St Leonards South

Supplementary Report

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For: Lane Cove Council

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INTRODUCTION

This report is in response to a number of technical questions that have arisen since the completion of the initial Masterplan Report in early 2015. It is in response to a series of questions from Council which are included below. Sections 1 to 6 respond to Council requests on 13 July 2015. Section 7 responds to additional Council requests in early 2016, following in house workshops to investigate potential heights south of Marshall Avenue for affordable housing.

1. **Park Road to Berry Road blocks** – Include this in an amended built form (shadow) model? Can it meet SEPP65 requirements? A land swap is proposed to transfer Berry Lane to Park Road frontage.
2. **Park Road East Transition** (to the single storey residences along Park Rd West) – Can we achieve viable development with:
   a. A 6m front setback in addition to the usual 4m front setback (10m in total) and
   b. Stepping in (say 3m to 5m) above the fourth floor (rather than the sixth as recommended by the Master Plan)? Assuming SEPP65 requirements being met
   c. Alternatively stepping in 3-5m above the second storey.
   d. Do we need to give FSR bonus if we only permit greater height on the Berry Road West side?
3. **Location of Community Facilities: Site 4 versus Site 5** –
   a. With provision of pocket park and east-west walkway and 600m2 min. community facility ground floor, will viable buildings fit on each lot?
   b. On those sites, given the current proposed setbacks and building width (i.e. 3x15m frontages = 45m lot width), is the building going to be wide enough to be feasible?
   c. East-west Walkway – is the 6m width of the walkway included within the side setback calculation of the building? i.e.: the site which has a walkway but not a community facility, will it have non-habitable rooms only facing the walkway?
4. **River Road Transition** – On sites 6 and 7, can the building heights be reduced (below 8 storeys), and still be viable? Further, could they work if set back further than 6m from their River Road/Canberra Ave frontage? Note: Address River Road if possible.
5. **Canberra Avenue – Holdsworth Avenue Transition** Estimate transitional heights (and thus development potential) within shadow framework in close proximity to the station and stepping down with distance from the station.

Figure 0.1 - Area of Investigation

1. EXTENSION OF PRECINCT WEST

This is to include heights as shown on Figure 1.1 and a large central park (to be acquired by Council) and a Park Road transition.

Include the additional block (Berry to Park Road). Test for SEPP 65 and viability.

Figure 1.1 – Extension of Master Plan to West

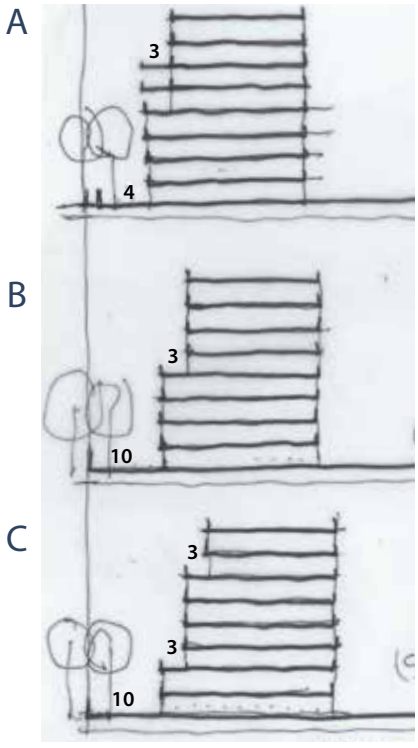
1.0 Introduction

The following pages include a 3-D model of shadow impact diagrams for options for this block. These are:

a. 8 storeys and 2.75:1 (if possible) with same setbacks as blocks to the east (front setback 4m + 3m above Level 6 i.e. for Levels 7 & 8)

b. Same footprints as above but with 10m front setback from Park Road for 4 levels plus additional 3m for Levels 5 and above.

c. Same footprints as above but with 10m setback for first two levels and then a further 3m setback for Levels 3 and another 3m for levels 7 and 8.



8 Storeys
6 @ 4m setback
2 @ +3m setback

8 Storeys
4 @ 10m setback
4 @ +3m setback

8 Storeys
2 @ 10m setback
4 @ +3m setback
2 @ +3m setback

Sectional Profiles

1.1 Option A - Development Potential

Figure 1.2 indicates a notional development option for condition 1(a) and calculations of possible development yield.

This indicates that within the indicated height limits and attendant setbacks the following development potential is realisable.

A (8 storey) = 2:1
(10 storey = 2.8:1
B = (B1+B2) = 8 + 10 storeys = 2.75:1
C = (C1+C2) = 8 storeys = 2.7:1

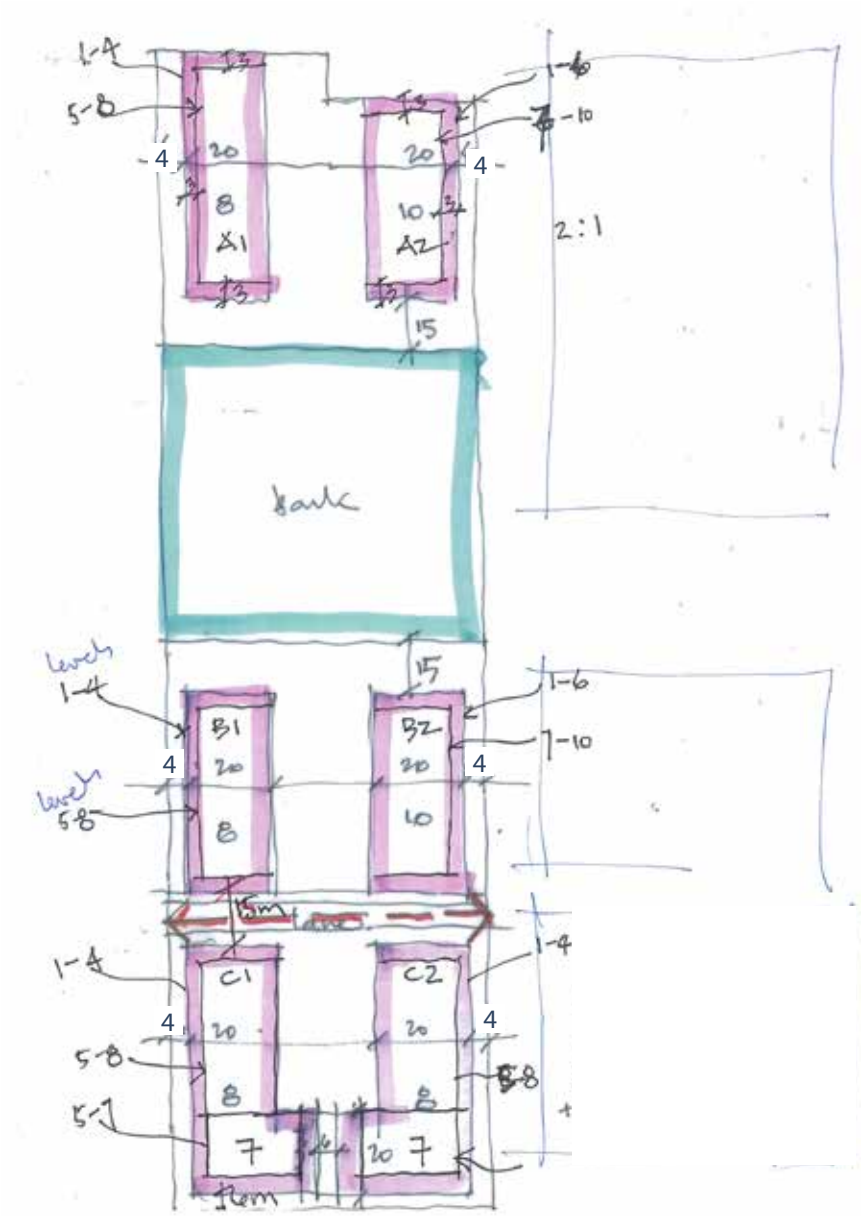


Figure 1.2 – Option A

Controls
8 storeys @ 2.75 : 1
4m setback (front) plus 3 at Levels 7 & 8

Option A - Development Potential

Table 1.1 – FSR Potential

A1			
GF	20 x 60 =	1200	
1		1200	
2		1200	
3		1200	4800
4	17 x 54 =	920	
5		920	
6		920	
7		920	3680
total			8480 x 80% = 6784m^2

A2			
GF	20 x 50 =	1000	
1		1000	
2		1000	
3		1000	
4		1000	
5		1000	6000
6	17 x 44 =	750	
7		750	
8		750	
9		750	3000
total			9000 x 80% = 7200m^2

FSR
A1 + A2 = 13,984m^2 / site area: (77 x 65) = 5005m^2
FSR = 13,984m^2 / 5005m^2 = 2.8 : 1

B1			
GF	50 x 20 =	1000	
1		1000	
2		1000	
3		1000	4000
4	17 x 44 =	750	
5		750	
6		750	
7		750	3000
total			7000 x 80% = 5600m^2

B2			
GF	20 x 50 =	1000	
1		1000	
2		1000	
3		1000	
4		1000	
5		1000	6000
6	17 x 44 =	750	
7		750	
8		750	
9		750	3000
total			9000 x 80% = 7200m^2

FSR
B1 + B2 = 7200 + 5600 = 12,800m2 / 4620
/ A (77 x 60 = 4620) = 2.75 : 1

Thus it would seem that the 2.75 : 1 and 8 - 10 floor controls are achievable as tested i.e. 8 storeys to Park Road and up to 10 storeys to Berry Road as indicated.

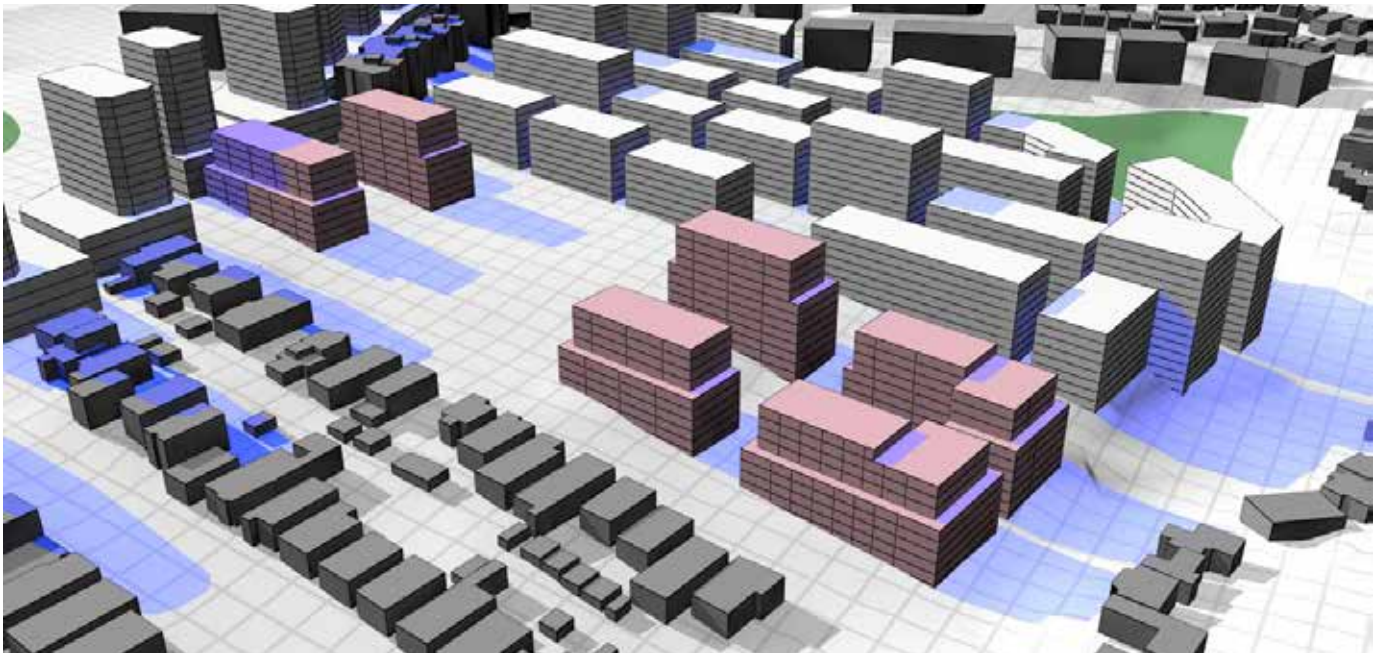
C1			
GF	20 x 60 + 20 x 10	1400	
1		1400	
2		1400	
3		1400	5600
4	64 x 17	1088	
5		1088	
6		1088	
7		705	3985
total			9585 x 80% = 7668m^2

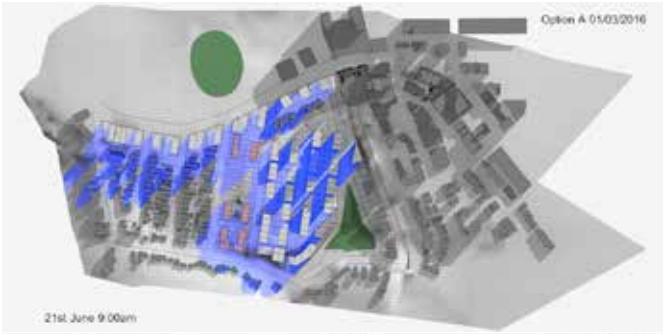
C2			
GF	20 x 60 + 20 x 10	1400	
1		1400	
2		1400	
3		1400	
4		1400	
5		1400	8400
6		1088	
7		705	1801
total			10,200 x 80% = 8160m^2

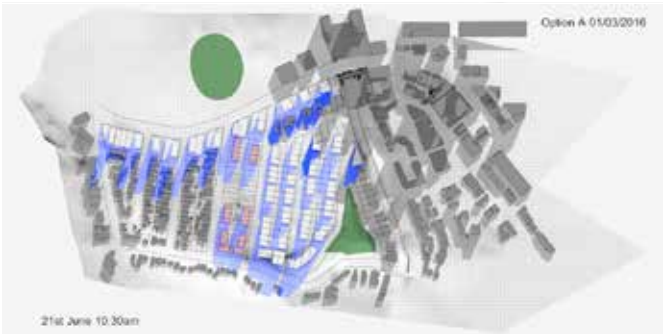
FSR
C1 + C2 = 8160m^2 + 7668 = 15,828m^2
/ A = 77 x 77 (including lane) = 5929
FSR = 15,828m^2 / 5929m^2 = 2.67 : 1

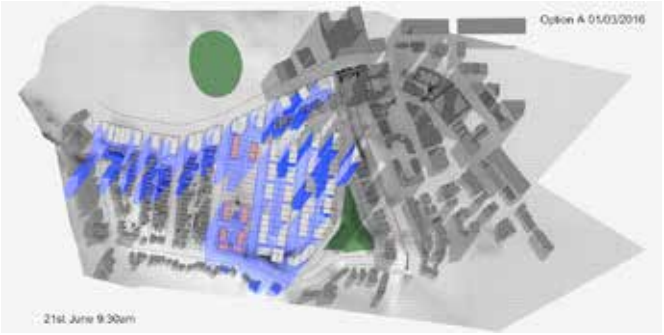
For the C sites near River Road an FSR in the order of 2.67 : 1 seems possible within an 8 storey framework. This may reduce with reduced height to River Road.

