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RIALTO STUDENT ACCOMMODATION

SHADOW – SUNLIGHT ANALYSIS

SHADOW / SUNLIGHT EFFECTS OF THE NEW BUILDING and DDC FUTURE BUILDINGS

**SOUTH CIRCULAR ROAD
RIALTO
DUBLIN**

SHIPSEY/BARRY

DKP-J79-6064-1P
2019-07-04

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Part 1 of 1

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Clients	Kealan McCluskey		✓
Architects	Shipsey/Barry		✓
Planning consultants	Tom Philips & Ass		✓
Structural/civil engineer	MMOS		✓
Quantity surveyor			

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P Planning
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S Scheme design
D Detail design
T Tender
C Construction
B Build / Constructed

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1 Introduction

1.1 Report purpose.

This report gives information on the effects on shadow and sunlight in neighbouring amenity space as a result of the new proposed development.

1.2 Introduction.

DKPartnership (DKP) have been commissioned by Kealan McLuskey and Shipsey/Barry to carry out the analysis and report for the proposed development at South Circular road, Rialto, Dublin.

1.3 Development details.

This report is in lieu of proposed student accommodation development located in South Circular Road, Rialto Dublin and consists of 313 student rooms and other social spaces spread over 6 floors including a basement level. There are no habitable/student rooms proposed in the basement.

1.4 Policy and building regulation requirements.

There are no particular building regulations in relation day light / shadow effect standards other than recommendations outlined or referred to in the CIBSE lighting guide 10, BS 8206 and the BRE document "Site layout planning for daylight and sun light".

The aforementioned documents do refer to a "right to a sky view" relating to existing buildings facing a new adjacent development in so far that it compares an existing sky view with the sky view when the new development is constructed. The difference, if any, must be within a certain acceptable threshold.

2 Executive summary

2.1 Project general.

The project is a student accommodation block with an average of 6 student bedrooms and a common kitchen/dining/living space in a typical cluster (apartment).

2.2 Analysis conducted.

In this report the effects of the new proposed development on shadow/sunlight in neighbouring amenity spaces have been analysed to ascertain if these are within the constraints of the guides and standards.

As specially requested by DCC a further study was conducted on future amenity spaces envisaged by DCC to be constructed in the next couple of years replacing the current apartments and housing to the left and rear of the new proposed development,

DCC had further requested to analysis the shadow/sunlight effects on December the 21st. This shadow/sunlight study was also conducted although the calculation results or outcome have not been taken into consideration in the report as they fall completely outside the remit of both the BRE guide and BS 2606.

The BRE guide and BS 2606 conduct the shadow/sunlight analysis only on March 21st representing the best annual average.

2.3 Guideline / standards applied.

For this report we applied the recommendations and guideline of the following ;

- The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight – a guide to good practice (referred to as the BRE Report).
- British Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for day lighting. BS 8206:2008 contains guidance on the minimum recommended levels of interior day lighting.
- CIBSE guide 10 Day light and lighting for buildings.

2.4 Technical analysis.

Calculations were conducted in accordance with the BRE guidelines to determine the effects on shadow/sunlight in neighbouring amenity spaces as a result of the new proposed development.

For this report we analysed 3 different building scenario's as requested by DCC ;

- 1 – Existing amenity spaces versus the current existing cinema.
- 2 – Existing amenity spaces versus the new proposed development.
- 3 – Future amenity spaces versus the new proposed development.

NB : Shadow/sunlight calculations are conducted on March 21st in line with the BRE guide and BS 8206.

DCC had also requested a further analysis to be conducted in December 21st although the calculation results or outcome have no bearing on the conclusions in this report as it falls completely outside the remit of both the BRE guide and BS 2606.

5.1 Conclusion.

From the calculation results we note the following ;

The new proposed development's effects on shadow / sunlight on the existing amenity areas G, H, I and J are all within the constraints (maximum change factor of 0.8) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations.

The new proposed development's effects on shadow / sunlight on the future DCC development's amenity areas J, K, L, M are all within the constraints (minimum of 2 hours sunlight on at least 50% of the area) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations

The new proposed development's effects on shadow / sunlight on the future DCC development's amenity areas N, N, O (own amenity spaces) are all within the constraints (minimum of 2 hours sunlight on at least 50% of the area) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations with a minor (<10%) infringement of area N the basketball court which also has artificial lighting.

From the above we conclude that the new proposed building's effects on shadow / sunlight are in line with the BRE Site report "Layout and Planning for Daylight and Sunlight"

The December 21st shadow / Sunlight calculation data are illustrated on appendix 1 but these are not relevant for the conclusions of this report which is based on March 21st as per the BRE report.

2.5 Mitigation measures / actions.

There are no actions or mitigation measures required on the proposed development based on the findings of this report.

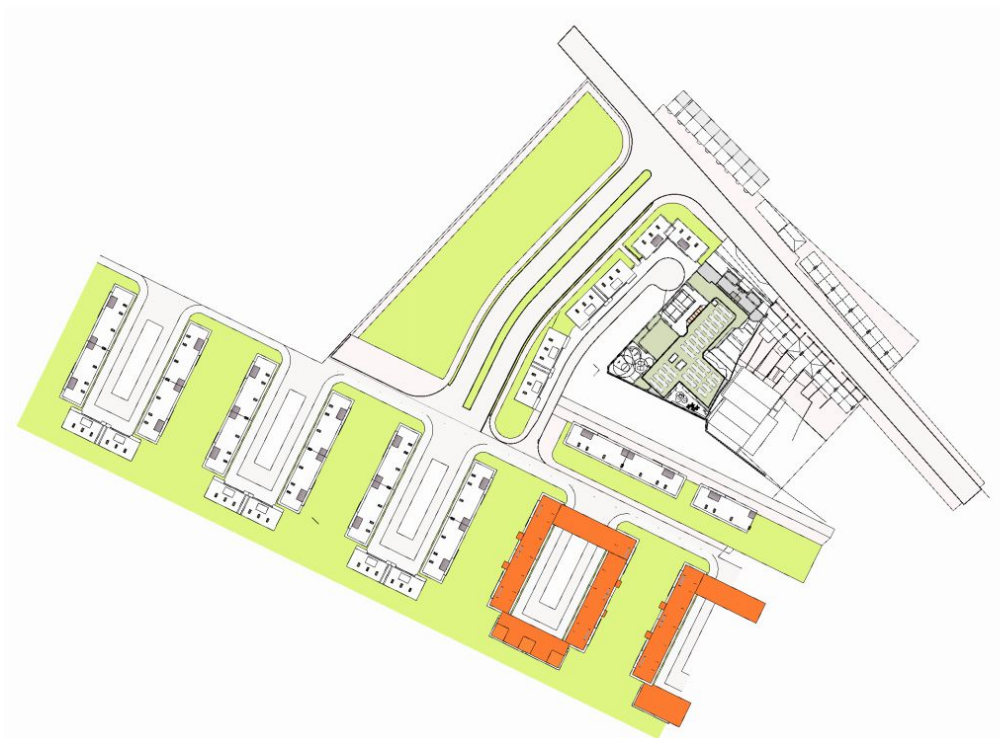
3 Geographical overview

3.1 Project site / site location overview.

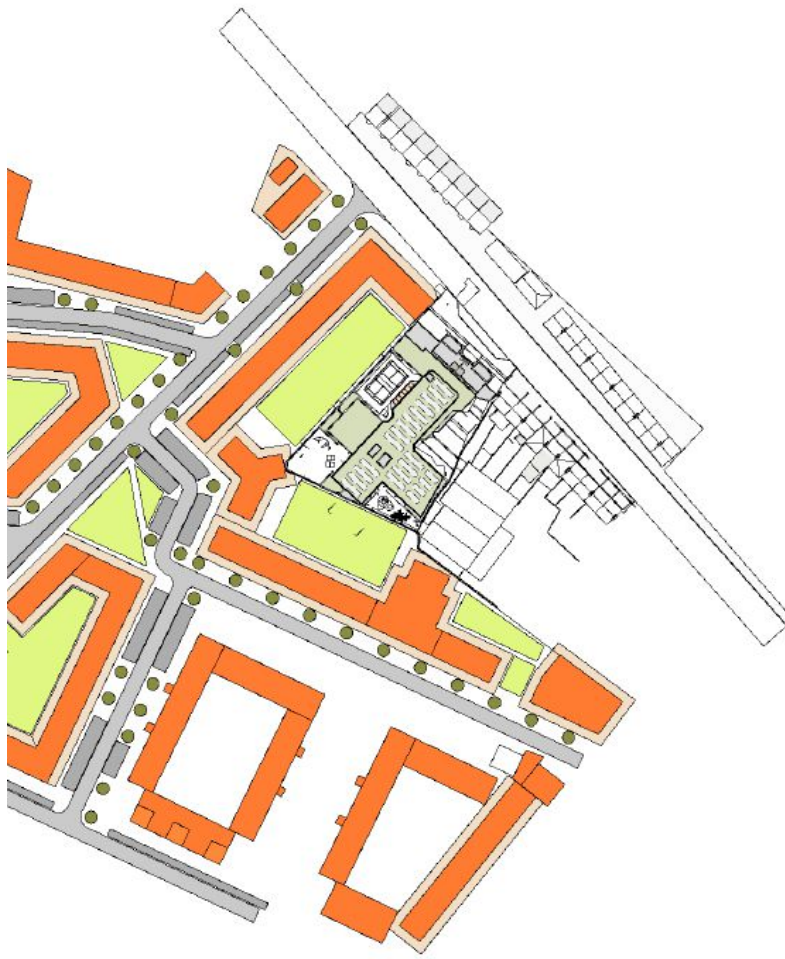
The site map below is a basic over view of the project location on the South Circular Road with the a) exiting building b) new proposed building and c) New proposed building with future DCC buildings.

**1**

Site with existing cinema building and existing DCC apartment blocks/housing

**2**

Site with new proposed building and existing DCC apartment blocks/housing

**3**

Site with new proposed building and future DCC apartment blocks

We note that although we are executing an amenity space shadow/sunlight analysis on the future DCC development technically the future DCC buildings should be conducting a shadow/sunlight analysis on the proposed new development as it is being constructed or applied for after the new proposed development

4 Approach and methodology

4.1 General approach.

This report covers the effects of the proposed development on shadow/sunlight in neighbouring amenity spaces. In basic terms a comparison is carried out between the current existing situation and with the proposed new development. A third analyses was carried out with the future DCC apartment development envisaged to be build in the next couple of years.

