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## **PROPOSED MIXED USE DEVELOPMENT AT CLONGRIFFIN**

### **SUNLIGHT SHADOW ANALYSIS REPORT**

EXISTING AND NEW AMENITY SPACES

**CLONGRIFFIN  
DUBLIN 13**

GERARD GANNON PROPERTIES

**DKP-K00-6064-2P**  
2019-08-09

## Document control

Document ID : **DKP-K00-6064**

Part 1 of 1

Circular	Issue >	1P	2P
Clients	Gerard Gannon Properties	x	x
Architects	CCK, Wilsons, Downey Architecture	x	x
Planning consultants	Downey Planning	x	x
Structural/civil engineer	Waterman-Moylan	x	
Quantity surveyor	MMP	x	

### Issue

1P	2018-11-30	Issue for pre planning
2P	2019-08-09	Adjusted to reflect final changes
3P	2019-08-20	Added direct / indirect sunlight reflection.

### Status

N	No status
G	General Information
P	Planning
O	Outline/sketch design
S	Scheme design
D	Detail design
T	Tender
C	Construction
B	Build / Constructed

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C	New amenity spaces – Sunlight / Shadow Calculation tables	Attached
D	One hourly overall site shadow – sunlight status	Attached



# 1 Introduction

## 1.1 Report purpose.

This report gives information on the effects of the proposed development on shadow / sunlight on existing and new proposed amenity spaces.

## 1.2 Introduction.

DKPartnership (DKP) have been commissioned by Gerard Gannon Properties to carry out the analysis and report for the proposed development at Clongriffin, Dublin 13.

## 1.3 Development details.

This report covers multiple mixed use apartment blocks located in Clongriffin, Dublin 13 and represents most of the remaining sites to be “filled-in” within the Clongriffin development.

This phase consists of 15 blocks with a total of 1950 residential units and +/- 22,727m<sup>2</sup> of commercial space.

The 15 blocks are applied for in 3 no. separate planning packages, this report covers all of the blocks.

The report therefore is applied in all of the 3 applications.

Table 1.1 below shows the details of the 3 no. planning applications.

Planning reference	Qty blocks	Block ID	No dwellings	Commercial space m2	Comments
SHD I	9	6, 8, 11, 17, 25, 26, 27, 28, 29	1030	2285	
SHD II	3	4, 5, 14	500	3125	
DCC I	3	3, 13, 15	420	17317	

Table 1.1

## 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 analysed "Development at Clongriffin, Dublin 13" consists of a total of 15 no. proposed mixed use apartment blocks mainly located in the remaining sites to be filled-in within the overall Clongriffin development.

These blocks had been granted permission previously albeit the new proposed version in most cases proposes a different mix of residential units and quantum of commercial areas.

### 2.2 Analysis conducted.

In this report the effect of proposed development on existing and new amenity spaces with regards to shadow and sunlight was analysed.

### 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 extent to which the proposed development could affect the shadow / sun light reception in any open formal amenity spaces.

For new amenity spaces in basic terms the minimum criteria is that at least 50% of the amenity space should receive at least two hours of sunlight on the 21<sup>st</sup> March and for "existing" amenity spaces there is also the additional criteria that any loss of sunlight should not be greater than 0.8 times its former size.

### 2.5 Note on "Existing" amenity spaces.

We note that whereas we refer to "existing" amenity spaces in this report there are technically no existing amenity within the development in terms of what we normally refer to as existing amenity spaces.

The current application for proposed residential units including the amenity spaces was previously applied for and granted permission albeit the current version has different apartment quantities and quantum of commercial space and technically these amenity spaces are also part of the new proposed amenity space but constructed earlier.

### 2.6 Glare / sunlight reflection note.

As the the new proposed mixed use development is partially under a Dublin Airport flight path we note that there are no solar thermal or photovoltaic panels es proposed for the part L requirements hence there is no direct or indirect sun light (glare) anticipated.

### 2.7 Conclusion.

Based on the calculation results and changes applied to the blocks we conclude that the effects on sunlight (shadow) of the new proposed development on the existing amenity spaces are all within the constraints of the BRE guidelines.

We further conclude that based on the calculation results that the overshadowing / available sunlight of new open amenity spaces within the proposed development are all within the constraints of the BRE guidelines.

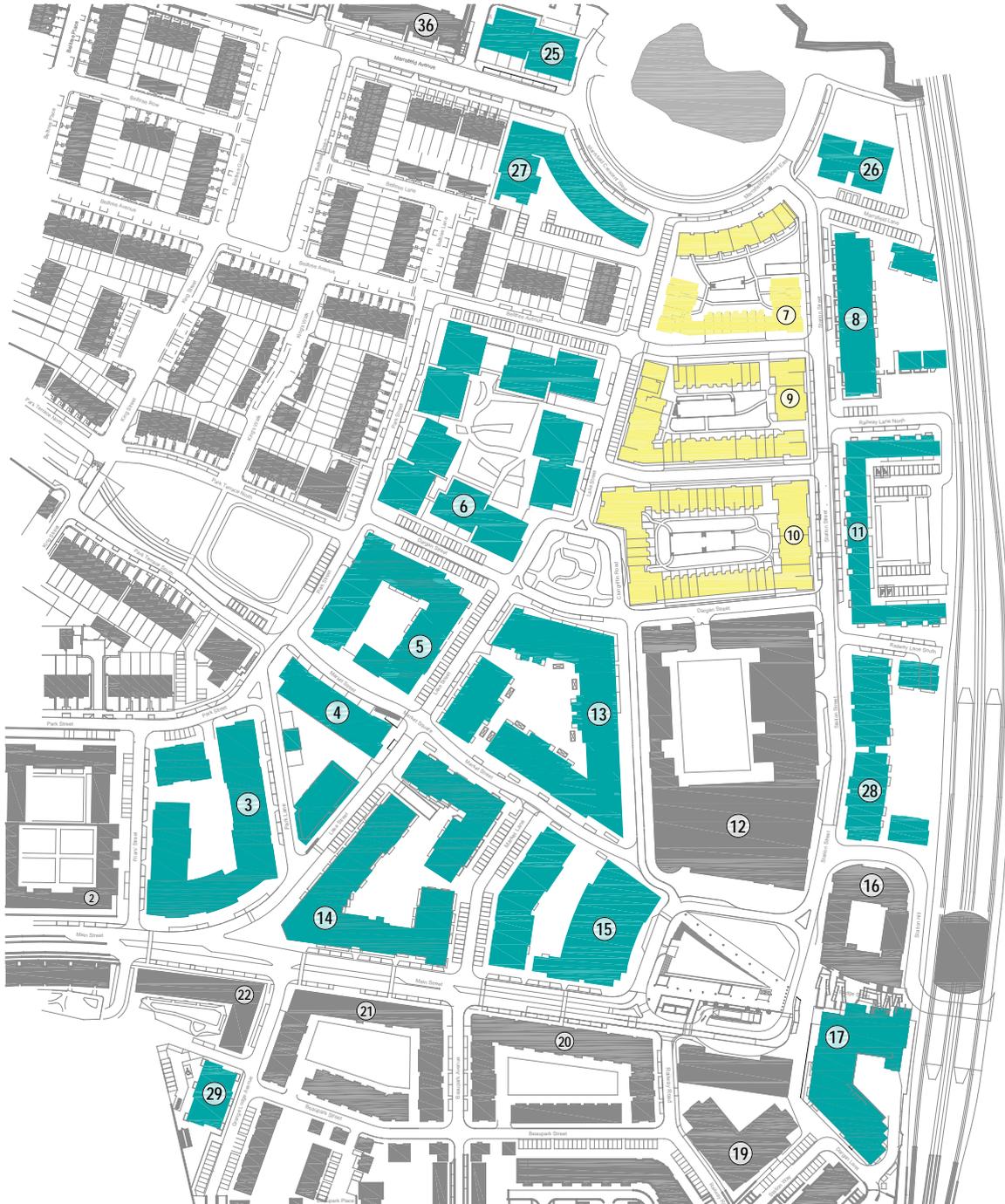
### 2.8 Mitigation measures / actions.

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 overview.

The site map below is a basic over view of the project and location of the apartment blocks. As indicated in section 1.3 the planning application will be applied for in 3 different packages.



#### 3.2 Buildings 7, 9 and 10.

Buildings 7, 9 and 10 are not part of the current application but they have been taken into consideration as part of the sunlight shadow analysis based on their original planning permission configuration.

## 4 Approach and methodology

### 4.1 General approach.

This report covers the shadow and sunlight effect of the new proposed development on both existing and new amenity spaces within the new proposed development.

### 4.2 The nature and effects of day light and sun light.

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. For example, on a cloudy or overcast day diffused daylight still shines through windows, even when sunlight is absent.

Any development within a built-up area has the potential to alter the amount of daylight and direct sun received by nearby residential properties.

Care should be taken when designing new buildings in built-up areas, especially when the proposed development is relatively tall or situated to the south of existing buildings, because in the northern hemisphere the majority of the sunlight comes from the south.

In Ireland (and other northern hemisphere countries) south-facing facades will, in general, receive the most sunlight, while the north facing facades will receive sunlight on only a handful of occasions, specifically early-mornings and late evenings during the summer months.

It is therefore important to ensure that buildings to the south of any development do not cause over shadowing to existing dwellings and therefore reduce their capacity to receive sunlight.

### 4.3 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.

#### 4.4 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, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight.

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 with flexibility since natural lighting 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.

The table below summarises the criteria used to assess the overshadowing / sunlight reception in amenity spaces. In this report we have separated the new and existing amenity spaces as they are assessed slightly differently.

Table 4.1 details the BRE assessment criteria for daylight reception.

