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Daylight & Sunlight Assessments of a Proposed Mixed Use Development for the 'Silver Granite' site, Palmerston, Dublin 20.

Applicant: Hollyville Investments Ltd

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MSc Environmental Design of Buildings

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1. Introduction

The proposed development will consist of the demolition of the existing pub on site and the construction of a 5-storey over partial basement, mixed-use development comprising a gastro pub/restaurant with off-licence, 2 no. retail/commercial units, associated bin stores, bike stores, 1 no. ESB sub-station, all at ground floor level, a small plant room at basement level; and a total of 50 no. apartments on the upper floors; communal roof gardens; with car parking spaces; motorcycle parking, bicycle parking; landscaping and upgrades to public realm; and all associated engineering and site works necessary to facilitate the development.

1.1 Executive Summary

The report assesses the impact of the proposed development for Daylight and Sunlight on the neighbouring buildings and the quality of daylight and sunlight to within the proposed development. This analysis is carried out based on the drawings of Downey Planning & Architecture.

Impact on adjacent properties

There will be minimal impact to the daylight and sunlight to the adjacent dwellings with no perceivable reduction in either daylight or sunlight. There will be minimal reduction in the sunlight to any of the adjacent amenity spaces. All areas assessed meet or exceed the recommendations of the BRE guidelines.

Assessment of the quality of the proposed development.

All the proposed units within the development will exceed the recommendations of the BRE guidelines for quality of Daylight. The bedroom and living space layouts have been optimised for daylight and sunlight. The proposed amenity spaces exceed the recommendations of the BRE guidelines.

The results find that any impact on the adjacent residential structures would be minimal and imperceivable. There would be a good quality of daylight in the apartments analysed and the amenity areas would have sufficient sunlight to be bright and a pleasant spaces. The proposed development meets the recommendations of the BRE guidelines.

2. Methodology

2.1 Notes on the use of BS 8206-2 2008 and BRE guidance document (2011) Site layout planning for daylight and sunlight.

This Daylight and Sunlight Assessment demonstrates compliance with the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) and BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. This in accordance with the most relevant S.28 Ministerial Guidelines including Section 6.6 of the Sustainable Urban Housing Design Standards for New Apartments 2020, and Section 3.2 of the Urban Development and Building Heights Guidelines for Planning Authorities (2018).

We are aware of a new European standard, BS EN 17037:2018, however this is not currently enforced until such time as confirmed by a government circular, or as an update to the Development Plan or the relevant S. 28 Ministerial Guidelines.'

Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities 2020 directs Planning authorities to have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or British Standard BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'. The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in both of these documents have been referenced in this Sunlight and Daylight Access Analysis.

Neither the British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide is preceded by the following very clear warning as to how the design advice contained therein should be used:

"The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aims 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."

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas.

2.2 Daylight to the existing dwellings

The site is analysed in plan, section and building use. Windows and amenity area are selected to test for impact from the proposed development.

BRE guidelines recommend that: *"Loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window."*
To check for this if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse light of the existing building may be adversely affected. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

For loss of daylight and sunlight to existing buildings BRE guidance document (2011) "Site layout planning for daylight and sunlight" is used and BS8206 Part 2:2008 Lighting for Buildings, Code of Practice for Daylighting.

For loss of light the report recommends calculation of the Vertical Sky Component. This is the ratio of direct sky illuminance falling on the outside window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE Overcast Sky is used and the ratio is usually expressed as a percentage. The maximum value is just under 40% for a completely unobstructed vertical wall. The Vertical Sky Component on a window is a good measure of the amount of daylight entering it.

The BRE guidelines set out a two stage assessment for the Vertical Sky Component:
a) Where the Vertical Sky Component at the centre of the existing window exceeds 27% with the new development in place then enough sky light should still be reached by the existing window.

b) Where the Vertical Sky Component with the new development in place is both less than 27% and less than 0.8 times its former value, then the area lit by the window is likely to appear more gloomy, and electric light will be needed more of the time.

2.3 Sunlight

The BRE guidelines recommend assessing the loss of sunlight to the main living rooms and conservatories if they have a window wall facing within 90° of due south. Kitchens and bedrooms are less important but care should be taken not to block too much sun. If the proposed development is fully north then sunlight need not be assessed.

The Annual Probable Sunlight Hours (APSH) is used to assess the quantity of sunlight for a given location. This is the total amount sunshine for a given location on an unobstructed horizontal surface taking cloud cover into account. To Assess the APSH and the Probable Sunlight Hours for winter statistical data from the Irish Meteorological Service is used. Table 1 shows the average sunlight hours for each month and the maximum possible without any cloud cover. This gives the factor of possible sunlight hours for each month.

Met Eireann Sunlight Hours Data Set 1981-2010													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average Sunlight Hours/ Day	1:54	2:45	3:36	5:32	6:44	6:40	5:17	5:13	4:16	3:17	2:10	1:44	
Average Sunlight Hours/ Month	58:54	77:00	111:36	166:00	208:44	200:00	163:47	161:43	128:00	101:47	65:00	53:44	1496.25
Total Available Sunlight Hours	252	265	358	412	488	485	496	451	375	320	250	248	4383
Probable Sunlight Hours Ratio	23.37%	29.06%	31.17%	40.29%	42.77%	41.24%	33.02%	35.86%	34.13%	31.81%	26.00%	21.67%	34.14%

Table 1: Average monthly sunlight hours recorded at Dublin Airport - Data set 1981-2010

The BRE guidelines recommend that the centre of a window or 1.6m above ground for a door be assessed and receive at least 25% of the APSH and at least 5% during the period of 21st September to 21st March. If the available APSH is less than this then it should not be reduced below 0.8 times its former value or noticeable loss of sunlight may occur.

2.4 Sunlight to gardens and open spaces

For calculations of sunlight analysis it is general practice to use March 21 and the recommendations of the BRE guidance document (2011) "Site layout planning for daylight and sunlight". P.J Littlefair, in relation to Gardens and open spaces section 3.3.17 state:

"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."

2.5 Calculations of Trees & Hedges

Trees are not usually included in the assessments of impact, unless specified otherwise. In relation to the effects of trees and hedges the BRE guidelines states,

> *"It is generally more difficult to calculate the effects of trees on daylight because of their irregular shape and because some light will generally penetrate through the crown. Where the effects of a new building on existing buildings nearby is being analysed, it is usual to ignore the effects of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf."*

2.6 Daylight in the proposed development.

The proposed project is analysed in plan & section, and building use. The rooms are assessed for Average Daylight Factor (ADF). Input values for the assessment of the Average Daylight Factor below in Table 2.

Surface Reflectance			
Element	Reflectance	Transmissivity	
Internal walls	84%	0%	White Painted Walls
Internal ceiling	88%	0%	White Painted Ceiling
Floor	52%	0%	Light wood Flooring
External walls - proposed development	58.3%	0%	Light yellow Brick
External walls - outside site	20%	0%	CIBSE
External ground	20%	0%	CIBSE
Glass	20.1	68.8	Triple glazed clear glass

Table 2: Surface reflectance parameters for ADF calculation

Sensor Grid spacing 0.6m, inset 0.45m, minimum inset 0.3m, Work plane offset 0.85.

2.7 Environmental impact assessment

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces. The guide does not give a specific range or percentages but sets out parameters set out below.

> *"Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.*
>
> *Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:*
>
> - *only a small number of windows or limited area of open space are affected*
> - *the loss of light is only marginally outside the guidelines*
> - *an affected room has other sources of skylight or sunlight*
> - *the affected building or open space only has a low level requirement for skylight or sunlight*
> - *there are particular reasons why an alternative, less stringent, guideline should be applied.*

Factors tending towards a major adverse impact include:

- *a large number of windows or large area of open space are affected*
- *the loss of light is substantially outside the guidelines*
- *all the windows in a particular property are affected*
- *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, eg a living room in a dwelling or a children's playground.*

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required. or in the amount of sunlight reaching an open space.

Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."

A flexible approach should be taken when assessing the impact with daylight and sunlight being one of many factors that influence the environment when planning a new development.

2.8 Assessment model

Neighbouring property model development is based on information available from Architectural and survey drawings, Local Authority planning records, Google Earth and on site observation. Window locations are represented as accurately as possible and are determined based on available information. Access to private rear gardens was not possible and any omissions or inaccurate window locations are unintentional.

3. Daylight to adjacent buildings.

Figure 1: Aerial view of site.

The proposed development site is on the junction of Kennelsfort Road Upper and Wheatfield Road. It currently has 1-2 storey commercial buildings and associated car parking, which includes the Silver Granite public house. There are commercial properties opposite the site on the Kennelsfort Road.

Across Wheatfield road, there are residential properties running perpendicular to the proposed development. There are residential properties adjacent to the East and South East, on Wheatfield Road and Oakcourt Grove. To the South is a petrol station, beyond which are residential properties in Oakcourt Avenue. These residential properties have been considered for potential impact in this report.

3.1 Preliminary assessment of adjoining dwellings

The BRE guideline recommends that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. The zone of influence 3 times the height of the proposal is plotted in Figure 2 in yellow.

The BRE guideline states that if part of a new building measured in a vertical section perpendicular to the main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse light of the existing building may be adversely affected. If a window falls within a 45° angle both in plan and elevation with a new development in place then the window may be affected and should be assessed.

Section planes perpendicular to the window wall of the properties facing the proposed development are indicated in blue. The planes at locations A-F extend and if they intersect the proposed development, they are plotted in Figure 3.

Figure 2: Proposed site plan showing the zone of influence and the direction of window walls in adjacent residential properties.

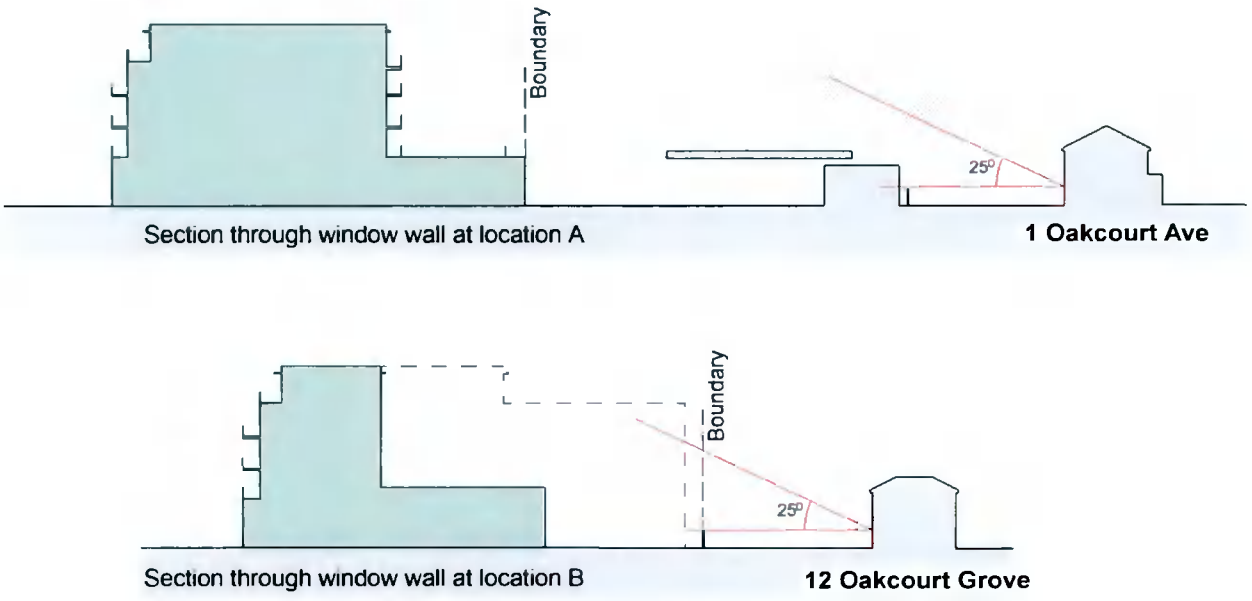


Figure 3: Section perpendicular to window wall at locations indicated in Figure 2.

3.2 Discussion

Due to the angles on the site, most of the surrounding residential properties do not look directly at the proposed development. This is the case at locations C - F, as noted in Figure 2.

Location A: A section was taken No.1 Oakcourt Ave. The 25° angle does not subtend the proposed development, indicating that a perceptible impact is unlikely, however due to the proximity, further assessment will be carried out for completeness.

Location B: A section was taken No.12 Oakcourt Grove. The 25° angle does not subtend the proposed development, indicating that a perceptible impact is unlikely, however due to the proximity, further assessment will be carried out for completeness.

3.3 Detailed assessment to adjoining dwellings

The BRE guideline recommends assessing the Vertical Sky Component (VSC) to adjacent properties, where the layouts are not known. The Annual Probable Sunlight Hours of the relevant properties will also be assessed.

The BRE guideline states that if a window retains a VSC in excess of 27% with the proposed development in place then it will still receive enough daylight. If the existing VSC is below 27% or is reduced below 27% and below 0.8 times its former value then the diffuse light maybe adversely affected.

Following the preliminary analysis the relevant windows were selected for assessment. Test points locations are indicated in Figures 4- 15 and the results are displayed in Table 3 below.

Figure 4: View of the rear of No.s 1 & 3 Wheatfield Road

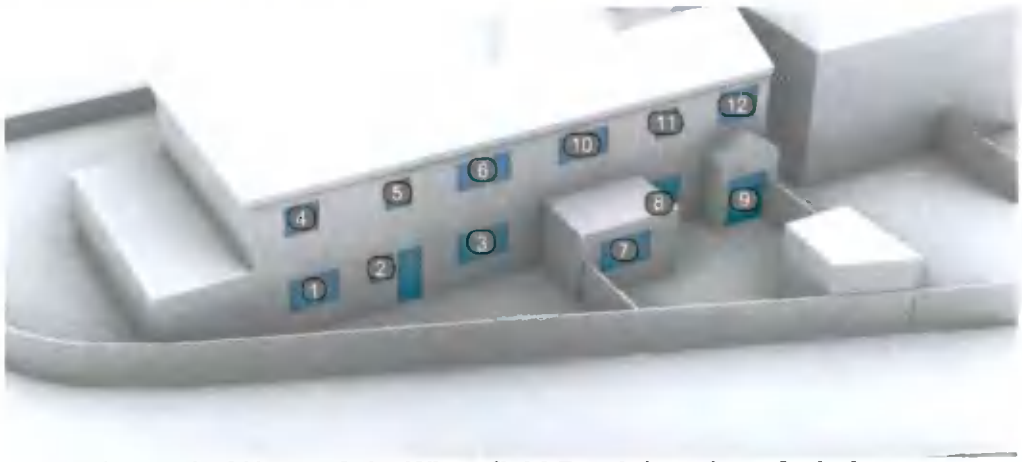


Figure 5: View of model of No.s 1 & 3 - Wheatfield Road, locating of windows assessed for VSC and APSH.

Figure 6: View of No.s 13 & 14 Oakcourt Grove

Figure 7: View of model of No.s 13 & 14 Oakcourt Grove, locating of windows assessed for VSC.

Figure 8: View of No.s 7 - 12 Oakcourt Grove

Figure 9: View of model of No.s 7 - 12 Oakcourt Grove, locating of windows assessed for VSC.

Figure 10: View of No.s 1 & 2 Oakcourt Ave.

Figure 11: View of model of No.s 1 & 2 Oakcourt Ave, locating of windows assessed for VSC.

Figure 12: View of No.s 170 & 172 Kennelsfort Road Upper

Figure 13: View of model of No.s 170 & 172 Kennelsfort Road Upper, locating of windows assessed for VSC.

Figure 14: View of No.s 215 & 215A Palmerstown Ave

Figure 15: View of model of No.s 215 & 215A Palmerstown Ave, locating of windows assessed for VSC & APSH.