4.2 Assessment criteria.

National Policy / building regulations.

The government does not have an adopted policy on daylight, sunlight and the effects of overshadowing, and does not have targets, criteria or relevant planning guidance in the way it has for other environmental impacts such as noise, landscape or air quality. However, there are a number of guidance documents which are relevant when considering daylight, sunlight and overshadowing in dwellings:

- **The Building Research Establishment (BRE) report, “Site layout planning for daylight and sunlight – a guide to good practice** (referred to as the BRE Report).

Although not Government guidance, this report is commonly referenced as the main guide in Ireland/UK in determining the minimum standards of daylight and sunlight and for determining the impact of a development.

- **British Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for day lighting.**

BS 8206:2008 contains guidance on the minimum recommended levels of interior day lighting and introduces some of the calculation procedures used in the BRE Report.

- **CIBSE guide 10 Day light and lighting for buildings.**

CIBSE lighting guide 10, like BS 8206 contains guidance on the minimum recommended levels of interior day lighting and introduces recommended day light levels for general buildings.

4.3 The BRE Report – “Site Layout and Planning for Daylight and Sunlight – A Guide to Good Practice”

The BRE report contains guidance on how to design developments for achieving suitable sunlight (shadow) levels.. The advice provided within the guide is not mandatory and should not be seen as an instrument of planning policy, its aim is to help rather than constrain the designer. Although it gives numerical guidance values, these should be interpreted flexibly since sunlight/shadow is one of many factors in site layout design.

The guidance should be applied appropriately to developments to assist in gaining the best development possible without adverse impacts. As well as advice, the report contains a methodology to assess levels of daylight, sunlight and over shadowing and contains criteria to determine the potential impacts of a new development on surrounding buildings.

4.4 Shadow / sunlight analysis.

The shadow / sunlight analysis is carried out on existing neighbouring amenity spaces to evaluate the effects of the new proposed development on same.

Whereas there are no standards applied for shadow / sunlight there are recommendations published in the CIBSE guides and BRE documents in relation to the maximum allowable effects on existing amenity space and minimum sun time requirements for new amenity spaces.

The criterion.

In basic terms, based on the BRE report states that at least 50% of the amenity space should receive at least two hours of sunlight on the 21st March and any loss of sunlight should not be greater than 0.8 times its former size.

The overshadowing / sun light assessment is executed in using a 3D model of the project and adjoining buildings with the results illustrated in tabular format showing the hourly status of the shadow / sunlight fraction in the relevant amenity spaces.

DCC had also requested an analysis for December 21st although this bears no effect on this report as the criterion for shadow/sunlight is calculated at March 21st as per BRE guide and BS 8206.

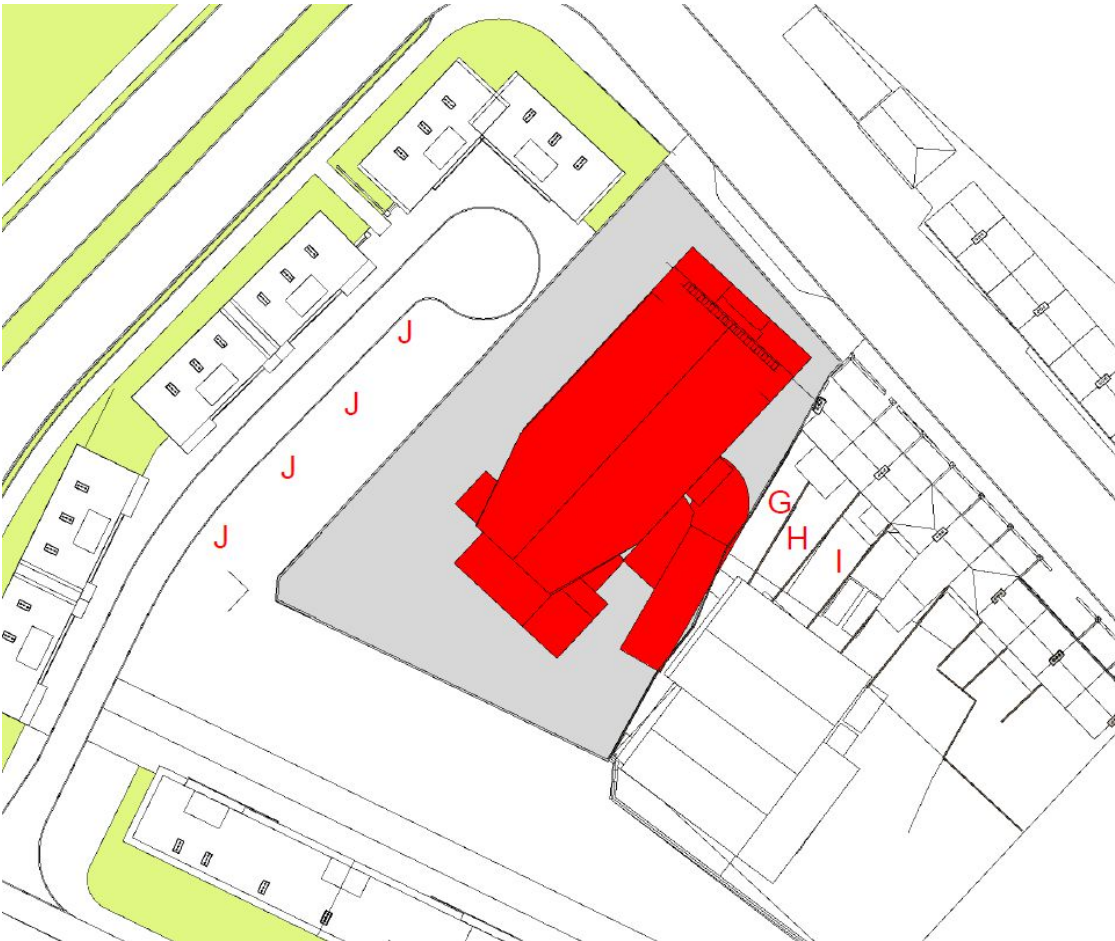
4.5 Basis of amenity space selection.

In general terms any existing amenity space effected by any shadows (sunlight) of the new proposed development need be analysed to ensure that any effects are within the constraints of the BRE guide.

4.6 Selected amenity spaces.

For analysis 1 (existing amenity -v- exiting building) and 2 (existing amenity -v- new development) the following amenity spaces have been selected.

- **Receptor G:** Left hand side neighbouring garden at rear of dwelling +/- 65m²
- **Receptor H:** Left hand side neighbouring garden at rear of dwelling +/- 60m²
- **Receptor I:** Left hand side neighbouring garden at rear of dwelling +/- 55m²
- **Receptor J:** Right hand side neighbouring existing parking area. NB this is not an amenity space.

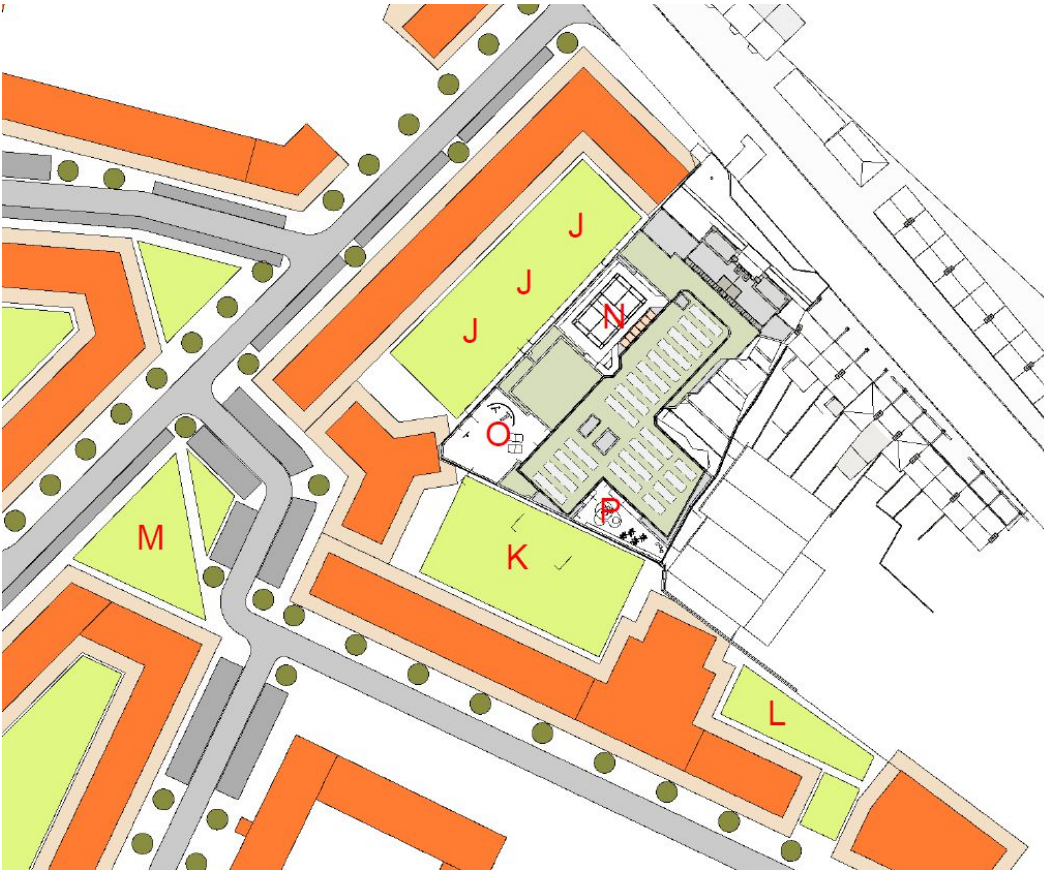


1+2

Existing amenity
spaces

- **Receptor J:** Future neighbouring amenity open space.
- **Receptor K:** Future neighbouring amenity open space.
- **Receptor L:** Future neighbouring amenity open space.
- **Receptor M:** Future neighbouring amenity open space.