Type	Criteria	Acceptable parameters
Overshadowing existing amenity spaces	Amenity space prevented from receiving any sunlight on March 21 <sup>st</sup>	At least 50% of the amenity space should receive at least two hours of sunlight and any loss of sunlight should not be greater than 0.8 times its former size.
Overshadowing new amenity spaces	Amenity space prevented from receiving any sunlight on March 21 <sup>st</sup>	At least 50% of the amenity space should receive at least two hours of sunlight

Table 4.1

#### 4.5 Overshadowing effects measured.

The minimum sunlight requirement in this report measured in sunlight time 2 hours (120 minutes) multiplied by 50% area m<sup>2</sup> or the minimum requirement = 120 (min) \* 0.5a (m<sup>2</sup>) = [ ] min·m<sup>2</sup>.

#### 4.6 Existing amenity spaces.

The overshadowing / sun light assessment is the effects the proposed development has on existing adjoining open amenity spaces.

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 21<sup>st</sup> 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.

The impacts of vegetation: It is important to note that according to the BRE Report, calculations do not normally take into account vegetation. The exception is when evergreen vegetation exists that forms a continuous barrier and would be permanent throughout the seasons.

#### 4.7 New amenity spaces.

The overshadowing / sun light assessment is the effects the proposed development has on new proposed adjoining open amenity spaces.

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 21<sup>st</sup> March.

The overshadowing / sun light assessment on new amenity spaces is executed using the same 3D model and illustrations as above in the existing amenity spaces. Item 4.6.

**4.8 Selected “existing” amenity spaces.**

The following are existing (recently built) amenity areas adjacent to proposed apartment blocks. Amenity spaces used for shadow & sunlight analysis are referred to as receptors.

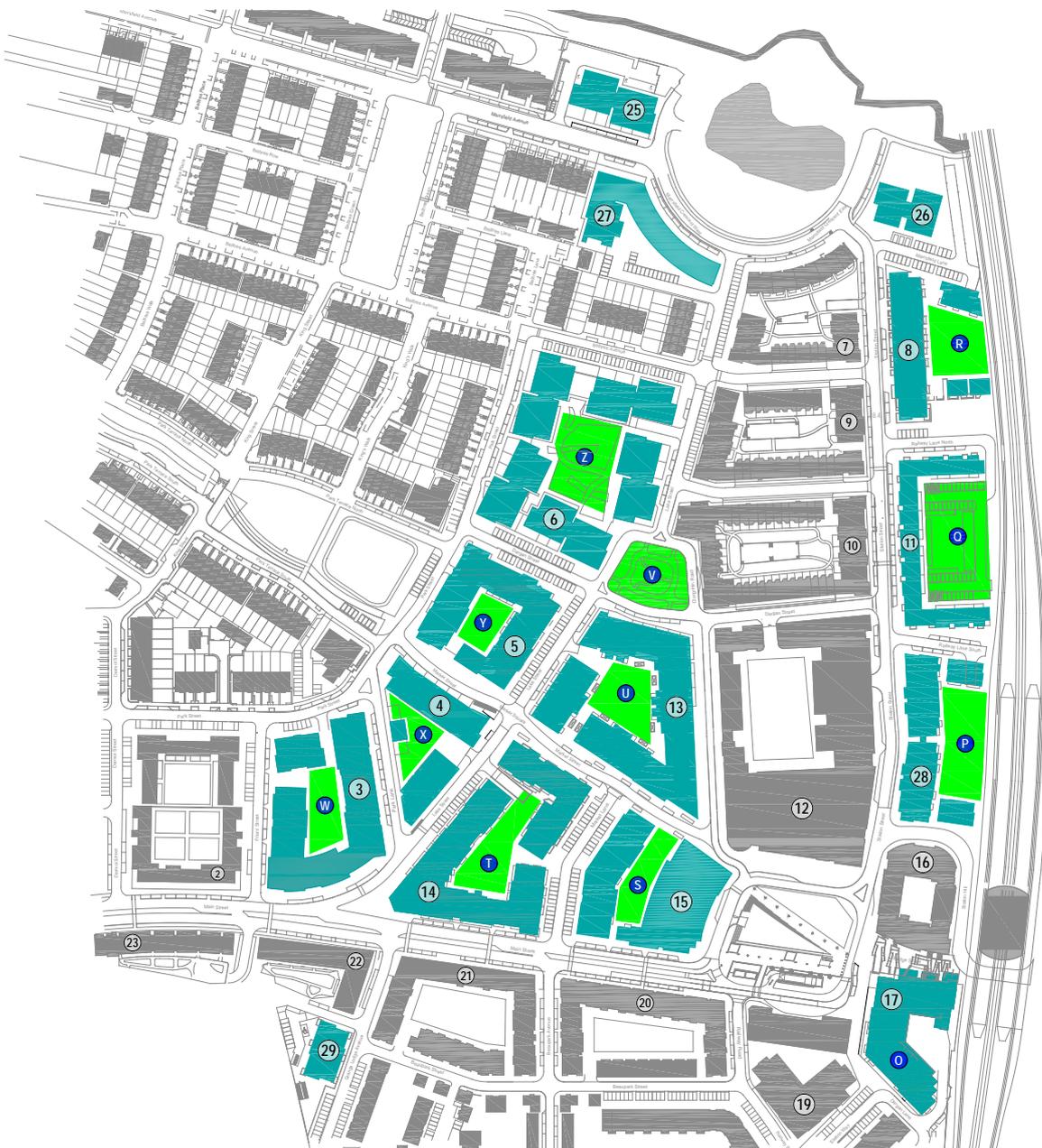
Receptor	Description/location	Block effecting space
A	Public space	25, 26, 27 (7)
B	Public space	25
C	Dwelling gardens	27
D	Dwelling gardens	27
E	Dwelling gardens	27, 6
F	Public space	27, 6
G	Dwelling gardens	6
H	Public space	4,5,6
I	Dwelling gardens	3,4,5
J	Apartment block public space	3
K	Apartment block public space	13,28
L	Public space (main square)	19,17,15



### 4.9 Selected new amenity spaces.

The following are new proposed amenity areas adjacent to proposed apartment blocks. Amenity spaces used for shadow & sunlight analysis are referred to as receptors.

Receptor	Description/location	Block effecting space
Z	Common block amenity space / gardens	Block 6
Y	Common block amenity space / gardens	Block 5
X	Common block amenity space / gardens	Block 4
W	Common block amenity space / gardens	Block 3
V	Public amenity space / gardens	Public square
U	Common block amenity space / gardens	Block 13
T	Common block amenity space / gardens	Block 14
S	Common block amenity space / gardens	Block 15
R	Common block amenity space / gardens	Block 8
Q	Common block amenity space / gardens	Block 11
P	Common block amenity space / gardens	Block 28
O	Common block amenity space / gardens	Block 17



## 5 Calculation results

### 5.1 Existing amenity spaces limited illustrations in this section.

To illustrate all of the 13 receptor points and result tables in this section would take up considerable space and we have therefore selected 5 no. receptor points c/w illustrations/result tables as examples with the remainder of the 13 points listed in appendix B.

Any grey shaded areas are the effects of shadows cast by other objects or buildings rather than the obstruction (building)

The left hand side tables below represents the current (existing) one hourly shadow casting and sunlight reception status of the amenity space and the right hand side table represents the one hourly shadow casting and sunlight reception status with the proposed development.

### 5.2 Receptor C and block 27 : Gardens of houses Belltree avenue to the south of block 27.

Existing status						New status							
Area C		Ground floor level				Area C		Ground floor level					
Area (m2)	1,165	Minimum time x area required				69,900	Area (m2)	1,165	Minimum time x area required				69,900
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area			
24 Hr	% / %	min	m2	120min*m2		24 Hr	% / %	min	m2	120min*m2			
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0		
7.00	83%	17%	10	198	2,020	7.00	91%	9%	5	105	566		
8.00	41%	59%	35	687	24,332	8.00	41%	59%	35	687	24,332		
9.00	27%	73%	44	850	37,250	9.00	27%	73%	44	850	37,250		
10.00	6%	94%	56	1,095	61,764	10.00	6%	94%	56	1,095	61,764		
11.00	2%	98%	59	1,142	67,132	11.00	2%	98%	59	1,142	67,132		
12.00	2%	98%	59	1,142	67,132	12.00	2%	98%	59	1,142	67,132		
13.00	2%	98%	59	1,142	67,132	13.00	2%	98%	59	1,142	67,132		
14.00	4%	96%	58	1,118	64,420	14.00	4%	96%	58	1,118	64,420		
15.00	9%	91%	55	1,060	57,884	15.00	9%	91%	55	1,060	57,884		
16.00	14%	86%	52	1,002	51,698	16.00	14%	86%	52	1,002	51,698		
17.00	81%	19%	11	221	2,523	17.00	81%	19%	11	221	2,523		
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0		
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0		
Sun time * area achieved						503,287	Sun time * area achieved						501,833
Total sun time achieved 8.3 Hrs							Total sun time achieved 8.2 Hrs		Total change		0.998		

Pass Marginal Short (fail)