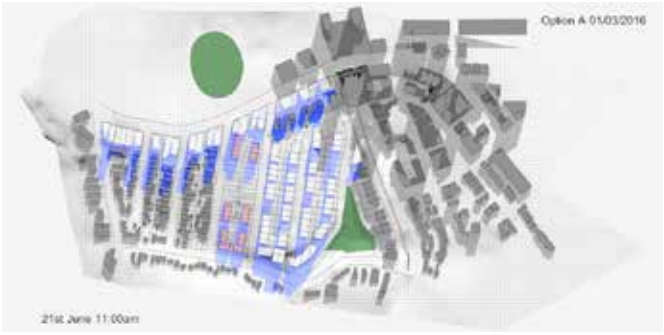
Figure 1.3 - Option A: Solar / Shadow Impacts (mid winter)

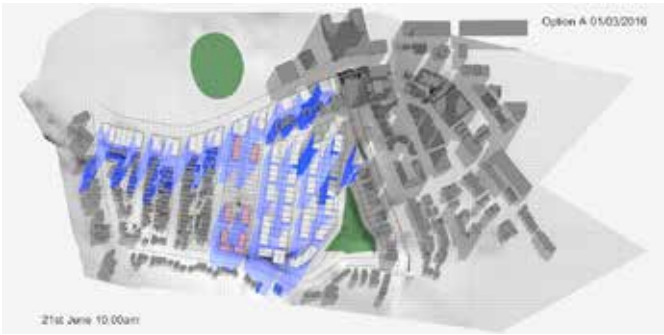


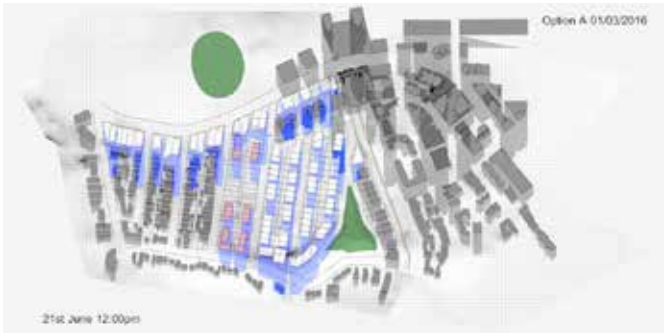


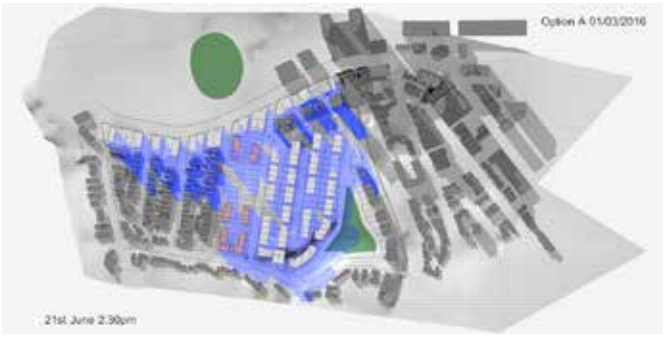


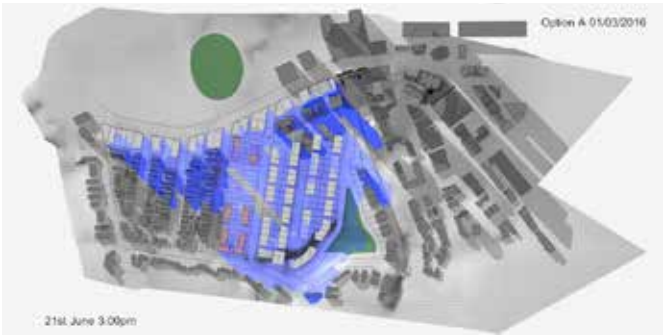












This analysis indicates compliant solar access (with ADG / SEPP65) is possible for streets and open space between 10:30 AM and 12:30 PM. Further analysis indicates general compliance with solar access to buildings is problematic because of street orientation and south facing slopes but almost achievable.

1.2 Option B - Modified Setbacks / Development Potential

Figure 1.3 expands the setback to Park Road from 4m to 10m for the first 4 levels with an additional 3m setback from levels 5 and above.

This indicates the following development potential is realisable:

A (A1+A2) = 8+10 storeys = FSR 2.75:1
(allowing for link lane to Park Road)

B = (B1+B2) = 8 + 10 storeys = FSR 2.75:1

C = (C1+C2) = 8 storeys = FSR 2.5:1
(allowing for E-W link lane) and allowing for a major park of some 5600m^2 to be acquired by Council

Park Road East Transition (to the single storey residences along Park Rd West) – can we achieve viable development with:

a. A 6m front setback in addition to the usual 4m front setback (10m in total) and
b. Stepping in (say 3m to 5m) above the fourth floor (rather than the sixth as recommended by the Master Plan)
c. Alternatively stepping in 3-5m above the second storey.

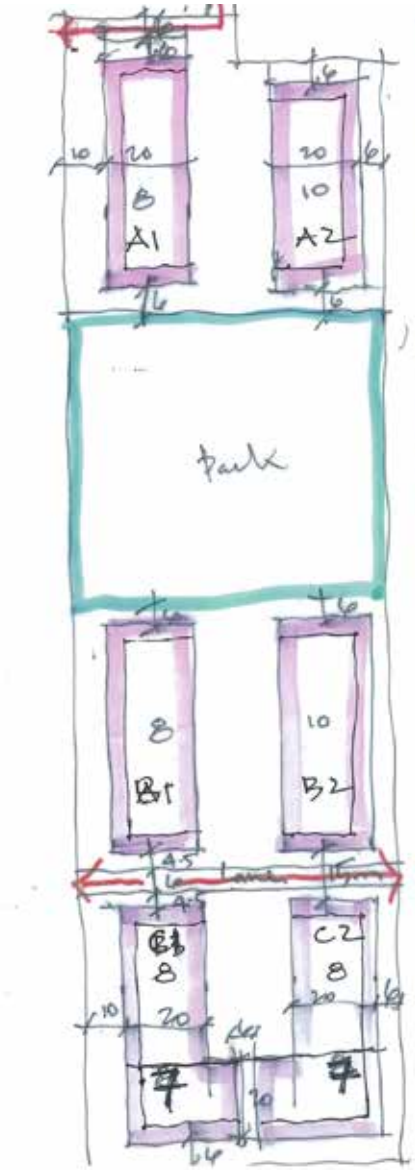


Figure 1.4 – Option B

Controls
Park Road front 8 floors, setbacks 10m plus 3m for 5, 6, 7 & 8.
Berry Road 8 floors, 4m setback plus 3m for 6, 7, 8+]

Option B - Development Potential

Table 1.2 – FSR Potential

A1			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	4400
4	49 x 17 =	833	
5		833	
6		833	
7		833	3332
total			7732 x 80% = 6185.6m^2

A2			
GF	50 x 20 =	1000	
1		1000	
2		1000	
3		1000	
4		1000	
5		1000	6000
6		750	
7		750	
8		750	
9		750	3000
total			9000 x 80% = 7200m^2

FSR
Total FA = 6185 + 7200 = 13,385
FSR = 13,385m^2 / 4851m^2 = 2.76 : 1

B1			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	4400
4	49 x 17 =	833	
5		833	
6		833	
7		833	3332
total			7732 x 80% = 6186m^2

B2			
GF	20 x 55 =	1100	
1		1100	
2		1100	
3		1100	
4		1100	
5		1100	6600
6		833	
7		833	
8		833	
9		833	3332
total			9932 x 80% = 7946m^2

FSR
B1 + B2 / site area (4620) i.e. 6186 + 7946 (14132) / 4620 = 3.1

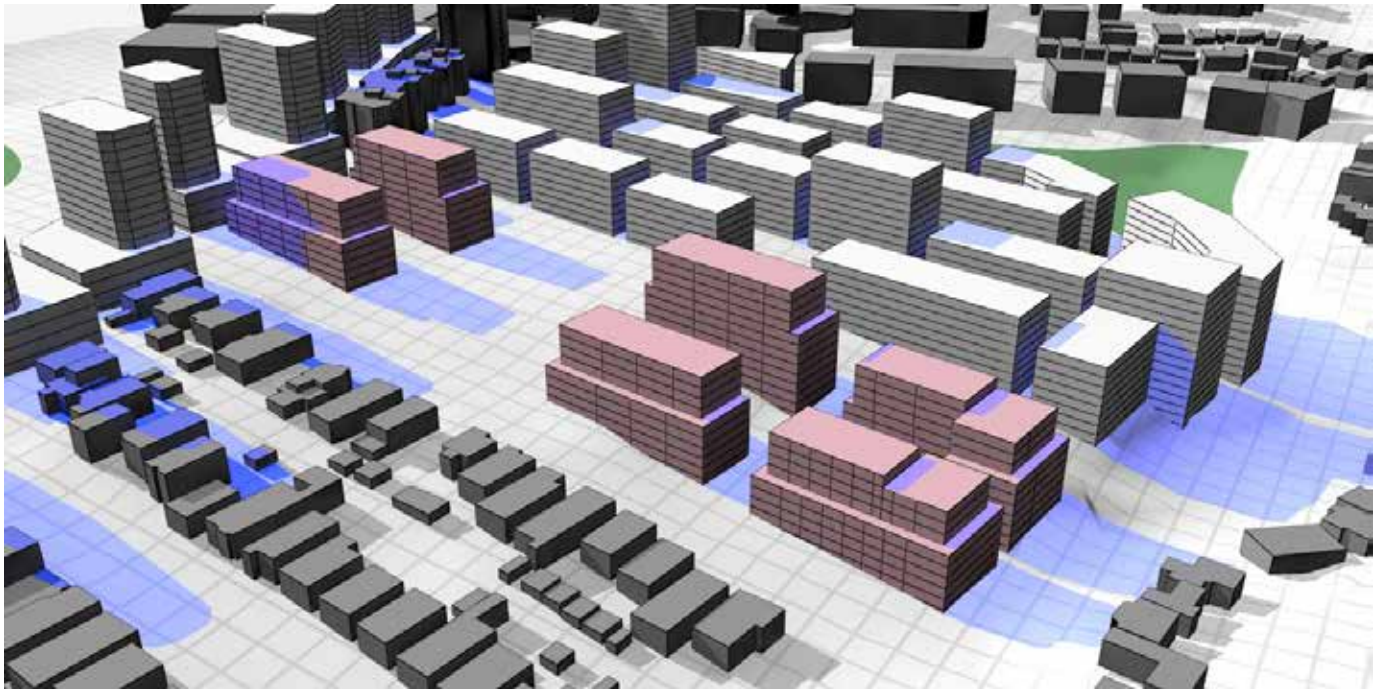
Option B - Development Potential

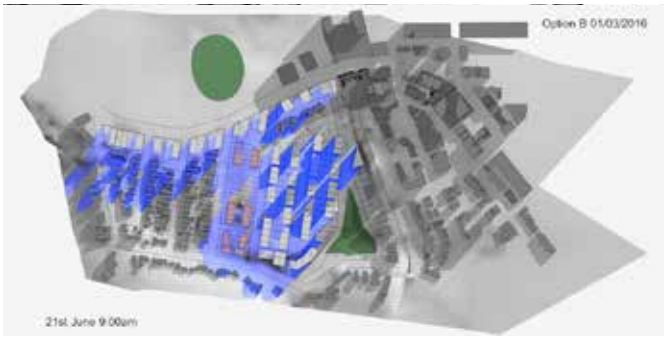
C1			
GF	65 x 20	1300	
1		1300	
2		1300	
3		1300	5200
4	50 x 17	850	
5		850	
6		850	
7		850	
8	35 x 17	595	3995
total			9195 x 80% = 7356m^2

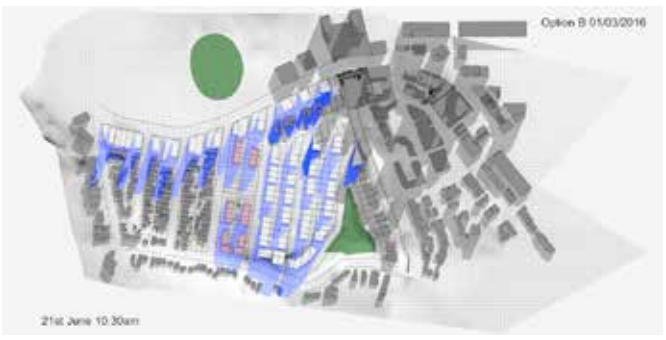
FSR
C1 + C2 =
FA = 7356 x 2 = 14,712 (including lane) / 5929 = 2.48 : 1

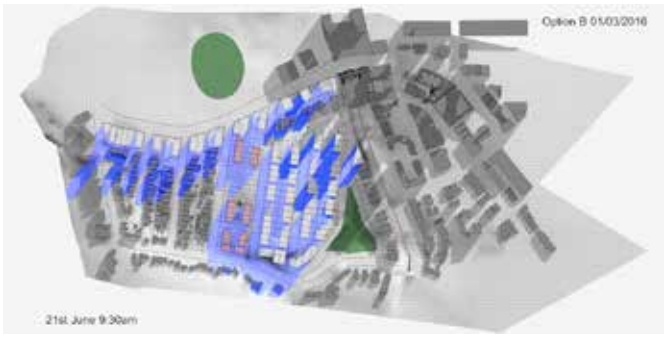
Thus it appears that FSR's of 2.5 - 2.75 : 1 are able to be achieved with these setbacks to facilitate transition. Site B2 @ 10 storeys facilitates a slightly higher FSR (3 :1) while C1 and C2 with steep south facing slope and reduced height to River Road will achieve only in the order of 2.5 : 1.

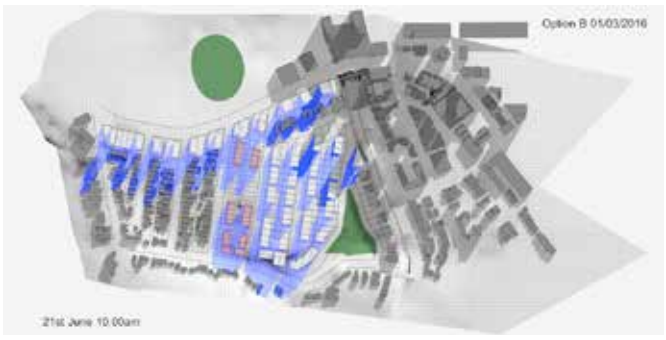
Fig. 1.5 Option B - Modified Setbacks / Solar / Shadow Impacts (mid winter)

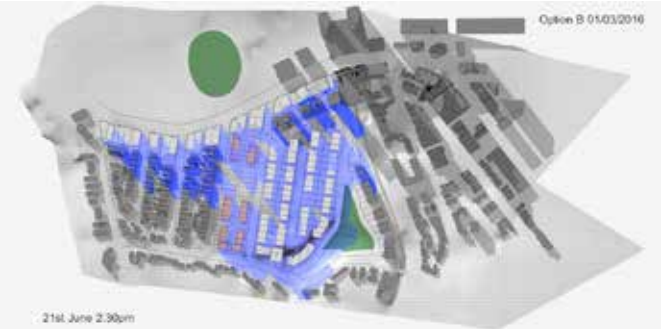


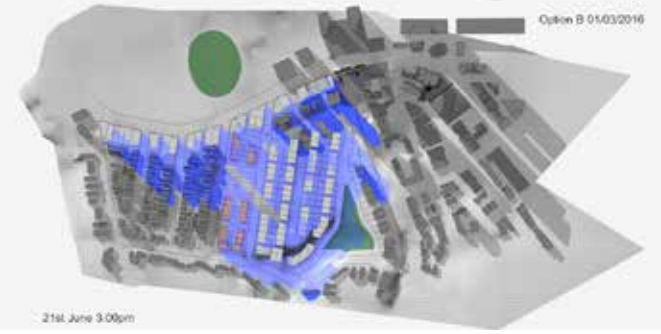












This option is able to comply with solar access requirements to open space. Note that compliance with solar access to 70% of units mid-winter will be difficult due to orientation, south facing slopes and reduced central building separation (due to increased setbacks to Park Road).

1.3 Option C - Modified Setback / Development Potential

Figure 1.4 indicates a similar floor plate with a 10m setback to Park Road for two levels and a further 3m setback above.

Note that maximum height to River Road will be 7 storeys for the first 7-10m and then 8 storeys as for previous plans.