- **Receptor N:** Amenity space within the new development.
- **Receptor O:** Amenity space within the new development.
- **Receptor P:** Amenity space within the new development

**3**Future and self
amenity spaces

5 Calculation results

5.2 Shadow – Sunlight calculation data.

The tables below represent the calculation data of the one hourly shadow / sunlight status of the selected amenity areas with the existing building and new proposed building. (G, H, I, J)

March 21st Amenity area G and H. Existing amenity areas with Existing building and new building status.

EXISTING					
Area	G 65 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	%	avg %	min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	96%	2%	60	1	78
9.00	50%	27%	60	18	1,053
10.00	20%	65%	60	42	2,535
11.00	17%	82%	60	53	3,179
12.00	12%	86%	60	56	3,335
13.00	4%	92%	60	60	3,588
14.00	8%	94%	60	61	3,666
15.00	50%	71%	60	46	2,769
16.00	100%	25%	60	16	975
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,900
Achieved sun time * area	21,177
Total achieved sun time @ 50% area	10.86
Achieved one hour peak sun time @ 50% area	3.72

NEW					
Area	G 65 m ²				
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	%	avg %	min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	96%	2%	60	1	78
9.00	50%	27%	60	18	1,053
10.00	20%	65%	60	42	2,535
11.00	17%	82%	60	53	3,179
12.00	12%	86%	60	56	3,335
13.00	4%	92%	60	60	3,588
14.00	35%	81%	60	52	3,140
15.00	100%	33%	60	21	1,268
16.00	100%	0%	60	0	0
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,900	
Achieved sun time * area	18,174	Change 0.86
Total achieved sun time @ 50% area	9.32	
Achieved one hour peak sun time @ 50% area	3.55	

EXISTING					
Area	H 60 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	98%	1%	60	1	36
9.00	50%	26%	60	16	936
10.00	20%	65%	60	39	2,340
11.00	17%	82%	60	49	2,934
12.00	12%	86%	60	51	3,078
13.00	6%	91%	60	55	3,276
14.00	8%	93%	60	56	3,348
15.00	18%	87%	60	52	3,132
16.00	60%	61%	60	37	2,196
17.00	100%	20%	60	12	720
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,600
Achieved sun time * area	21,996
Total achieved sun time @ 50% area	12.22
Achieved one hour peak sun time @ 50% area	3.68

NEW					
Area	H 60 m ²				
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	% / %	min	m ²	120min*m ²	
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	98%	1%	60	1	36
9.00	50%	26%	60	16	936
10.00	20%	65%	60	39	2,340
11.00	17%	82%	60	49	2,934
12.00	12%	86%	60	51	3,078
13.00	6%	91%	60	55	3,276
14.00	8%	93%	60	56	3,348
15.00	100%	46%	60	28	1,656
16.00	100%	0%	60	0	0
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,600	
Achieved sun time * area	17,604	Change 0.80
Total achieved sun time @ 50% area	9.78	
Achieved one hour peak sun time @ 50% area	3.68	



March 21st Amenity area I and J. Existing amenity areas with Existing building and new building status.

EXISTING					
Area	55 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	90%	5%	60	3	165
9.00	60%	25%	60	14	825
10.00	20%	60%	60	33	1,980
11.00	17%	82%	60	45	2,690
12.00	12%	86%	60	47	2,822
13.00	5%	92%	60	50	3,020
14.00	8%	94%	60	51	3,086
15.00	12%	90%	60	50	2,970
16.00	70%	59%	60	32	1,947
17.00	100%	15%	60	8	495
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,300
Achieved sun time * area	19,998
Total achieved sun time @ 50% area	12.12
Achieved one hour peak sun time @ 50% area	3.70

NEW					
Area	55 m ²				
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	% / %	min	m ²	120min*m ²	
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	90%	5%	60	3	165
9.00	60%	25%	60	14	825
10.00	20%	60%	60	33	1,980
11.00	17%	82%	60	45	2,690
12.00	12%	86%	60	47	2,822
13.00	5%	92%	60	50	3,020
14.00	8%	94%	60	51	3,086
15.00	35%	79%	60	43	2,591
16.00	70%	48%	60	26	1,568
17.00	100%	15%	60	8	495
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	3,300	
Achieved sun time * area	19,239	Change 0.96
Total achieved sun time @ 50% area	11.66	
Achieved one hour peak sun time @ 50% area	3.70	

EXISTING					
Area	1,230 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	85%	8%	60	92	5,535
9.00	45%	35%	60	431	25,830
10.00	15%	70%	60	861	51,660
11.00	10%	88%	60	1076	64,575
12.00	8%	91%	60	1119	67,158
13.00	6%	93%	60	1144	68,634
14.00	4%	95%	60	1169	70,110
15.00	8%	94%	60	1156	69,372
16.00	40%	76%	60	935	56,088
17.00	100%	30%	60	369	22,140
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	73,800
Achieved sun time * area	501,102
Total achieved sun time @ 50% area	13.58
Achieved one hour peak sun time @ 50% area	3.78

NEW					
Area	1,230 m ²				
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	% / %	min	m ²	120min*m ²	
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	90%	5%	60	62	3,690
10.00	55%	28%	60	338	20,295
11.00	30%	58%	60	707	42,435
12.00	17%	77%	60	941	56,457
13.00	10%	87%	60	1,064	63,837
14.00	5%	93%	60	1,138	68,265
15.00	8%	94%	60	1,150	69,003
16.00	40%	76%	60	935	56,088
17.00	100%	30%	60	369	22,140
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	73,800	
Achieved sun time * area	402,210	Change 0.80
Total achieved sun time @ 50% area	10.90	
Achieved one hour peak sun time @ 50% area	3.72	



5.2 Shadow – Sunlight calculation data.

The tables below represent the calculation data of the one hourly shadow / sunlight status of the selected amenity areas with the future DCC buildings and new proposed building. (J, K, L, M) and amenity areas within the development ((N, O, P)

March 21st Amenity area J, K, L, and M. Future amenity areas with new building status.

NEW					
Area	J	1,000 m ²		Sun area in time.area	
Time	Shadow	Sunlight	Sun time		
24 Hr	%	avrg %	min	m2	min*m2
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	99%	1%	60	5	300
9.00	92%	4%	60	45	2,700
10.00	59%	25%	60	245	14,700
11.00	24%	59%	60	585	35,100
12.00	19%	79%	60	785	47,100
13.00	11%	85%	60	850	51,000
14.00	14%	88%	60	875	52,500
15.00	16%	85%	60	850	51,000
16.00	68%	58%	60	580	34,800
17.00	100%	16%	60	160	9,600
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	60,000
Achieved sun time * area	298,800
Total achieved sun time @ 50% area	9.96
Achieved one hour peak sun time @ 50% area	3.45

NEW					
Area	K	850 m ²		Sun area in time.area	
Time	Shadow / Sunlight	Sun time			
24 Hr	%	avrg %	min	m2	min*m2
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	50%	25%	60	213	12,750
9.00	35%	58%	60	489	29,325
10.00	28%	69%	60	582	34,935
11.00	17%	78%	60	659	39,525
12.00	10%	87%	60	735	44,115
13.00	9%	91%	60	769	46,155
14.00	20%	86%	60	727	43,605
15.00	26%	77%	60	655	39,270
16.00	66%	54%	60	459	27,540
17.00	100%	17%	60	145	8,670
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	51,000
Achieved sun time * area	325,890
Total achieved sun time @ 50% area	12.78
Achieved one hour peak sun time @ 50% area	3.54

NEW					
Area	L	300 m ²		Sun area in time.area	
Time	Shadow	Sunlight	Sun time		
24 Hr	% / %		min	m2	120min*m2
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	20%	40%	60	120	7,200
9.00	90%	45%	60	135	8,100
10.00	60%	25%	60	75	4,500
11.00	25%	58%	60	173	10,350
12.00	12%	82%	60	245	14,670
13.00	9%	90%	60	269	16,110
14.00	48%	72%	60	215	12,870
15.00	90%	31%	60	93	5,580
16.00	100%	5%	60	15	900
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	18,000
Achieved sun time * area	80,280
Total achieved sun time @ 50% area	8.92
Achieved one hour peak sun time @ 50% area	3.42

NEW					
Area	M	550 m ²		Sun area in time.area	
Time	Shadow / Sunlight	Sun time			
24 Hr	% / %	min	m2	120min*m2	
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	10%	45%	60	248	14,850
9.00	0%	95%	60	523	31,350
10.00	0%	100%	60	550	33,000
11.00	8%	96%	60	528	31,680
12.00	14%	89%	60	490	29,370
13.00	23%	82%	60	448	26,895
14.00	47%	65%	60	358	21,450
15.00	44%	55%	60	300	17,985
16.00	36%	60%	60	330	19,800
17.00	100%	32%	60	176	10,560
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	33,000
Achieved sun time * area	236,940
Total achieved sun time @ 50% area	14.36
Achieved one hour peak sun time @ 50% area	3.92



March 21st Amenity area N, O and P New amenity areas with new building status.

NEW					
Area	N 200 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	99%	1%	60	1	60
11.00	97%	2%	60	4	240
12.00	76%	14%	60	27	1,620
13.00	57%	34%	60	67	4,020
14.00	46%	49%	60	98	5,850
15.00	72%	41%	60	83	4,950
16.00	80%	24%	60	48	2,880
17.00	90%	15%	60	30	1,800
18.00	100%	5%	60	10	600
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	12,000
Achieved sun time * area	22,020
Total achieved sun time @ 50% area	3.67
Achieved one hour peak sun time @ 50% area	1.80

NEW					
Area	O 180 m ²				
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	98%	1%	60	2	108
10.00	90%	6%	60	11	648
11.00	83%	14%	60	24	1,458
12.00	54%	32%	60	57	3,402
13.00	36%	55%	60	99	5,940
14.00	21%	72%	60	129	7,722
15.00	70%	55%	60	98	5,886
16.00	100%	15%	60	27	1,620
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	10,800
Achieved sun time * area	26,784
Total achieved sun time @ 50% area	4.96
Achieved one hour peak sun time @ 50% area	2.53

NEW					
Area	P 100 m ²				
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	90%	5%	60	5	300
9.00	62%	24%	60	24	1,440
10.00	14%	62%	60	62	3,720
11.00	7%	90%	60	90	5,370
12.00	5%	94%	60	94	5,640
13.00	4%	96%	60	96	5,730
14.00	2%	97%	60	97	5,820
15.00	12%	93%	60	93	5,580
16.00	24%	82%	60	82	4,920
17.00	100%	38%	60	38	2,280
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Required sun time 2 hours * 50% area	6,000
Achieved sun time * area	40,800
Total achieved sun time @ 50% area	13.60
Achieved one hour peak sun time @ 50% area	3.85



5.3 Conclusion.

From the calculation results we note the following ;

The new proposed development's effects on shadow / sunlight on the existing amenity areas G, H, I and J are all within the constraints (maximum change factor of 0.8) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations.