### 6.3 Receptor H and block 27 : Gardens of houses Belltree Lane to the west of block 27.

Existing status						New status							
Area D		Ground floor level				Area D		Ground floor level					
Area (m2)	1,439	Minimum time x area required				86,340	Area (m2)	1,439	Minimum time x area required				86,340
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area			
24 Hr	% / %	min	m2	120min*m2		24 Hr	% / %	min	m2	120min*m2			
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0		
7.00	72%	28%	17	403	6,769	7.00	98%	2%	1	29	35		
8.00	12%	88%	53	1,266	66,862	8.00	27%	73%	44	1,050	46,011		
9.00	8%	92%	55	1,324	73,078	9.00	8%	92%	55	1,324	73,078		
10.00	4%	96%	58	1,381	79,571	10.00	4%	96%	58	1,381	79,571		
11.00	2%	98%	59	1,410	82,921	11.00	2%	98%	59	1,410	82,921		
12.00	1%	99%	59	1,425	84,622	12.00	1%	99%	59	1,425	84,622		
13.00	1%	99%	59	1,425	84,622	13.00	1%	99%	59	1,425	84,622		
14.00	2%	98%	59	1,410	82,921	14.00	2%	98%	59	1,410	82,921		
15.00	6%	94%	56	1,353	76,290	15.00	6%	94%	56	1,353	76,290		
16.00	48%	52%	31	748	23,346	16.00	48%	52%	31	748	23,346		
17.00	82%	18%	11	259	2,797	17.00	82%	18%	11	259	2,797		
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0		
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0		
Sun time * area achieved						663,799	Sun time * area achieved						636,214
Total sun time achieved 8.6 Hrs							Total sun time achieved 8.2 Hrs		Total change		0.959		

Pass Marginal Short (fail)



5.4 Receptor G and block 6 : Gardens of houses on Park Street to the west of block 6.

Existing status					New status						
Area <b>G</b>		Ground floor level			Area <b>G</b>		Ground floor level				
Area (m2)	1,807	Minimum time x area required			108,420	Area (m2)	1,807	Minimum time x area required			108,420
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2	24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0	7.00	100%	0%	0	0	0
8.00	61%	39%	23	705	16,491	8.00	68%	32%	19	578	11,102
9.00	25%	75%	45	1,355	60,986	9.00	24%	76%	46	1,373	62,623
10.00	13%	87%	52	1,572	82,063	10.00	12%	88%	53	1,590	83,960
11.00	6%	94%	56	1,699	95,800	11.00	5%	95%	57	1,717	97,849
12.00	1%	99%	59	1,789	106,262	12.00	1%	99%	59	1,789	106,262
13.00	2%	98%	59	1,771	104,127	13.00	2%	98%	59	1,771	104,127
14.00	2%	98%	59	1,771	104,127	14.00	2%	98%	59	1,771	104,127
15.00	6%	94%	56	1,699	95,800	15.00	6%	94%	56	1,699	95,800
16.00	18%	82%	49	1,482	72,902	16.00	17%	83%	50	1,500	74,691
17.00	93%	7%	4	126	531	17.00	90%	10%	6	181	1,084
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved			V	739,088	Sun time * area achieved			V	741,625		
Total sun time achieved 7.7 Hrs					Total sun time achieved 7.7 Hrs		Total change	V	1.004		
Pass		Marginal		Short (fail)							

5.5 Receptor H and block 5 : Public amenity area to the west of block 5.

Existing status					New status						
Area <b>H</b>		Ground floor level			Area <b>H</b>		Ground floor level				
Area (m2)	5,586	Minimum time x area required			335,160	Area (m2)	5,586	Minimum time x area required			335,160
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2	24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	0%	100%	60	5,586	335,160	7.00	56%	44%	26	2,458	64,887
8.00	0%	100%	60	5,586	335,160	8.00	24%	76%	46	4,245	193,588
9.00	0%	100%	60	5,586	335,160	9.00	4%	96%	58	5,363	308,883
10.00	0%	100%	60	5,586	335,160	10.00	0%	100%	60	5,586	335,160
11.00	0%	100%	60	5,586	335,160	11.00	0%	100%	60	5,586	335,160
12.00	0%	100%	60	5,586	335,160	12.00	0%	100%	60	5,586	335,160
13.00	0%	100%	60	5,586	335,160	13.00	0%	100%	60	5,586	335,160
14.00	0%	100%	60	5,586	335,160	14.00	0%	100%	60	5,586	335,160
15.00	1%	99%	59	5,530	328,490	15.00	1%	99%	59	5,530	328,490
16.00	2%	98%	59	5,474	321,888	16.00	2%	98%	59	5,474	321,888
17.00	6%	94%	56	5,251	296,147	17.00	6%	94%	56	5,251	296,147
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved			V	3,627,805	Sun time * area achieved			V	3,189,684		
Total sun time achieved 10.9 Hrs					Total sun time achieved 10.1 Hrs		Total change	V	0.88		
Pass		Marginal		Short (fail)							



## 5.6 Amenity space L (the main square) – Exiting / current situation

Existing status						New status					
Area (m <sup>2</sup> )		Area L		Ground floor level		Area (m <sup>2</sup> )		Area L		Ground floor level	
2,649		Minimum time x area required		158,940		2,649		Minimum time x area required		158,940	
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area
24 Hr	% / %		min	m <sup>2</sup>	120min*m <sup>2</sup>	24 Hr	% / %		min	m <sup>2</sup>	120min*m <sup>2</sup>
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	56%	44%	26	1166	30,771	7.00	86%	14%	8	371	3,115
8.00	44%	56%	34	1483	49,844	8.00	84%	16%	10	424	4,069
9.00	19%	81%	49	2146	104,281	9.00	68%	32%	19	848	16,275
10.00	12%	88%	53	2331	123,083	10.00	27%	73%	44	1,934	84,699
11.00	2%	98%	59	2596	152,646	11.00	10%	90%	54	2,384	128,741
12.00	0%	100%	60	2649	158,940	12.00	3%	97%	58	2,570	149,547
13.00	0%	100%	60	2649	158,940	13.00	3%	97%	58	2,570	149,547
14.00	2%	98%	59	2596	152,646	14.00	3%	97%	58	2,570	149,547
15.00	2%	98%	59	2596	152,646	15.00	6%	94%	56	2,490	140,439
16.00	24%	76%	46	2013	91,804	16.00	22%	78%	47	2,066	96,699
17.00	79%	21%	13	556	7,009	17.00	66%	34%	20	901	18,373
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved				V	1,182,609	Sun time * area achieved				V	941,052
Total sun time achieved 8.6 Hrs						Total sun time achieved 7.2 Hrs			Total change	V	0.80
Pass		Marginal		Short (fail)		Pass		Marginal		Short (fail)	

## 5.7 Amenity space L (the main square) – Previous planning permission.

Original planning						New status					
Area (m <sup>2</sup> )		Area L		Ground floor level		Area (m <sup>2</sup> )		Area L		Ground floor level	
2,649		Minimum time x area required		158,940		2,649		Minimum time x area required		158,940	
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area
24 Hr	% / %		min	m <sup>2</sup>	120min*m <sup>2</sup>	24 Hr	% / %		min	m <sup>2</sup>	120min*m <sup>2</sup>
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	72%	28%	17	742	12,461	7.00	86%	14%	8	371	3,115
8.00	67%	33%	20	874	17,309	8.00	84%	16%	10	424	4,069
9.00	53%	47%	28	1245	35,110	9.00	68%	32%	19	848	16,275
10.00	26%	74%	44	1960	87,036	10.00	27%	73%	44	1,934	84,699
11.00	6%	94%	56	2490	140,439	11.00	10%	90%	54	2,384	128,741
12.00	2%	98%	59	2596	152,646	12.00	3%	97%	58	2,570	149,547
13.00	2%	98%	59	2596	152,646	13.00	3%	97%	58	2,570	149,547
14.00	2%	98%	59	2596	152,646	14.00	3%	97%	58	2,570	149,547
15.00	3%	97%	58	2570	149,547	15.00	6%	94%	56	2,490	140,439
16.00	24%	76%	46	2013	91,804	16.00	22%	78%	47	2,066	96,699
17.00	79%	21%	13	556	7,009	17.00	66%	34%	20	901	18,373
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved				V	998,652	Sun time * area achieved				V	941,052
Total sun time achieved 7.6 Hrs						Total sun time achieved 7.2 Hrs			Total change	V	0.95
Pass		Marginal		Short (fail)		Pass		Marginal		Short (fail)	



### 5.8 Shadow / Sunlight assessment on "existing" amenity spaces conclusion.

Based on the guidelines as per BRE report i.e. ; at least 50% of the amenity space should receive at least two hours of sunlight on the 21<sup>st</sup> March and any loss of sunlight should not be greater than 0.8 times its former size, we conclude that the effects of overshadowing / available sunlight of new proposed development on the existing amenity spaces are all within the constraints of the BRE guidelines.

See appendix B all amenity space details.

Quick overview of current status of the amenity spaces effected by the proposed blocks.

ID                      OK                      <=5%                      <=10%                      >10%

Receptor	Description/location	Block effecting space
A	Public space	25, 26, 27 (7)
B	Public space	25
C	Dwelling gardens	27
D	Dwelling gardens	27
E	Dwelling gardens	27, 6
F	Public space	27, 6
G	Dwelling gardens	6
H	Public space	4,5,6
I	Dwelling gardens	3,4,5
J	Apartment block public space	3
K	Apartment block public space	13,28
L	Public space (main square)	19,17,15
M	Apartment block public space	19

### 5.9 New amenity spaces limited illustrations in this section.

To illustrate all of the 12 receptor points and result tables in this section would take up considerable space and we have therefore selected 4 no. receptor points c/w illustrations/result tables as examples with the remainder of the 12 points listed in appendix C.

Any grey shaded areas are the effects of shadows cast by other objects or buildings rather than the obstruction (building)

The table represents the one hourly shadow casting and sunlight reception status with the proposed development.