This indicates the following development potential is realisable:

A (A1+A2) = 8+10 storeys = FSR 2.75:1
(with 6m lane connection to Park Road)

B = (B1+B2) = 8 + 10 storeys = FSR 2.75+:1

C = (C1+C2) = 8 storeys = FSR 2.5:1

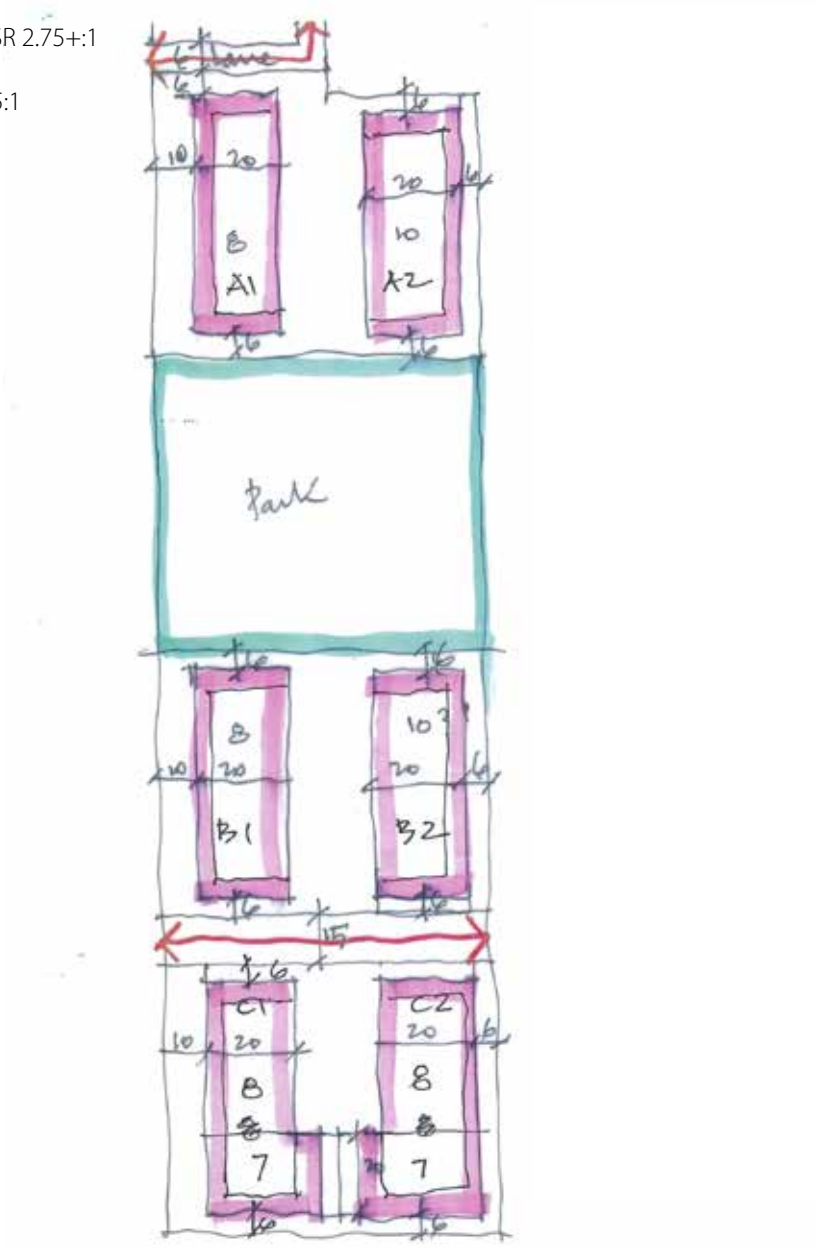


Figure 1.6 – Option C

Controls
8 storeys
10m front setbacks for 2 storeys
+3m additional to 6 storeys
+3m additional for 7 & 8 storeys

Option C - Development Potential

Table 1.3 – FSR Potential

A1			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	4400
4	49 x 17 =	833	
5		833	
6		833	
7		833	3332
total			7732 x 80% = 6186m^2

A2			
GF	50 x 20 =	1000	
1		1000	
2		1000	
3		1000	
4		1000	
5		1000	6000
6		750	
7		750	
8		750	
9		750	3000
total			9000 x 80% = 7200m^2

FSR
Total FA = 6185 + 7200 = 13,386
FSR = 13,386m^2 / 4851m^2 = 2.76 : 1

B1			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	4400
4	49 x 17 =	833	
5		833	
6		833	
7		833	3332
total			7732 x 80% = 6186m^2

B2			
GF	20 x 55 =	1100	
1		1100	
2		1100	
3		1100	
4		1100	
5		1100	6600
6		833	
7		833	
8		833	
9		833	3332
total			9932 x 80% = 7946m^2

FSR
B1 + B2 / site area (4620) i.e. 6186 + 7946 = 14132 / 4620 = 3.1 : 1

Option C - Development Potential

C1			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	4400
4	49 x 17	833	
5		833	
6		833	2499
7	35 x 17	595	595
total			7494 x 80% = 5995m^2

C2			
GF	55 x 20 =	1100	
1		1100	
2		1100	
3		1100	
4		1100	
5		1100	6600
6		833	
7		595	1428
total			8028 x 80% = 6422m^2

FSR
TFA = 5995 + 6422 = 12,417m^2
FSR = 12,417m^2 / (77 x 77 = 5929) = 2.09 : 1

Thus it can be seen that a similar FSR can be achieved with increased setback but with some reduction caused by loss of one level to River Road (Site C). Note the modeling for Option C is generally very similar to Option B in terms of solar access.

1.4 Conclusions

1. It is certainly possible to include the block from Berry to Park Road in the rezoning. It can be viable and SEPP65 compliant at 8-10 storeys.
2. Modified (increased) setbacks to improve the transition to Park Road residential can be achieved / accommodated within the FSR with minor reduction of solar access to lower central units.
3. Some loss of FSR (development potential is caused to Site C by reduced height to River Road).

2. SITES 4 & 5

2.1 Introduction

Provision of the following:
(a) E-W links
(b) Pocket Parks 500-600m^2
(c) Community floor space 600m^2
(d) Childcare centre 600m^2 + outdoor play area of 900m^2

The diagrams provided (Fig 2.1) are problematic for the following reasons:
i) Wide E-W link 15m (c.f. previously proposed 6m). This will more than double the acquisition cost from $4 to $10 Million.
ii) Provision of pocket parks 600m2 at a cost of $2.5 Million each (total $5 Million). This when open spaces are proposed (or exist) at each end of E-W link.
iii) Development footprint is small and cannot deliver major development nor accommodate major floor space bonus

a. With provision of pocket park and east-west walkway and 600m2 min. community facility ground floor, will viable buildings fit on each lot?
b. On those sites, given the current proposed setbacks and building width (i.e. 3x15m frontages = 45m lot width), is the building going to be wide enough to be feasible?
c. East-West Walkway – is the 6m width of the walkway included within the side setback calculation of the building? i.e.: the site which has a walkway but not a community facility, will it have non-habitable rooms only facing the walkway?

2.2 Options

It is suggested that:

- E-W link be reduced to 6m as previously shown in Masterplan (as shareway between Berry and Holdsworth Avenue and as pedestrian path from Holdsworth to Canberra Avenue (because of steep slope). This will significantly reduce costs (and should be funded by bonus floorspace over 2.75:1 north of these E-W links.
- Sites to be further amalgamated to include a minimum of 8-10 lots as shown.

Figure 2.1 – Sites 4 & 5 - East / West Links

2.3 Sample Development Alternative (Site 4 or 5)

Figure 2.2 indicates how a larger site can provide the E-W link and a park and community facilities/childcare at a development yield of 2.5-2.75:1 (excluding community facilities).

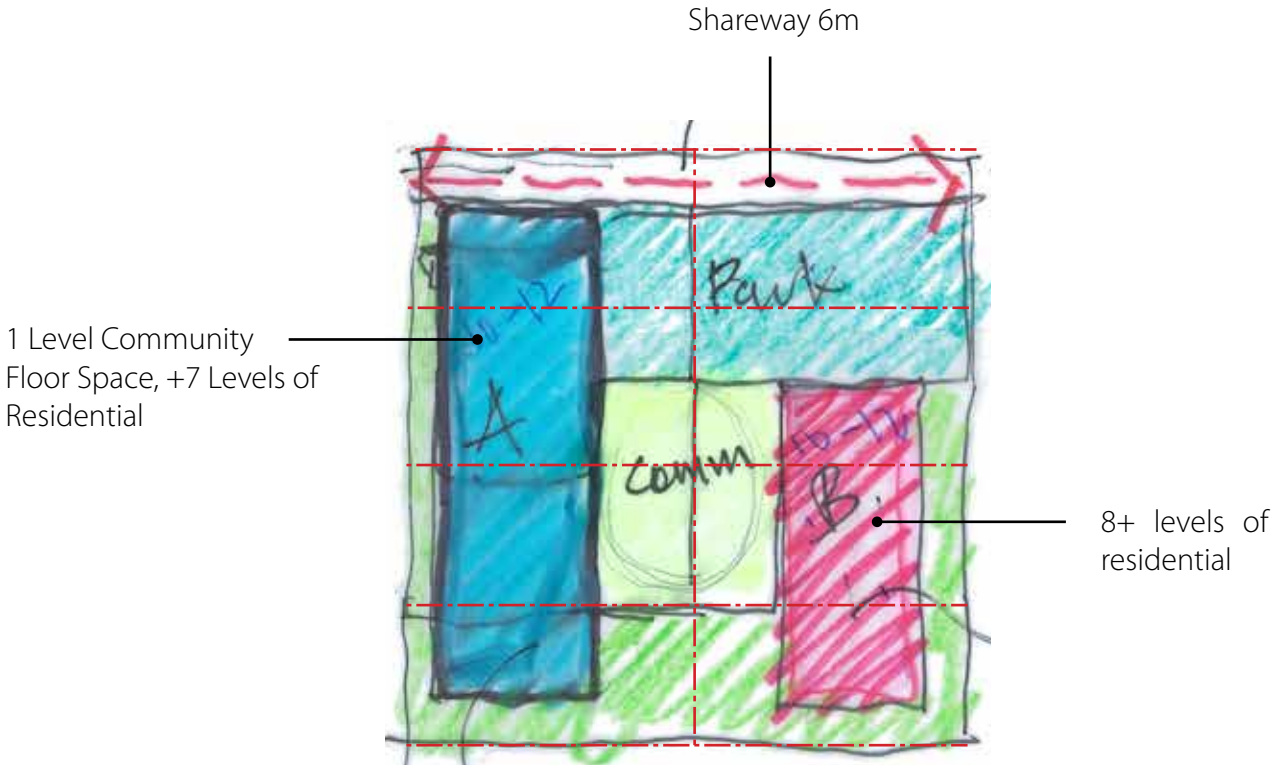


Figure 2.2 – Sample Redevelopment Alternative

Development Potential (modified site)

Table 2.1 – FSR Potential

A			
GF	60 x 20 =	1200	
1		1200	
2		1200	
3		1200	
4		1200	
5		1200	7200
6	54 x 17 =	920	
7		920	1840
8	48 x 14 =	672	
9		672	1344
10	41 x 11 =	462	
11		462	924
total			11,308m^2 @ 12 floors

B			
GF	40 x 20 =	800	
1		800	
2		800	
3		800	
4		800	
5		800	4800
6	34 x 17 =	578	
7		578	1156
8	28 x 14 =	392	
9		392	784
10	22 x 11 =	242	
11		242	484
total			7224m^2 @ 12 floors

FSR @ 10 floors
Site Area = 80 x 73 = 5840m^2
A (10 floors) + B (10 floors)
= 10,384 + 6740
= 17,124 x 80%
= 13,699
/ 5840 = 2.35 : 1

FSR @12 floors
Site Area = 80 x 73 = 5840m^2
A (12 floors) + B (12 floors)
= 11,308 + 7224
= 18,532 x 80%
= 14,826
/ 5840 = 2.54 : 1

2.4 Conclusions

1. The development framework as shown is NOT VIABLE. However, by extending the site(s) as shown, viability may be achieved at 10 storeys and improved at 12 storeys.
2. A narrower walkway is suggested.
3. Inclusion of pocket parks are surplus to requirements if new park is achieved between Berry and Parks Roads.
4. FSR's in the order of 2.5 to 2.75 : 1 can be achieved in this location. Seek to apply bonus if E-W link and community facilities are to be provided. Suggest 10-12 storeys.

3. RIVER ROAD TRANSITION

3.1 Introduction

Review plans in order to reduce bulk and shadow impact to River Road:

- Test reduced heights on sites 6/7 to 6-7 storeys to River Road
- Increase setbacks >6m at GF to River Road
- Note areas of steep slope (south facing) are particularly problematic.

River Road Transition – On sites 6 and 7, can the building heights be reduced (below 8 storeys), and still be viable? Further, could they work if set back further than 6m from their River Road/Canberra Ave frontage? Note: Address River Road if possible.

Figure 3.1 – River Road Transition

Controls
6 storeys to River Road maximum
8 storeys to streets
>6m setback to River Road

3.2 Site 6

This site is difficult because of its awkward shape and limited depth. Again a northerly expansion may assist somewhat.

In this case an 8 storey building may be permitted on the upper levels of the site, stepping down to 4 levels to the River Road frontage (see Figure 3.2).

The difficult size and shape of this site may limit development potential (See Table 3.2). Close examination nevertheless reveals a potential FSR of approximately 2:5 - 2.75 : 1 @ 4/6/8 stories.

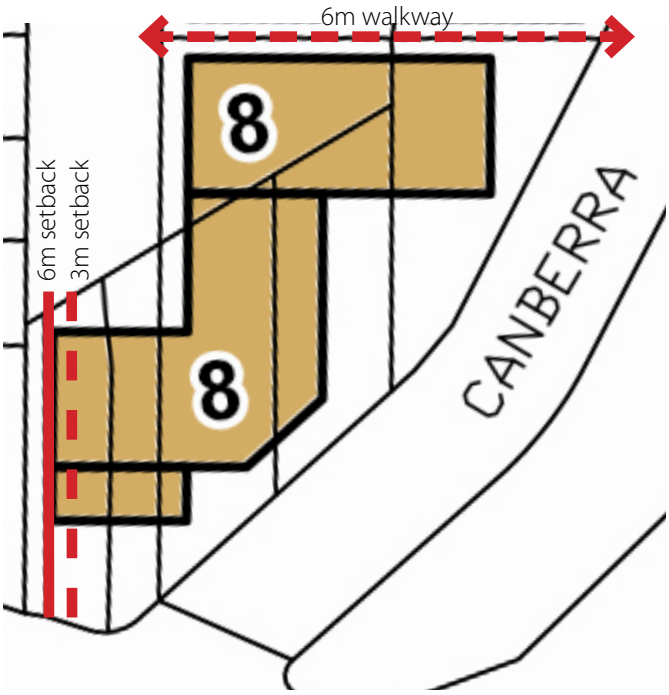


Figure 3.2 – Site 6 Test Option

C			
GF	100 x 17 =	1700	
1		1700	
2		1700	
3		1700	
4		1700	
5		1700	10,200
6	60 x 17 =	1020	
7		1020	2040
total			12,240m^2 x 80% = 9792m^2

FSR
12,240m^2 x 80% = 9792m^2 / 3600 = 2.72 : 1

Note that there may be some difficulties achieving compliant solar access to communal open space (south facing) and some problems associating with steep slopes.

3.3 Site 7

Consider:

- Extending site northwards (fig. 3.3)
- Providing N-S buildings to Berry and Holdsworth so that buildings gain solar E & W (minimise south facing particularly at lower levels)
- Move through - site link northwards
- Figure 3.4 indicates potential
- GF setback 6-10m from River Road
- At Level 4 River Road setback one unit deep (6-8m)
- At Level 8 River Road setback another unit deep (6-8m) (see fig. 3.5)

This will facilitate a development potential in the order of 2-2.5 : 1 (See Table 3.2).