The new proposed development's effects on shadow / sunlight on the future DCC development's amenity areas J, K, L, M are all within the constraints (minimum of 2 hours sunlight on at least 50% of the area) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations

The new proposed development's effects on shadow / sunlight on the future DCC development's amenity areas N, N, O (own amenity spaces) are all within the constraints (minimum of 2 hours sunlight on at least 50% of the area) of the BRE Site report "Layout and Planning for Daylight and Sunlight" recommendations with a minor (<10%) infringement of area N the basketball court which also has artificial lighting.

From the above we conclude that the new proposed building's effects on shadow / sunlight are in line with the BRE Site report "Layout and Planning for Daylight and Sunlight"

The December 21st shadow / Sunlight calculation data are illustrated on appendix 1 but these are not relevant for the conclusions of this report which is based on march 21st as per the BRE report.

APPENDIX 1 DECEMBER CALCULATION DATA.

DECEMBER 21st Amenity area J, K, L, and M. Future amenity areas with new building status.

NEW					
Area	J		1,000 m ² December 21st		
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	%	avg %	min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	90%	5%	60	50	3,000
11.00	82%	14%	60	140	8,400
12.00	66%	26%	60	260	15,600
13.00	52%	41%	60	410	24,600
14.00	66%	41%	60	410	24,600
15.00	92%	21%	60	210	12,600
16.00	90%	9%	60	90	5,400
17.00	100%	5%	60	50	3,000
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 97,200
 Total achieved sun time @ 50% area 3.24
 Achieved one hour peak sun time @ 50% area 1.34

NEW					
Area	K		850 m ² December 21st		
Time	Shadow /	Sunlight	Sun time	Sun area in time.area	
24 Hr	%	avg %	min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	82%	9%	60	77	4,590
11.00	71%	24%	60	200	11,985
12.00	72%	29%	60	242	14,535
13.00	84%	22%	60	187	11,220
14.00	100%	8%	60	68	4,080
15.00	100%	0%	60	0	0
16.00	100%	0%	60	0	0
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 46,410
 Total achieved sun time @ 50% area 1.82
 Achieved one hour peak sun time @ 50% area 1.04

NEW					
Area	L		300 m ² December 21st		
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	90%	5%	60	15	900
11.00	86%	12%	60	36	2,160
12.00	81%	17%	60	50	2,970
13.00	78%	21%	60	62	3,690
14.00	86%	18%	60	54	3,240
15.00	94%	10%	60	30	1,800
16.00	100%	3%	60	9	540
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 15,300
 Total achieved sun time @ 50% area 1.70
 Achieved one hour peak sun time @ 50% area 0.77

NEW					
Area	M		550 m ² December 21st		
Time	Shadow /	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	70%	15%	60	83	4,950
9.00	40%	45%	60	248	14,850
10.00	33%	64%	60	349	20,955
11.00	68%	50%	60	272	16,335
12.00	84%	24%	60	132	7,920
13.00	90%	13%	60	72	4,290
14.00	100%	5%	60	28	1,650
15.00	90%	5%	60	28	1,650
16.00	73%	19%	60	102	6,105
17.00	100%	14%	60	74	4,455
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 83,160
 Total achieved sun time @ 50% area 5.04
 Achieved one hour peak sun time @ 50% area 2.26



DECEMBER 21st Amenity area N, O and P New amenity areas with new building status.

NEW					
Area	N	200 m ²		December 21st	
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	100%	0%	60	0	0
11.00	100%	0%	60	0	0
12.00	100%	0%	60	0	0
13.00	100%	0%	60	0	0
14.00	100%	0%	60	0	0
15.00	100%	0%	60	0	0
16.00	100%	0%	60	0	0
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 0
 Total achieved sun time @ 50% area 0.00
 Achieved one hour peak sun time @ 50% area 0.00

NEW					
Area	O	180 m ²		December 21st	
Time	Shadow / Sunlight	Sun time	Sun area in time.area		
24 Hr	% / %	min	m ²	120min*m ²	
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	100%	0%	60	0	0
10.00	86%	7%	60	13	756
11.00	78%	18%	60	32	1,944
12.00	53%	35%	60	62	3,726
13.00	31%	58%	60	104	6,264
14.00	34%	68%	60	122	7,290
15.00	84%	41%	60	74	4,428
16.00	86%	15%	60	27	1,620
17.00	100%	7%	60	13	756
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 26,784
 Total achieved sun time @ 50% area 4.96
 Achieved one hour peak sun time @ 50% area 2.51

NEW					
Area	P	100 m ²		December 21st	
Time	Shadow	Sunlight	Sun time	Sun area in time.area	
24 Hr	% / %		min	m ²	120min*m ²
6.00	100%	0%	0	0	0
7.00	100%	0%	60	0	0
8.00	100%	0%	60	0	0
9.00	90%	5%	60	5	300
10.00	100%	5%	60	5	300
11.00	92%	4%	60	4	240
12.00	57%	26%	60	26	1,530
13.00	34%	55%	60	55	3,270
14.00	27%	70%	60	70	4,170
15.00	100%	37%	60	37	2,190
16.00	100%	0%	60	0	0
17.00	100%	0%	60	0	0
18.00	100%	0%	60	0	0
19.00	100%	0%	60	0	0

Achieved sun time * area 12,000
 Total achieved sun time @ 50% area 4.00
 Achieved one hour peak sun time @ 50% area 2.48





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APPENDIX **A**

DKP-J79-6064

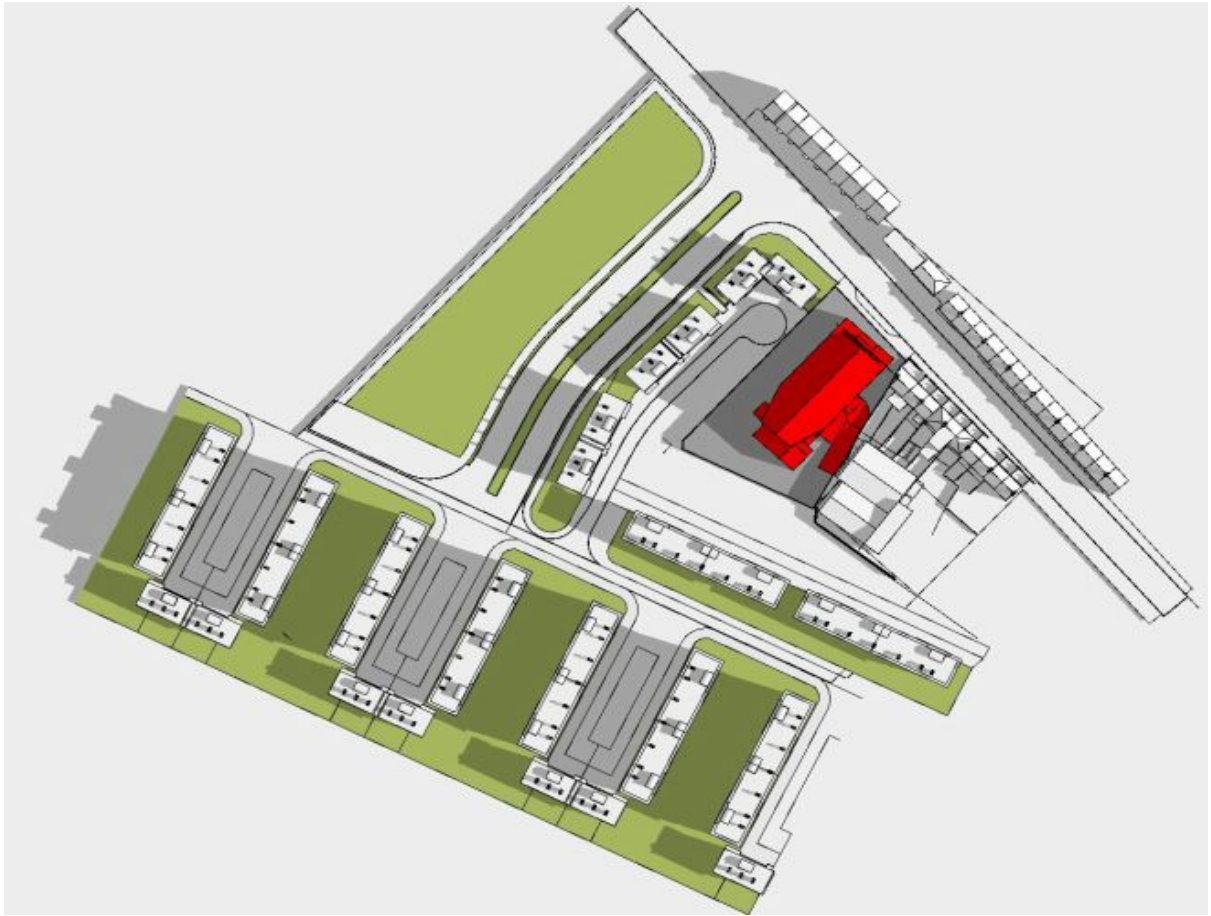
ONE HOURLY SUNLIGHT / SHADOW IMAGING (EXISTING BUILDING)