#### 5.10 Receptor Z in block 6: Amenity space on podium level in the centre of block 6.

New status		Area Z		Podium level +1	
Area (m2)	3,659	Minimum time x area required		219,540	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	89%	11%	7	402	2,656
9.00	54%	46%	28	1683	46,455
10.00	43%	57%	34	2086	71,329
11.00	28%	72%	43	2634	113,810
12.00	17%	83%	50	3037	151,241
13.00	12%	88%	53	3220	170,012
14.00	24%	76%	46	2781	126,806
15.00	46%	54%	32	1976	64,018
16.00	74%	26%	16	951	14,841
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			v	761,167	
Total sun time achieved 5.1 Hrs					

 Pass
 Marginal
 Short (fail)

#### 5.11 Receptor Y in block 5: Amenity space on podium level in the centre of block 5.

New status		Area Y		Podium level +1	
Area (m2)	762	Minimum time x area required		45,720	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	100%	0%	0	0	0
9.00	99%	1%	1	8	5
10.00	72%	28%	17	213	3,584
11.00	29%	71%	43	541	23,047
12.00	14%	86%	52	655	33,815
13.00	6%	94%	56	716	40,398
14.00	3%	97%	58	739	43,018
15.00	26%	74%	44	564	25,036
16.00	88%	12%	7	91	658
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			v	169,562	
Total sun time achieved 4.6 Hrs					

 Pass
 Marginal
 Short (fail)

### 5.12 Receptor T in block 14: Amenity space on podium level in the centre of block 14.

New status		Area <b>T</b>		Podium level +1	
Area (m2)	1,540	Minimum time x area required		92,400	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	99%	1%	1	15	9
9.00	97%	3%	2	46	83
10.00	86%	14%	8	216	1,811
11.00	62%	38%	23	585	13,343
12.00	34%	66%	40	1016	40,249
13.00	21%	79%	47	1217	57,667
14.00	24%	76%	46	1170	53,370
15.00	54%	46%	28	708	19,552
16.00	97%	3%	2	46	83
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	186,168	
Total sun time achieved 3.3 Hrs					

  Pass      Marginal      Short (fail)

### 5.13 Receptor S in block 15: Amenity space in the centre of block 15.

New status		Area <b>S</b>		Podium level +1	
Area (m2)	856	Minimum time x area required		51,360	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	100%	0%	0	0	0
9.00	100%	0%	0	0	0
10.00	84%	16%	10	137	1,315
11.00	61%	39%	23	334	7,812
12.00	11%	89%	53	762	40,682
13.00	9%	91%	55	779	42,531
14.00	12%	88%	53	753	39,773
15.00	49%	51%	31	437	13,359
16.00	76%	24%	14	205	2,958
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	148,430	
Total sun time achieved 4.0 Hrs					

  Pass      Marginal      Short (fail)

#### 5.14 Receptor O in block 17: Amenity space on the roof of block 17.

Time	Shadow / Sunlight % / %	Sun time min	Sun area m2	Sun time.area 120min*m2
6.25	0%	0%	0	0
7.00	22%	78%	47	323
8.00	8%	92%	55	381
9.00	3%	97%	58	402
10.00	2%	98%	59	406
11.00	0%	100%	60	414
12.00	3%	97%	58	402
13.00	6%	94%	56	389
14.00	8%	92%	55	381
15.00	8%	92%	55	381
16.00	10%	90%	54	373
17.00	12%	88%	53	364
18.00	100%	0%	0	0
18.40	0%	0%	0	0
Sun time * area achieved			✓	234,932
Total sun time achieved 10.2 Hrs				

Pass
  Marginal
  Short (fail)

#### 5.15 Shadow / Sunlight assessment on new (own/self) amenity spaces conclusion.

Based on the guidelines as per BRE report i.e.; at least 50% of the amenity space should receive at least two hours of sunlight on the 21<sup>st</sup> March, we conclude that the overshadowing / available sunlight of open amenity spaces within the proposed development are all within the constraints of the said guidelines.

Quick overview of status of the proposed amenity spaces.

ID	OK	<=5%	<=10%	>10%

Receptor	Description/location	Block effecting space
Z	Common block amenity space / gardens	Block 6
Y	Common block amenity space / gardens	Block 5
X	Common block amenity space / gardens	Block 4
W	Common block amenity space / gardens	Block 3
V	Public amenity space / gardens	Public square
U	Common block amenity space / gardens	Block 13
T	Common block amenity space / gardens	Block 14
S	Common block amenity space / gardens	Block 15
R	Common block amenity space / gardens	Block 8
Q	Common block amenity space / gardens	Block 11
P	Common block amenity space / gardens	Block 28
O	Common block amenity space / gardens	Block 17



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# APPENDIX B

DKP-K00-6064-B

APPENDIX TO

SUNLIGHT SHADOW REPORT DKP-K00-6064

**EXISTING AMENITY SPACES CALCULATION TABLES**

## Contents

Receptor	Description/location	Block effecting space
A	Public space	25, 26, 27 (7)
B	Public space	25
C	Dwelling gardens	27
D	Dwelling gardens	27
E	Dwelling gardens	27, 6
F	Public space	27, 6
G	Dwelling gardens	6
H	Public space	4,5,6
I	Dwelling gardens	3,4,5
J	Apartment block public space	3
K	Apartment block public space	13,28
L	Public space (main square)	19,17,15
M	Apartment block public space	19



Existing status		Area A		Ground floor level	
Area (m2)	10,868	Minimum time x area required		652,080	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	0%	100%	60	10,868	652,080
8.00	0%	100%	60	10,868	652,080
9.00	0%	100%	60	10,868	652,080
10.00	0%	100%	60	10,868	652,080
11.00	0%	100%	60	10,868	652,080
12.00	0%	100%	60	10,868	652,080
13.00	0%	100%	60	10,868	652,080
14.00	0%	100%	60	10,868	652,080
15.00	0%	100%	60	10,868	652,080
16.00	0%	100%	60	10,868	652,080
17.00	0%	100%	60	10,868	652,080
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	7,172,880	
Total sun time achieved 11.0 Hrs					

New status		Area A		Ground floor level	
Area (m2)	10,868	Minimum time x area required		652,080	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	20%	80%	48	8,694	417,331
8.00	14%	86%	52	9,346	482,278
9.00	12%	88%	53	9,564	504,971
10.00	10%	90%	54	9,781	528,185
11.00	4%	96%	58	10,433	600,957
12.00	0%	100%	60	10,868	652,080
13.00	0%	100%	60	10,868	652,080
14.00	0%	100%	60	10,868	652,080
15.00	2%	98%	59	10,651	626,258
16.00	16%	84%	50	9,129	460,108
17.00	46%	54%	32	5,869	190,147
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	5,766,474	
Total sun time achieved 9.8 Hrs			Total change	V	0.804

Pass Marginal Short (fail)

Existing status		Area B		Ground floor level	
Area (m2)	5,235	Minimum time x area required		314,100	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	0%	100%	60	5,235	314,100
8.00	0%	100%	60	5,235	314,100
9.00	1%	99%	59	5,183	307,849
10.00	1%	99%	59	5,183	307,849
11.00	2%	98%	59	5,130	301,662
12.00	2%	98%	59	5,130	301,662
13.00	2%	98%	59	5,130	301,662
14.00	3%	97%	58	5,078	295,537
15.00	3%	97%	58	5,078	295,537
16.00	3%	97%	58	5,078	295,537
17.00	61%	39%	23	2,042	47,775
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	3,083,268	
Total sun time achieved 10.2 Hrs					

New status		Area B		Ground floor level	
Area (m2)	5,235	Minimum time x area required		314,100	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	0%	100%	60	5,235	314,100
8.00	0%	100%	60	5,235	314,100
9.00	1%	99%	59	5,183	307,849
10.00	1%	99%	59	5,183	307,849
11.00	2%	98%	59	5,130	301,662
12.00	2%	98%	59	5,130	301,662
13.00	2%	98%	59	5,130	301,662
14.00	3%	97%	58	5,078	295,537
15.00	3%	97%	58	5,078	295,537
16.00	6%	94%	56	4,921	277,539
17.00	62%	38%	23	1,989	45,356
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	3,062,852	
Total sun time achieved 10.2 Hrs			Total change	V	0.994

Pass Marginal Short (fail)



Existing status		Area C		Ground floor level	
Area (m2)	1,165	Minimum time x area required		69,900	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	83%	17%	10	198	2,020
8.00	41%	59%	35	687	24,332
9.00	27%	73%	44	850	37,250
10.00	6%	94%	56	1,095	61,764
11.00	2%	98%	59	1,142	67,132
12.00	2%	98%	59	1,142	67,132
13.00	2%	98%	59	1,142	67,132
14.00	4%	96%	58	1,118	64,420
15.00	9%	91%	55	1,060	57,884
16.00	14%	86%	52	1,002	51,698
17.00	81%	19%	11	221	2,523
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	503,287	
Total sun time achieved 8.3 Hrs					

New status		Area C		Ground floor level	
Area (m2)	1,165	Minimum time x area required		69,900	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	91%	9%	5	105	566
8.00	41%	59%	35	687	24,332
9.00	27%	73%	44	850	37,250
10.00	6%	94%	56	1,095	61,764
11.00	2%	98%	59	1,142	67,132
12.00	2%	98%	59	1,142	67,132
13.00	2%	98%	59	1,142	67,132
14.00	4%	96%	58	1,118	64,420
15.00	9%	91%	55	1,060	57,884
16.00	14%	86%	52	1,002	51,698
17.00	81%	19%	11	221	2,523
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved				V	501,833
Total sun time achieved 8.2 Hrs			Total change	V	0.998

Pass
  Marginal
  Short (fail)

Existing status		Area D		Ground floor level	
Area (m2)	1,439	Minimum time x area required		86,340	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	72%	28%	17	403	6,769
8.00	12%	88%	53	1,266	66,862
9.00	8%	92%	55	1,324	73,078
10.00	4%	96%	58	1,381	79,571
11.00	2%	98%	59	1,410	82,921
12.00	1%	99%	59	1,425	84,622
13.00	1%	99%	59	1,425	84,622
14.00	2%	98%	59	1,410	82,921
15.00	6%	94%	56	1,353	76,290
16.00	48%	52%	31	748	23,346
17.00	82%	18%	11	259	2,797
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	663,799	
Total sun time achieved 8.6 Hrs					