Vertical Sky Component				
Test Point	Vertical Sky Component Recommended Value > 27%		Ratio: Proposed to Existing Recommended > 80%	Meets criteria of 27% VSC or >80% Existing Value
	Existing	Proposed		
1	35.42	33.97	95.9%	Y
2	34.76	33.73	97.0%	Y
3	33.47	32.61	97.4%	Y
4	35.48	34.25	96.5%	Y
5	35.27	34.42	97.6%	Y
6	35.55	34.83	98.0%	Y
7	34.43	33.92	98.5%	Y
8	24.36	24.36	100.0%	Y
9	27.16	27.08	99.7%	Y
10	35.57	34.99	98.4%	Y
11	35.26	34.88	98.9%	Y
12	35.89	35.49	98.9%	Y
13	32.37	32.27	99.7%	Y
14	35.35	32.40	91.7%	Y
15	34.54	32.70	94.7%	Y
16	35.23	33.27	94.4%	Y
17	35.27	33.10	93.8%	Y
18	35.64	33.05	92.7%	Y
19	33.39	29.85	89.4%	Y
20	35.30	31.12	88.2%	Y
21	35.71	32.65	91.4%	Y
22	35.47	31.96	90.1%	Y
23	36.13	31.12	86.1%	Y
24	36.19	31.64	87.4%	Y
25	35.79	31.46	87.9%	Y
26	36.00	31.98	88.8%	Y
27	36.18	32.09	88.7%	Y
28	35.14	31.44	89.5%	Y
29	36.01	32.30	89.7%	Y
30	35.76	32.34	90.4%	Y
31	35.16	32.28	91.8%	Y
32	36.01	32.99	91.6%	Y
33	35.75	32.76	91.6%	Y
34	36.04	33.24	92.2%	Y
35	35.69	33.10	92.7%	Y
36	35.01	32.58	93.1%	Y
37	36.03	33.51	93.0%	Y
38	35.72	33.43	93.6%	Y
39	34.51	33.14	96.0%	Y
40	35.56	33.60	94.5%	Y
41	35.70	33.74	94.5%	Y
42	35.91	34.15	95.1%	Y
43	35.39	33.82	95.6%	Y
44	34.97	33.57	96.0%	Y
45	35.86	34.29	95.6%	Y
46	35.50	34.07	96.0%	Y
47	33.89	33.14	97.8%	Y
48	34.83	33.91	97.4%	Y
49	35.64	34.09	95.7%	Y
50	35.93	34.36	95.6%	Y

Vertical Sky Component				
Test Point	Vertical Sky Component Recommended Value > 27%		Ratio: Proposed to Existing Recommended > 80%	Meets criteria of 27% VSC or >80% Existing Value
	Existing	Proposed		
51	35.02	34.15	97.5%	Y
52	34.75	34.06	98.0%	Y
53	35.30	34.60	98.0%	Y
54	35.91	34.38	95.7%	Y
55	35.60	34.11	95.8%	Y
56	36.10	34.66	96.0%	Y
57	37.39	36.25	97.0%	Y
58	37.77	36.81	97.5%	Y
59	36.03	35.13	97.5%	Y
60	36.31	35.43	97.6%	Y
61	37.16	36.57	98.4%	Y
62	37.84	37.16	98.2%	Y
63	36.15	35.50	98.2%	Y
64	36.11	35.52	98.4%	Y
65	36.38	34.05	93.6%	Y
66	29.03	29.03	100.0%	Y
67	35.29	33.36	94.5%	Y
68	35.44	33.68	95.0%	Y
69	27.34	26.03	95.2%	Y
70	22.15	20.02	90.4%	Y
71	37.02	35.44	95.7%	Y
72	35.27	33.76	95.7%	Y
73	35.18	33.81	96.1%	Y

Table 3: Vertical sky component for windows adjacent residential properties

3.3 Discussion

The assessment of the Vertical Sky Component is used where the room layout is not known and a good indicator of access to daylight for the existing window. Only habitable rooms need to be assessed.

3.4 Conclusion

All the windows assessed either retain a VSC in excess of 27% or are not reduced below 80% of their former value. The proposed development meets the recommendations of the BRE guide and BS8206 Part 2:2008 Lighting for Buildings Code of Practice for Daylighting. Any reduction to the daylight in neighbouring dwellings would be imperceptible and any impact will be negligible.

4. Sunlight in Adjoining Residential Living Areas

4.1 Annual Probable Sunlight Hours (APSH)

The BRE guide recommends assessing window walls for the APSH that face within 90° of due south. It states that

" In housing the main requirement for sunlight is living rooms, where it is valued at any time of day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens, where people prefer it in the morning rather than the afternoon."

For a proposed development to have a noticeable impact on the Annual Probable Sunlight Hours the value need to be reduced below the recommended 25% annual or 5% in the winter period, from September to March. If the value is either below this to begin with or is reduced below this, then it should not be reduced below 0.8 times its former value.

Typically main living spaces are assessed for Sunlight. Those that meet the criteria of having a windows that faces within 90° of due South were assessed for a potential impact on their APSH. Their locations are indicated in Figures 5 - 15 and the results are set out in Table 4.

Annual Probable Sunlight Hours							
	APSH >25% Target			Sept 21 - Mar 21 PSH >5% Target			Meets criteria of >25% APSH and >5% PSH Or <25% or <5% PSH but >80% Existing Value
Location ID	Existing	Proposed	Ratio	Existing	Proposed	Ratio	
	% of APSH	% of APSH	Target if less than 25% APSH >80%	% PSH	% PSH	Target if less than 5% PSH >80%	
1 & 3 Wheatfield Road							
1	73.53%	66.71%	90.72%	26.0%	23.2%	89%	Y
2	73.41%	67.00%	91.27%	26.2%	23.2%	89%	Y
3	66.43%	61.46%	92.51%	23.8%	21.4%	90%	Y
7	72.71%	69.51%	95.61%	24.9%	23.3%	94%	Y
8	31.58%	31.58%	100.00%	10.3%	10.3%	100%	Y
9	49.93%	49.52%	99.18%	14.7%	14.4%	98%	Y
215 & 215 A Palmerstown Ave							
65	49.91%	43.04%	86.24%	15.6%	9.9%	64%	Y
66	28.18%	28.18%	100.00%	1.3%	1.3%	100%	Y
69	40.37%	35.87%	88.86%	12.7%	8.9%	71%	Y
70	42.56%	36.99%	86.92%	14.9%	10.3%	69%	Y
71	50.82%	44.64%	87.83%	16.2%	11.0%	68%	Y

Table 4: Annual Probable Sunlight hours to adjoining properties

*If the window retains 25% annual or 5% winter sunlight hours the it meets the recommendations of the BRE guide even if the value is reduced below 80% of its former value.

4.2 Discussion

All the windows assessed have an APSH percentage greater than the recommended 25% (414 hours) and 5% (75 hours) from 21 September to 21 March and meet the recommendations of the BRE guide.

4.3 Conclusion

All windows assessed exceed the target values set out for sunlight. The proposed development meets the recommendations of the BRE guide.

5. Daylight to Proposed Development.

The BRE guidelines recommend that the Average Daylight Factor (ADF) be assessed in habitable rooms of new developments. BS 8206-2 gives minimum values of ADF of 2% for kitchens and living rooms which include a kitchen, 1.5% for living rooms and 1% for bedrooms. An average daylight factor of 5% is a well daylit space. The factors that affect ADF are room depth, aspect, window size relative to floor area and closeness to an adjacent obstruction.

The first & second floor habitable rooms were assessed for the Average Daylight Factor. The rooms above will have increased accessed to the sky and will have a higher value Average Daylight Factor. Room identifying plans and generated analysis are shown in Figures 16 & 17. The room numbering follows that of the Architectural drawings. The results are set out in Table 5 below.

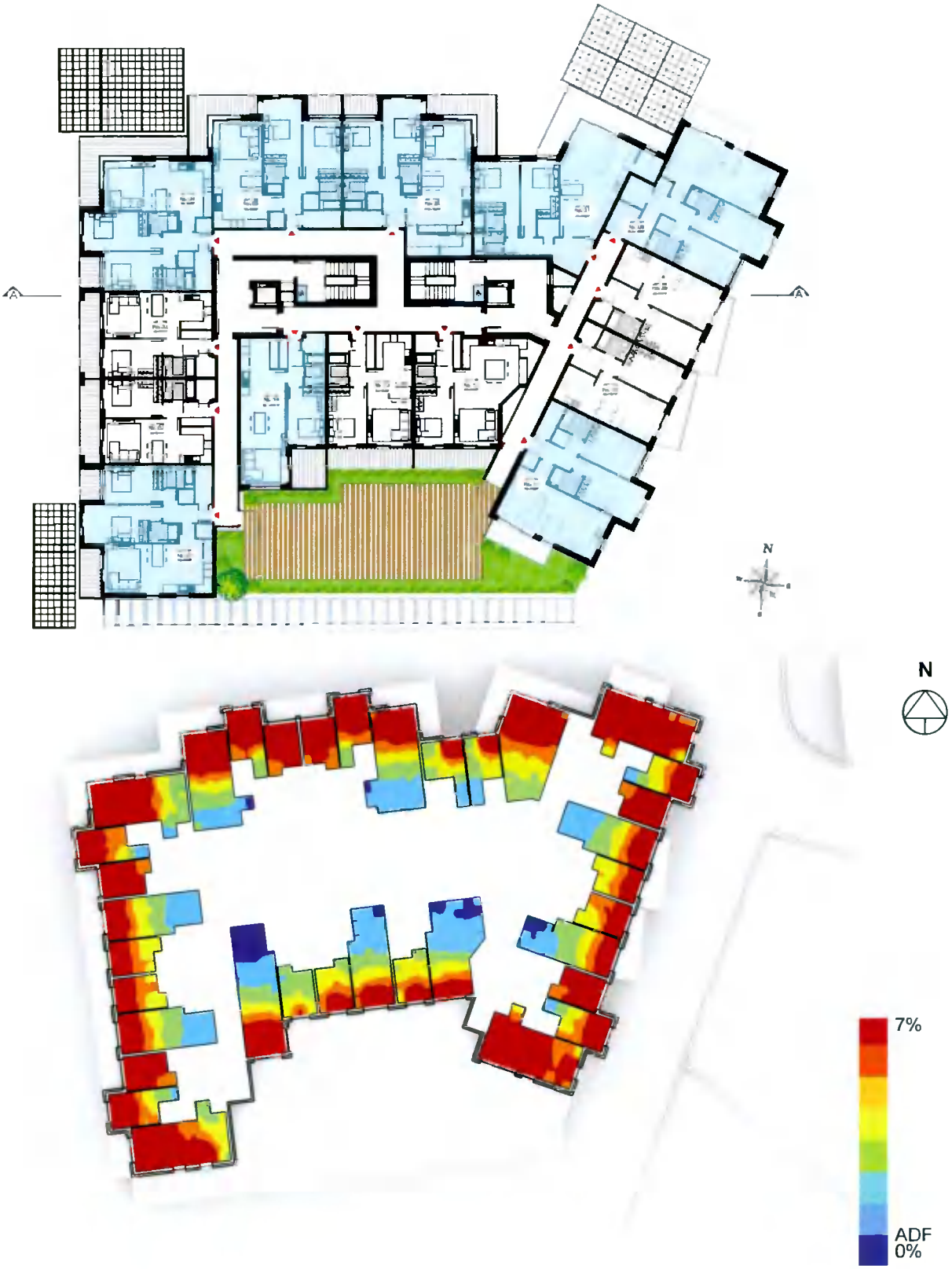


Figure 16: First floor plan locating rooms assessed for ADF, together with false colour plans of ADF. Scale 0 - 7%

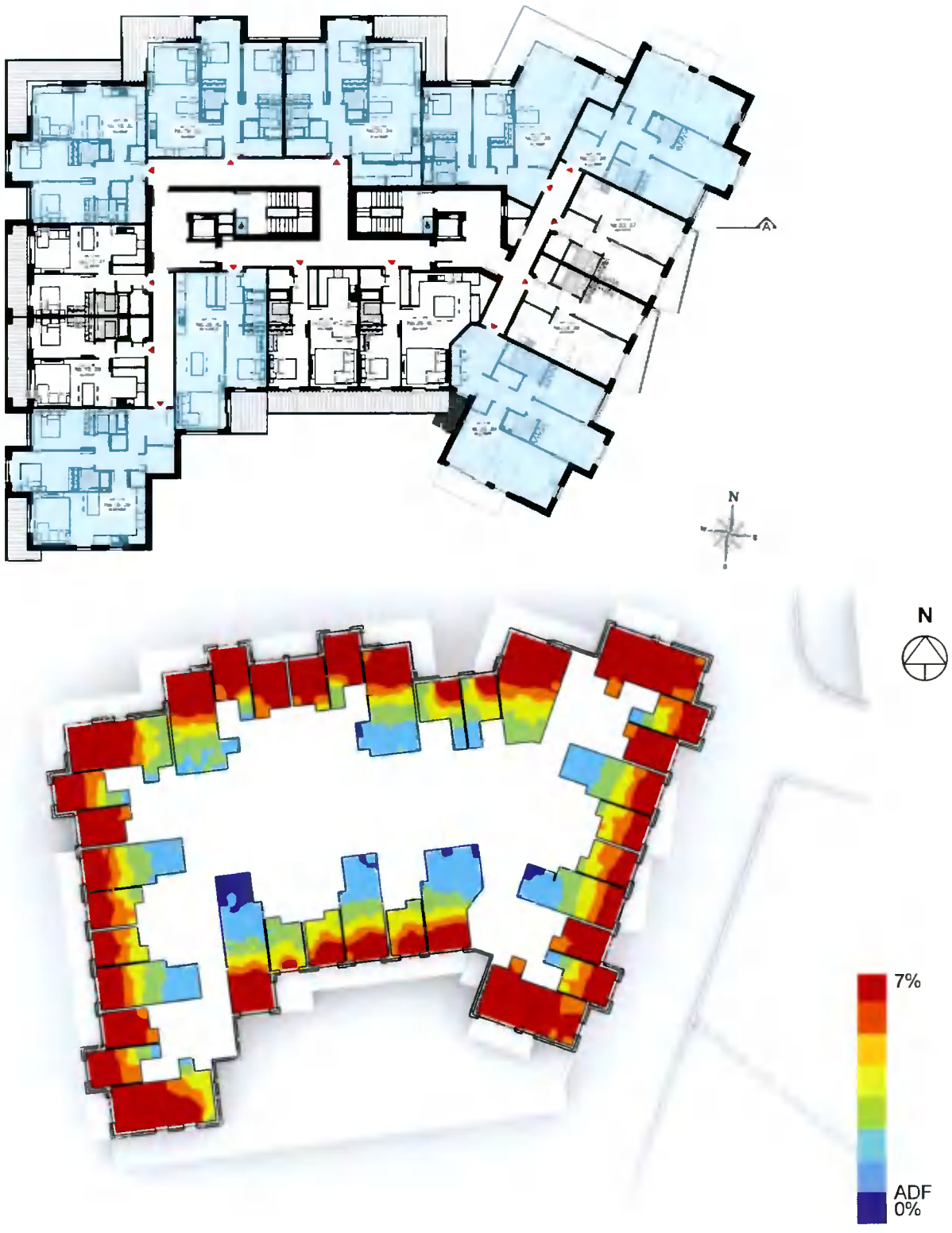


Figure 17: Second floor plan locating rooms assessed for ADF, together with false colour plans of ADF. Scale 0 - 7%

Average Daylight Factor						
Space ID	Description	Area m2	Sensor Count	ADF	Minimum Recommended ADF	Meets Criteria
First Floor						
1-01.1	Liv / Kit	30.47	70	5.01%	2%	Y
1-01.2	Bed	13.07	33	5.60%	1%	Y
1-01.3	Bed	10.74	31	5.74%	1%	Y
1-02.1	Liv / Kit	24.50	61	3.04%	2%	Y
1-02.2	Bed	10.80	31	4.48%	1%	Y
1-03.1	Liv / Kit	24.50	61	3.08%	2%	Y
1-03.2	Bed	10.92	31	4.41%	1%	Y
1-04.1	Liv / Kit	30.47	70	5.87%	2%	Y
1-04.2	Bed	13.07	33	5.67%	1%	Y
1-04.3	Bed	10.74	31	7.11%	1%	Y
1-05.1	Liv / Kit	30.47	70	4.17%	2%	Y
1-05.2	Bed	13.07	33	6.65%	1%	Y
1-05.3	Bed	10.74	31	5.57%	1%	Y
1-06.1	Liv / Kit	32.48	90	3.39%	2%	Y
1-06.2	Bed	13.07	33	6.55%	1%	Y
1-06.3	Bed	10.74	31	5.65%	1%	Y
1-07.1	Liv / Kit	33.86	86	5.11%	2%	Y
1-07.2	Bed	12.01	29	3.15%	1%	Y
1-07.3	Bed	12.86	29	3.62%	1%	Y
1-08.1	Liv / Kit	30.47	70	6.15%	2%	Y
1-08.2	Bed	13.07	33	4.99%	1%	Y
1-08.3	Bed	10.74	31	6.70%	1%	Y
1-09.1	Liv / Kit	24.50	61	3.01%	2%	Y
1-09.2	Bed	10.80	31	4.08%	1%	Y
1-10.1	Liv / Kit	24.40	60	2.77%	2%	Y
1-10.2	Bed	10.80	31	4.49%	1%	Y
1-11.1	Liv / Kit	30.47	70	6.09%	2%	Y
1-11.2	Bed	13.07	33	5.04%	1%	Y
1-11.3	Bed	10.74	31	6.55%	1%	Y
1-12.1	Liv / Kit	30.74	82	2.07%	2%	Y
1-12.2	Bed	10.80	31	3.67%	1%	Y
1-13.1	Liv / Kit	25.30	60	2.59%	2%	Y
1-13.2	Bed	10.80	31	3.79%	1%	Y
1-14.1	Liv / Kit	34.11	86	3.18%	2%	Y
1-14.2	Bed	10.80	31	2.52%	1%	Y
Second Floor						
2-15.1	Liv / Kit	30.47	70	5.16%	2%	Y
2-15.2	Bed	13.07	33	5.70%	1%	Y
2-15.3	Bed	10.74	31	5.81%	1%	Y
2-16.1	Liv / Kit	24.50	61	3.08%	2%	Y
2-16.2	Bed	10.80	31	4.57%	1%	Y
2-17.1	Liv / Kit	24.50	61	3.15%	2%	Y
2-17.2	Bed	10.92	31	4.48%	1%	Y
2-18.1	Liv / Kit	30.47	70	5.92%	2%	Y
2-18.2	Bed	13.07	33	5.68%	1%	Y
2-18.3	Bed	10.74	31	7.38%	1%	Y
2-19.1	Liv / Kit	30.47	70	4.25%	2%	Y
2-19.2	Bed	13.07	33	6.75%	1%	Y
2-19.3	Bed	10.74	31	5.61%	1%	Y