Rialto student Accommodation

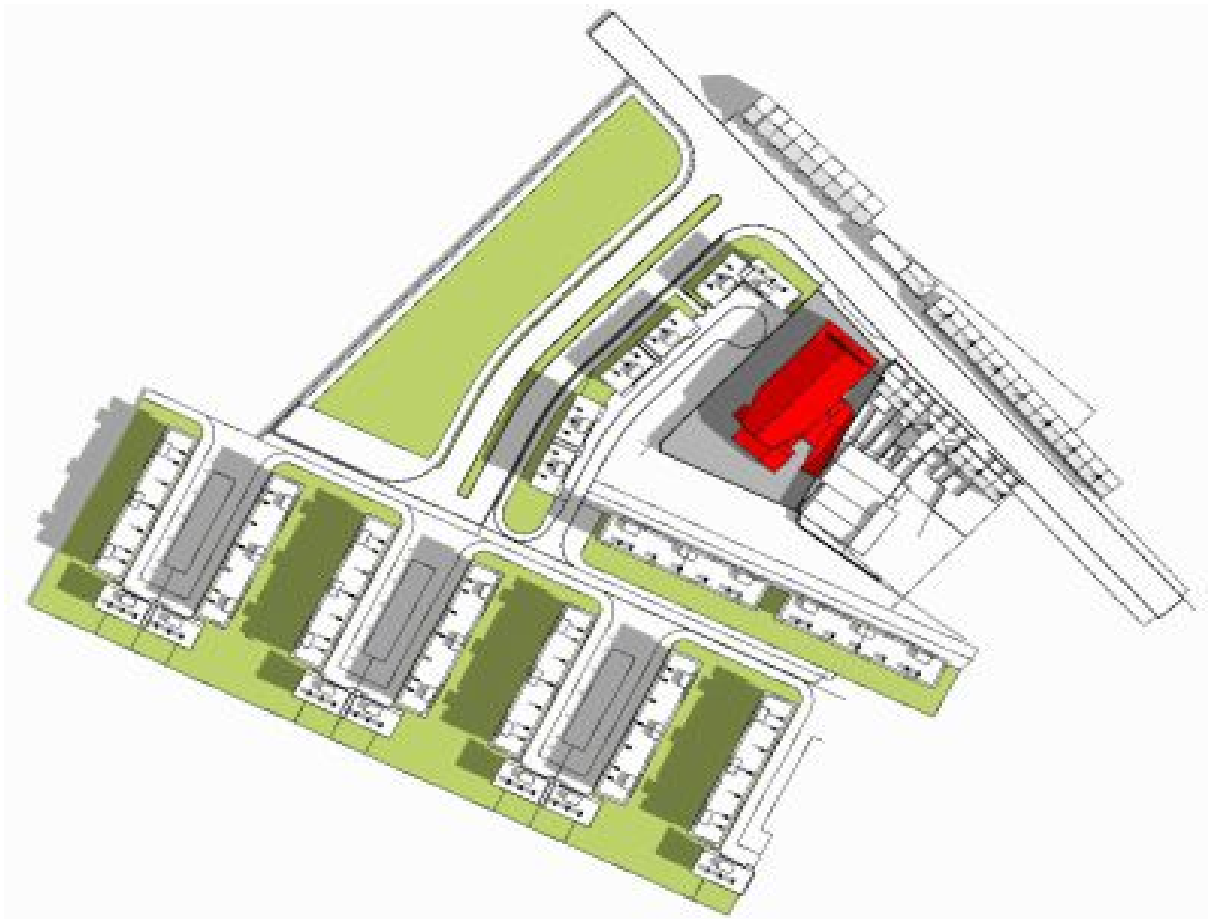


ONE HOURLY SUNLIGHT / SHADOW IMAGING (EXISTING BUILDING)

march 21st 8.00

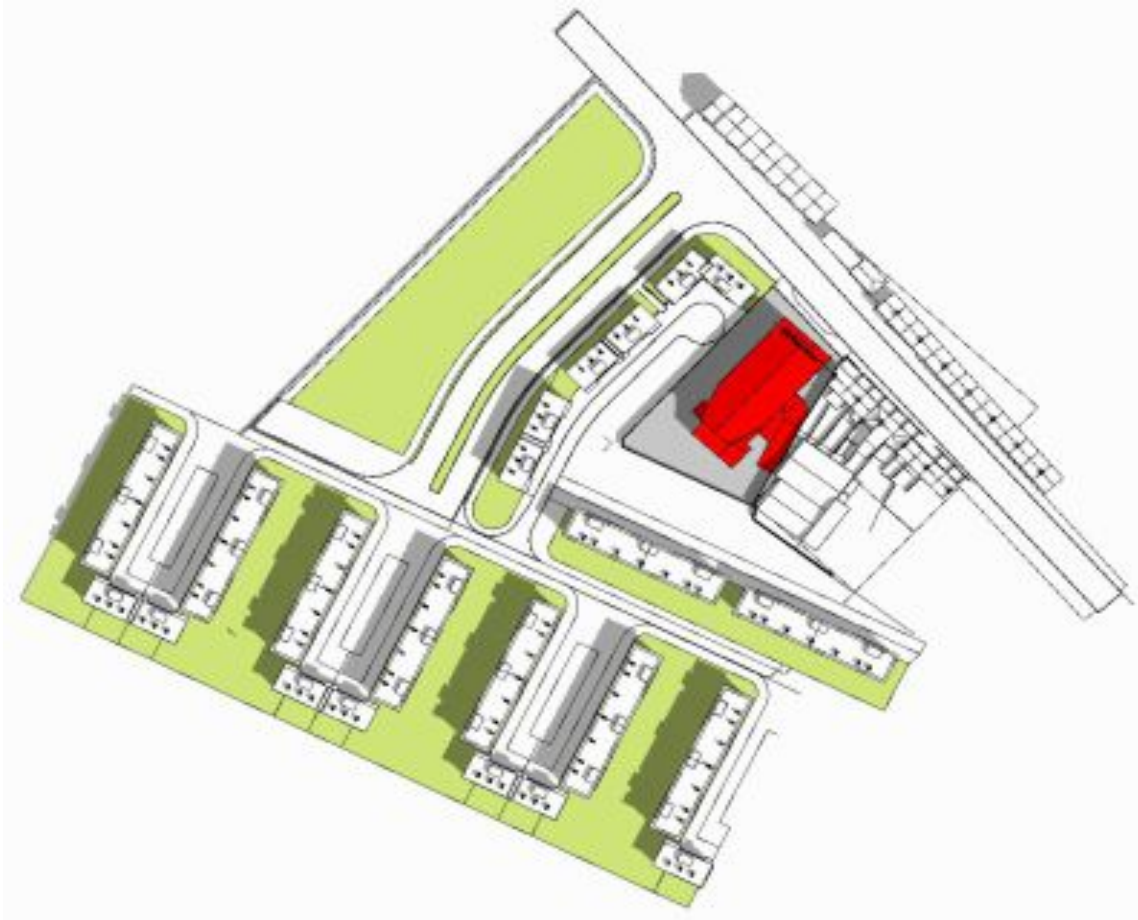


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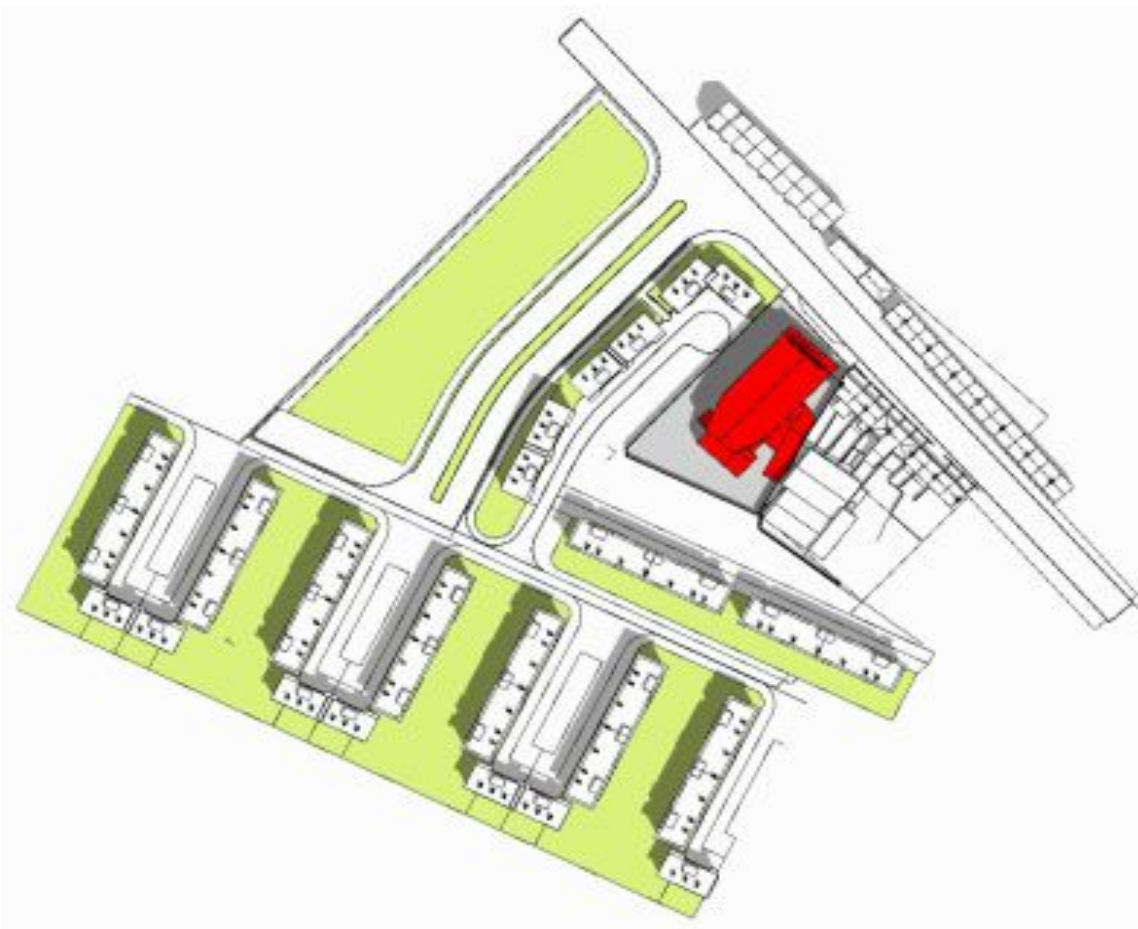