New status		Area D		Ground floor level	
Area (m2)	1,439	Minimum time x area required		86,340	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	98%	2%	1	29	35
8.00	27%	73%	44	1,050	46,011
9.00	8%	92%	55	1,324	73,078
10.00	4%	96%	58	1,381	79,571
11.00	2%	98%	59	1,410	82,921
12.00	1%	99%	59	1,425	84,622
13.00	1%	99%	59	1,425	84,622
14.00	2%	98%	59	1,410	82,921
15.00	6%	94%	56	1,353	76,290
16.00	48%	52%	31	748	23,346
17.00	82%	18%	11	259	2,797
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved				V	636,214
Total sun time achieved 8.2 Hrs			Total change	V	0.959

Pass
  Marginal
  Short (fail)



Existing status		Area E		Ground floor level	
Area (m2)	821	Minimum time x area required		49,260	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	97%	3%	2	25	44
8.00	78%	22%	13	181	2,384
9.00	27%	73%	44	599	26,251
10.00	8%	92%	55	755	41,694
11.00	2%	98%	59	805	47,309
12.00	0%	100%	60	821	49,260
13.00	0%	100%	60	821	49,260
14.00	1%	99%	59	813	48,280
15.00	4%	96%	58	788	45,398
16.00	39%	61%	37	501	18,330
17.00	86%	14%	8	115	965
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	329,175	
Total sun time achieved 7.6 Hrs					

New status		Area E		Ground floor level	
Area (m2)	821	Minimum time x area required		49,260	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	97%	3%	2	25	44
8.00	78%	22%	13	181	2,384
9.00	27%	73%	44	599	26,251
10.00	8%	92%	55	755	41,694
11.00	2%	98%	59	805	47,309
12.00	0%	100%	60	821	49,260
13.00	0%	100%	60	821	49,260
14.00	1%	99%	59	813	48,280
15.00	4%	96%	58	788	45,398
16.00	39%	61%	37	501	18,330
17.00	86%	14%	8	115	965
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	329,175	
Total sun time achieved 7.6 Hrs			Total change	V	1

Pass
  Marginal
  Short (fail)

Existing status		Area F		Ground floor level	
Area (m2)	3,069	Minimum time x area required		184,140	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	88%	12%	7	368	2,652
8.00	12%	88%	53	2,701	142,598
9.00	0%	100%	60	3,069	184,140
10.00	0%	100%	60	3,069	184,140
11.00	0%	100%	60	3,069	184,140
12.00	0%	100%	60	3,069	184,140
13.00	0%	100%	60	3,069	184,140
14.00	0%	100%	60	3,069	184,140
15.00	0%	100%	60	3,069	184,140
16.00	0%	100%	60	3,069	184,140
17.00	27%	73%	44	2,240	98,128
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	1,716,498	
Total sun time achieved 9.7 Hrs					

New status		Area F		Ground floor level	
Area (m2)	3,069	Minimum time x area required		184,140	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	88%	12%	7	368	2,652
8.00	12%	88%	53	2,701	142,598
9.00	0%	100%	60	3,069	184,140
10.00	0%	100%	60	3,069	184,140
11.00	0%	100%	60	3,069	184,140
12.00	0%	100%	60	3,069	184,140
13.00	0%	100%	60	3,069	184,140
14.00	0%	100%	60	3,069	184,140
15.00	0%	100%	60	3,069	184,140
16.00	0%	100%	60	3,069	184,140
17.00	27%	73%	44	2,240	98,128
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	1,716,498	
Total sun time achieved 9.7 Hrs			Total change	V	1

Pass
  Marginal
  Short (fail)



Existing status					New status						
Area (m2)		Area G		Ground floor level	Area (m2)		Area G		Ground floor level		
1,807		Minimum time x area required		108,420	1,807		Minimum time x area required		108,420		
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area
24 Hr	% / %		min	m2	120min*m2	24 Hr	% / %		min	m2	120min*m2
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0	7.00	100%	0%	0	0	0
8.00	61%	39%	23	705	16,491	8.00	68%	32%	19	578	11,102
9.00	25%	75%	45	1,355	60,986	9.00	24%	76%	46	1,373	62,623
10.00	13%	87%	52	1,572	82,063	10.00	12%	88%	53	1,590	83,960
11.00	6%	94%	56	1,699	95,800	11.00	5%	95%	57	1,717	97,849
12.00	1%	99%	59	1,789	106,262	12.00	1%	99%	59	1,789	106,262
13.00	2%	98%	59	1,771	104,127	13.00	2%	98%	59	1,771	104,127
14.00	2%	98%	59	1,771	104,127	14.00	2%	98%	59	1,771	104,127
15.00	6%	94%	56	1,699	95,800	15.00	6%	94%	56	1,699	95,800
16.00	18%	82%	49	1,482	72,902	16.00	17%	83%	50	1,500	74,691
17.00	93%	7%	4	126	531	17.00	90%	10%	6	181	1,084
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved				V	739,088	Sun time * area achieved				V	741,625
Total sun time achieved 7.7 Hrs						Total sun time achieved 7.7 Hrs			Total change	V	1.004
Pass		Marginal		Short (fail)		Pass		Marginal		Short (fail)	

Existing status					New status						
Area (m2)		Area H		Ground floor level	Area (m2)		Area H		Ground floor level		
5,586		Minimum time x area required		335,160	5,586		Minimum time x area required		335,160		
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area
24 Hr	% / %		min	m2	120min*m2	24 Hr	% / %		min	m2	120min*m2
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0
7.00	0%	100%	60	5,586	335,160	7.00	56%	44%	26	2,458	64,887
8.00	0%	100%	60	5,586	335,160	8.00	24%	76%	46	4,245	193,588
9.00	0%	100%	60	5,586	335,160	9.00	4%	96%	58	5,363	308,883
10.00	0%	100%	60	5,586	335,160	10.00	0%	100%	60	5,586	335,160
11.00	0%	100%	60	5,586	335,160	11.00	0%	100%	60	5,586	335,160
12.00	0%	100%	60	5,586	335,160	12.00	0%	100%	60	5,586	335,160
13.00	0%	100%	60	5,586	335,160	13.00	0%	100%	60	5,586	335,160
14.00	0%	100%	60	5,586	335,160	14.00	0%	100%	60	5,586	335,160
15.00	1%	99%	59	5,530	328,490	15.00	1%	99%	59	5,530	328,490
16.00	2%	98%	59	5,474	321,888	16.00	2%	98%	59	5,474	321,888
17.00	6%	94%	56	5,251	296,147	17.00	6%	94%	56	5,251	296,147
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0
Sun time * area achieved				V	3,627,805	Sun time * area achieved				V	3,189,684
Total sun time achieved 10.9 Hrs						Total sun time achieved 10.1 Hrs			Total change	V	0.88

Pass Marginal Short (fail)



Existing status		Area I		Ground floor level		
Area (m2)	868	Minimum time x area required		52,080		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	
7.00	100%	0%	0	0	0	
8.00	86%	14%	8	122	1,021	
9.00	61%	39%	23	339	7,921	
10.00	32%	68%	41	590	24,082	
11.00	11%	89%	53	773	41,253	
12.00	5%	95%	57	825	47,002	
13.00	6%	94%	56	816	46,018	
14.00	6%	94%	56	816	46,018	
15.00	7%	93%	56	807	45,044	
16.00	12%	88%	53	764	40,331	
17.00	16%	84%	50	729	36,748	
18.00	100%	0%	0	0	0	
18.40	0%	0%	0	0	0	
Sun time * area achieved			V	335,437		
Total sun time achieved 7.6 Hrs						

New status		Area I		Ground floor level		
Area (m2)	868	Minimum time x area required		52,080		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	
7.00	100%	0%	0	0	0	
8.00	86%	14%	8	122	1,021	
9.00	61%	39%	23	339	7,921	
10.00	32%	68%	41	590	24,082	
11.00	11%	89%	53	773	41,253	
12.00	5%	95%	57	825	47,002	
13.00	6%	94%	56	816	46,018	
14.00	6%	94%	56	816	46,018	
15.00	7%	93%	56	807	45,044	
16.00	12%	88%	53	764	40,331	
17.00	16%	84%	50	729	36,748	
18.00	100%	0%	0	0	0	
18.40	0%	0%	0	0	0	
Sun time * area achieved			V	335,437		
Total sun time achieved 7.6 Hrs			Total change	V	1	

Pass Marginal Short (fail)

Existing status		Area J		Ground floor level		
Area (m2)	2,307	Minimum time x area required		138,420		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	
7.00	96%	4%	2	92	221	
8.00	79%	21%	13	484	6,104	
9.00	36%	64%	38	1,476	56,697	
10.00	16%	84%	50	1,938	97,669	
11.00	15%	85%	51	1,961	100,008	
12.00	14%	86%	52	1,984	102,375	
13.00	17%	83%	50	1,915	95,358	
14.00	23%	77%	46	1,776	82,069	
15.00	42%	58%	35	1,338	46,564	
16.00	62%	38%	23	877	19,988	
17.00	94%	6%	4	138	498	
18.00	100%	0%	0	0	0	
18.40	0%	0%	0	0	0	
Sun time * area achieved			V	607,553		
Total sun time achieved 6.1 Hrs						