Average Daylight Factor						
Space ID	Description	Area m2	Sensor Count	ADF	Minimum Recommended ADF	Meets Criteria
2-20.1	Liv / Kit	32.48	90	3.53%	2%	Y
2-20.2	Bed	13.07	33	6.65%	1%	Y
2-20.3	Bed	10.74	31	5.69%	1%	Y
2-21.1	Liv / Kit	33.86	86	5.28%	2%	Y
2-21.2	Bed	12.01	29	3.29%	1%	Y
2-21.3	Bed	12.86	29	3.78%	1%	Y
2-22.1	Liv / Kit	30.47	70	6.28%	2%	Y
2-22.2	Bed	13.07	33	5.15%	1%	Y
2-22.3	Bed	10.74	31	6.81%	1%	Y
2-23.1	Liv / Kit	24.50	61	3.12%	2%	Y
2-23.2	Bed	10.80	31	4.22%	1%	Y
2-24.1	Liv / Kit	24.40	60	2.86%	2%	Y
2-24.2	Bed	10.80	31	4.51%	1%	Y
2-25.1	Liv / Kit	30.47	70	6.29%	2%	Y
2-25.2	Bed	13.07	33	5.14%	1%	Y
2-25.3	Bed	10.74	31	6.78%	1%	Y
2-26.1	Liv / Kit	30.74	82	2.39%	2%	Y
2-26.2	Bed	10.80	31	3.95%	1%	Y
2-27.1	Liv / Kit	25.30	60	2.69%	2%	Y
2-27.2	Bed	10.80	31	3.99%	1%	Y
2-28.1	Liv / Kit	34.11	86	3.40%	2%	Y
2-28.2	Bed	10.80	31	2.67%	1%	Y

Table 5: Average Daylight Factor of habitable rooms on the first & second floors.

5.1 Discussion

Within the development the design was optimised for good quality daylight. Where possible living rooms are dual aspect. Rooms and windows are taller than the minimums standards. All habitable rooms were assessed on the first & second floors. These are the lowest residential floors. Its is evident from the results that the ADF values improve with the higher the floor level. This is due to increased access to the sky with less obstruction from opposing buildings.

5.2 Conclusion

The proposed development meets the recommendations of the BRE Guidelines and BS 8206 Part 2:2008 Lighting for Buildings, Code of Practice for Daylighting and all the units will have a good quality of daylight.

6. Sunlight to gardens and open spaces

The BRE guide indicates that for an amenity area to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st March. It also states that front gardens need not be assessed for sunlight.

6.1 Amenity space to neighbouring properties.

Five adjacent amenity spaces were selected for assessment of a calculation of Sun on the Ground. Existing and proposed radiation maps of generated analysis are shown in Figures 18 & 19 below and the results are shown in Table 6.

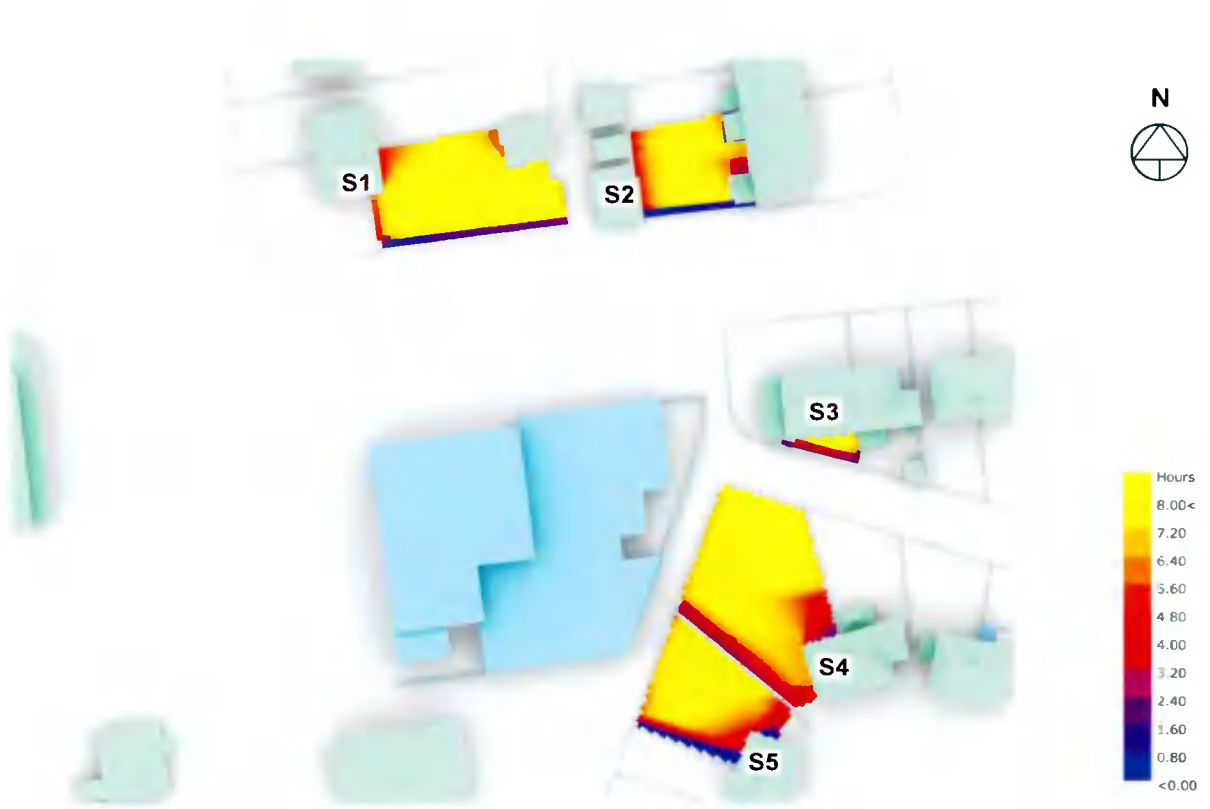


Figure 18: Existing Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

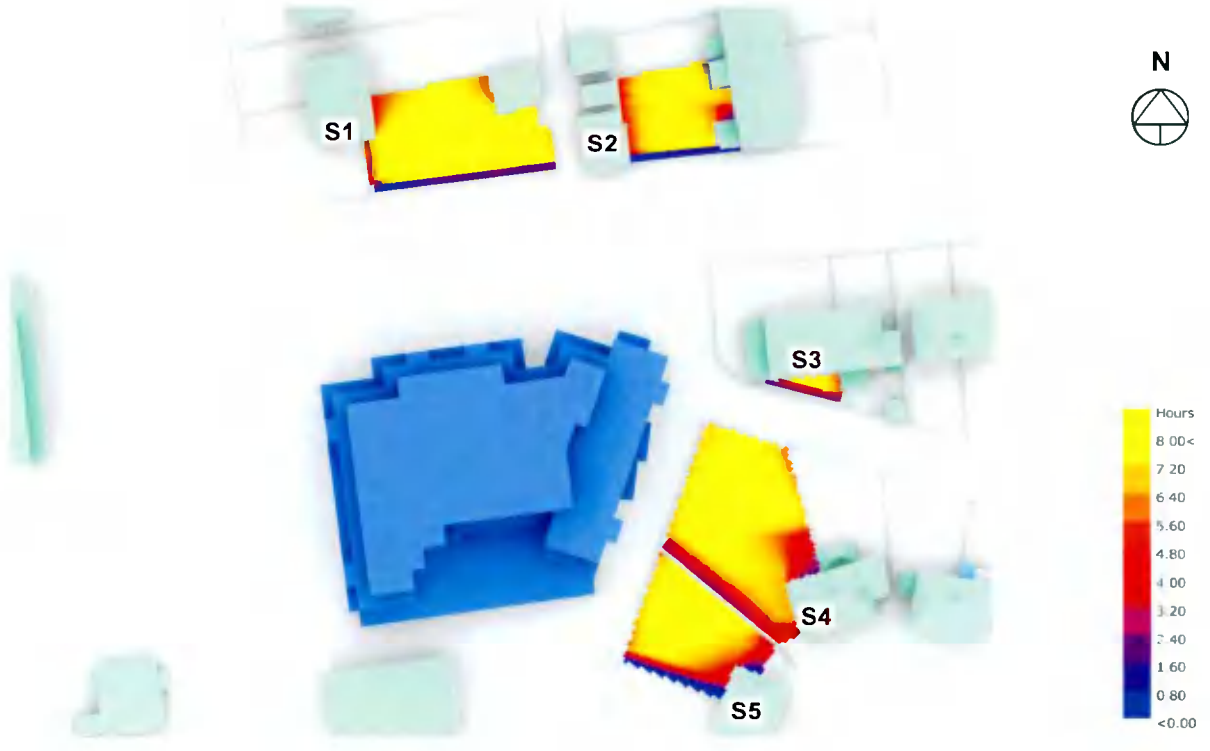


Figure 19: Proposed Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

Sunlight on the Ground - Adjacent Properties					
No.	Location	Existing	Proposed	Ratio Proposed to Existing	Meets criteria of >50% area Or if <50% but >80% Existing Value
		% Area receiving 2 hours sunlight on 21st March			
S1	172 Kennelsfort Rd Upper	90.6	90.6	100%	Y
S2	215 & 215A Palmerstown Ave	84.6	84.6	100%	Y
S3	1 Wheatfield Rd	69.2	69.2	100%	Y
S4	13 Oakcourt Grove	97.1	97.1	100%	Y
S5	12 Oakcourt Grove	90.2	90.2	100%	Y

Table 6: Calculation of Sun on the Ground to adjacent amenity areas on 21st March.

6.2 Conclusion

No impact was noted to the amenity of any adjacent residential properties. The proposed development meets the BRE guidelines for Gardens and Open Spaces.

6.3 Sunlight to Amenity within the Proposed Development

Two large terraces have been designed in this scheme at first floor and fourth floor levels. They both exceeds the BRE recommendation that 50% of the area receive more than 2 hours of sunlight on the 21st March. A plan of generated analysis is shown in Figure 20 and results in Table 7 below.

Sunlight on the Ground - Proposed Development			
	Description	Proposed % Area receiving 2 hours sunlight on 21st March	Meets Criteria
L1	First Floor Terrace	100.0%	Y
L2	Fourth Floor Terrace	99.5%	Y
L3	Street level public realm	79.1%	Y

Table 7: Calculation of Sun on the Ground to public amenity spaces within the development

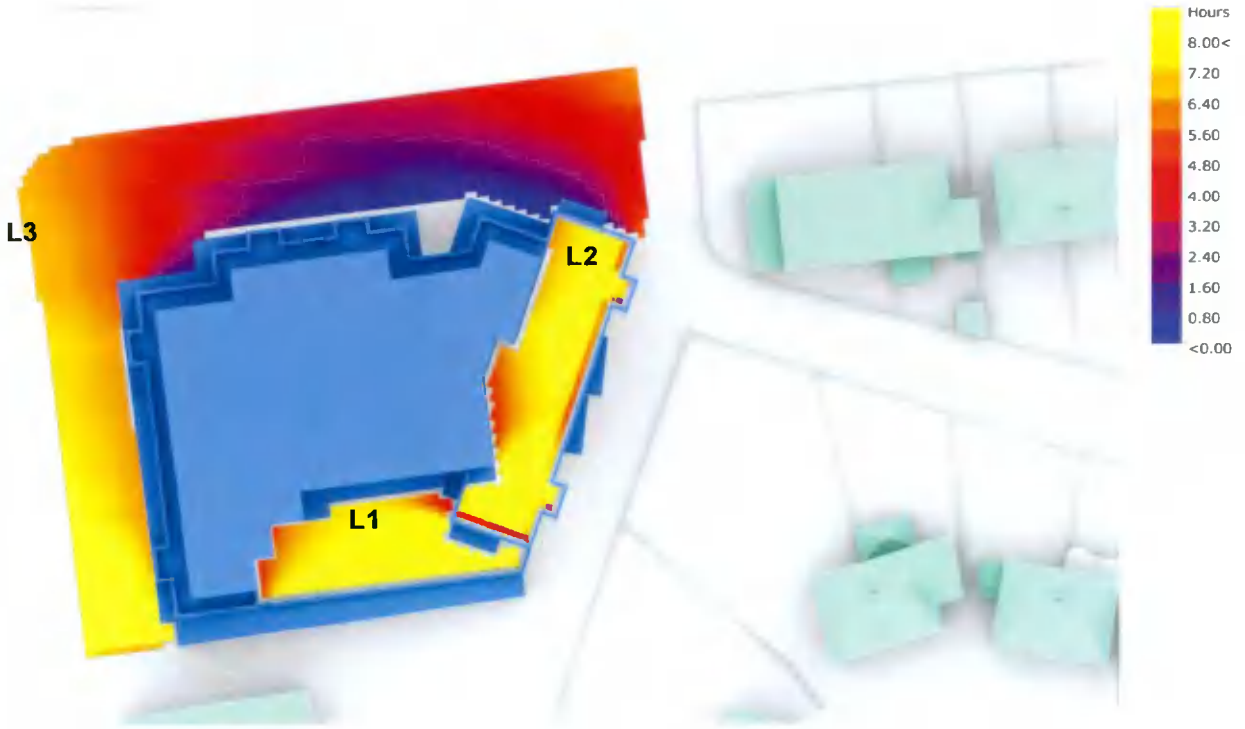


Figure 20: Radiation map of amenity areas, showing available sunlight on 21st March. The scale represents the percentage of daylight received from 0 - 8 hrs.

6.4 Conclusion

The proposed development meets the recommendations of the BRE guidelines and will receive well in excess of 2 hours sunlight over 50% of the open space.

7. Shadow Diagrams

7.1 BRE Guidance on Shadow Studies

Shadow diagrams are a visual aid to understand where possible shading may occur. The BRE guidelines recommend using the March Equinox due the equal length of the day and night time. It states:

"If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required."

June 21st and December 21st are provided below for information but it should be noted that the summer solstice is the best case scenario with shadows at their shortest. In Winter even low buildings will cast long shadows and it is common for large areas of the ground to be in shadow throughout the day especially in a built up area and sun barely rises above an altitude of 10° during the course of the day. The guidelines recommends that Sunlight at an altitude of 10° or less does not count. Below are the times for the Equinox and Solstice that the sun is above 10° altitude rounded to the nearest half hour.