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march 21st 10.00

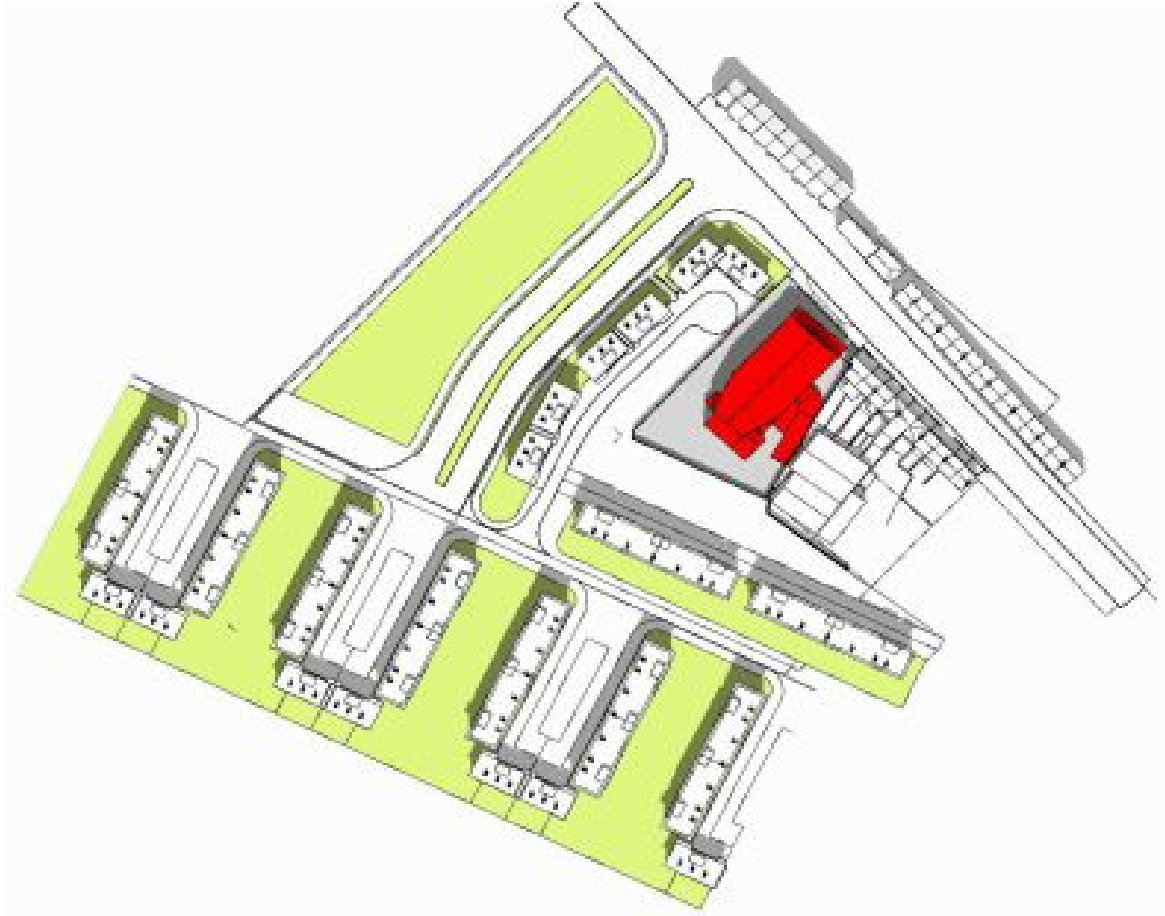


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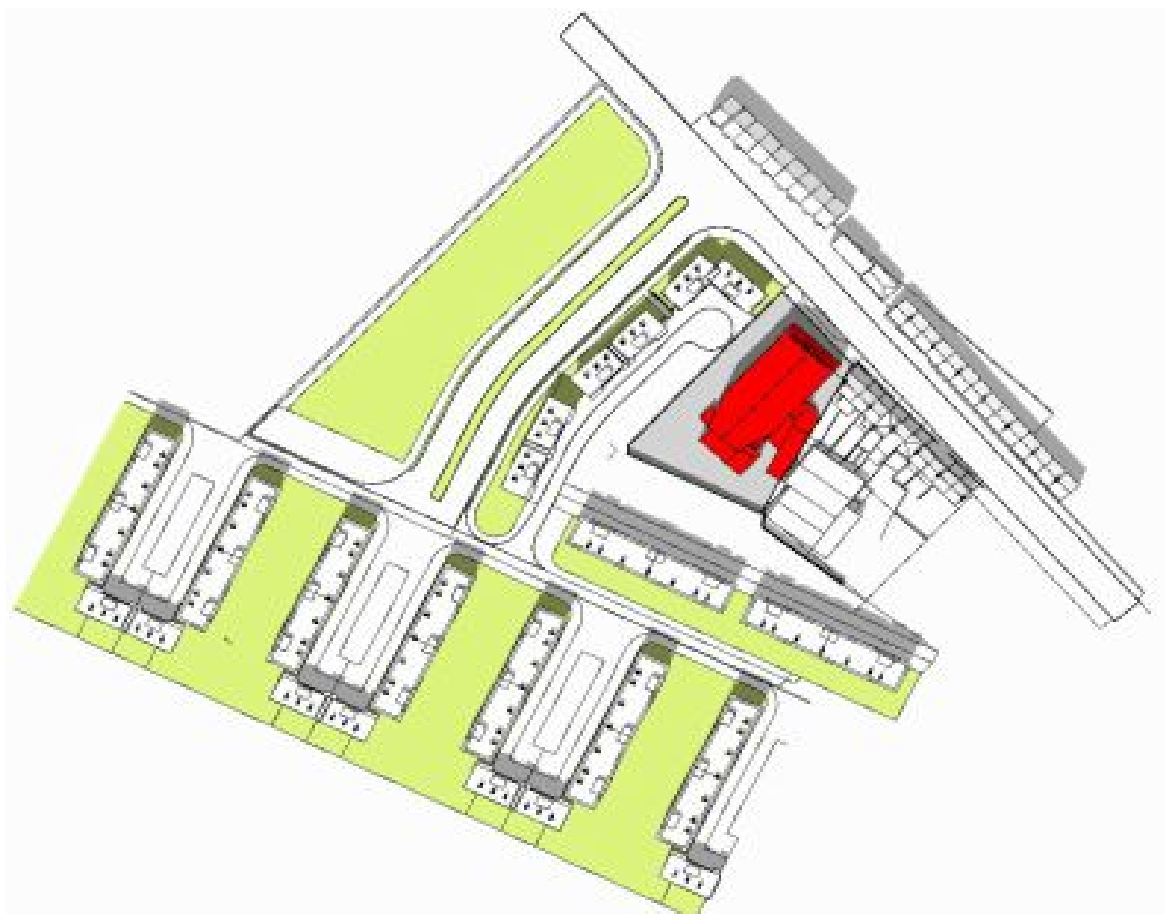


