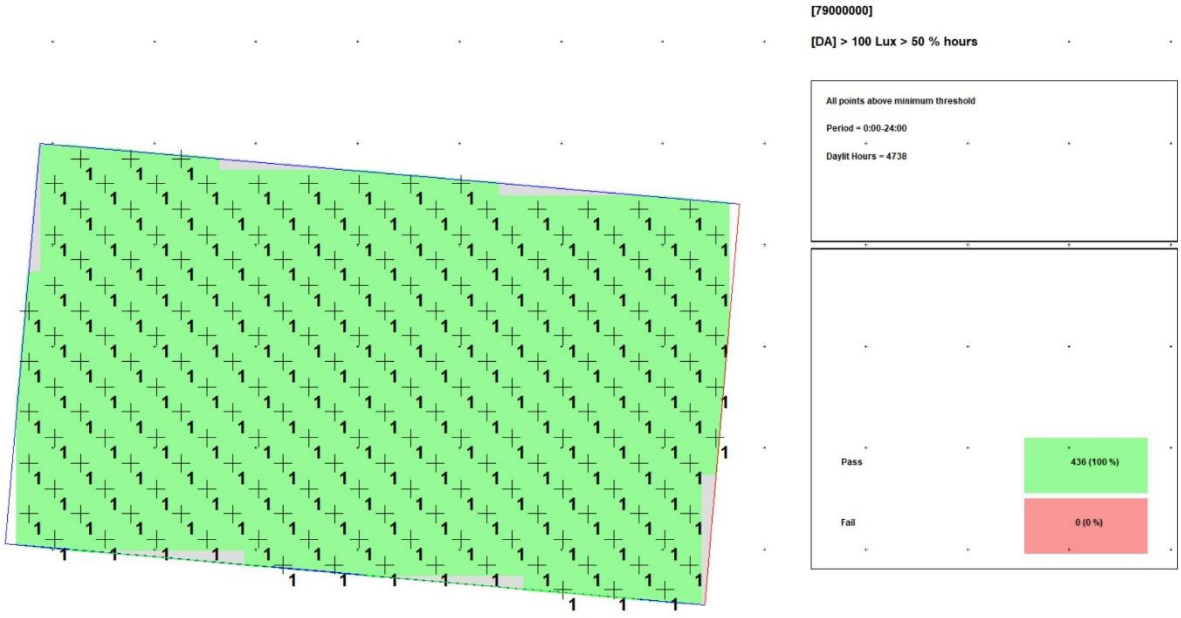


Figure A.24: Daylight Provision – BA02 – Unit 4 – KLD

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