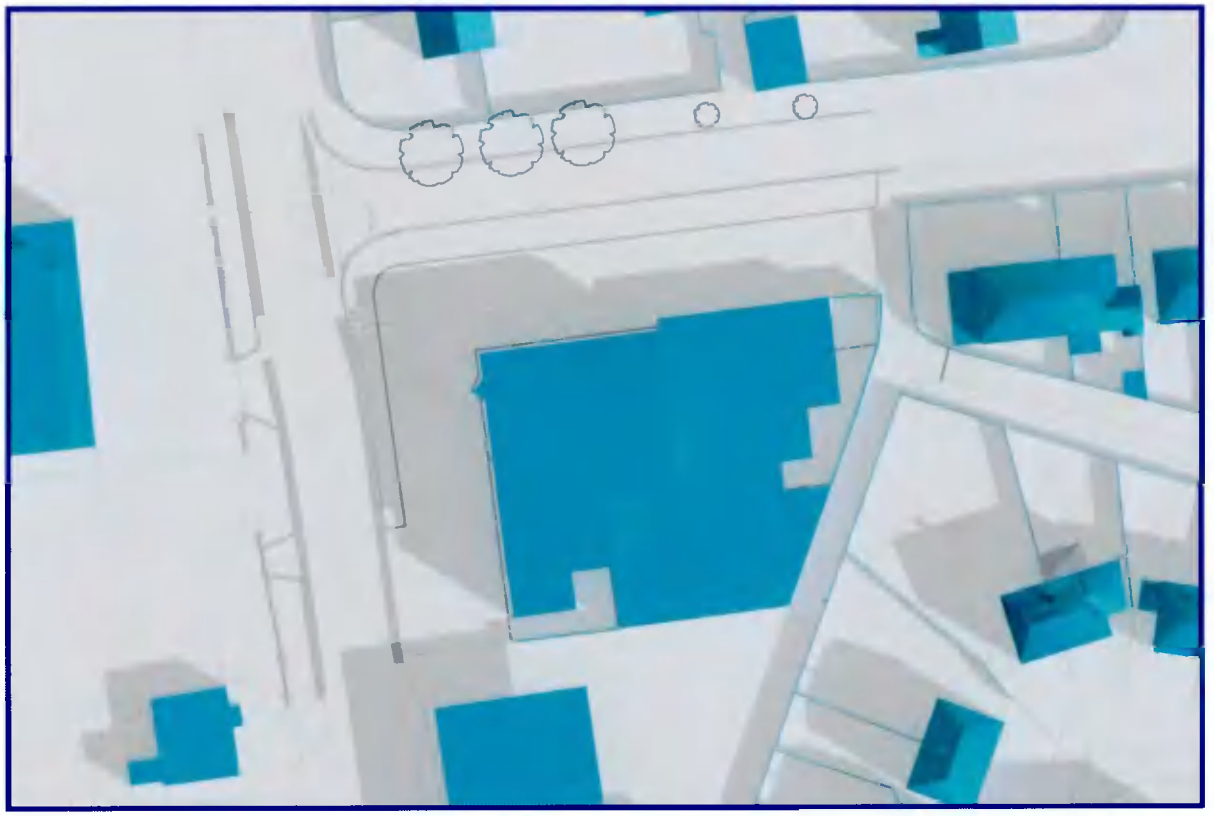
Equinox: between 8:30 and 17:30
Summer Solstice: Between 6:30 and 20:00
Winter Solstice: Between 10:30 and 14:00

Section 7.2 shows the existing and proposed shadow diagrams for the Equinox on the 21st March at 2 hourly intervals during the day between 09:00 and 17:00.
Section 7.3 shows the existing and proposed shadow diagrams for the Summer Solstice on the 21st June at 2 hourly intervals during the day between 10:00 and 18:00.
Section 7.4 shows the existing and proposed shadow diagrams for the Winter Solstice on the 21st December at 2 hourly intervals during the day between 10:00 and 14:00.

The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions.

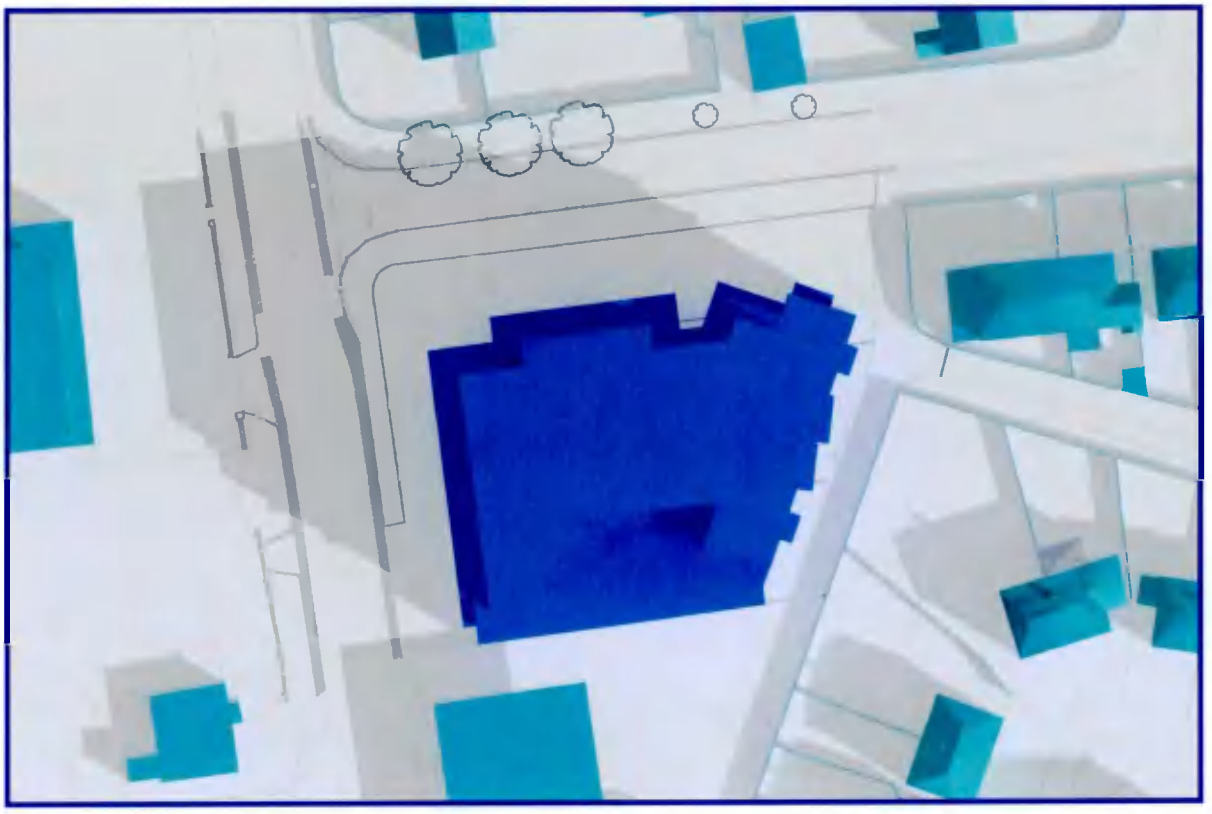
7.2 Shadow Casting diagrams March Equinox

N



Existing

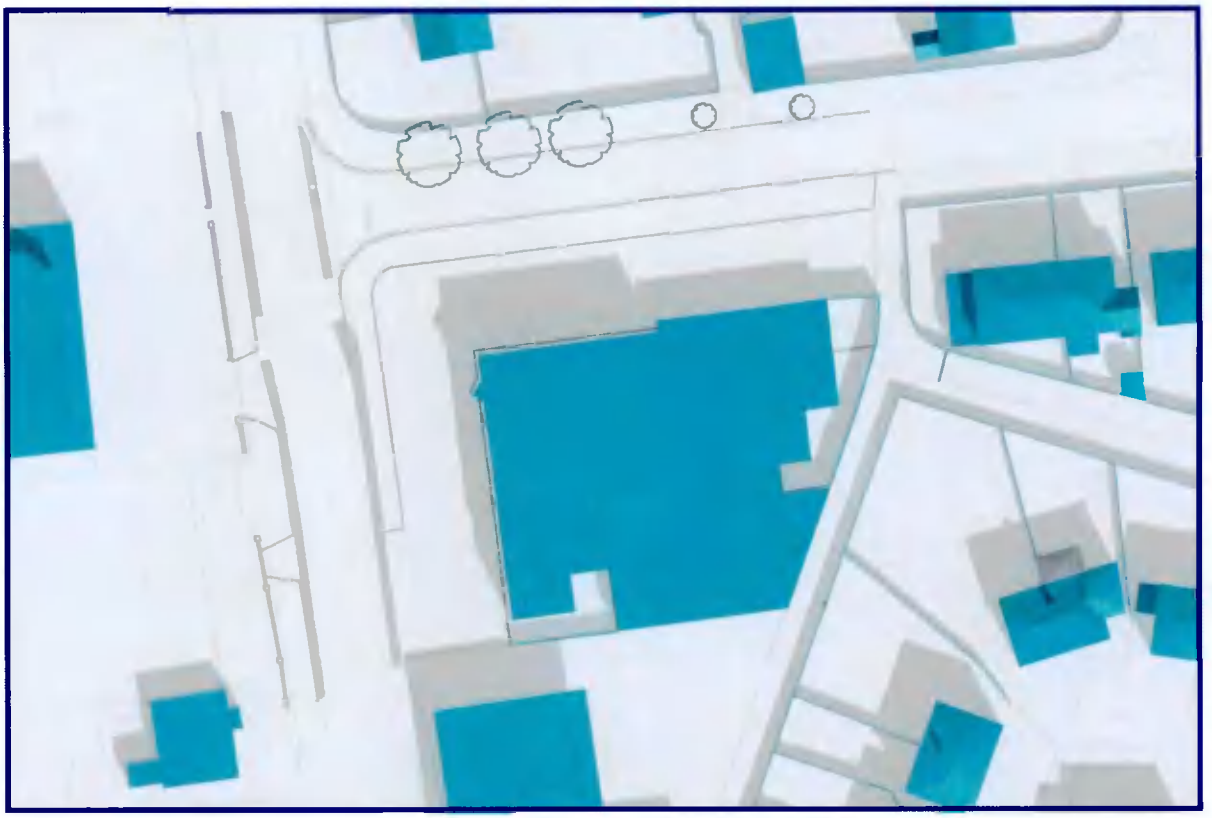
N



Proposed

Figure 21: Shadow diagrams 21 March 09:00 GMT

N



Existing

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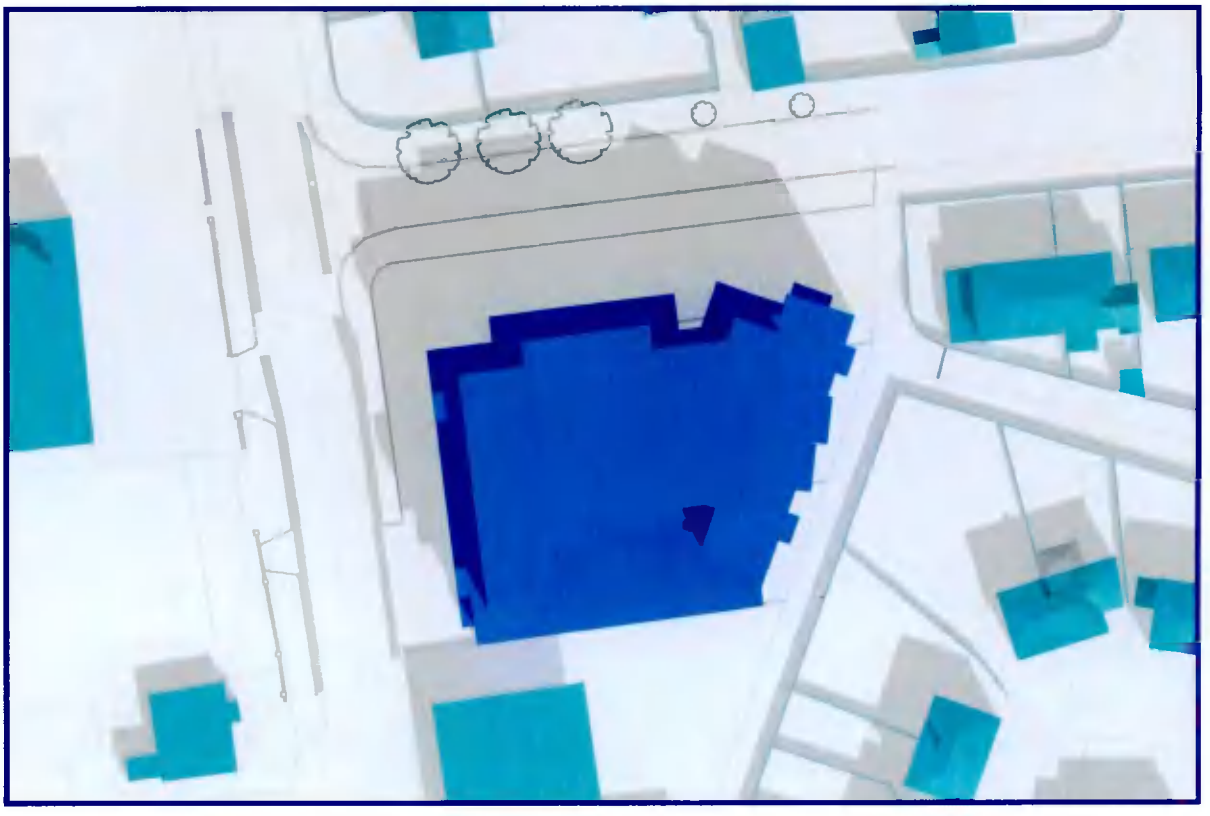
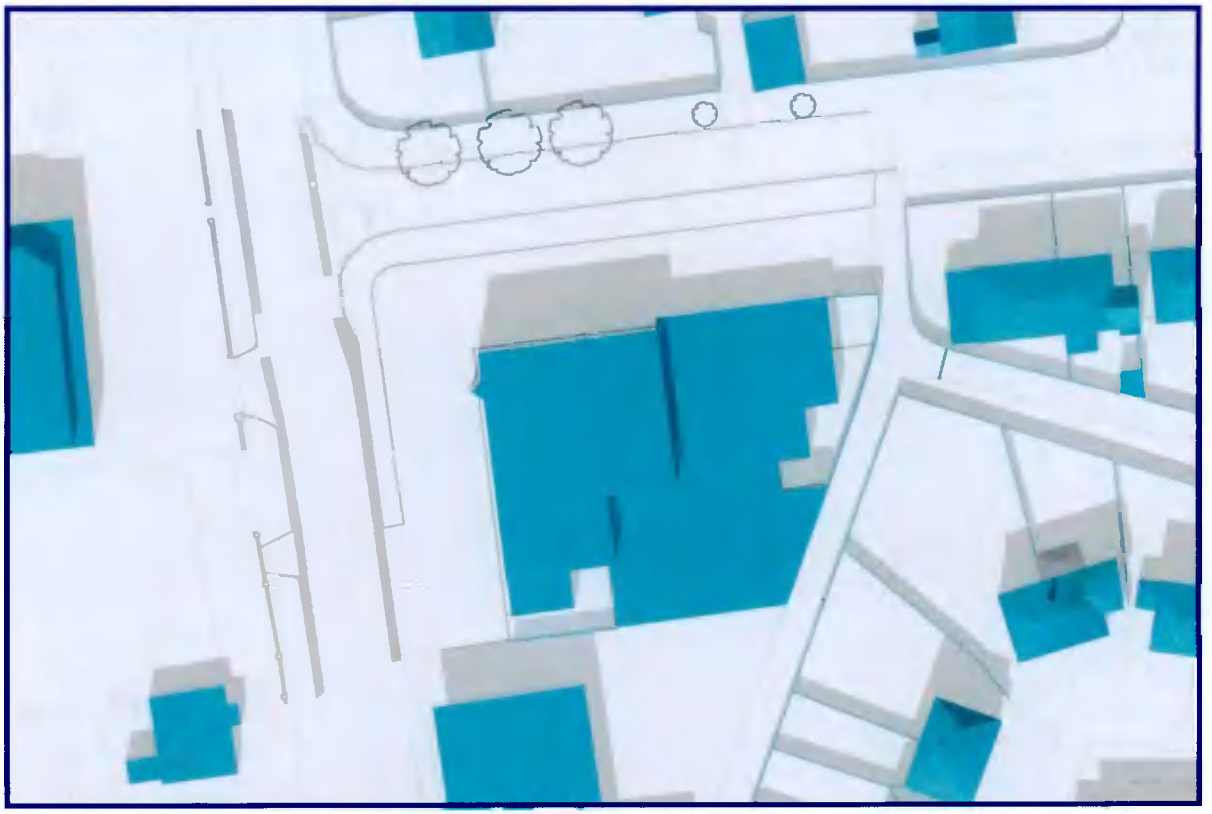