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march 21st 12.00

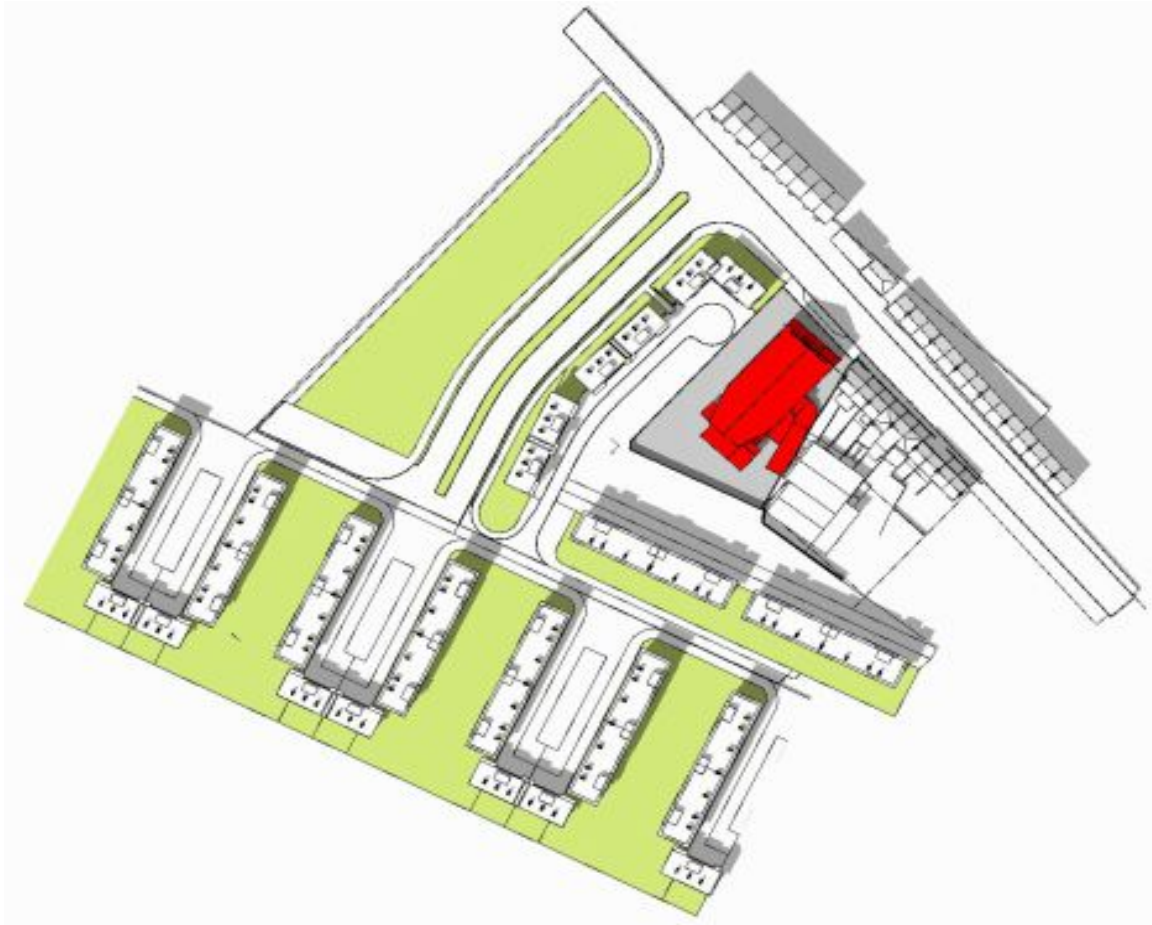


march 21st 13.00

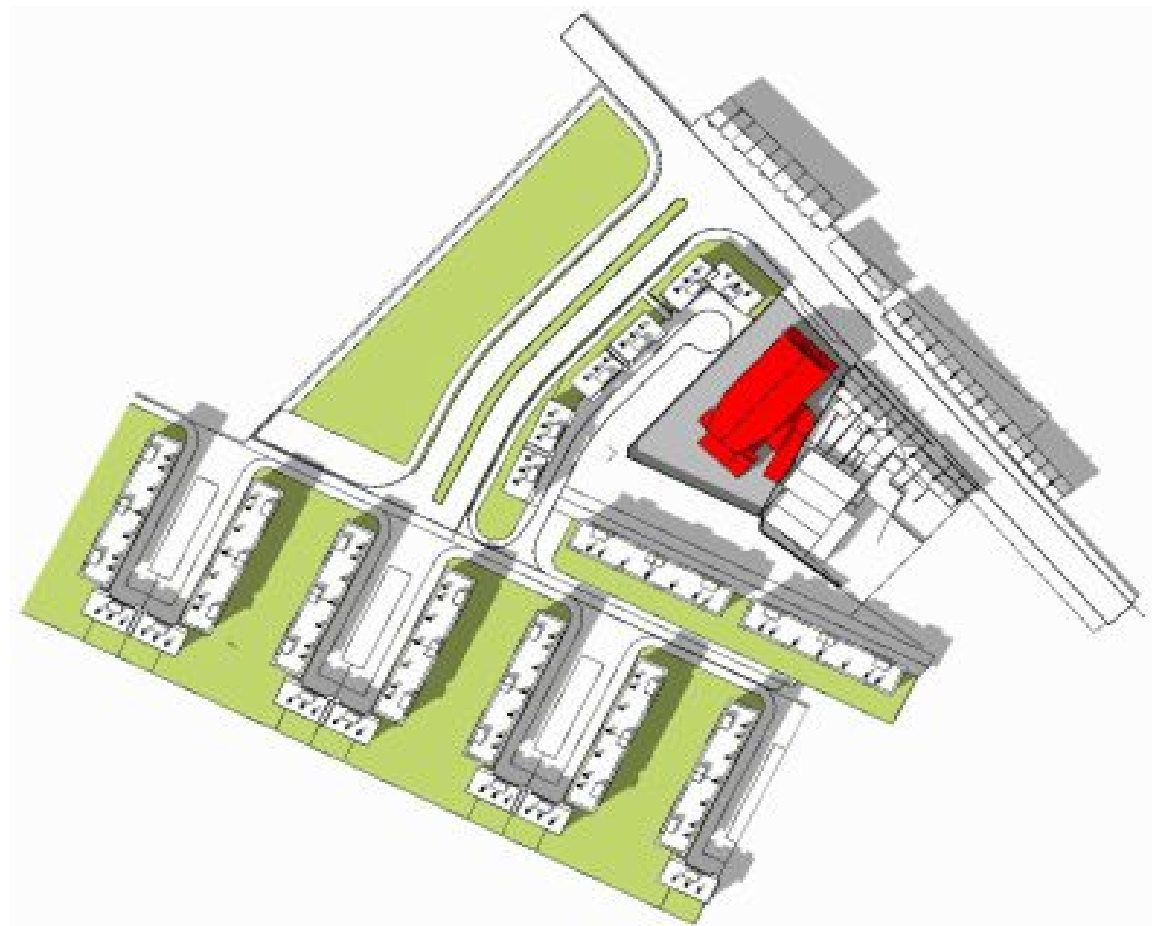


ONE HOURLY SUNLIGHT / SHADOW IMAGING (EXISTING BUILDING)

march 21st 14.00



march 21st 15.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (EXISTING BUILDING)

march 21st 16.00



march 21st 17.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (EXISTING BUILDING)

march 21st 18.00





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APPENDIX **B**

DKP-J79-6064

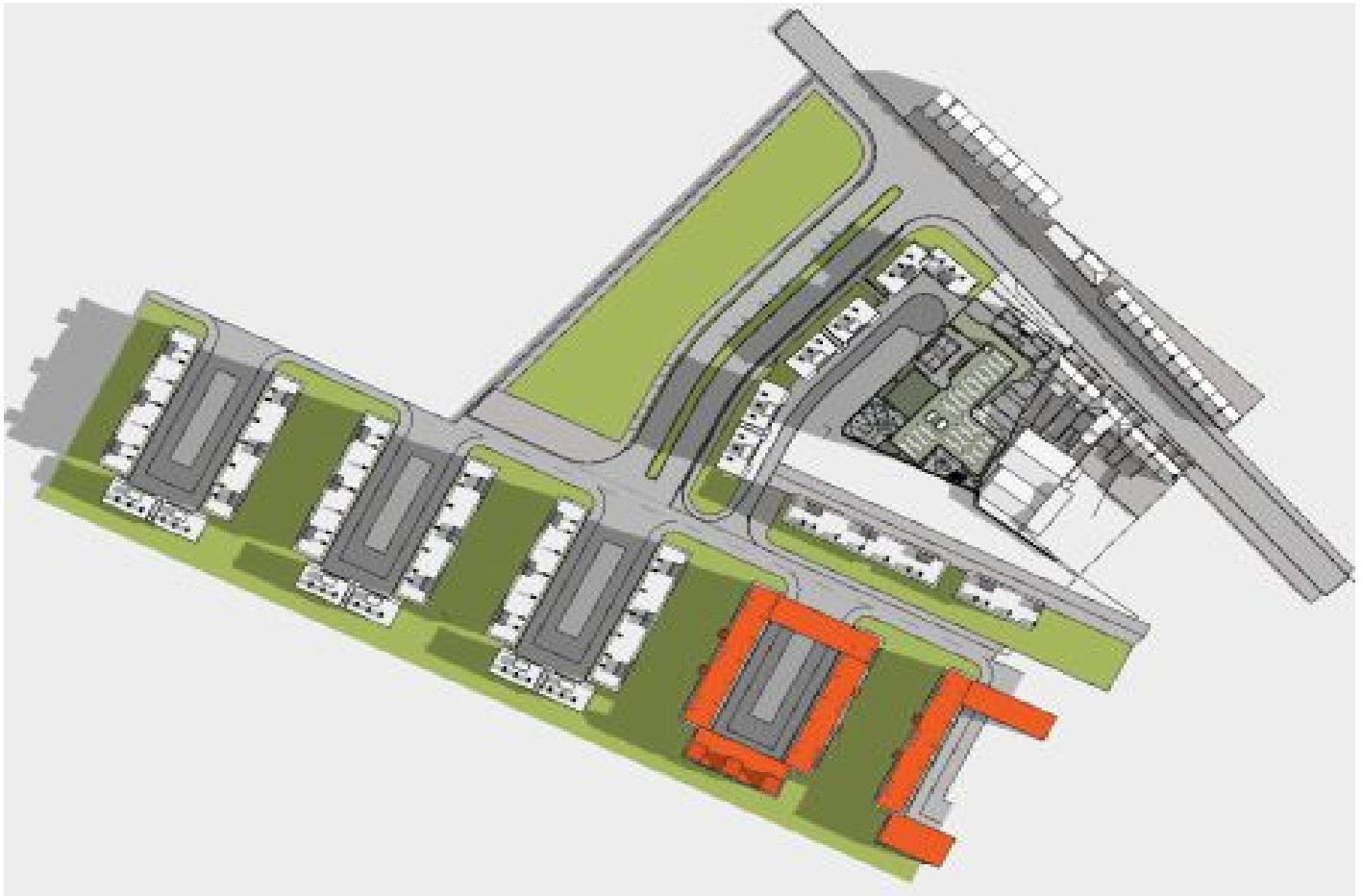
ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