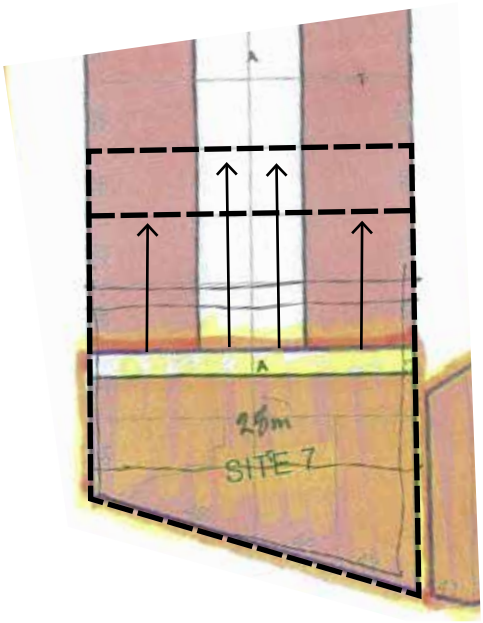


Figure 3.3 – Extend Site North of River Road

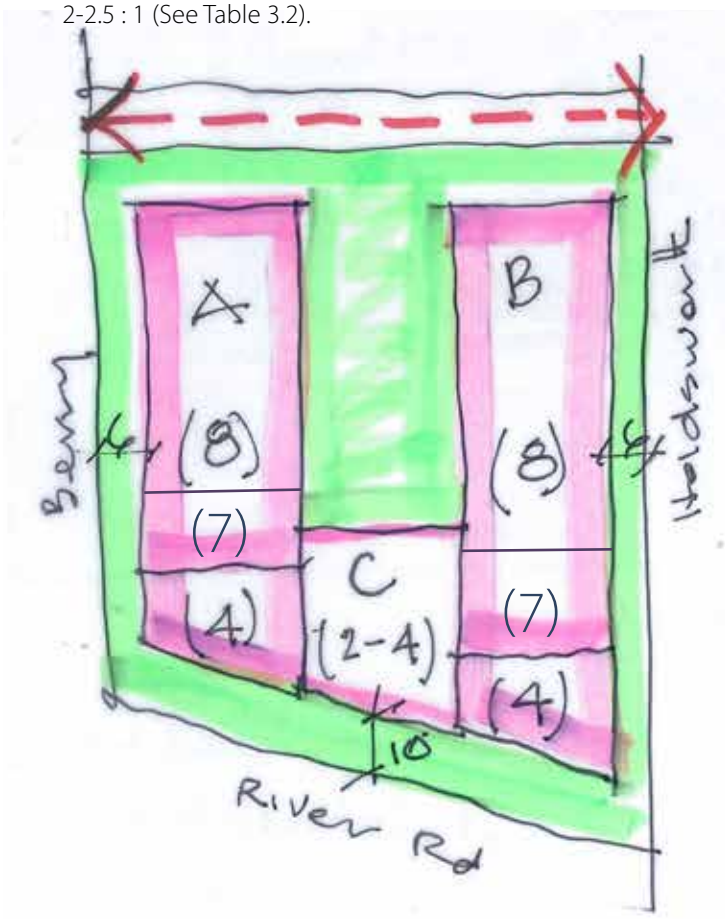


Figure 3.4 – Site 7 Development Potential

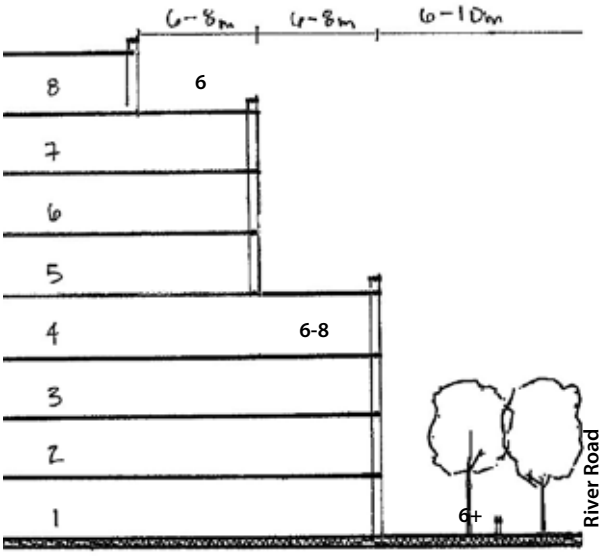


Figure 3.5 – Section to River Road

A			
GF	20 x 60 =	1200	
1		1200	
2		1200	
3		1200	4800
4	17 x 50 =	850	
5		850	1700
6	14 x 44 =	616	
7		616	1232
total			7732m^2

B			
GF	20 x 70 =	1400	
1		1400	
2		1400	
3		1400	5600
4	17 x 60 =	1020	
5		1020	2040
6	14 x 54 =	756	
7		756	1512
total			9152m^2

FSR
FSR = A + B = 7732 + 9152 = 16884 x 80% = 13,507m^2
/ 6300 (site area) = 2.1 : 1 to 2.4 : 1 (including River Road infill)

3.4 Conclusions

1. Viable development is extremely difficult whilst reducing impact onto River Road
2. A larger site amalgamation (pushing northward) will facilitate viable and compliant development.
3. Lower scale buildings to River Road (with 6-10m setback) is possible with small reduction in development potential.

4. SITES 1, 2 & 3 (MARSHALL AVE)

4.1 Introduction

These sites are closest to the Railway Station and to existing high rise buildings (north side Marshall Avenue).

It is currently proposed to permit these to develop to 58m/19 floors (Site 1), 46m/15 floors (Site 2) and 37m/12 floors (Site 3).

Canberra Avenue – Holdsworth Avenue Transition

Estimate transitional heights (and thus development potential) within shadow framework in close proximity to the station and stepping down with distance from the station.

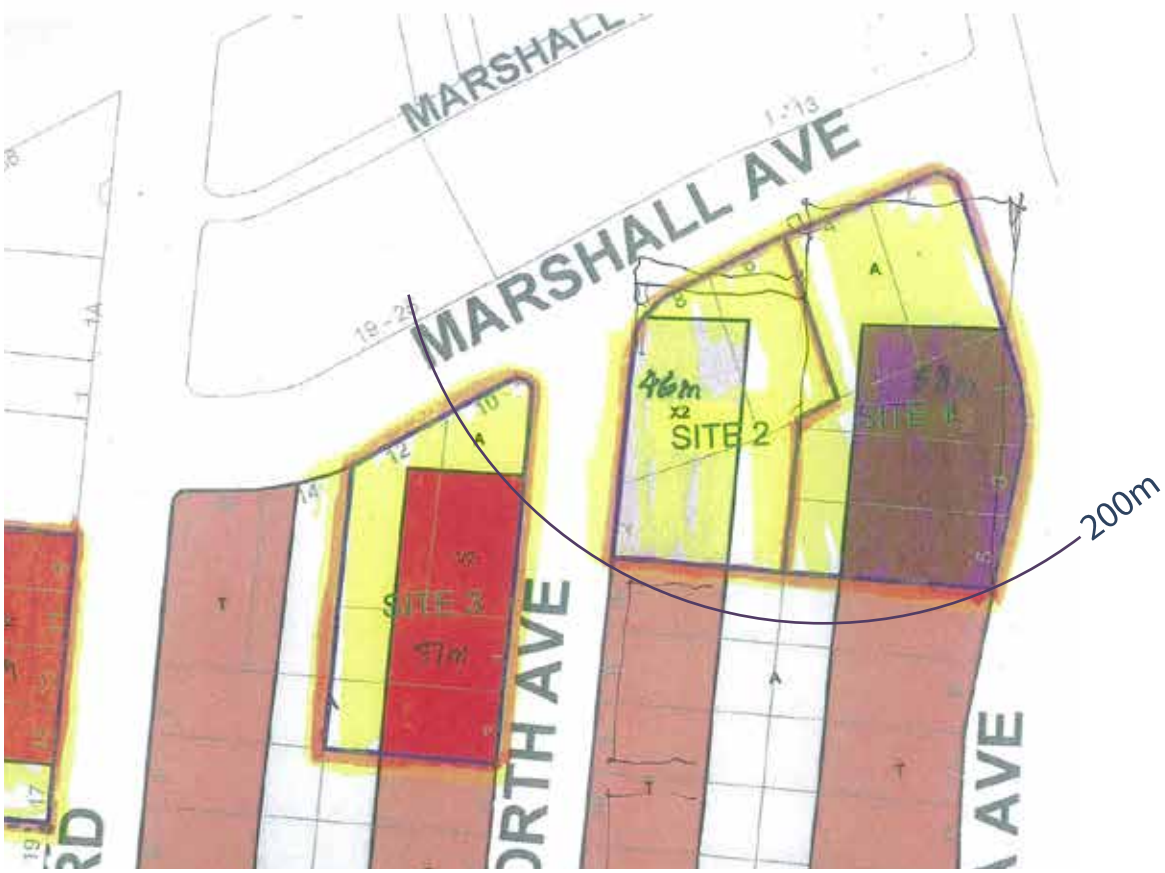


Figure 4.1 – Sites 1,2 and 3

This additional floor space (over 2.75:1/25m) may be justified by:

- Proximity to station (<200m)
- Proximity to existing high rise (Marshall Avenue)
- Compensation for provision of
  - > Open space on Marshall Avenue
  - > Funding towards open space and community facilities across the precinct
  - > Provision of affordable housing
- Limited additional overshadowing beyond existing shadows

It is important however, to constrain the development footprint to the N-S development Zones as shown in the master plan (4-6m from front boundary and 20m deep envelope) in order to optimise provision of solar access to units to the south.

4.2 Development Potential

Table 4.1 – FSR Potential

Site 1 - 19 floors	
45 x 25 = 1125 x 6 =	6750
40 x 20 = 800 x 6 =	4800
34 x 17 = 578 x 7 =	4046
	15,596 x 0.8 = 12,476.8m^2

FSR
Site Area = 80 x 40 = 3200m^2
12477 / 3200 = 3.9 : 1 (say 4 : 1)

Site 2 - 15 floors	
45 x 20 x 6 =	5400
40 x 17 x 6 =	4080
34 x 14 x 3 =	1428
	10,908 x 0.8 = 8726m^2

FSR
Site Area = 37 x 60 = 2220m2
8726 / 2220 = 3.93 : 1 (say 4 : 1)

Site 3 - 12 floors	
20 x 50 = 1000 x 6 =	6000
17 x 44 = 748 x 6 =	4488
	10,488 x 0.8 = 8390m^2

FSR
Site Area = 2450m2
8390 / 2450 = 3.4 : 1 (say 3.5 : 1)

4.3 Conclusions

It appears that the following development potential can be facilitated within these heights:

	height (m)	height (storeys)	FSR	Additional GFA m2
Site 1	58	19	3.5 : 1 - 4 : 1	4000
Site 2	46	15	3.5 : 1 - 4 : 1	2775
Site 3	37	12	3.2 : 1 - 3.5 : 1	1837
			Total	8612

Thus it can be seen that within 200m of the railway station an additional 8612m2 of GFA can be provided which is approximately 80+ 2br/dwellings.

5. MAXIMUM HEIGHT AND FSR WITHIN IMMEDIATE OF PROXIMITY STATION

5.1 Introduction

3-D modeling of existing and approved buildings indicate that some increased building heights may be acceptable (without further impact).

We have carried out comparative modeling to test a number of height options within close proximity to the railway station.

Working with existing proposed maximum heights in Masterplan and within the context of shadows of existing and approved buildings, investigate maximum development potential (height and FSR) for sites within 400m of Railway Station (See Fig 5.1)

Figure 5.1 – Proximity to Rail Station

Development Investigations

These options will include the following:

a. Existing / Approved Buildings and shadow impact.

b. Heights as shown in figure 5.1

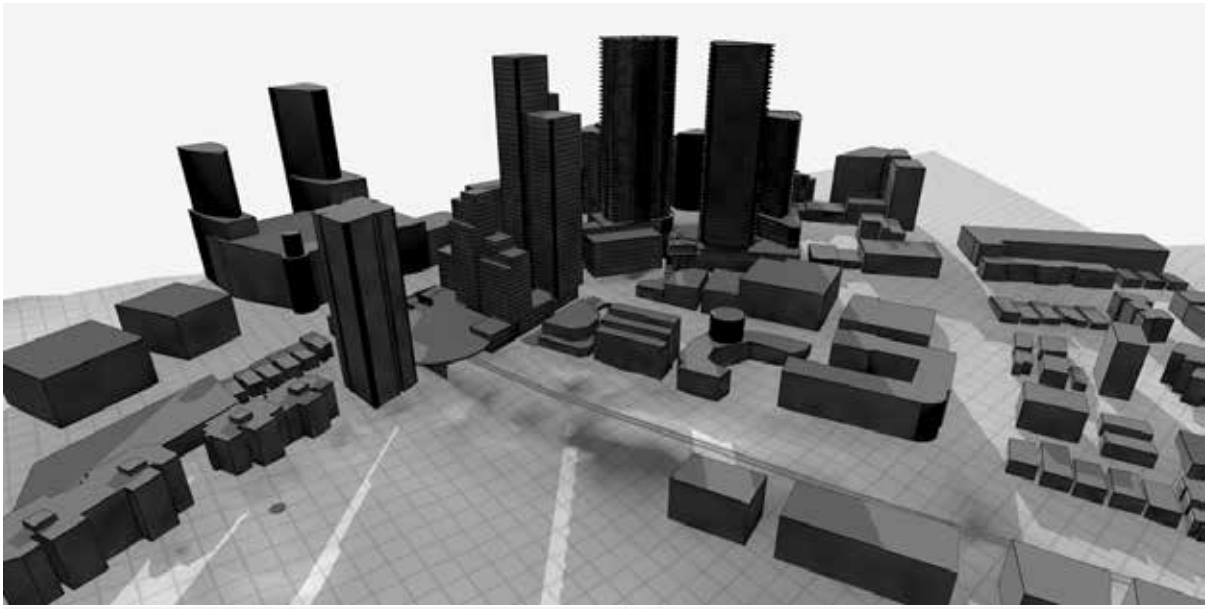
c. Option 1 - Notional graduated heights based on visual impact stepping down to 8 storeys at about 300m. This is illustrated in figure 5.2.

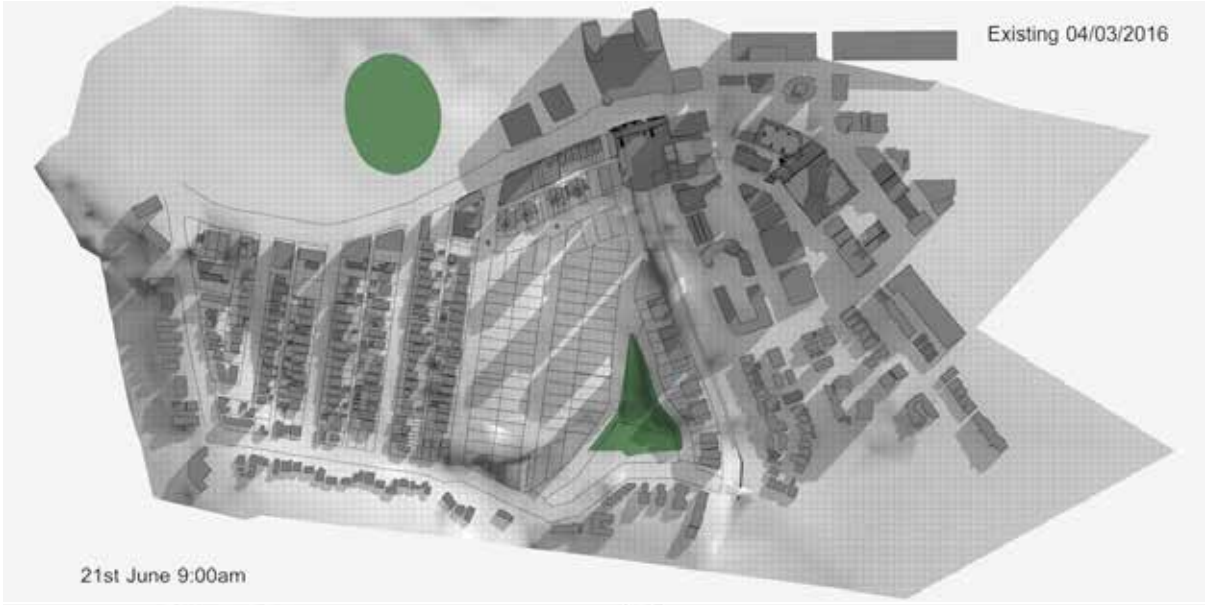
d. Option 2 - Notional maximum heights whilst still maintaining general 2 hour compliance with SEPP65 solar access criteria (figure 5.3).

e. Option 3 - A compromise which attempts to optimise height and FSR while minimising solar impacts to 1.5 hours.