New status		Area J		Ground floor level		
Area (m2)	2,307	Minimum time x area required		138,420		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area		
24 Hr	% / %	min	m2	120min*m2		
6.25	0%	0%	0	0	0	
7.00	100%	0%	0	0	0	
8.00	79%	21%	13	484	6,104	
9.00	36%	64%	38	1,476	56,697	
10.00	16%	84%	50	1,938	97,669	
11.00	15%	85%	51	1,961	100,008	
12.00	14%	86%	52	1,984	102,375	
13.00	17%	83%	50	1,915	95,358	
14.00	23%	77%	46	1,776	82,069	
15.00	42%	58%	35	1,338	46,564	
16.00	62%	38%	23	877	19,988	
17.00	94%	6%	4	138	498	
18.00	100%	0%	0	0	0	
18.40	0%	0%	0	0	0	
Sun time * area achieved			V	607,332		
Total sun time achieved 6.0 Hrs			Total change	V	1	

Pass Marginal Short (fail)



Existing status		Area <b>K</b>	Level / floor 6		
Area (m2)	2,393	Minimum time x area required	143,580		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	74%	26%	16	622	9,706
8.00	37%	63%	38	1,508	56,987
9.00	22%	78%	47	1,867	87,354
10.00	5%	95%	57	2,273	129,581
11.00	5%	95%	57	2,273	129,581
12.00	5%	95%	57	2,273	129,581
13.00	4%	96%	58	2,297	132,323
14.00	9%	91%	55	2,178	118,899
15.00	18%	82%	49	1,962	96,543
16.00	34%	66%	40	1,579	62,543
17.00	66%	34%	20	814	16,598
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	969,696	
Total sun time achieved 8.2 Hrs					

New status		Area <b>K</b>	Level / floor 6		
Area (m2)	2,393	Minimum time x area required	143,580		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	74%	26%	16	622	9,706
8.00	37%	63%	38	1,508	56,987
9.00	22%	78%	47	1,867	87,354
10.00	5%	95%	57	2,273	129,581
11.00	5%	95%	57	2,273	129,581
12.00	5%	95%	57	2,273	129,581
13.00	4%	96%	58	2,297	132,323
14.00	9%	91%	55	2,178	118,899
15.00	18%	82%	49	1,962	96,543
16.00	34%	66%	40	1,579	62,543
17.00	66%	34%	20	814	16,598
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	969,696	
Total sun time achieved 8.2 Hrs		Total change	<span style="background-color: #92d050;">V</span>	1	

V Pass    V Marginal    V Short (fail)

Existing status		Area <b>M</b>	Ground floor level		
Area (m2)	1,466	Minimum time x area required	87,960		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	96%	4%	2	59	141
8.00	57%	43%	26	630	16,264
9.00	42%	58%	35	850	29,590
10.00	27%	73%	44	1,070	46,874
11.00	17%	83%	50	1,217	60,596
12.00	12%	88%	53	1,290	68,116
13.00	14%	86%	52	1,261	65,055
14.00	17%	83%	50	1,217	60,596
15.00	26%	74%	44	1,085	48,167
16.00	58%	42%	25	616	15,516
17.00	89%	11%	7	161	1,064
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	411,978	
Total sun time achieved 6.5 Hrs					

New status		Area <b>M</b>	Ground floor level		
Area (m2)	1,466	Minimum time x area required	87,960		
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	57%	43%	26	630	16,264
9.00	42%	58%	35	850	29,590
10.00	27%	73%	44	1,070	46,874
11.00	17%	83%	50	1,217	60,596
12.00	12%	88%	53	1,290	68,116
13.00	14%	86%	52	1,261	65,055
14.00	17%	83%	50	1,217	60,596
15.00	26%	74%	44	1,085	48,167
16.00	58%	42%	25	616	15,516
17.00	89%	11%	7	161	1,064
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			<span style="background-color: #92d050;">V</span>	411,838	
Total sun time achieved 6.4 Hrs		Total change	<span style="background-color: #92d050;">V</span>	1	

V Pass    V Marginal    V Short (fail)



Existing status					New status									
Area <b>L</b>		Ground floor level			Area <b>L</b>		Ground floor level							
Area (m2)	2,649	Minimum time x area required			158,940	Area (m2)	2,649	Minimum time x area required			158,940			
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area			
24 Hr	% / %		min	m2	120min*m2	24 Hr	% / %		min	m2	120min*m2			
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0			
7.00	56%	44%	26	1166	30,771	7.00	86%	14%	8	371	3,115			
8.00	44%	56%	34	1483	49,844	8.00	84%	16%	10	424	4,069			
9.00	19%	81%	49	2146	104,281	9.00	68%	32%	19	848	16,275			
10.00	12%	88%	53	2331	123,083	10.00	27%	73%	44	1,934	84,699			
11.00	2%	98%	59	2596	152,646	11.00	10%	90%	54	2,384	128,741			
12.00	0%	100%	60	2649	158,940	12.00	3%	97%	58	2,570	149,547			
13.00	0%	100%	60	2649	158,940	13.00	3%	97%	58	2,570	149,547			
14.00	2%	98%	59	2596	152,646	14.00	3%	97%	58	2,570	149,547			
15.00	2%	98%	59	2596	152,646	15.00	6%	94%	56	2,490	140,439			
16.00	24%	76%	46	2013	91,804	16.00	22%	78%	47	2,066	96,699			
17.00	79%	21%	13	556	7,009	17.00	66%	34%	20	901	18,373			
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0			
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0			
Sun time * area achieved					V	1,182,609	Sun time * area achieved					V	941,052	
Total sun time achieved 8.6 Hrs							Total sun time achieved 7.2 Hrs					Total change	V	0.80
Pass		Marginal		Short (fail)										

Original planning					New status									
Area <b>L</b>		Ground floor level			Area <b>L</b>		Ground floor level							
Area (m2)	2,649	Minimum time x area required			158,940	Area (m2)	2,649	Minimum time x area required			158,940			
Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area	Time	Shadow / Sunlight		Sun time	Sun area	Sun time.area			
24 Hr	% / %		min	m2	120min*m2	24 Hr	% / %		min	m2	120min*m2			
6.25	0%	0%	0	0	0	6.25	0%	0%	0	0	0			
7.00	72%	28%	17	742	12,461	7.00	86%	14%	8	371	3,115			
8.00	67%	33%	20	874	17,309	8.00	84%	16%	10	424	4,069			
9.00	53%	47%	28	1245	35,110	9.00	68%	32%	19	848	16,275			
10.00	26%	74%	44	1960	87,036	10.00	27%	73%	44	1,934	84,699			
11.00	6%	94%	56	2490	140,439	11.00	10%	90%	54	2,384	128,741			
12.00	2%	98%	59	2596	152,646	12.00	3%	97%	58	2,570	149,547			
13.00	2%	98%	59	2596	152,646	13.00	3%	97%	58	2,570	149,547			
14.00	2%	98%	59	2596	152,646	14.00	3%	97%	58	2,570	149,547			
15.00	3%	97%	58	2570	149,547	15.00	6%	94%	56	2,490	140,439			
16.00	24%	76%	46	2013	91,804	16.00	22%	78%	47	2,066	96,699			
17.00	79%	21%	13	556	7,009	17.00	66%	34%	20	901	18,373			
18.00	100%	0%	0	0	0	18.00	100%	0%	0	0	0			
18.40	0%	0%	0	0	0	18.40	0%	0%	0	0	0			
Sun time * area achieved					V	998,652	Sun time * area achieved					V	941,052	
Total sun time achieved 7.6 Hrs							Total sun time achieved 7.2 Hrs					Total change	V	0.95
Pass		Marginal		Short (fail)										





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# APPENDIX C

DKP-K00-6064-C

APPENDIX TO

SUNLIGHT SHADOW REPORT DKP-K00-6064

## **NEW AMENITY SPACES CALCULATION TABLES**

## Contents

Receptor	Description/location	Block effecting space
Z	Common block amenity space / gardens	Block 6
Y	Common block amenity space / gardens	Block 5
X	Common block amenity space / gardens	Block 4
W	Common block amenity space / gardens	Block 3
V	Public amenity space / gardens	Public square
U	Common block amenity space / gardens	Block 13
T	Common block amenity space / gardens	Block 14
S	Common block amenity space / gardens	Block 15
R	Common block amenity space / gardens	Block 8
Q	Common block amenity space / gardens	Block 11
P	Common block amenity space / gardens	Block 28
O	Common block amenity space / gardens	Block 17



New status		Area <b>Z</b>		Podium level +1	
Area (m2)	3,659	Minimum time x area required		219,540	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	89%	11%	7	402	2,656
9.00	54%	46%	28	1683	46,455
10.00	43%	57%	34	2086	71,329
11.00	28%	72%	43	2634	113,810
12.00	17%	83%	50	3037	151,241
13.00	12%	88%	53	3220	170,012
14.00	24%	76%	46	2781	126,806
15.00	46%	54%	32	1976	64,018
16.00	74%	26%	16	951	14,841
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	761,167	
Total sun time achieved 5.1 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area <b>Y</b>		Podium level +1	
Area (m2)	762	Minimum time x area required		45,720	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	100%	0%	0	0	0
9.00	99%	1%	1	8	5
10.00	72%	28%	17	213	3,584
11.00	29%	71%	43	541	23,047
12.00	14%	86%	52	655	33,815
13.00	6%	94%	56	716	40,398
14.00	3%	97%	58	739	43,018
15.00	26%	74%	44	564	25,036
16.00	88%	12%	7	91	658
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	169,562	
Total sun time achieved 4.6 Hrs					

Pass
  Marginal
  Short (fail)