Rialto student Accommodation

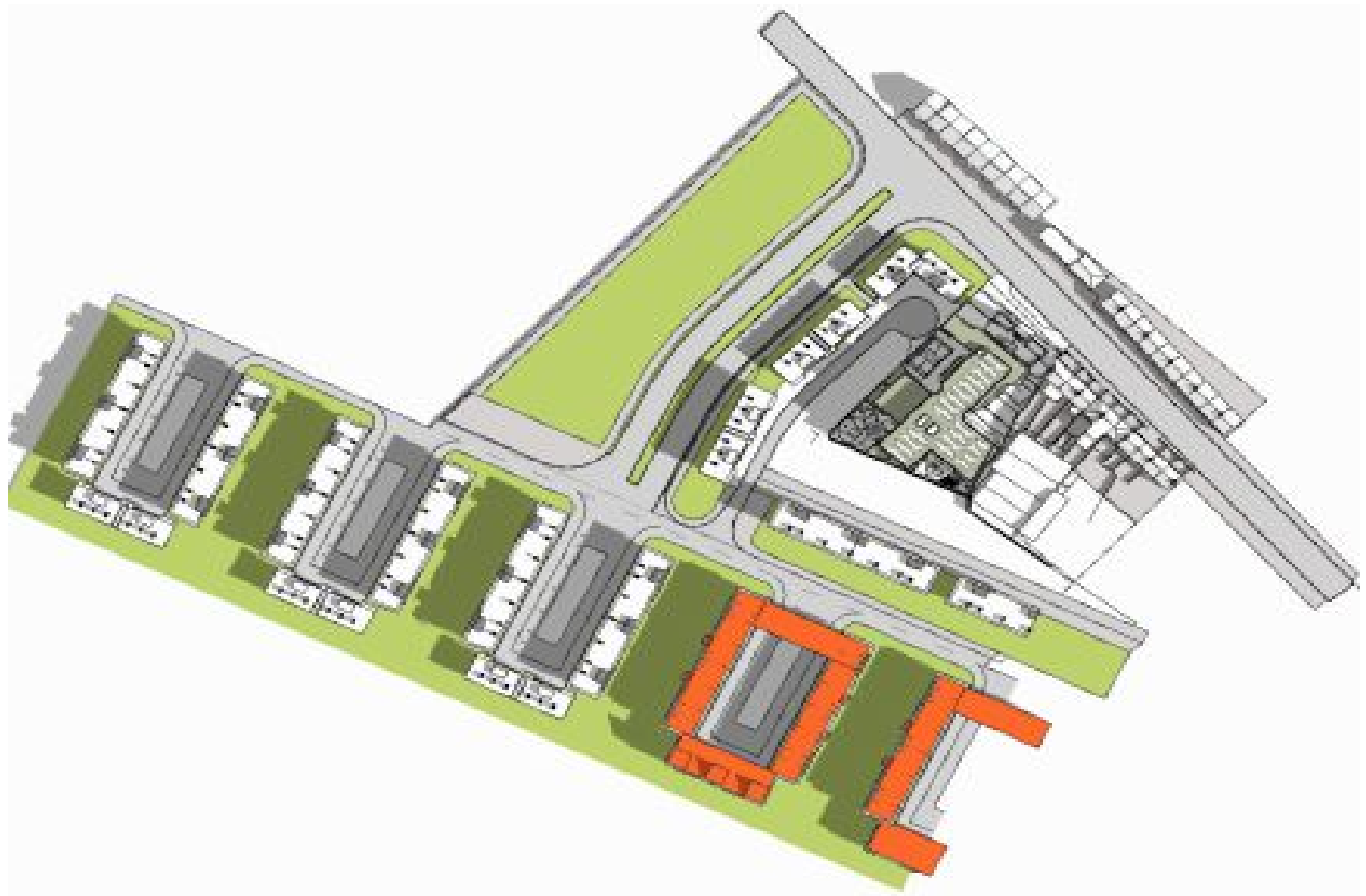


ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 8.00



march 21st 9.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 10.00



march 21st 11.00

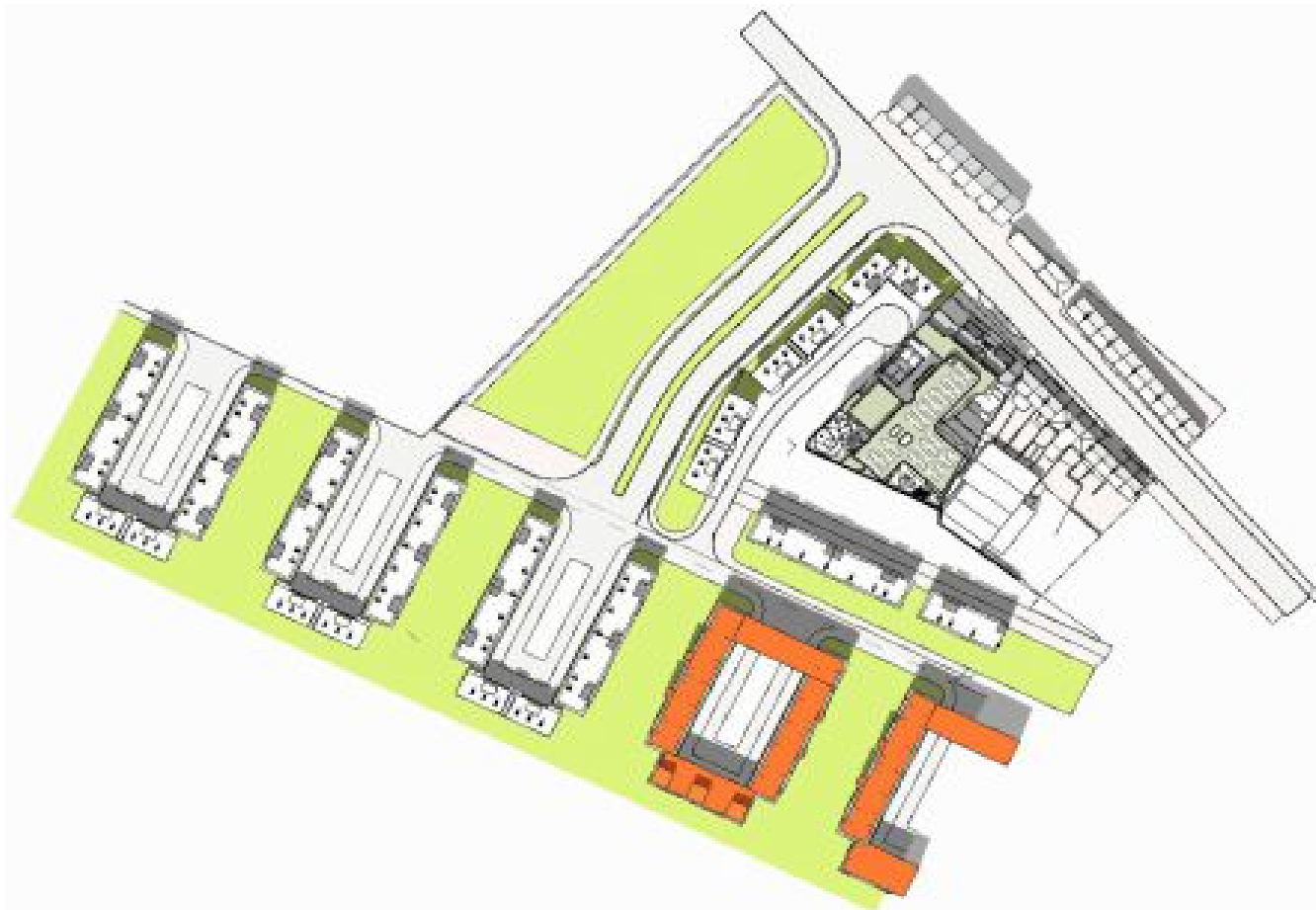


ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 12.00



march 21st 13.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 14.00



march 21st 15.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 16.00



march 21st 17.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT)

march 21st 18.00





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APPENDIX **C**

DKP-J79-6064

ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

Rialto student Accommodation



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 8.00



march 21st 9.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 10.00



march 21st 11.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 12.00

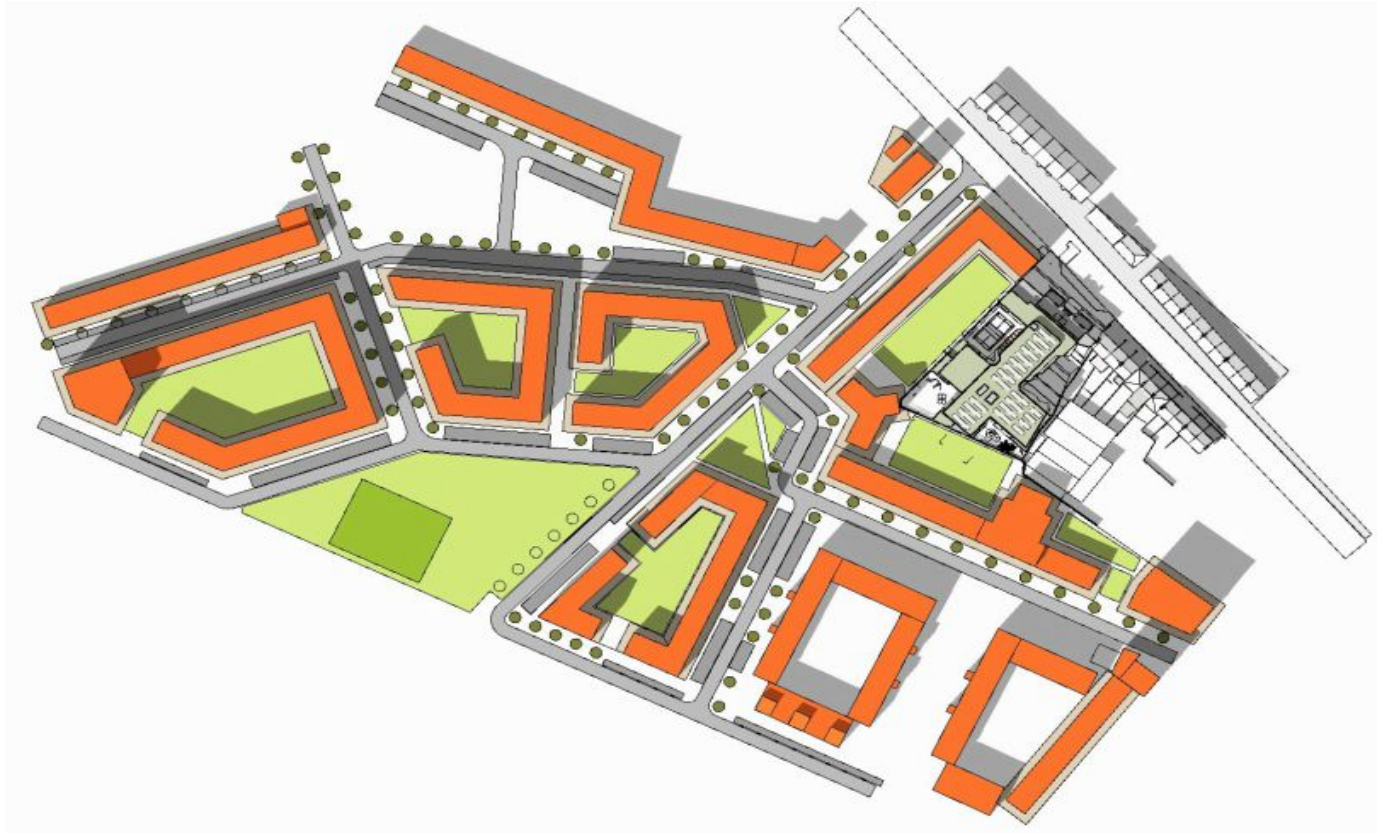


march 21st 13.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 14.00



march 21st 15.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 16.00



march 21st 17.00



ONE HOURLY SUNLIGHT / SHADOW IMAGING (NEW DEVELOPMENT - FUTURE DCC BUILDINGS)

march 21st 18.00