5.2 Existing / Approved Buildings & Shadow Impacts on Ground Plane

The following modeling shows the impacts of existing and proposed off-site buildings on the immediate precinct.






Existing 04/03/2016
21st June 10:00am


Existing 04/03/2016
21st June 10:30am


Existing 04/03/2016
21st June 11:00am


Existing 04/03/2016
21st June 11:30am

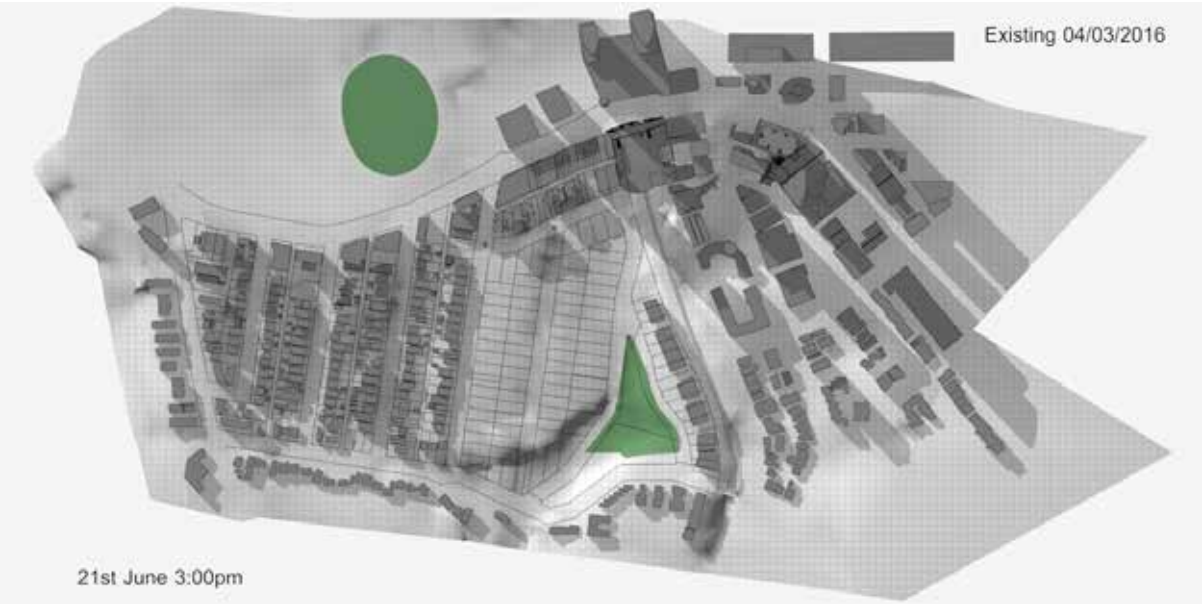

Existing 04/03/2016
21st June 12:00pm


Existing 04/03/2016
21st June 12:30pm


Existing 04/03/2016
21st June 1:00pm

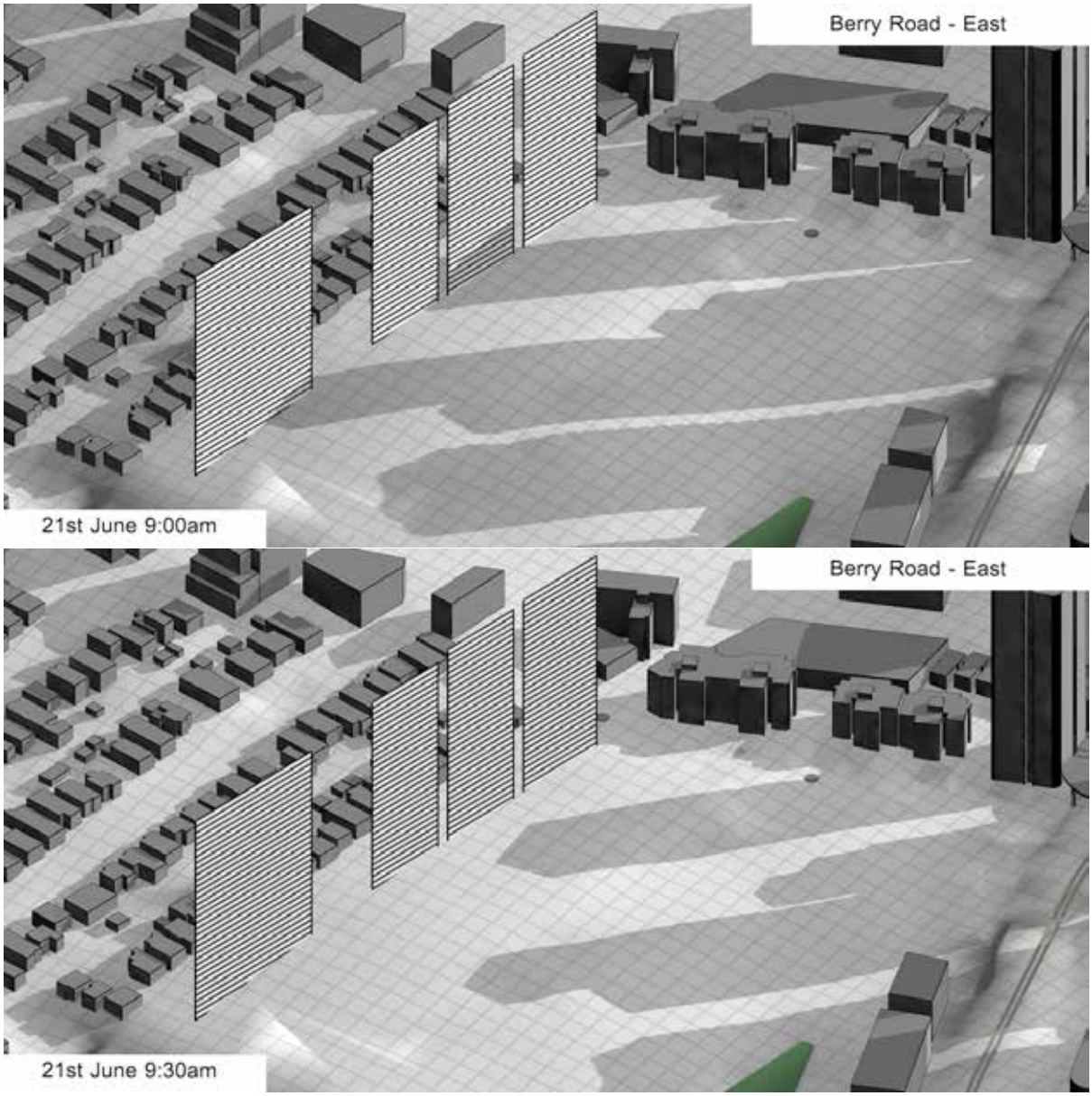

Existing 04/03/2016
21st June 1:30pm

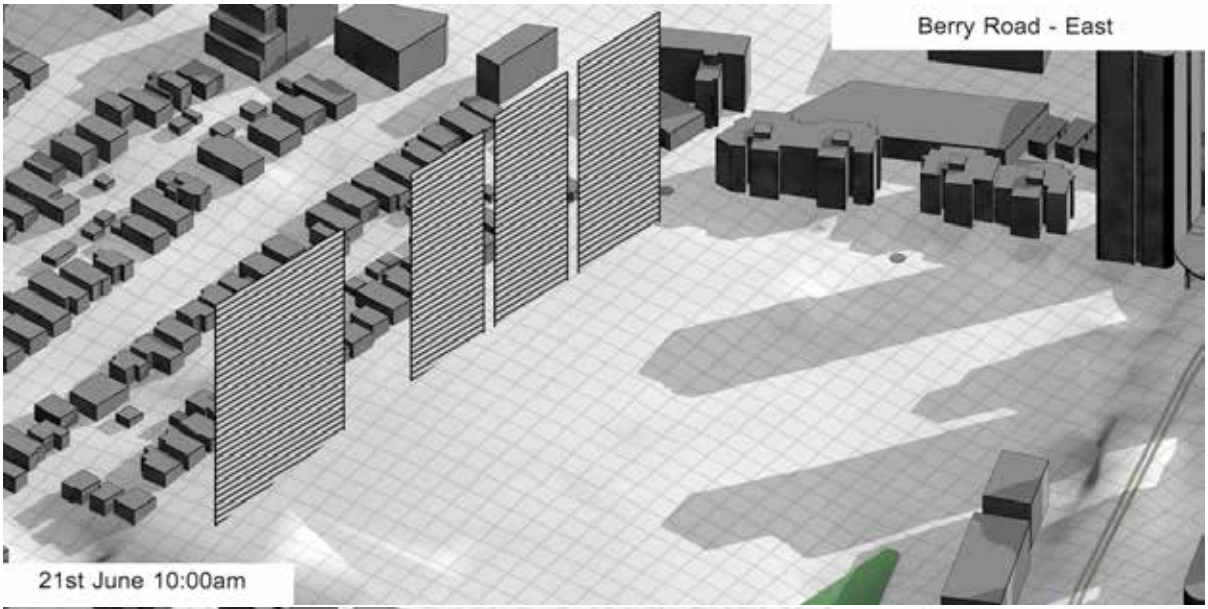

Existing 04/03/2016
21st June 2:00pm

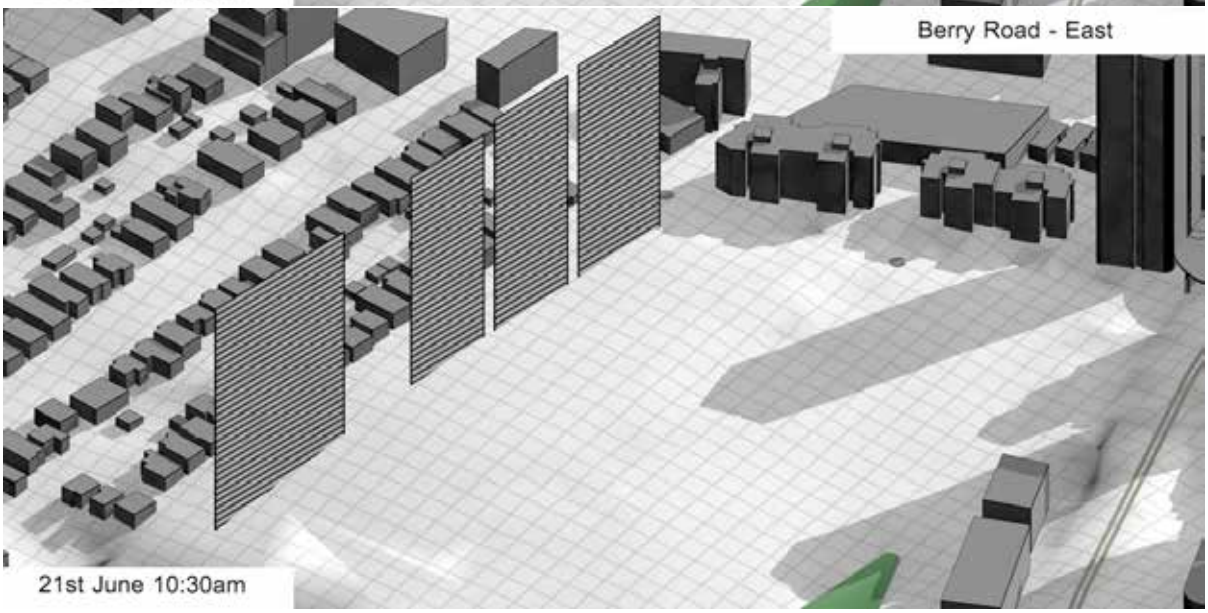


Thus plans show that shadows from existing and approved buildings have considerable impact particularly between Canberra and Berry Road in the early AM but have generally cleared by mid-morning with the exception of the Loftex building which continues to impact until noon.

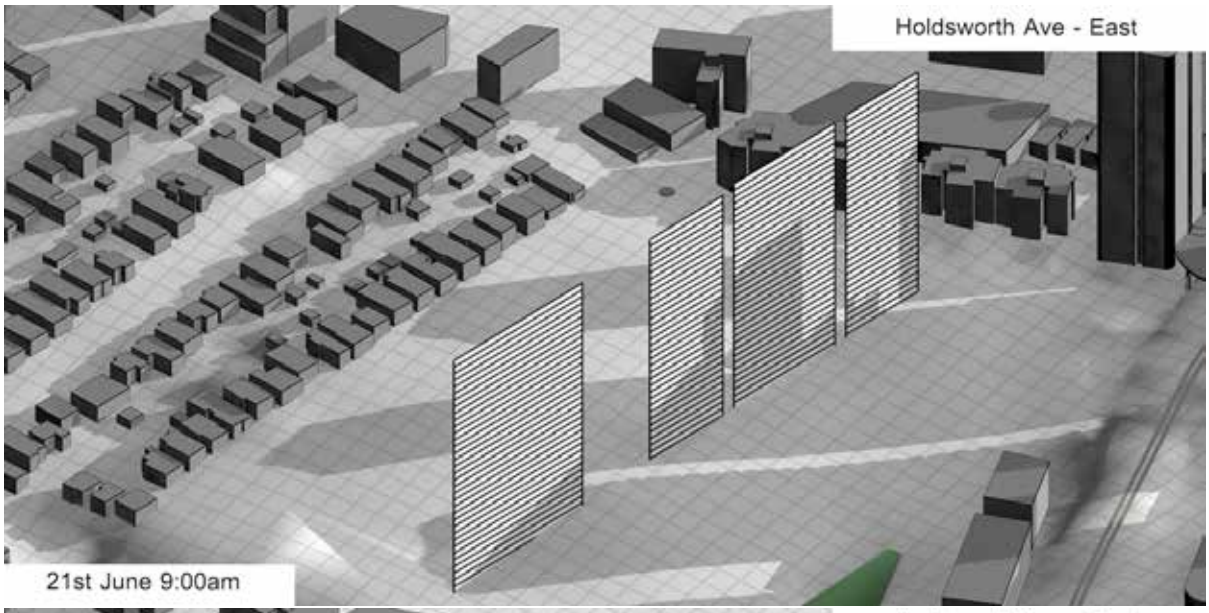
Existing / Approved Buildings - Shadow Impacts on Building Planes