Proposed

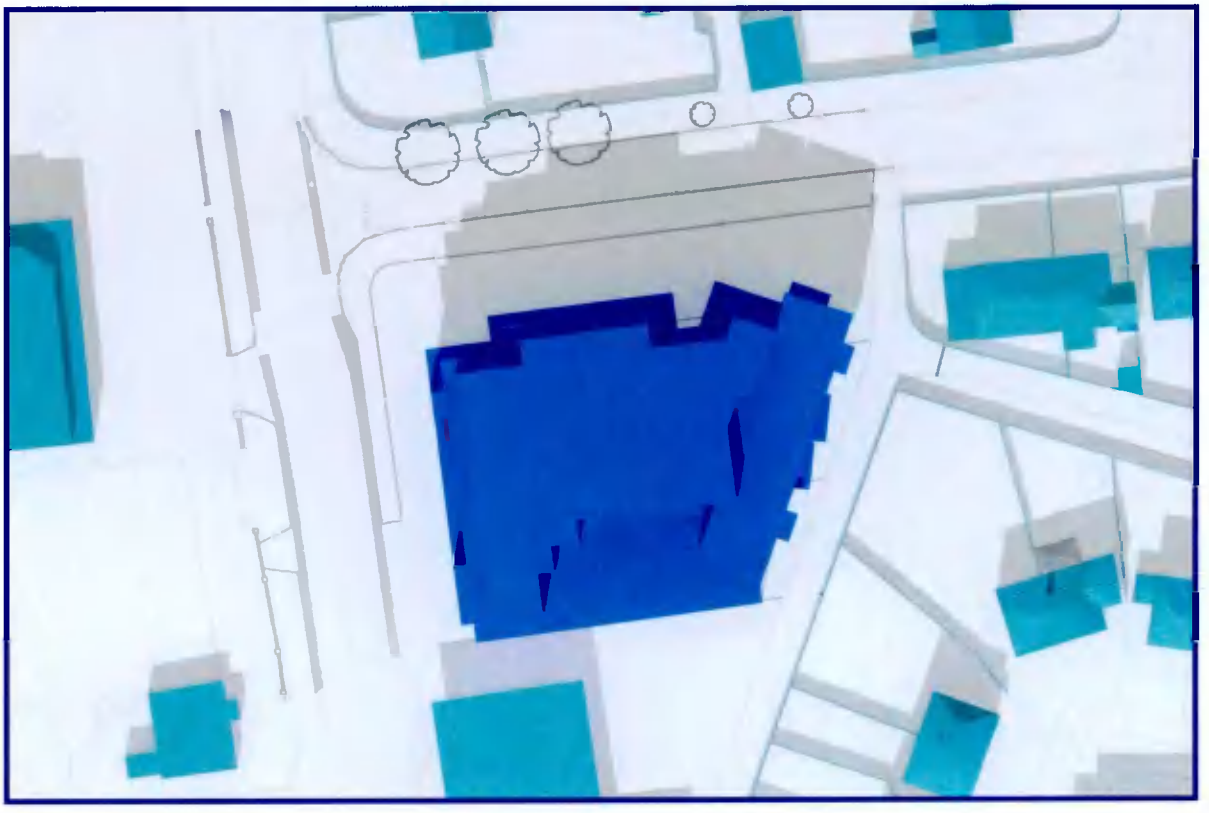
Figure 22: Shadow diagrams 21 March 11:00 GMT

N



Existing

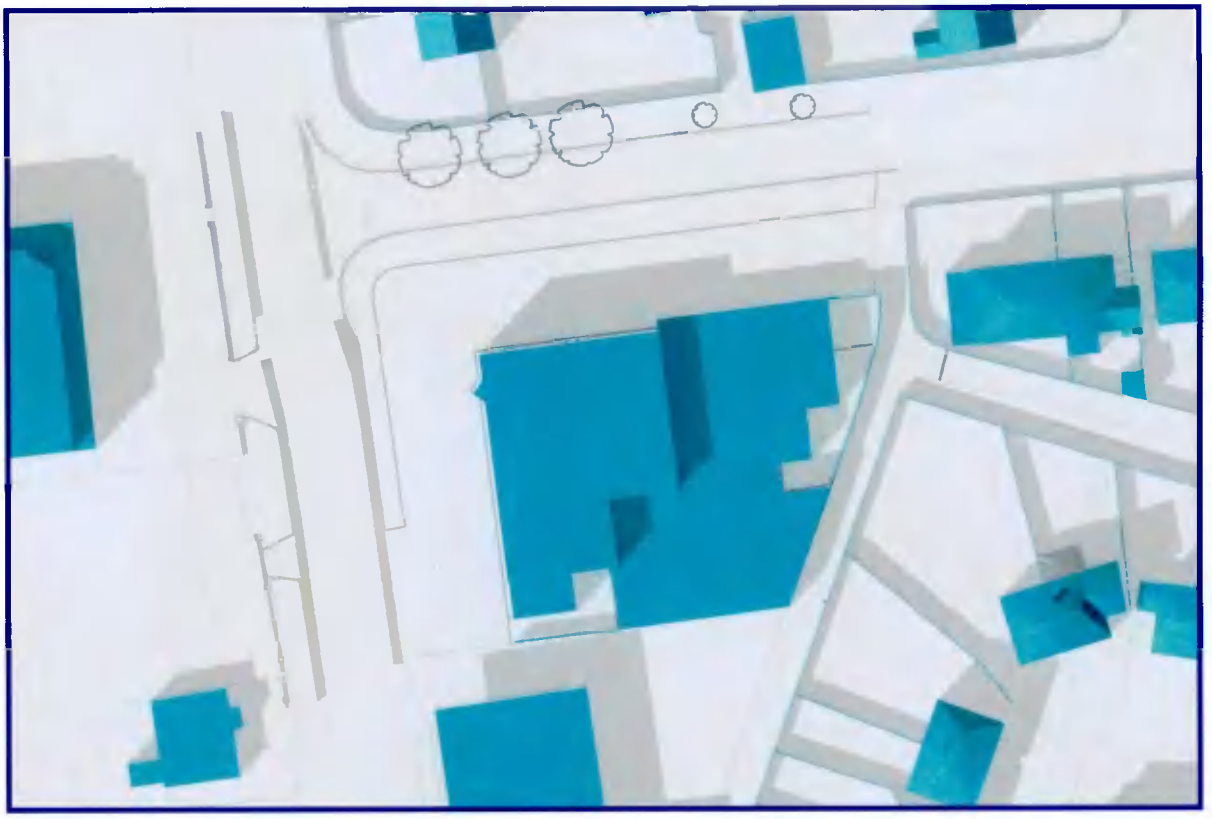
N



Proposed

Figure 23: Shadow diagrams 21 March 13:00 GMT

N



Existing

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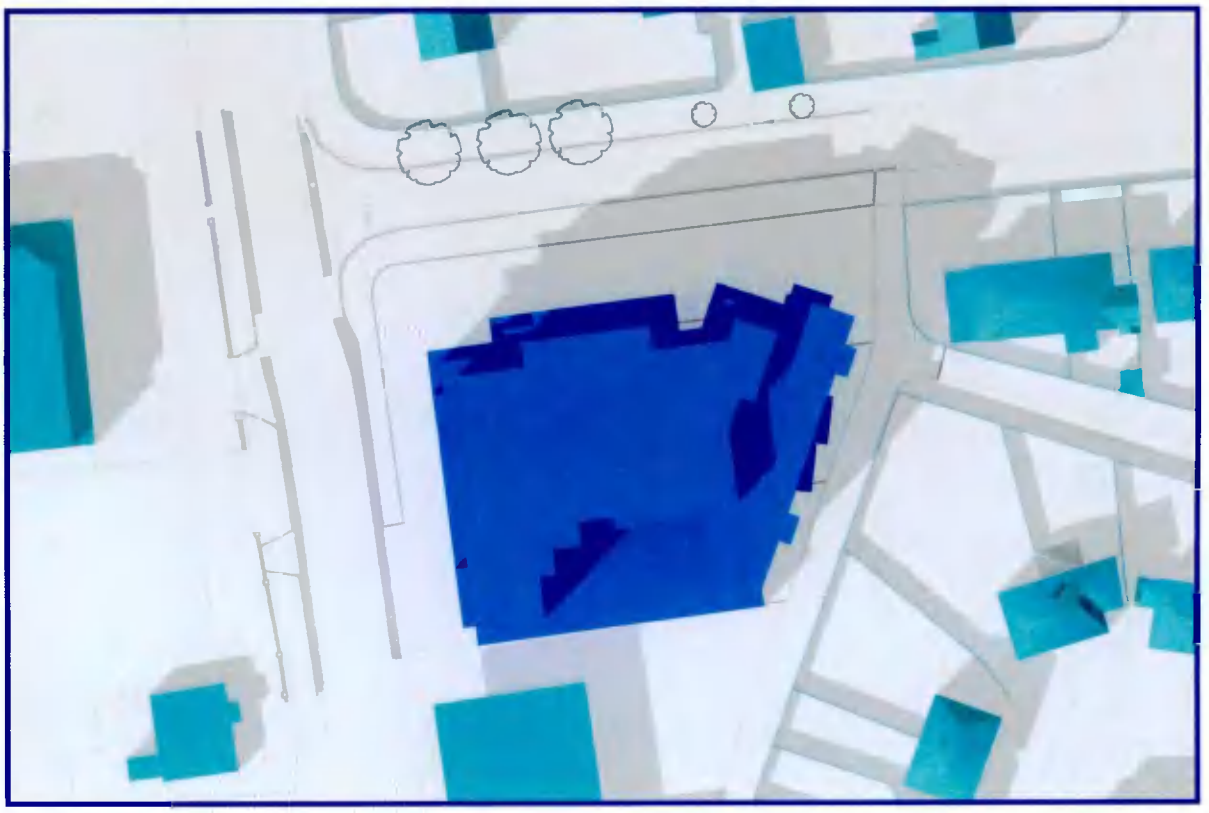
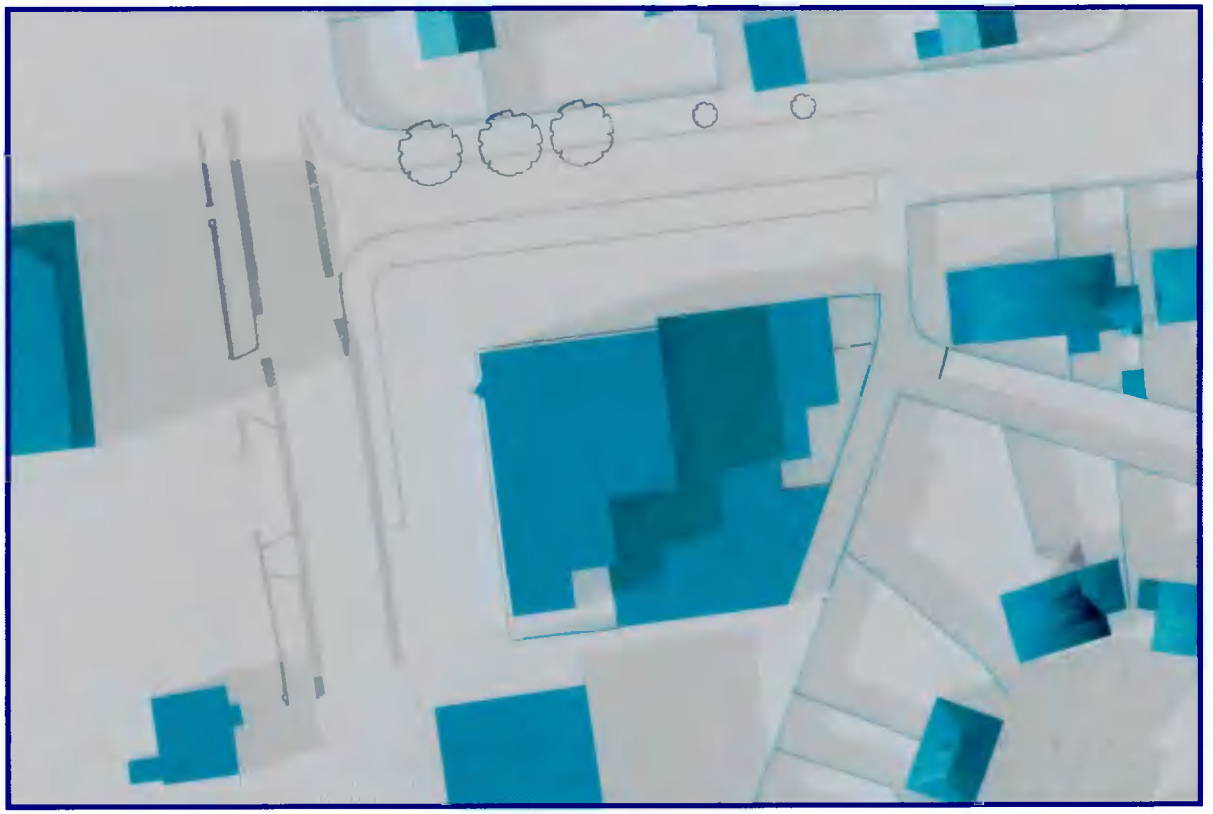


Proposed

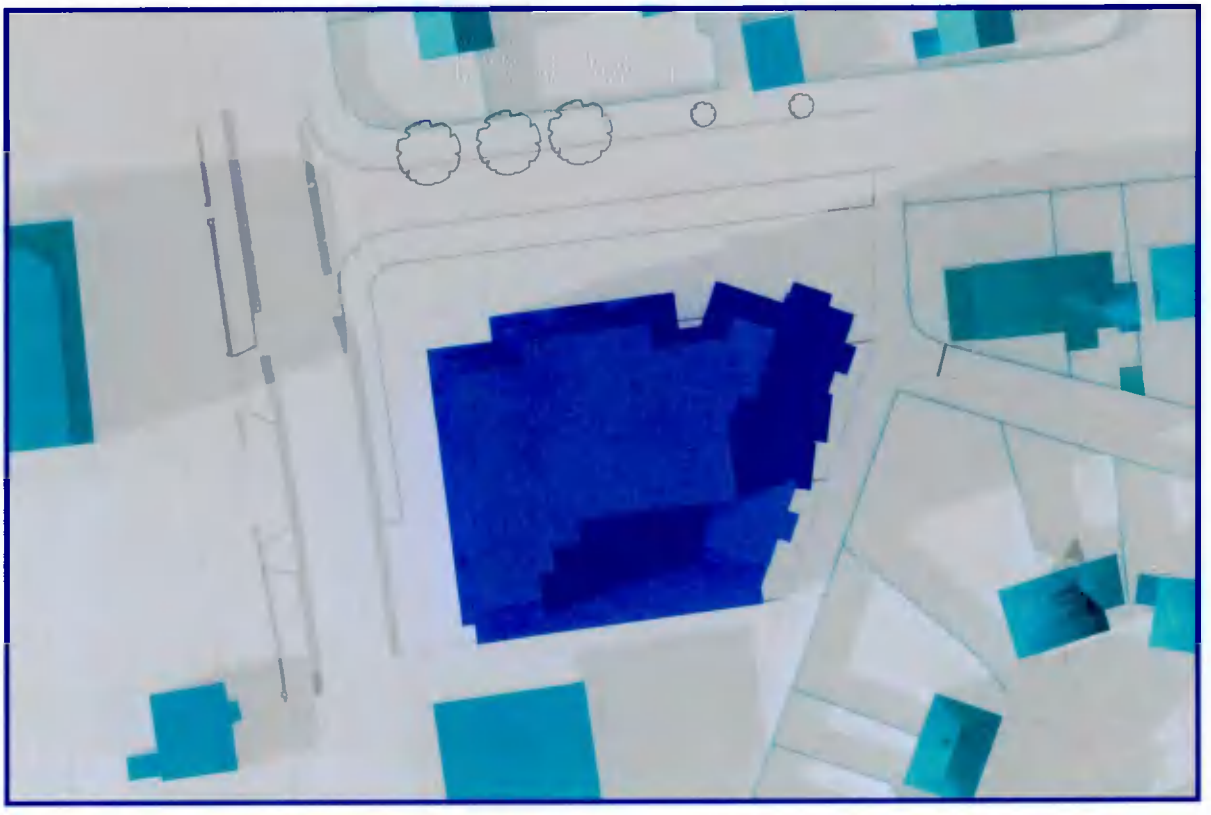
Figure 24: Shadow diagrams 21 March 15:00 GMT