New status		Area <b>X</b>		Ground floor	
Area (m2)	948	Minimum time x area required		56,880	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	98%	2%	1	19	23
9.00	92%	8%	5	76	364
10.00	68%	32%	19	303	5,825
11.00	38%	62%	37	588	21,865
12.00	13%	87%	52	825	43,052
13.00	6%	94%	56	891	50,259
14.00	0%	100%	60	948	56,880
15.00	56%	44%	26	417	11,012
16.00	90%	10%	6	95	569
17.00	90%	10%	6	95	569
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	190,417	
Total sun time achieved 4.5 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area <b>W</b>		Podium level +1	
Area (m2)	959	Minimum time x area required		57,540	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	100%	0%	0	0	0
9.00	92%	8%	5	77	368
10.00	66%	34%	20	326	6,652
11.00	27%	73%	44	700	30,663
12.00	14%	86%	52	825	42,557
13.00	15%	85%	51	815	41,573
14.00	23%	77%	46	738	34,115
15.00	33%	67%	40	643	25,830
16.00	86%	14%	8	134	1,128
17.00	87%	13%	8	125	972
18.00		100%			
18.40	0%	0%	0	0	0
Sun time * area achieved			V	183,858	
Total sun time achieved 4.6 Hrs					

Pass
  Marginal
  Short (fail)



New status		Area <b>T</b>		Podium level +1	
Area (m2)	1,540	Minimum time x area required		92,400	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	99%	1%	1	15	9
9.00	97%	3%	2	46	83
10.00	86%	14%	8	216	1,811
11.00	62%	38%	23	585	13,343
12.00	34%	66%	40	1016	40,249
13.00	21%	79%	47	1217	57,667
14.00	24%	76%	46	1170	53,370
15.00	54%	46%	28	708	19,552
16.00	97%	3%	2	46	83
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved				V	186,168
Total sun time achieved 3.3 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area <b>V</b>		Ground floor	
Area (m2)	1,406	Minimum time x area required		84,360	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	74%	26%	16	366	5,703
8.00	52%	48%	29	675	19,437
9.00	26%	74%	44	1040	46,196
10.00	12%	88%	53	1237	65,328
11.00	0%	100%	60	1406	84,360
12.00	0%	100%	60	1406	84,360
13.00	2%	98%	59	1378	81,019
14.00	7%	93%	56	1308	72,963
15.00	12%	88%	53	1237	65,328
16.00	26%	74%	44	1040	46,196
17.00	96%	4%	2	56	135
18.00		100%			
18.40	0%	0%	0	0	0
Sun time * area achieved				V	571,024
Total sun time achieved 7.9 Hrs					

Pass
  Marginal
  Short (fail)



New status		Area <b>R</b>		Ground floor	
Area (m2)	1,193	Minimum time x area required		71,580	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	15%	85%	51	1014	51,717
8.00	5%	95%	57	1133	64,601
9.00	7%	93%	56	1109	61,910
10.00	8%	92%	55	1098	60,585
11.00	9%	91%	55	1086	59,275
12.00	9%	91%	55	1086	59,275
13.00	11%	89%	53	1062	56,699
14.00	32%	68%	41	811	33,099
15.00	48%	52%	31	620	19,355
16.00	91%	9%	5	107	580
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	467,095	
Total sun time achieved 7.7 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area <b>Q</b>		Ground floor	
Area (m2)	843	Minimum time x area required		50,580	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	35%	65%	39	548	21,370
8.00	5%	95%	57	801	45,648
9.00	6%	94%	56	792	44,692
10.00	6%	94%	56	792	44,692
11.00	7%	93%	56	784	43,747
12.00	7%	93%	56	784	43,747
13.00	12%	88%	53	742	39,169
14.00	26%	74%	44	624	27,698
15.00	39%	61%	37	514	18,821
16.00	100%	0%	0	0	0
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	329,584	
Total sun time achieved 7.6 Hrs					

Pass
  Marginal
  Short (fail)



New status		Area P		Ground floor	
Area (m2)	1,395	Minimum time x area required		83,700	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	35%	65%	39	907	35,363
8.00	2%	98%	59	1367	80,385
9.00	4%	96%	58	1339	77,138
10.00	6%	94%	56	1311	73,957
11.00	7%	93%	56	1297	72,392
12.00	10%	90%	54	1256	67,797
13.00	14%	86%	52	1200	61,905
14.00	41%	59%	35	823	29,136
15.00	76%	24%	14	335	4,821
16.00	98%	2%	1	28	33
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	502,928	
Total sun time achieved 7.1 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area O		Level 6	
Area (m2)	414	Minimum time x area required		24,840	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	22%	78%	47	323	15,113
8.00	8%	92%	55	381	21,025
9.00	3%	97%	58	402	23,372
10.00	2%	98%	59	406	23,856
11.00	0%	100%	60	414	24,840
12.00	3%	97%	58	402	23,372
13.00	6%	94%	56	389	21,949
14.00	8%	92%	55	381	21,025
15.00	8%	92%	55	381	21,025
16.00	10%	90%	54	373	20,120
17.00	12%	88%	53	364	19,236
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	234,932	
Total sun time achieved 10.2 Hrs					

Pass
  Marginal
  Short (fail)



New status		Area <b>U</b>		Podium level +1	
Area (m2)	2,148	Minimum time x area required		128,880	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	91%	9%	5	193	1,044
9.00	53%	47%	28	1010	28,470
10.00	24%	76%	46	1632	74,441
11.00	16%	84%	50	1804	90,938
12.00	22%	78%	47	1675	78,411
13.00	24%	76%	46	1632	74,441
14.00	28%	72%	43	1547	66,811
15.00	46%	54%	32	1160	37,581
16.00	84%	16%	10	344	3,299
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	455,436	
Total sun time achieved 5.1 Hrs					

Pass
  Marginal
  Short (fail)

New status		Area <b>S</b>		Podium level +1	
Area (m2)	856	Minimum time x area required		51,360	
Time	Shadow / Sunlight	Sun time	Sun area	Sun time.area	
24 Hr	% / %	min	m2	120min*m2	
6.25	0%	0%	0	0	0
7.00	100%	0%	0	0	0
8.00	100%	0%	0	0	0
9.00	100%	0%	0	0	0
10.00	84%	16%	10	137	1,315
11.00	61%	39%	23	334	7,812
12.00	11%	89%	53	762	40,682
13.00	9%	91%	55	779	42,531
14.00	12%	88%	53	753	39,773
15.00	49%	51%	31	437	13,359
16.00	76%	24%	14	205	2,958
17.00	100%	0%	0	0	0
18.00	100%	0%	0	0	0
18.40	0%	0%	0	0	0
Sun time * area achieved			V	148,430	
Total sun time achieved 4.0 Hrs					

Pass
  Marginal
  Short (fail)





**DKPartnership**

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# APPENDIX D

DKP-K00-6064-D

APPENDIX TO

SUNLIGHT SHADOW REPORT DKP-K00-6064

**ONE HOURLY OVERALL SITE SUNLIGHT / SHADOW STATUS**

Contents

**Overall Clongriffin site.**

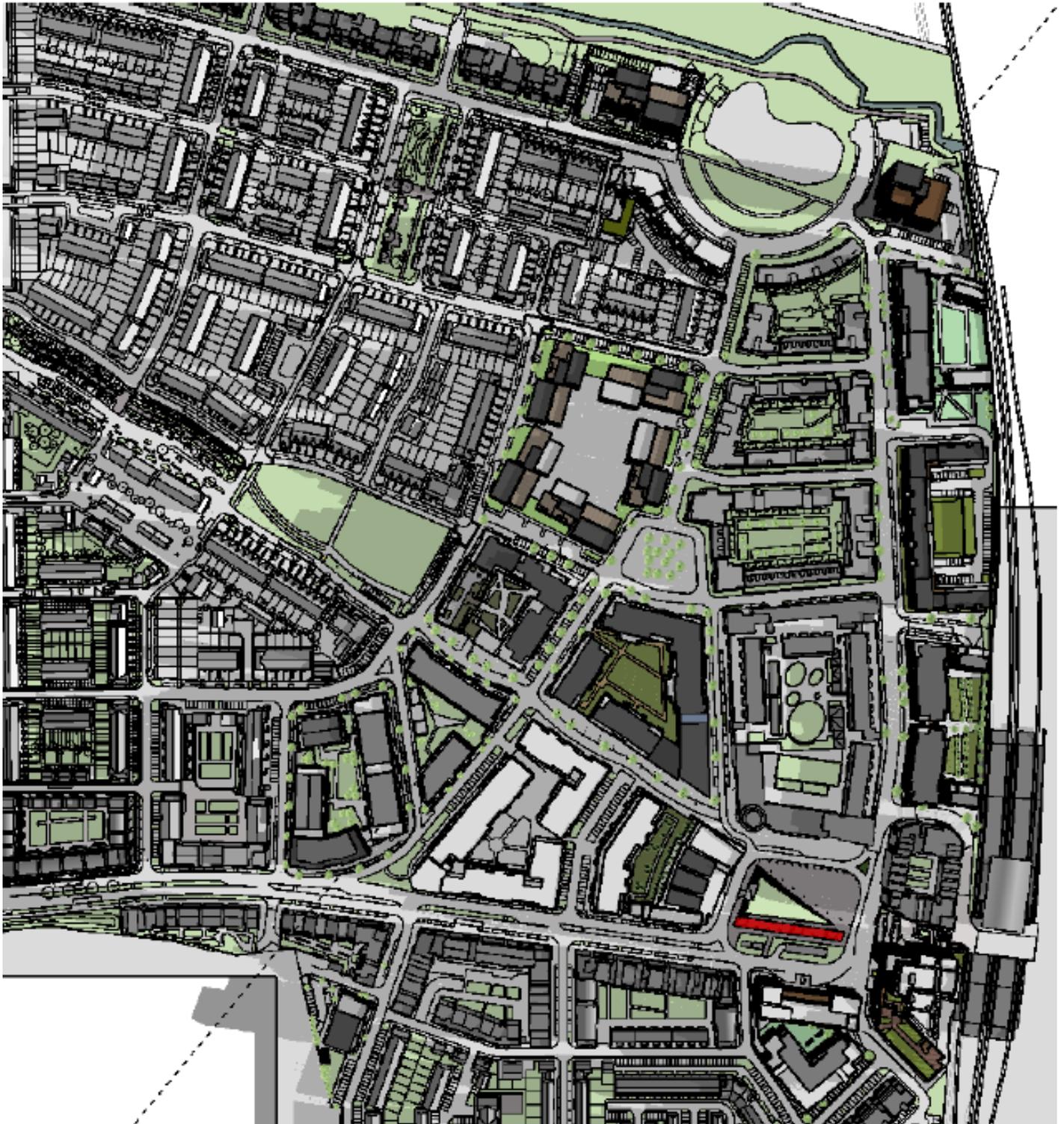
Shadow / sunlight status	6.45
Shadow / sunlight status	7.00
Shadow / sunlight status	8.00
Shadow / sunlight status	9.00
Shadow / sunlight status	10.00
Shadow / sunlight status	11.00
Shadow / sunlight status	12.00
Shadow / sunlight status	13.00
Shadow / sunlight status	14.00
Shadow / sunlight status	15.00
Shadow / sunlight status	16.00
Shadow / sunlight status	17.00
Shadow / sunlight status	17.30