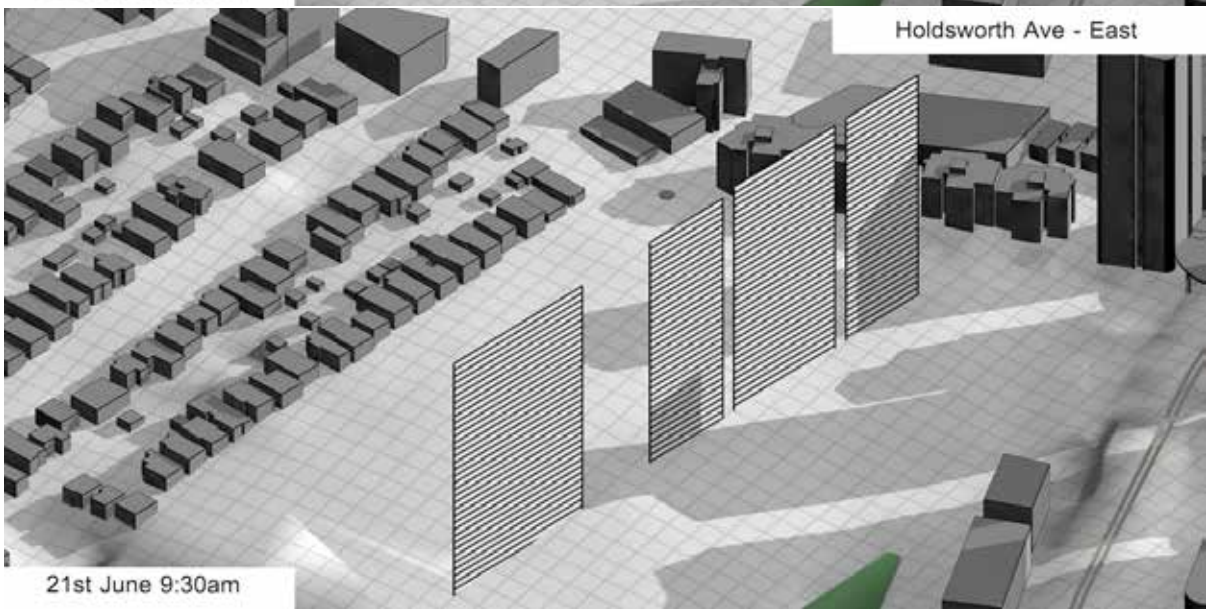


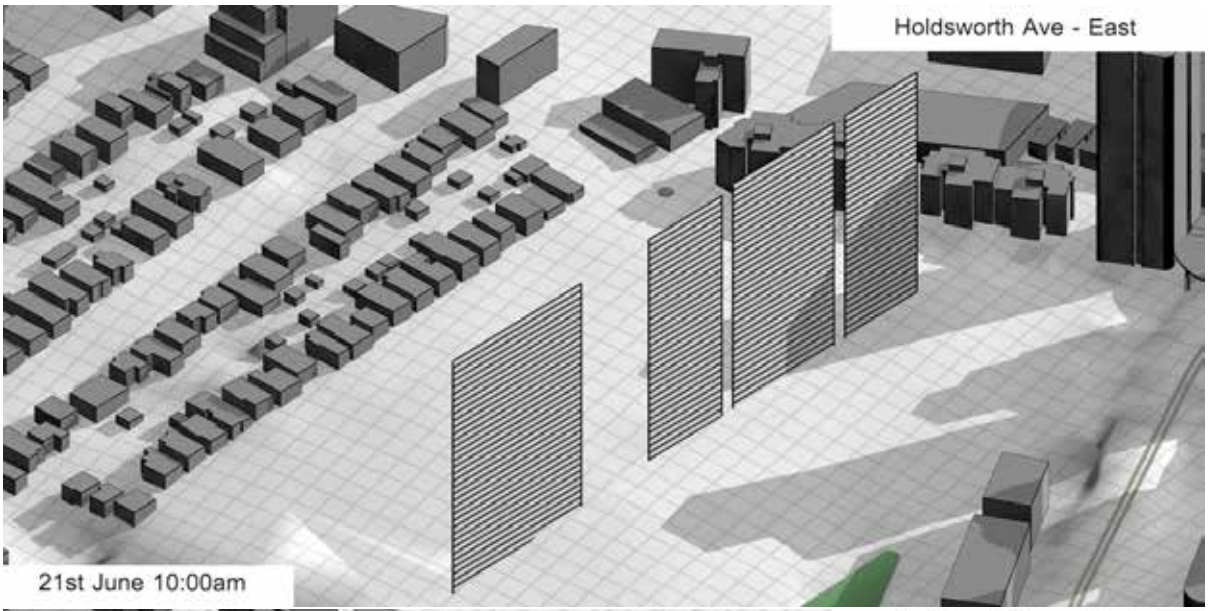




Holdsworth Avenue figures on next pages.


Holdsworth Ave - East
21st June 9:00am


Holdsworth Ave - East
21st June 9:30am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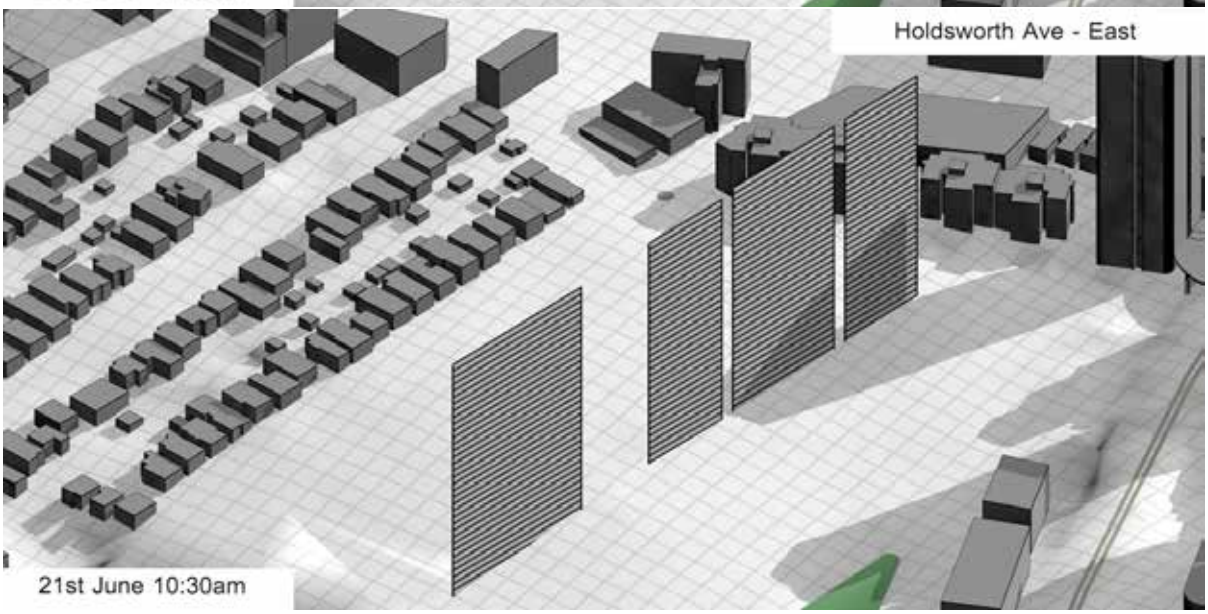
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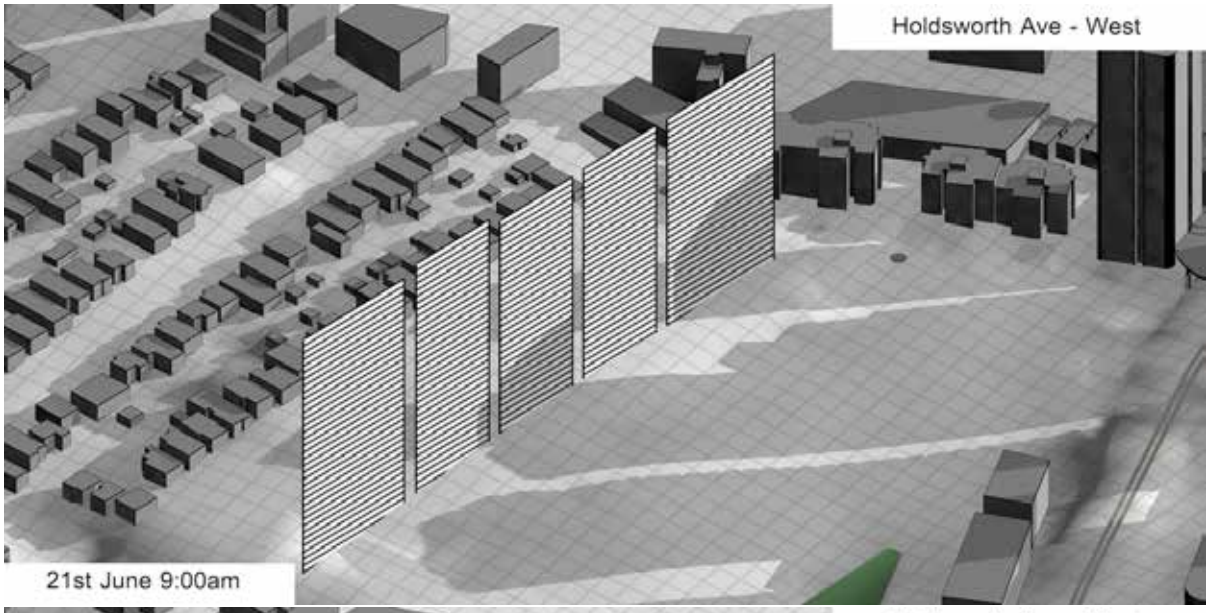
Holdsworth Ave - West
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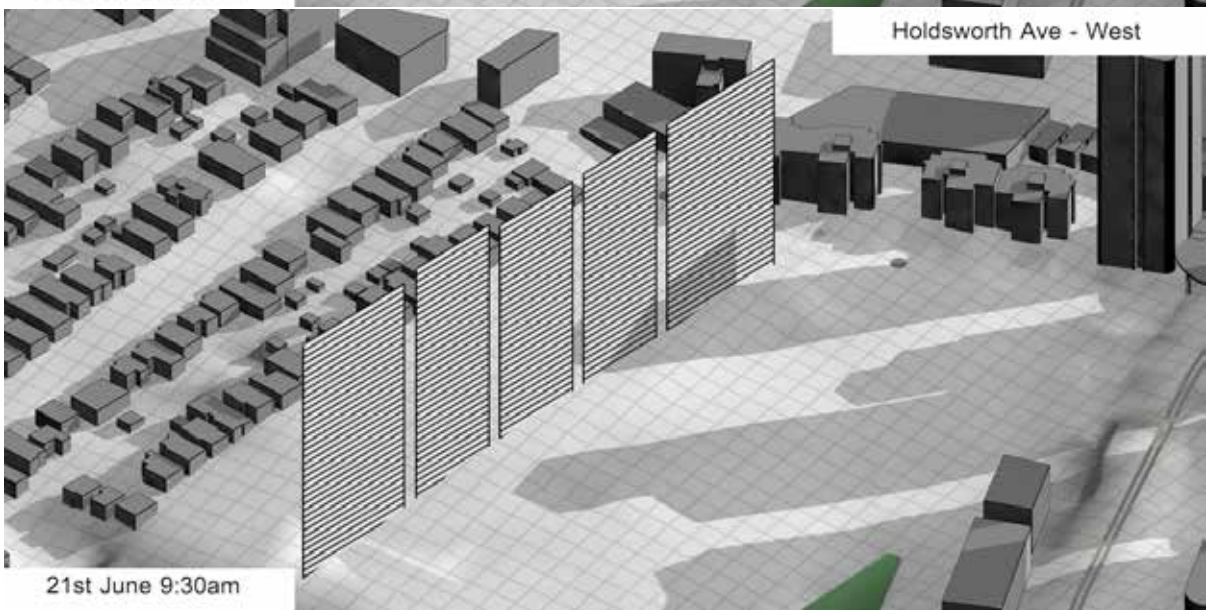
Holdsworth Ave - West
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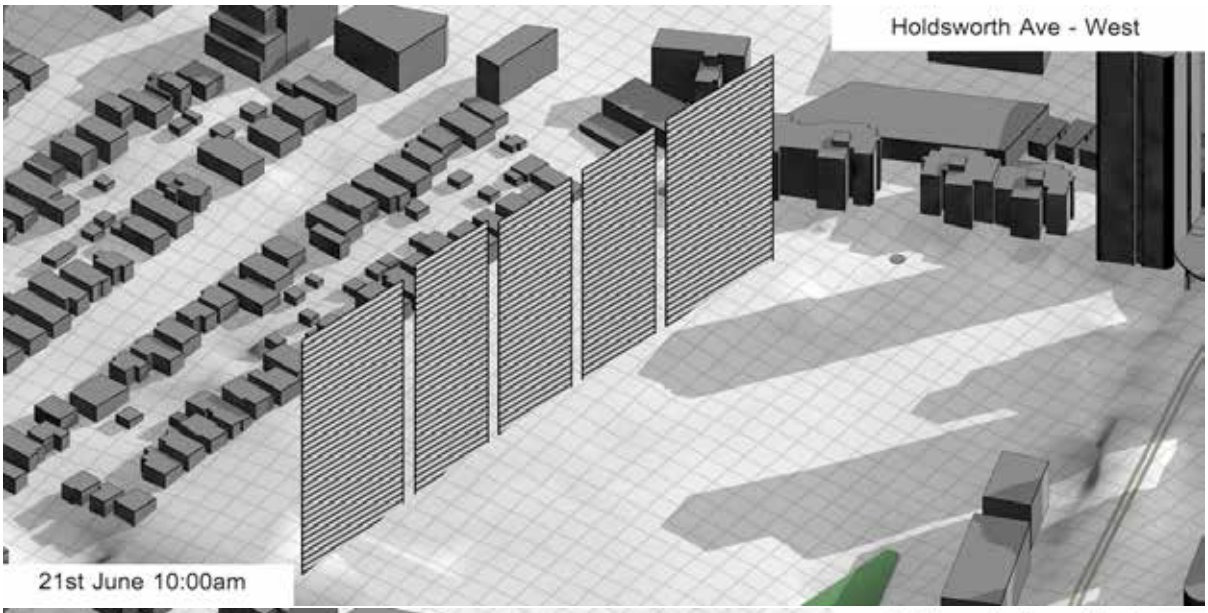
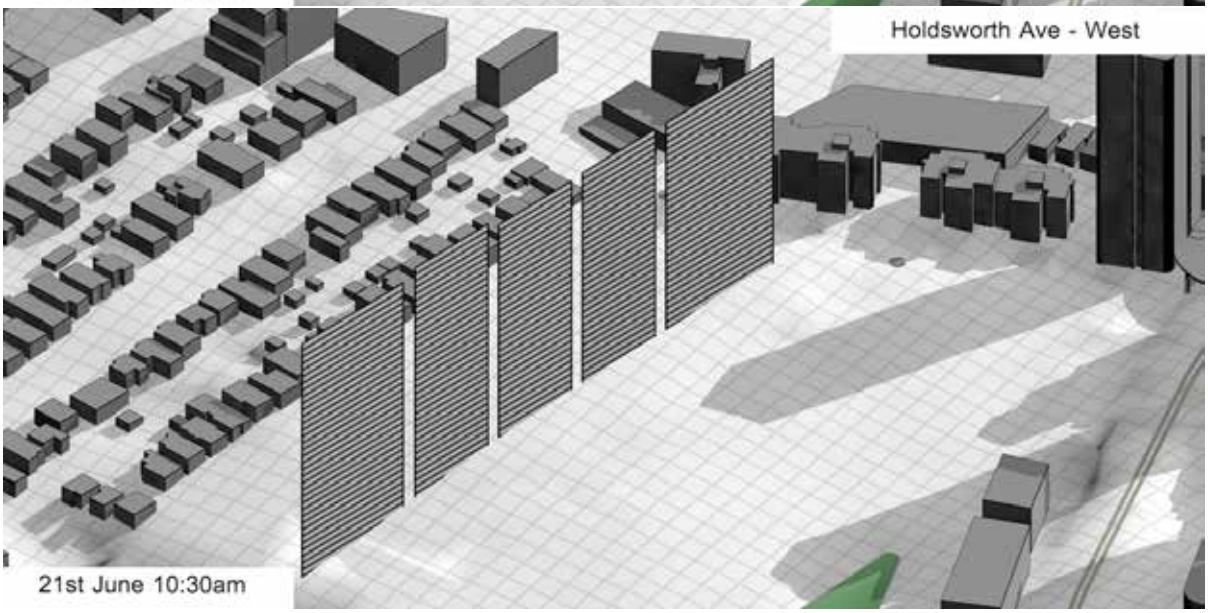
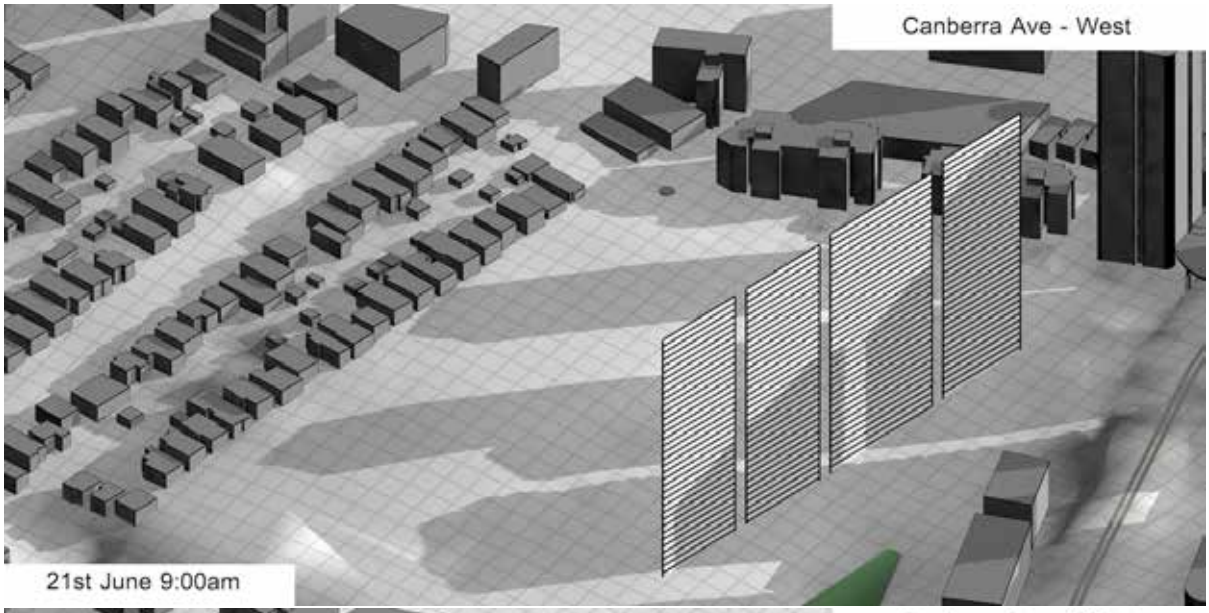
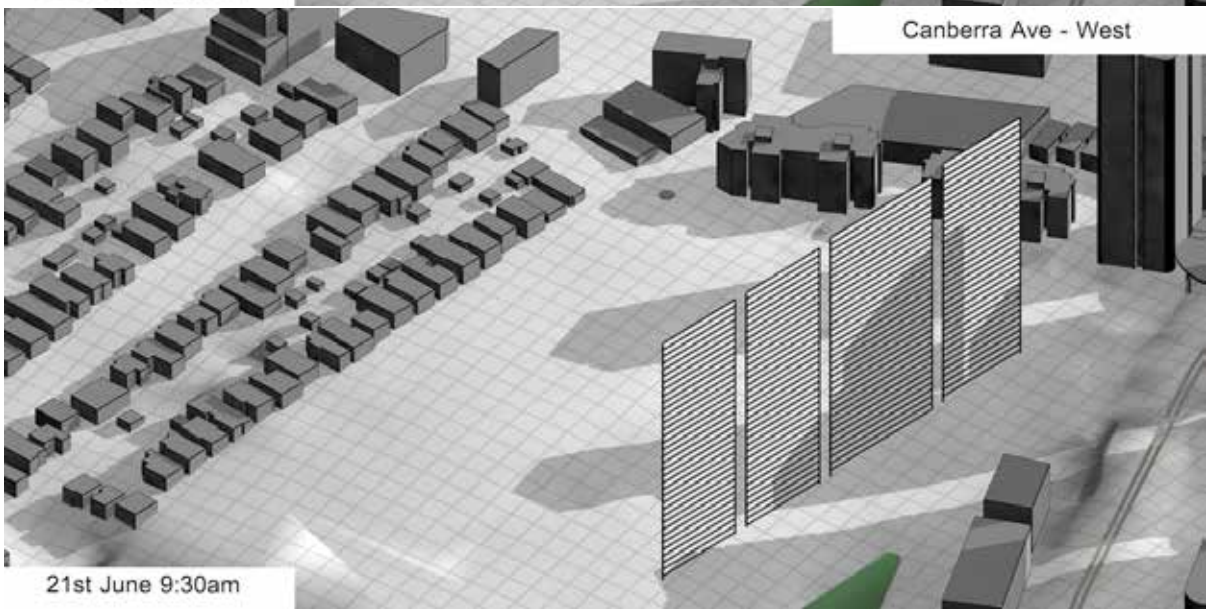
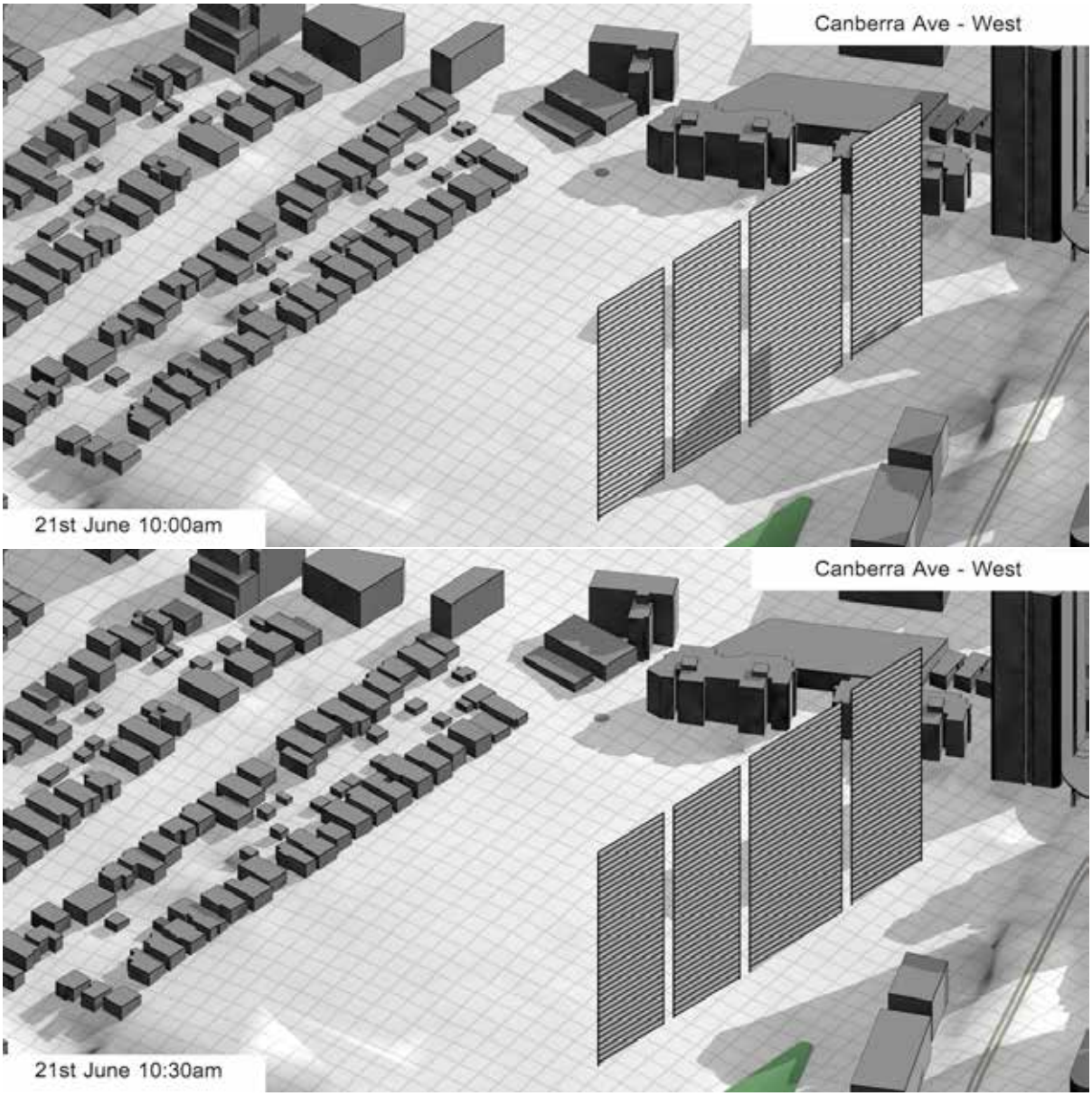