N



Existing

N

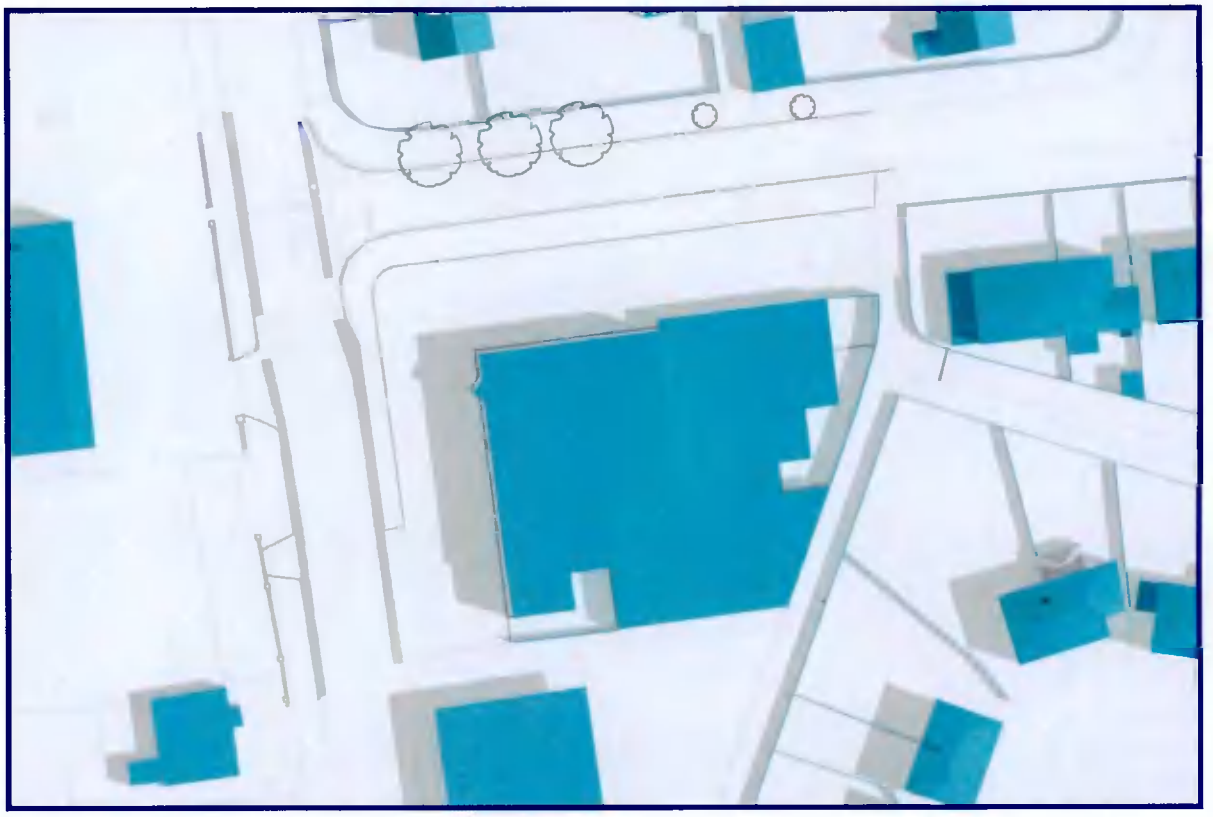


Proposed

Figure 25: Shadow diagrams 21 March 17:00 GMT

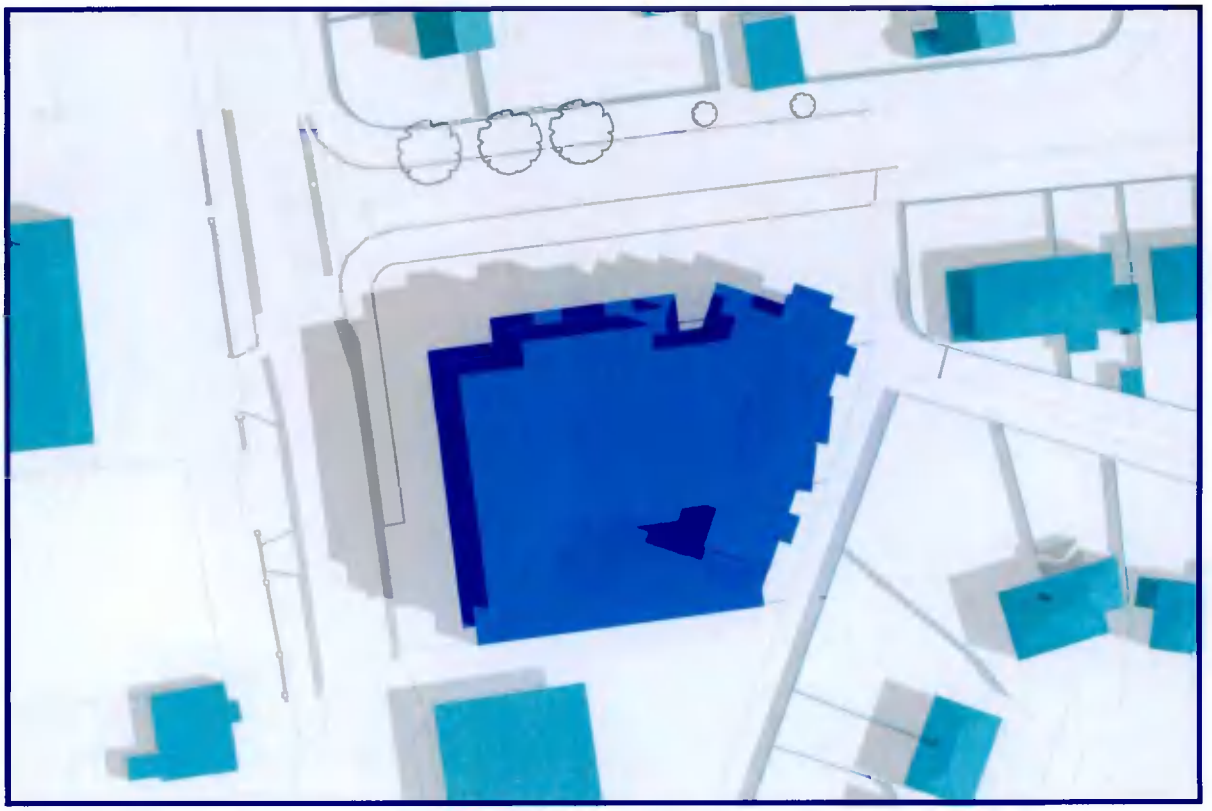
7.3 Shadow Casting diagrams June Solstice

N



Existing

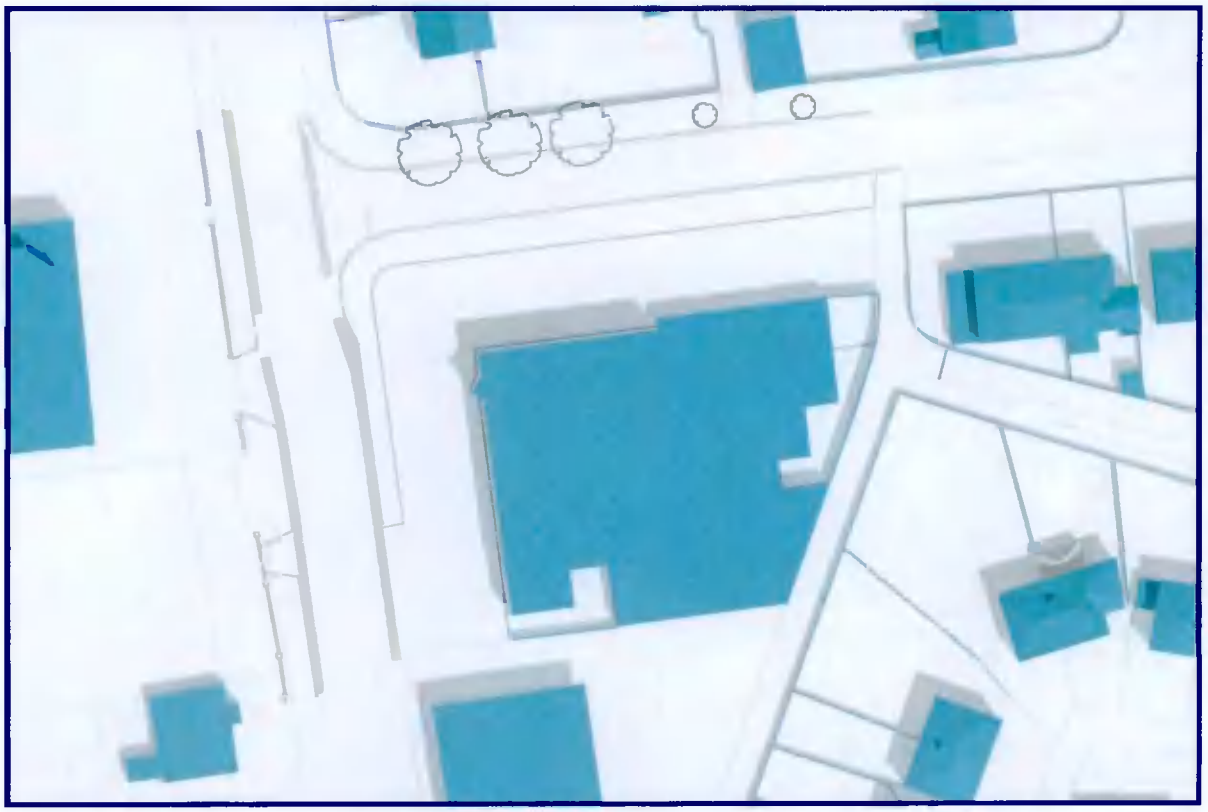
N



Proposed

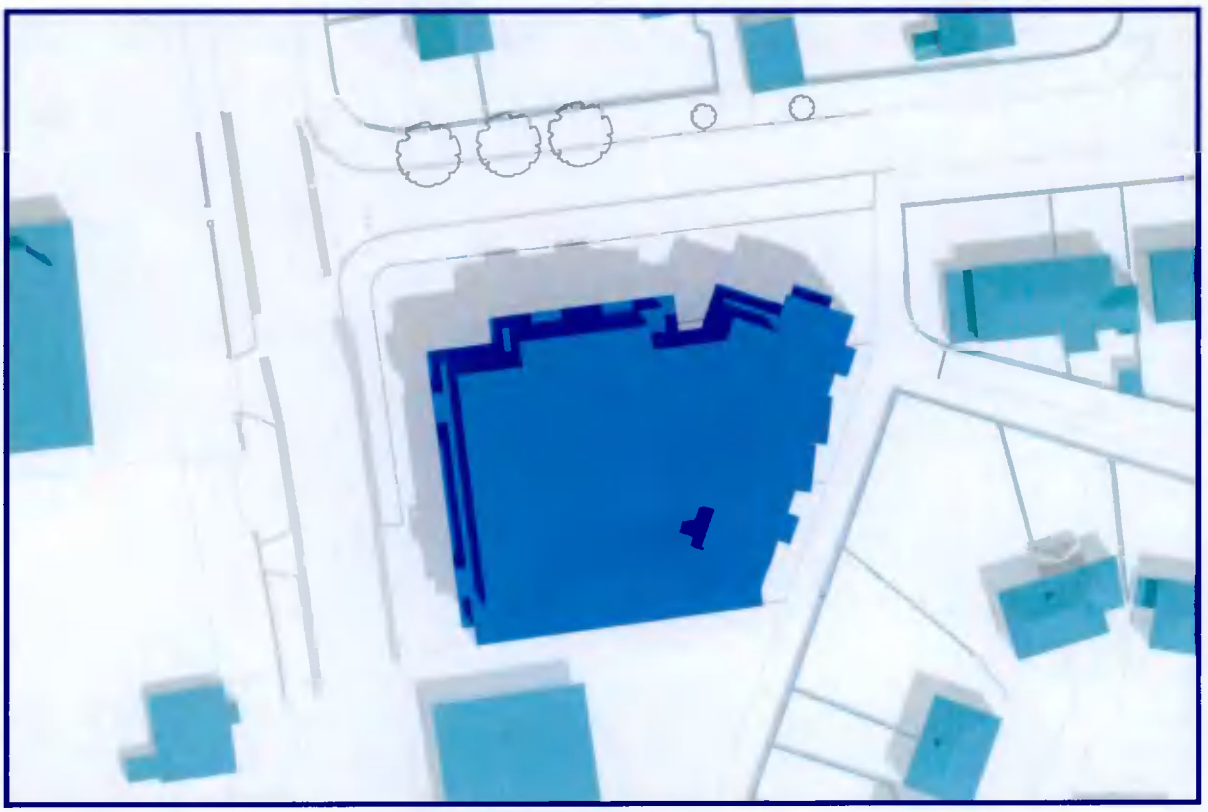
Figure 26: Shadow diagrams 21 June 10:00 GMT +1 (DST)

N



Existing

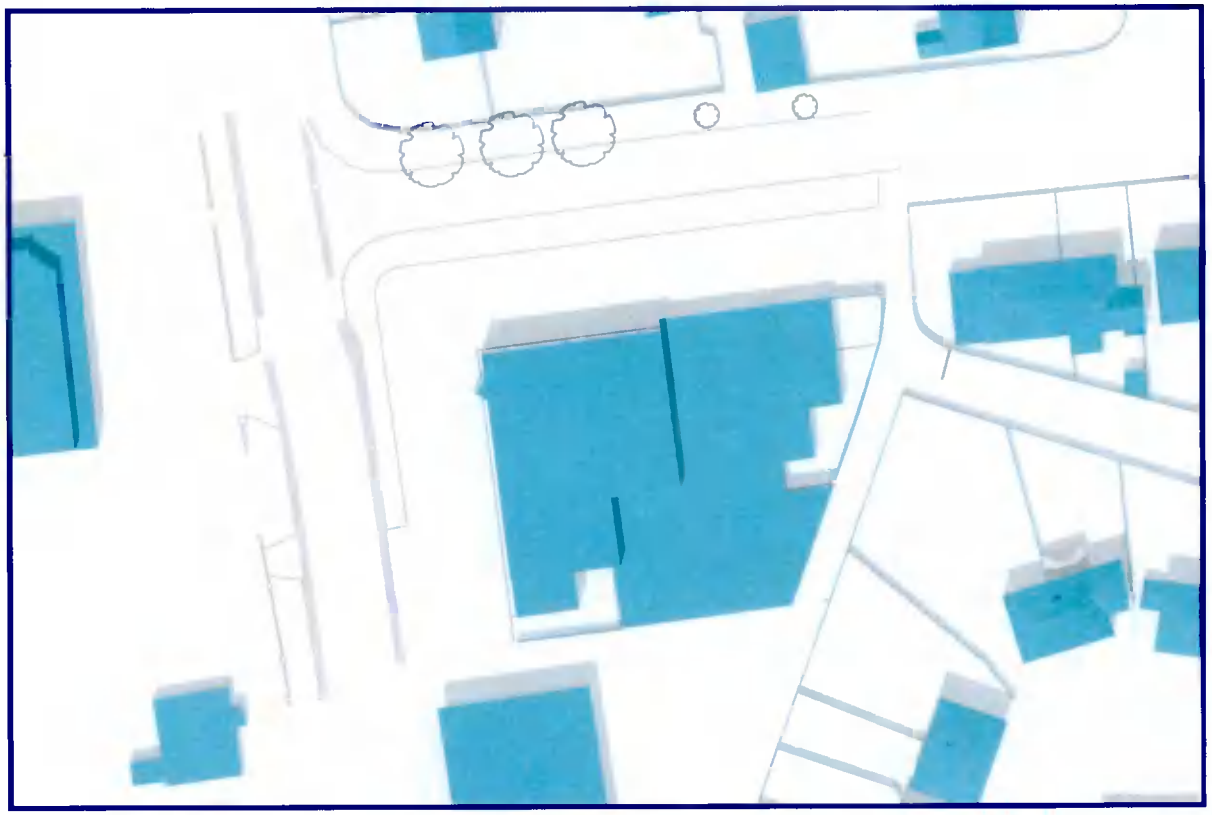
N



Proposed

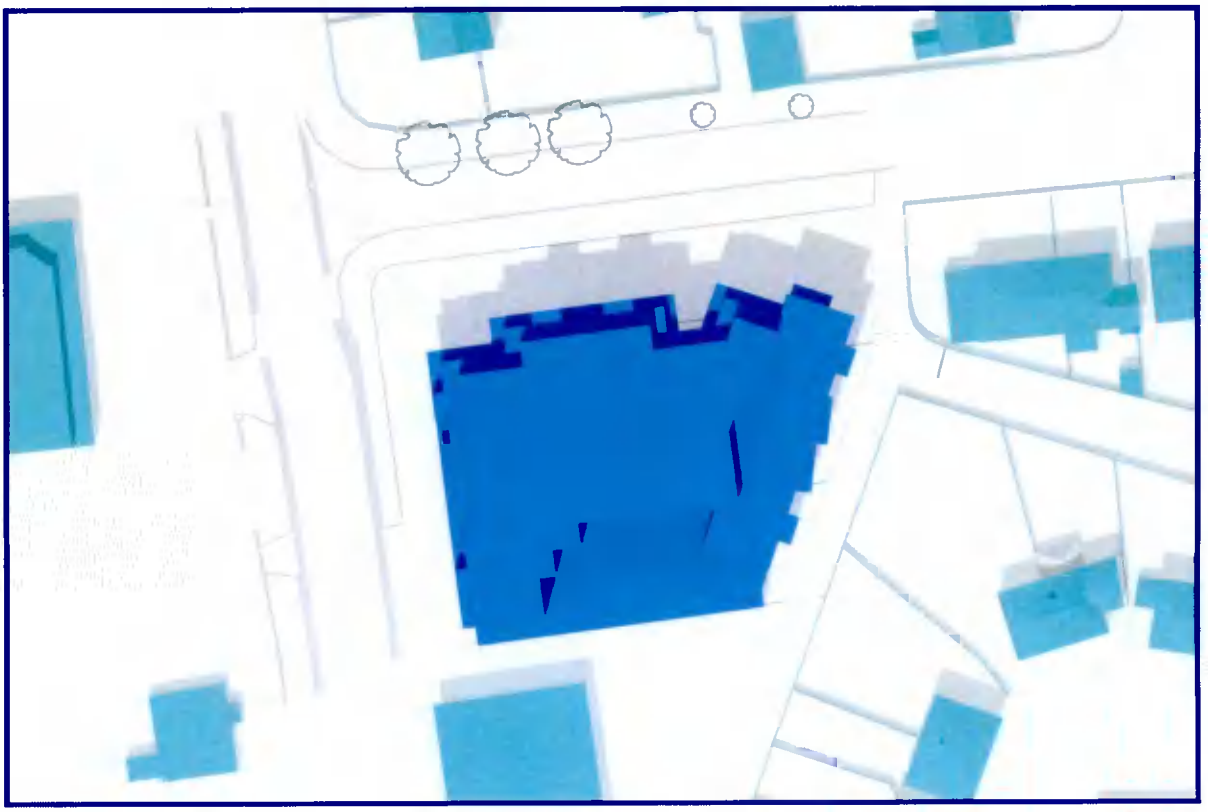
Figure 27: Shadow diagrams 21 June 12:00 GMT +1 (DST)