March 21<sup>st</sup> 6.45 hrs



March 21<sup>st</sup> 7.00 hrs



March 21<sup>st</sup> 8.00 hrs



March 21<sup>st</sup> 9.00 hrs



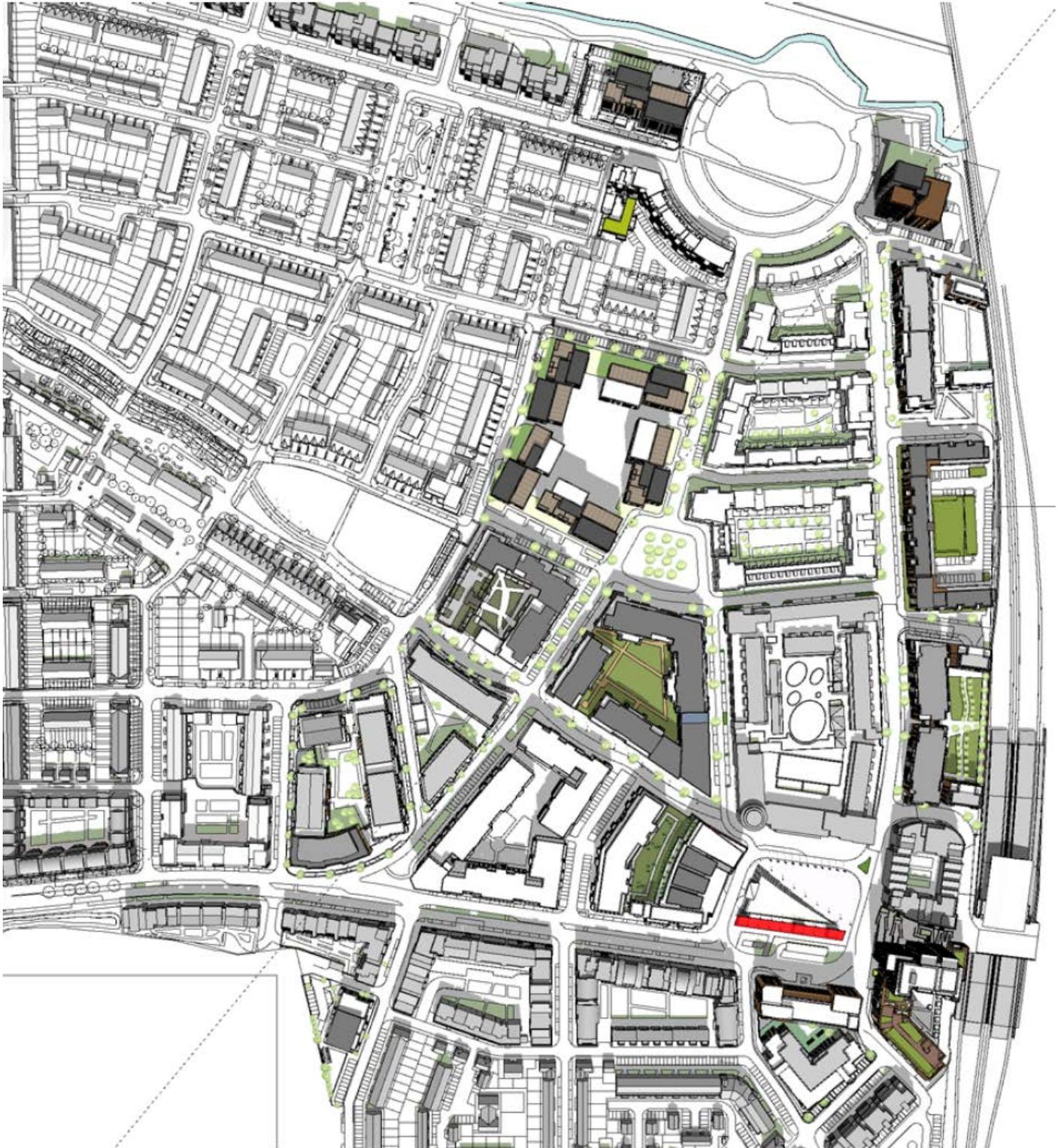
March 21<sup>st</sup> 10.00 hrs



March 21<sup>st</sup> 11.00 hrs



March 21<sup>st</sup> 12.00 hrs



March 21<sup>st</sup> 13.00 hrs



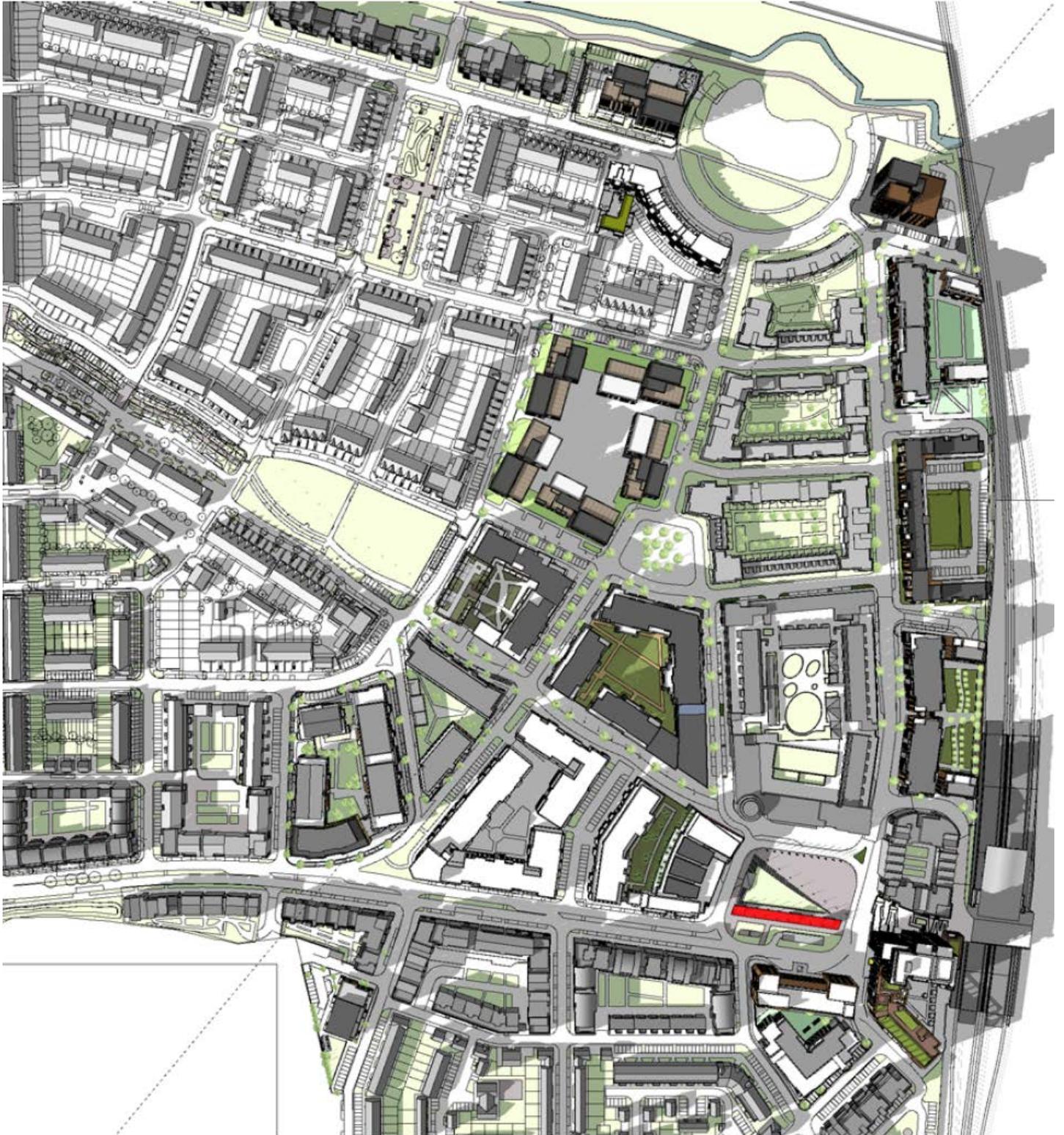
March 21<sup>st</sup> 14.00 hrs



March 21<sup>st</sup> 15.00 hrs



March 21<sup>st</sup> 16.00 hrs



March 21<sup>st</sup> 17.00 hrs



March 21<sup>st</sup> 17.30 hrs