Holdsworth Ave - West
21st June 10:00am


Holdsworth Ave - West
21st June 10:30am


Canberra Ave - West
21st June 9:00am


Canberra Ave - West
21st June 9:30am



These shadow projections show that existing and approved buildings have negligible impacts on Berry Road buildings but significant impacts on lower levels of Canberra Avenue buildings in the early morning (9 - 9:30am). These impacts have however abated by mid-morning.

5.3 Option A - Notional Graduated Heights

Heights are graduated from those proposed on Marshall Avenue (19/15/12/10) down to meet with overall 8 storey at 300-400m from station. This option seeks to create a strong and coherent visual transition.

Figure 5.2 – Option A Notional Heights Stepped Down to 8 Storeys

On the following pages are the development potential calculations in order to measure additional floor space potential over the 8 storey / 2.75 : 1 base which is generally applied to the precinct, if the above heights could be achieved. Note that some non-compliance with the ADG of SEPP65 may ensue with respect to solar access.

Development Potential

Table 5.1– FSR Potential

Base Case / Improvement

Site i - 15 floors

40 x 20 = 800 x 6 =	4800
34 x 17 = 578 x 6 =	3468
28 x 14 = 392 x 3 =	1176
	9444 x 0.8 = 7555m^2 / 1800 = 4.2 : 1 (say 4 : 1)

1800 x 2.75 = 4950 x 0.8 = 3960m^2
Therefore additional Floor Space = 7555 - 3960 = 3595m^2 or approximately 40 units.

Site ii - 12 floors

40 x 20 = 800 x 6 =	4800
34 x 17 = 578 x 6 =	3468
	8268 x 0.8 = 6614m^2 / 1800 = 3.67 : 1 (say 3 : 5)

1800 x 2.75 = 4950 x 0.8 = 3960m^2
Therefore additional Floor Space = 6614 - 3960 = 2654m^2 or approximately 30 units.

Site iii - 12 floors

35 x 20 = 700 x 6 =	4200
29 x 17 = 493 x 6 =	2958
	7158 x 0.8 = 5726m^2 / 1665 = 3.44 : 1

1665 x 2.75 = 4579 x 0.8 = 3663m^2
Therefore additional Floor Space = 5726 - 3663 = 2063m^2 or approximately 23 units.

Site iv - 10 floors

35 x 20 = 700 x 6 =	4200
29 x 17 = 493 x 4 =	1972
	6172 x 0.8 = 4937m^2 / 1665 = 2.96 : 1 (say 3 : 1)

1665 x 2.75 = 4579 x 0.8 = 3663m^2
Therefore additional Floor Space = 4937 - 3663 = 1274m^2 or approximately 15 units.

Site v - 10 floors

35 x 20 = 700 x 6 =	4200
29 x 17 = 493 x 4 =	1972
	6172 x 0.8 = 4937m^2 / 1505 = 3.3 : 1

1505 x 2.75 = 4139 x 0.8 = 3311m^2
Therefore additional Floor Space = 4937 - 3311 = 1626m^2 or approximately 18 units.

Site vi - 10 floors

40 x 20 = 800 x 6 =	4800
34 x 17 = 578 x 4 =	2312
	7112 x 0.8 = 5690m^2 / 1961 = 2.9 : 1 (say 3 : 1)

1961 x 2.75 = 5393 x 0.8 = 4314m^2
Therefore additional Floor Space = 5690 - 4314 = 1376m^2 or approximately 15 units.

Site vii - 8 floors (10 floors)

35 x 20 = 700 x 6 =	4200
29 x 17 = 493 x 2 =	986
	5186 x 0.8 = 4149m^2 / 1620 = 2.56 : 1

No Addition

Total	**12,588m^2**

Thus, if these heights, can be achieved a total additional NFA of 12,588m2 or in the order of 140 additional units may be delivered in close proximity to the rail station. These may be used to fund additional open space, affordable housing and community facilities.

Table 5.2
From this height map and maintaining Masterplan building footprints, the following FSR may be achieved.

	height floors (m)	height (storeys)	FSR
i	48	15	4 : 1
ii	38	12	3.5 : 1
iii	38	12	3.5 : 1
iv	33	10	3 : 1
v	33	10	3.25 : 1
vi	33	10	3 : 1
vii	26	8	2.75 : 1

Table 5.3
This suggests that there is development potential above that generally permissible (2.75:1 at 8 storeys) in the order of:

	basic FSR	Additional FSR : 1	NFA Uplift (m2)	Units
Site 1	2.75	1.25	5437	61
Site 2	2.75	1.25	3842	43
Site 3	2.75	0.75	3000	34
i	2.75	1.25	3595	40
ii	2.75	0.75	2654	30
iii	2.75	0.75	2063	23
iv	2.75	0.25	1274	14
v	2.75	0.50	1626	18
vi	2.75	0.25	1376	15
vii	2.75	---	---	---
Total			24,867	278

Thus it can be seen that within 200-300m of the railway station an additional 24,867m2 of FA can be provided which is approximately 278 2br/dwellings.

5.4 Maximum Heights

The following shadow diagrams are based on a desire to increase the building heights along Marshall Avenue to 15-19 storeys tapering down to River Road to 8 storeys. The shadow diagrams show that most of the open space could receive 2 hours of direct sunlight. The west and east facades of the building envelopes only achieve 70% receiving 1.5 hours of direct sunlight between 9am and 3pm at mid winter.

This is due to the following:

- slightly oblique N-S street alignments limiting solar access to about 2hrs max.
- South facing slope which increase difficulty of solar access.

In reality buildings over 8 storeys will be difficult to gain full solar access to ADG standards.