N



Existing

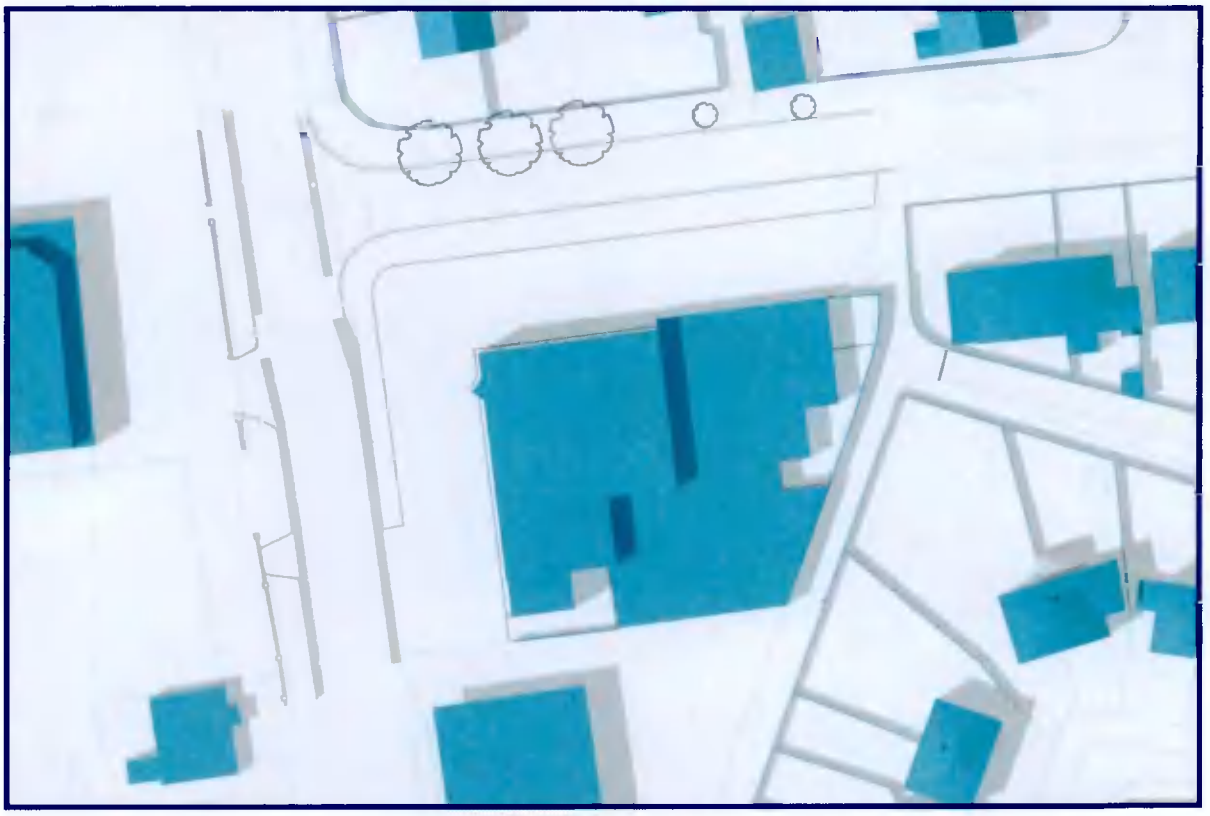
N



Proposed

Figure 28: Shadow diagrams 21 June 14:00 GMT +1 (DST)

N



Existing

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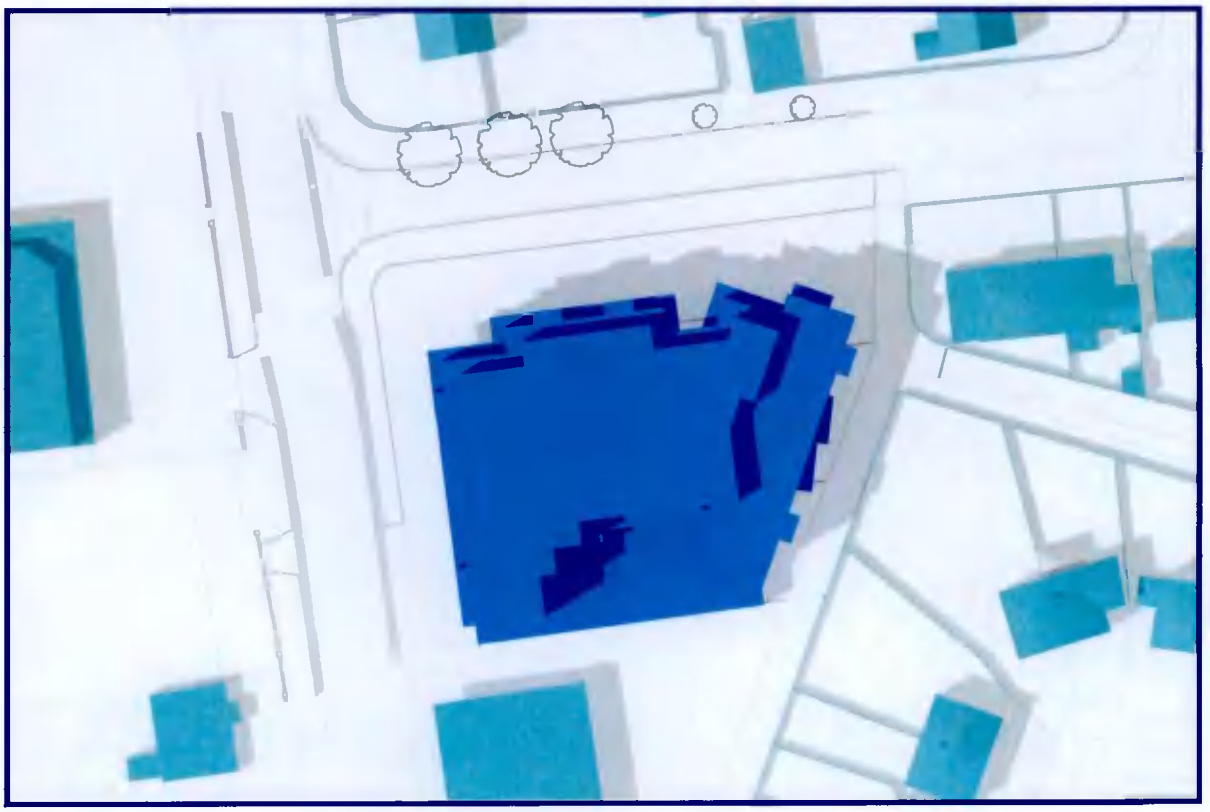
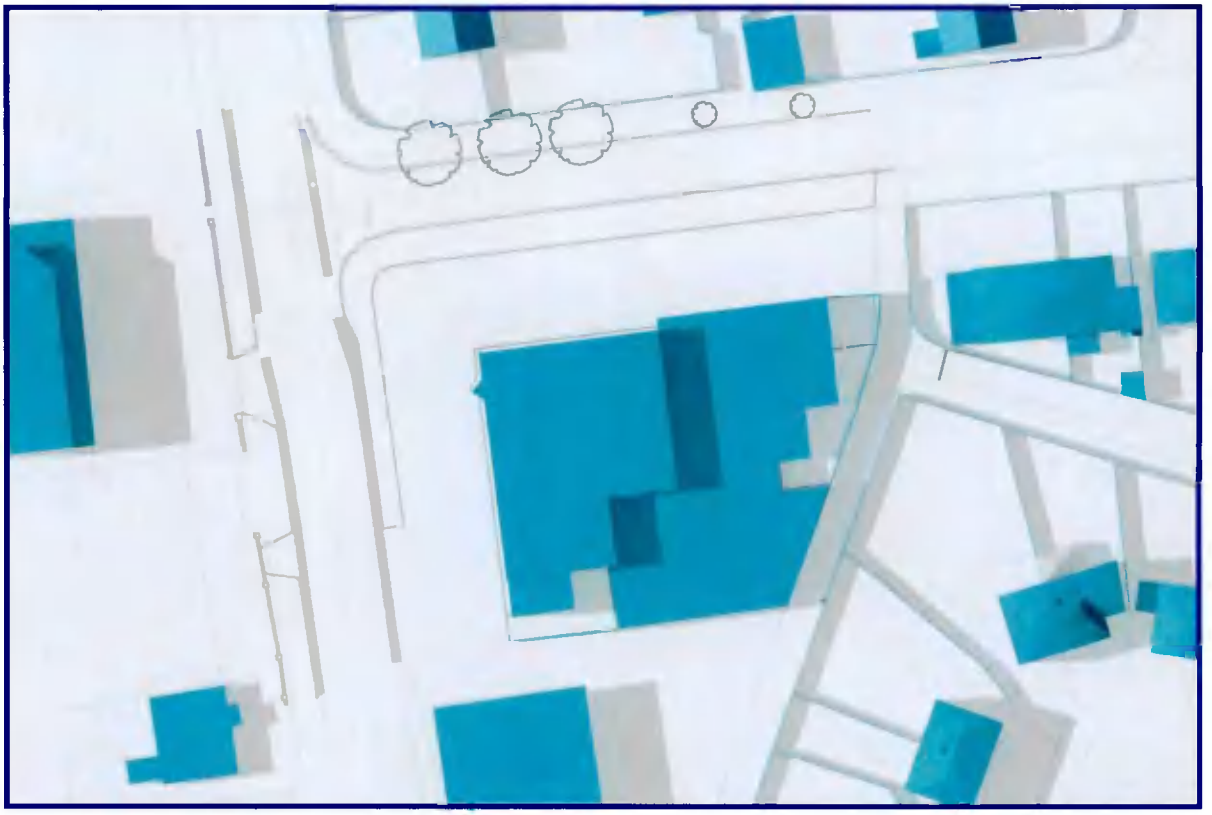


Proposed

Figure 29: Shadow diagrams 21 June 16:00 GMT +1 (DST)

N



Existing

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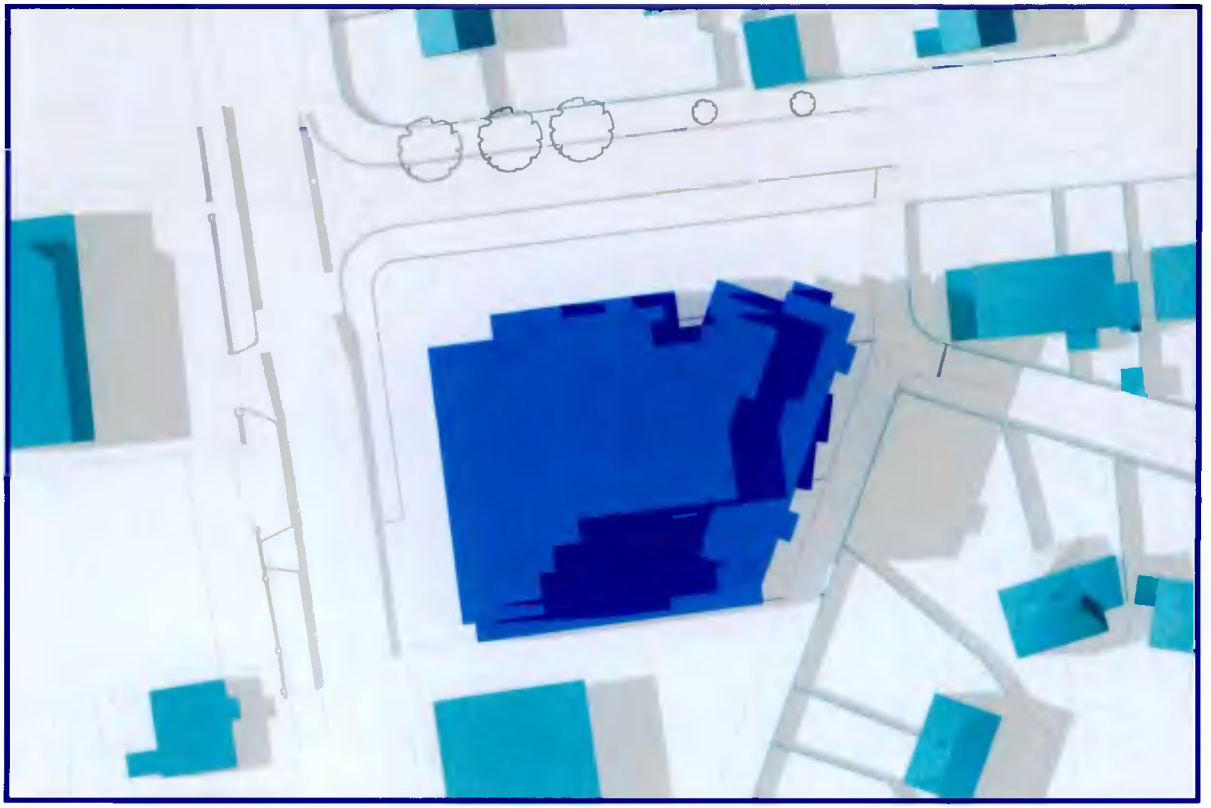
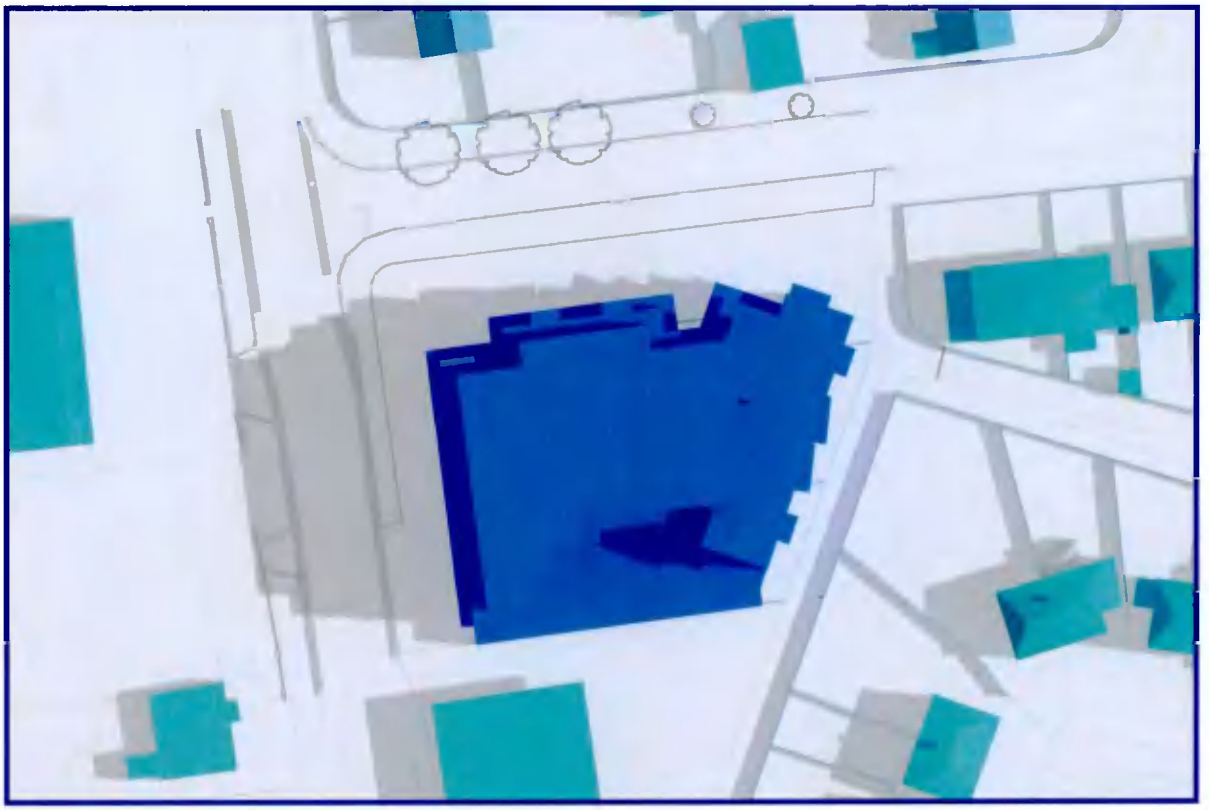


Proposed

Figure 30: Shadow diagrams 21 June 18:00 GMT +1 (DST)

7.4 Shadow Casting diagrams December Solstice

N



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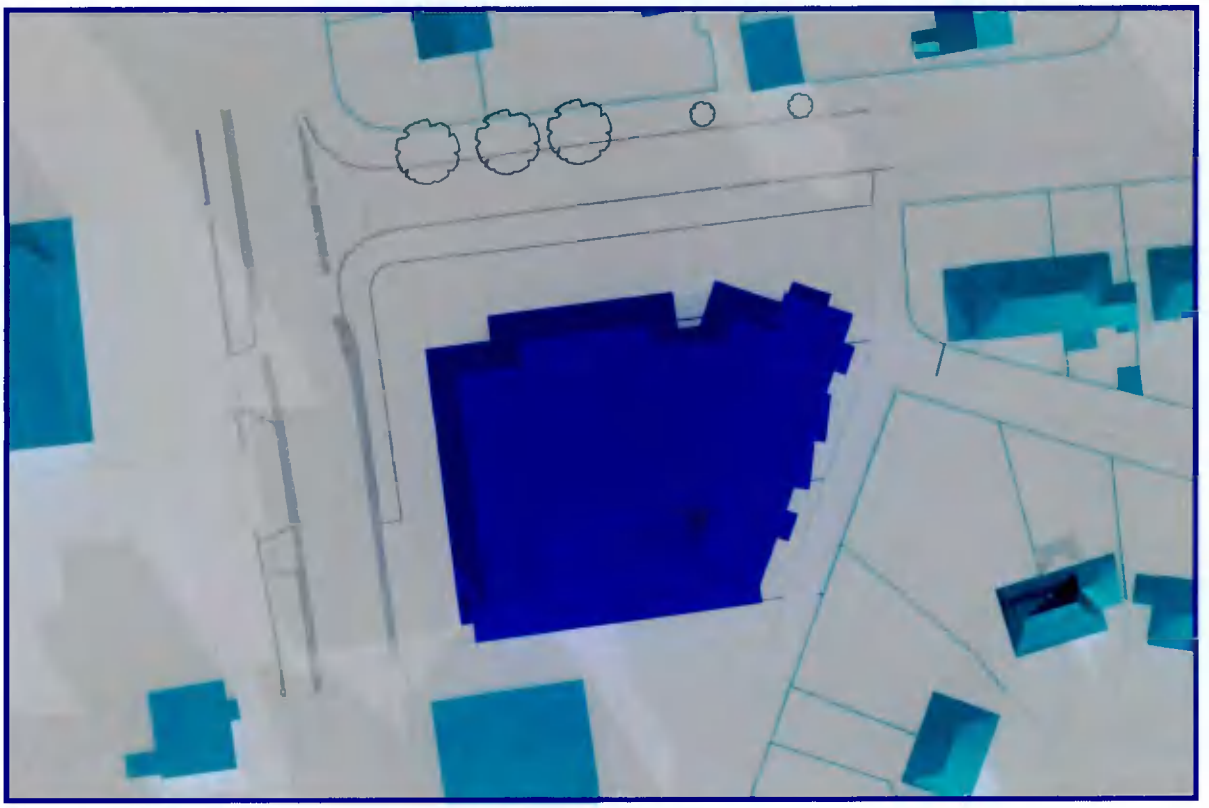
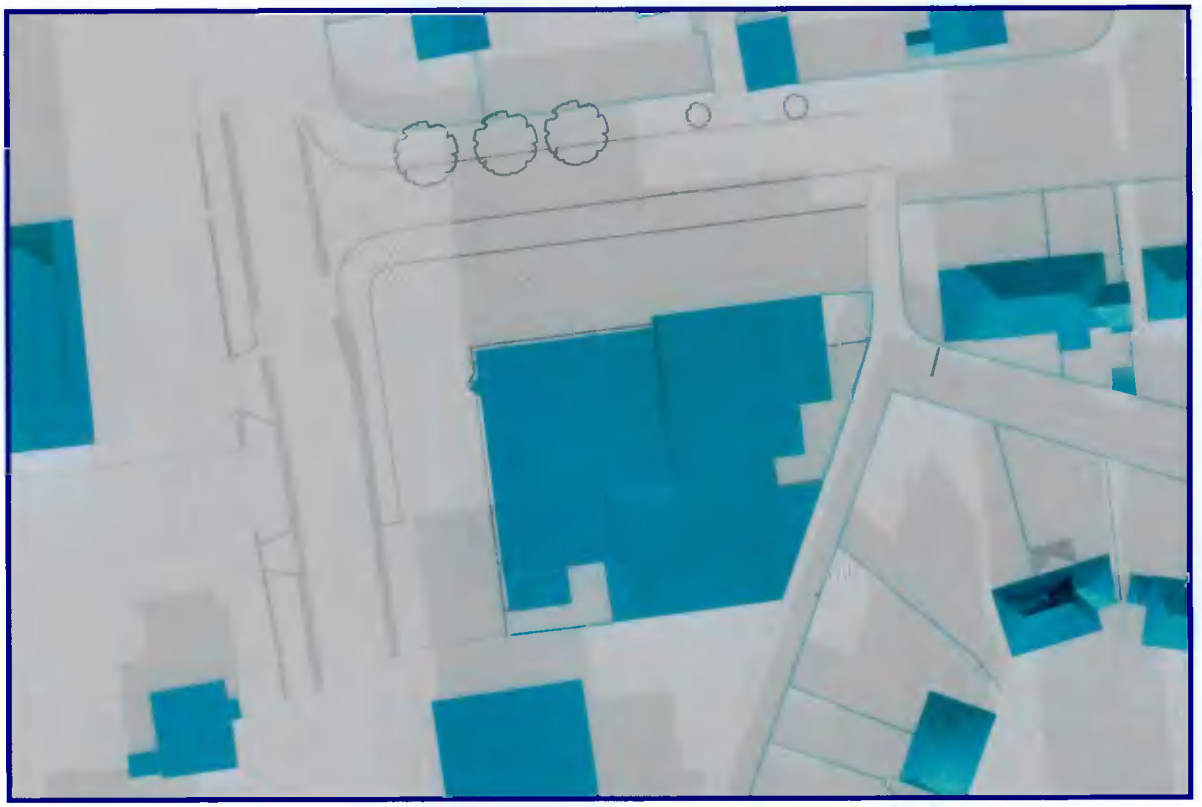


Proposed

Figure 31: Shadow diagrams 21 December 10:00 GMT

N



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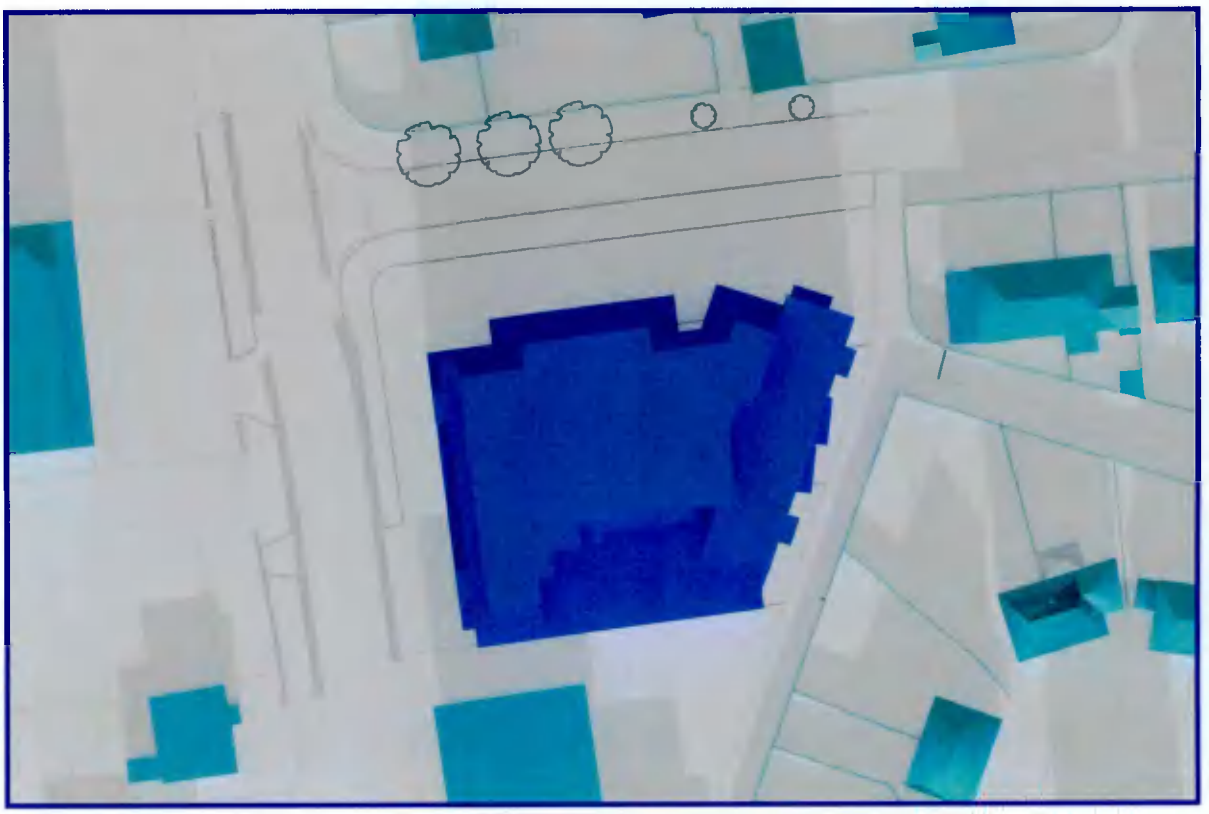
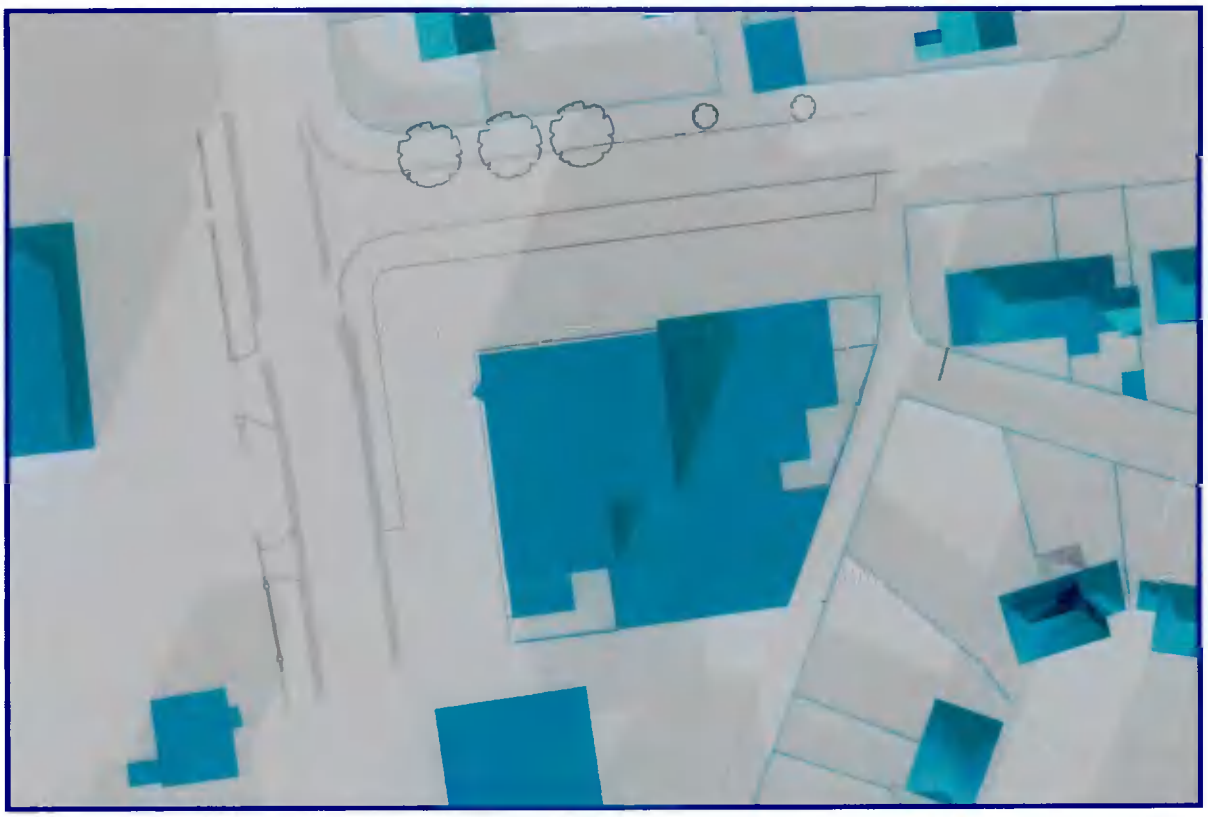


Proposed

Figure 32: Shadow diagrams 21 December 12:00 GMT

N



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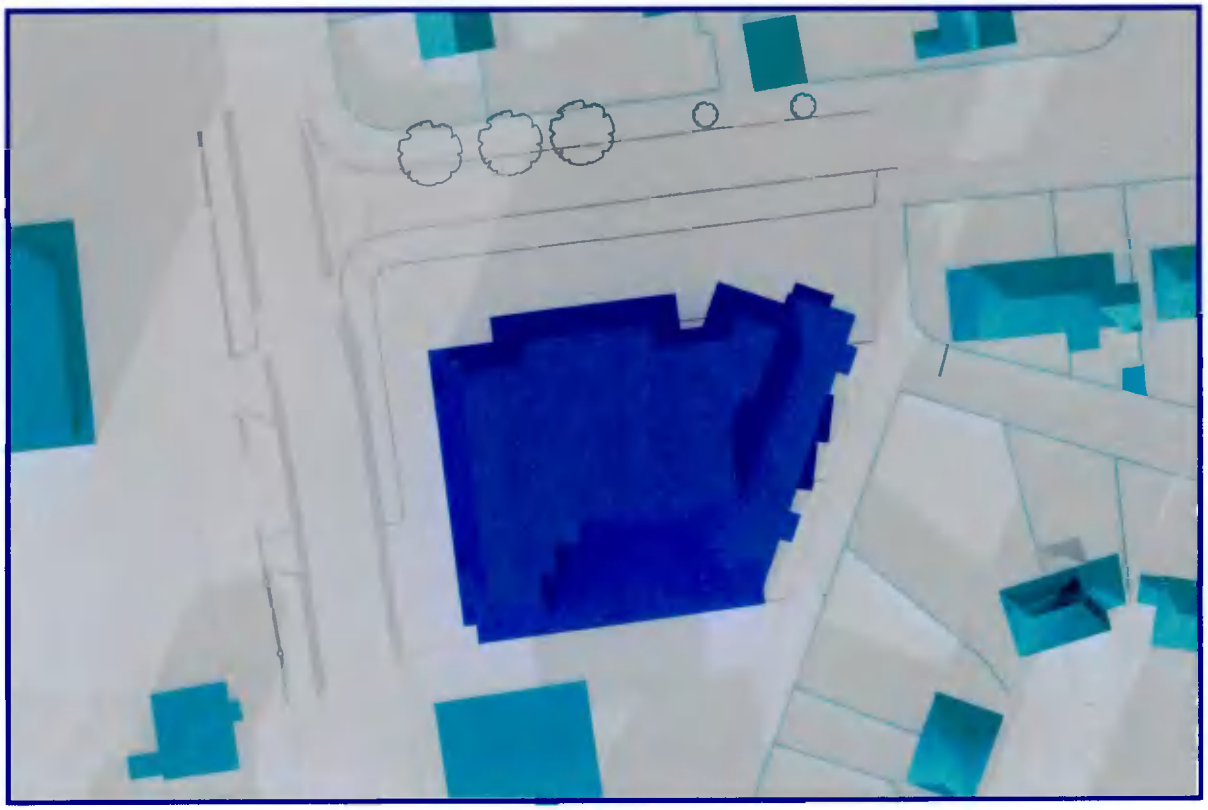

Proposed

Figure 33: Shadow diagrams 21 December 14:00 GMT