Figure 5.3 – Maximum Heights

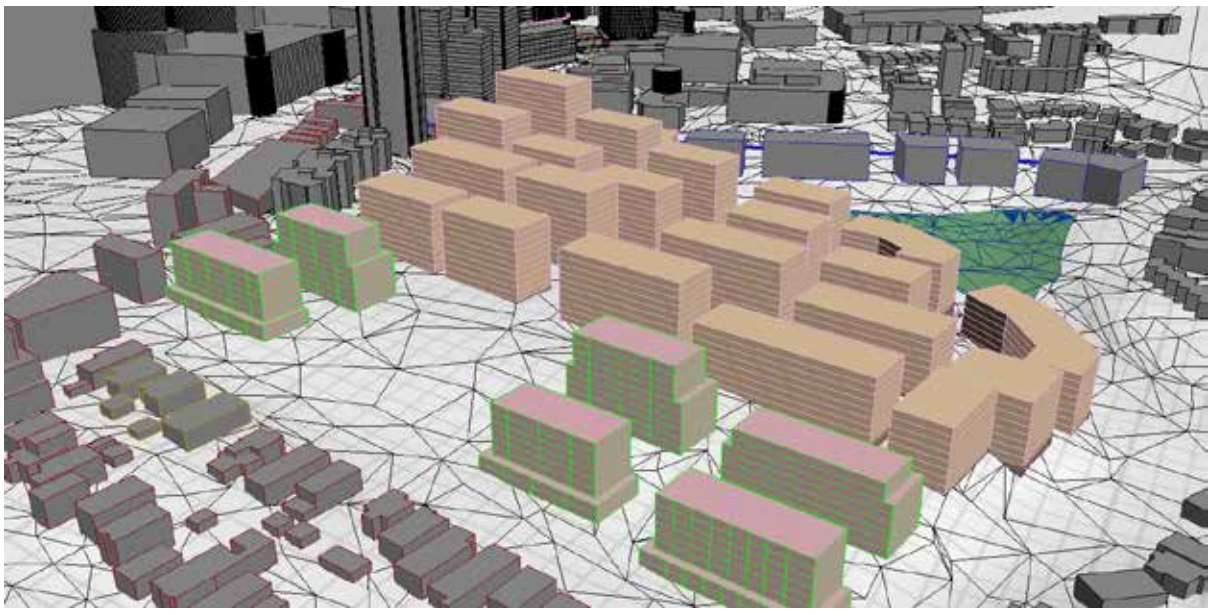
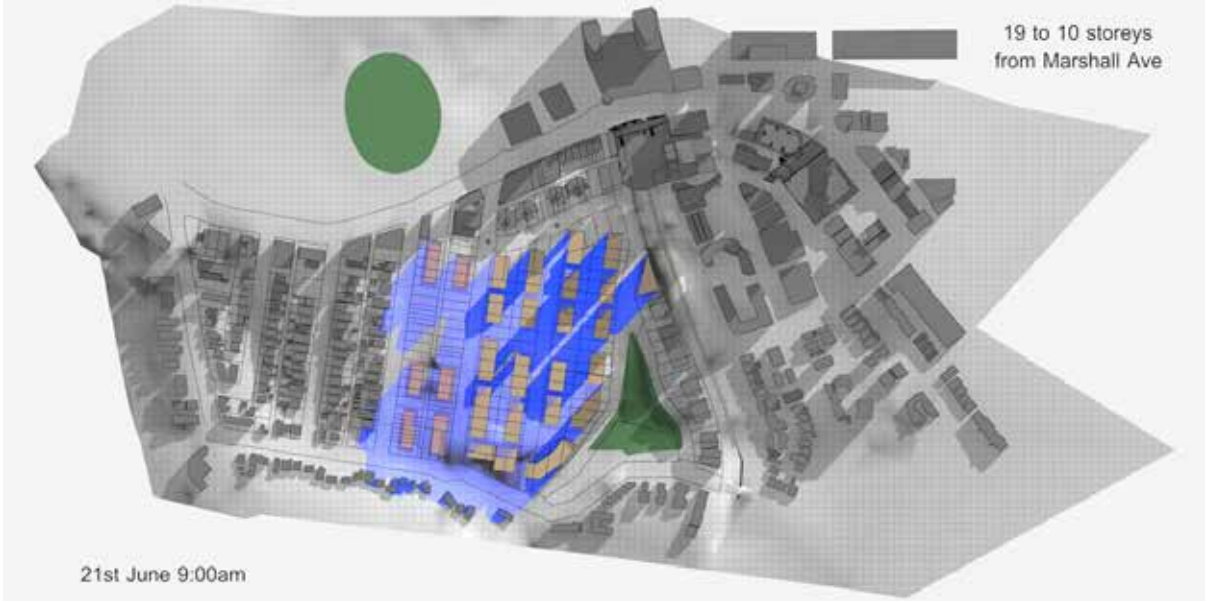
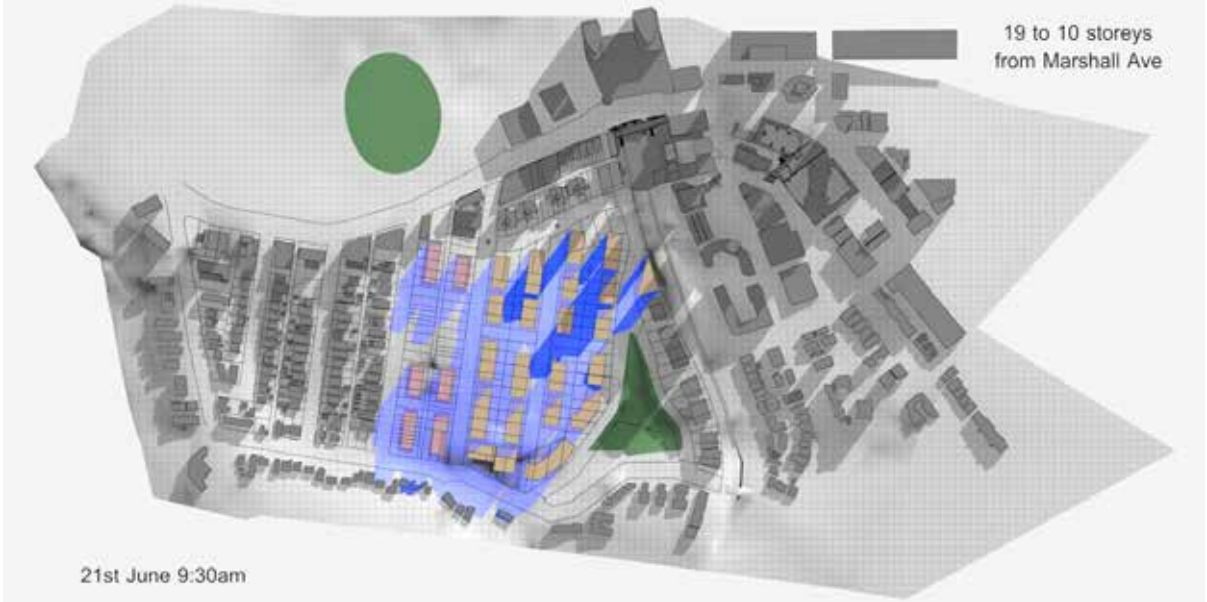
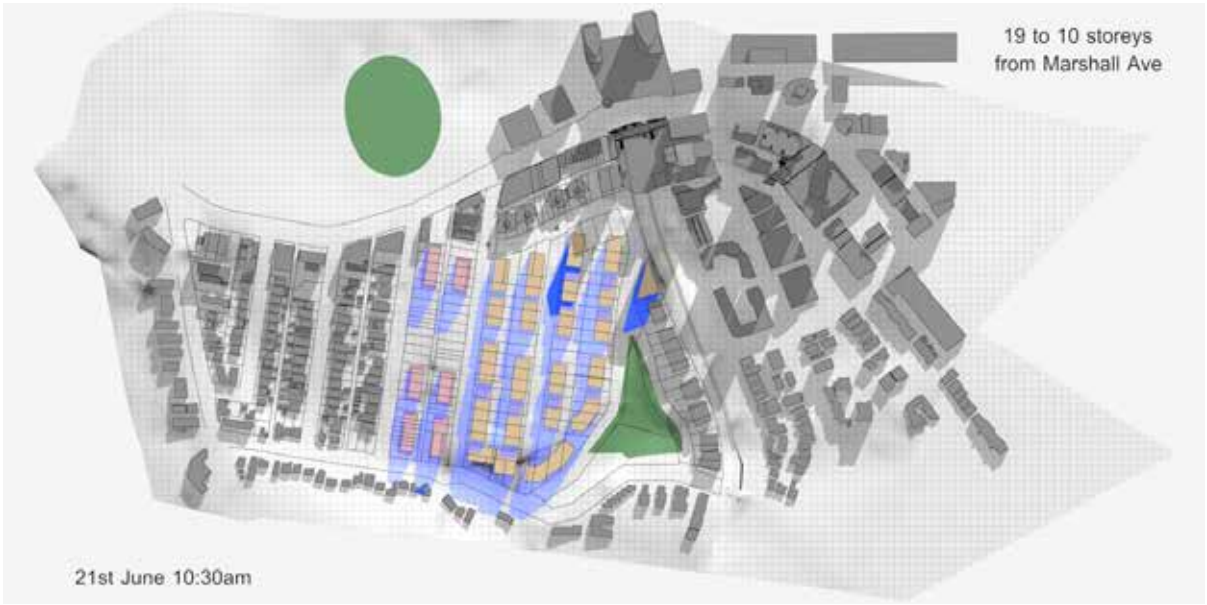


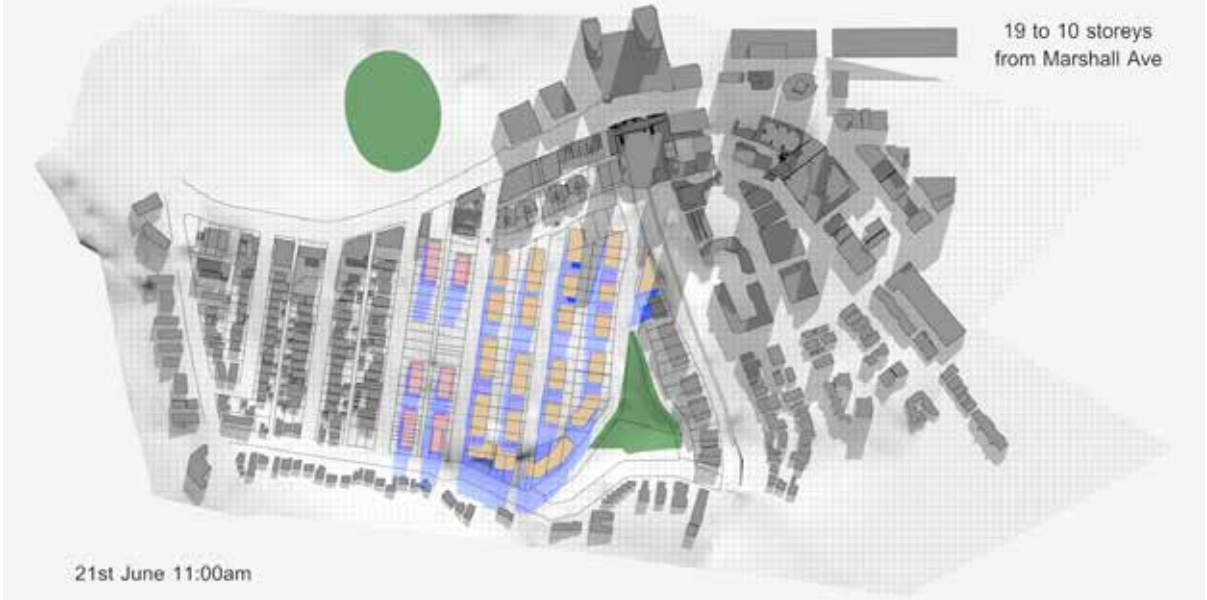
Figure 5.4 – Maximum Heights - 3D Model

Solar access to Open Space / Shadow Impacts

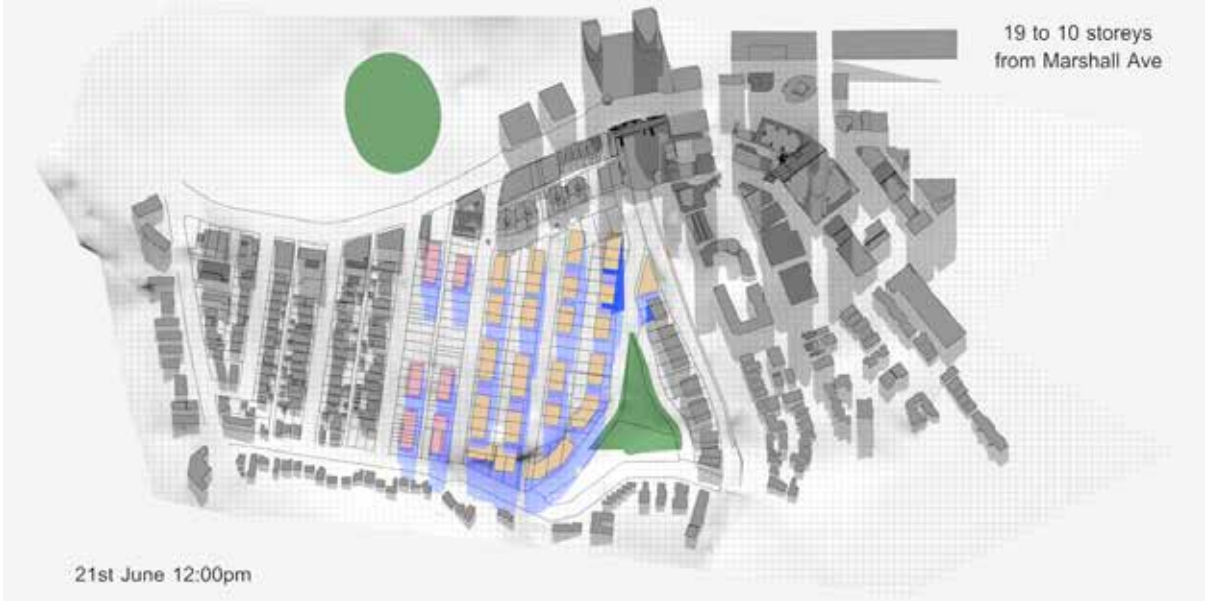





19 to 10 storeys
from Marshall Ave
21st June 10:30am


19 to 10 storeys
from Marshall Ave
21st June 11:00am


19 to 10 storeys
from Marshall Ave
21st June 11:30am

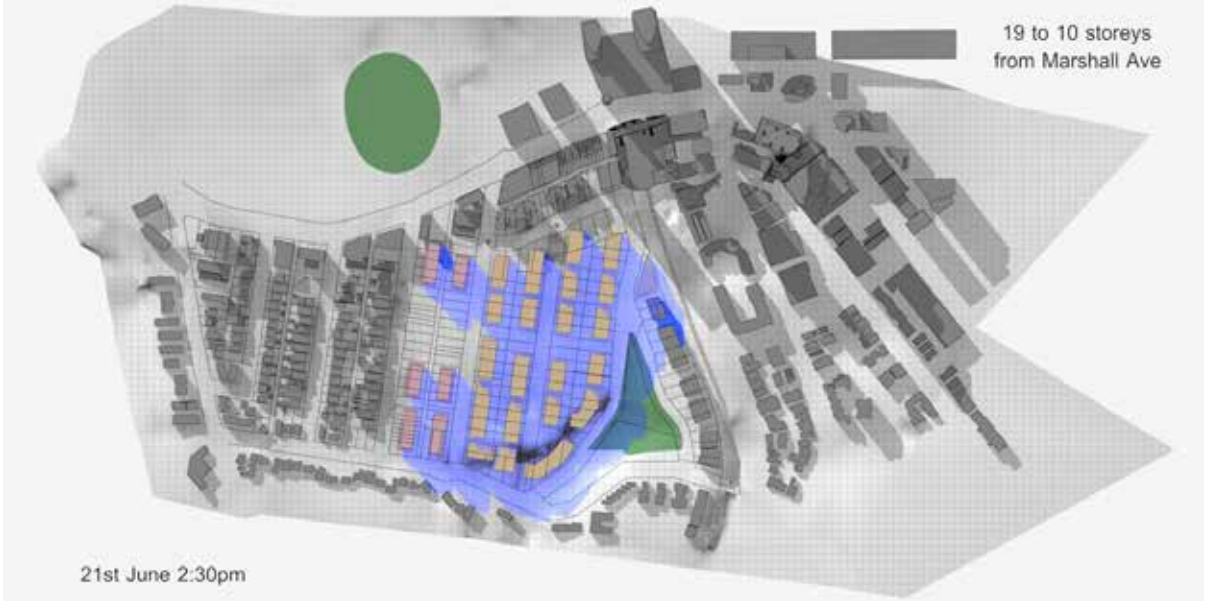

19 to 10 storeys
from Marshall Ave
21st June 12:00pm

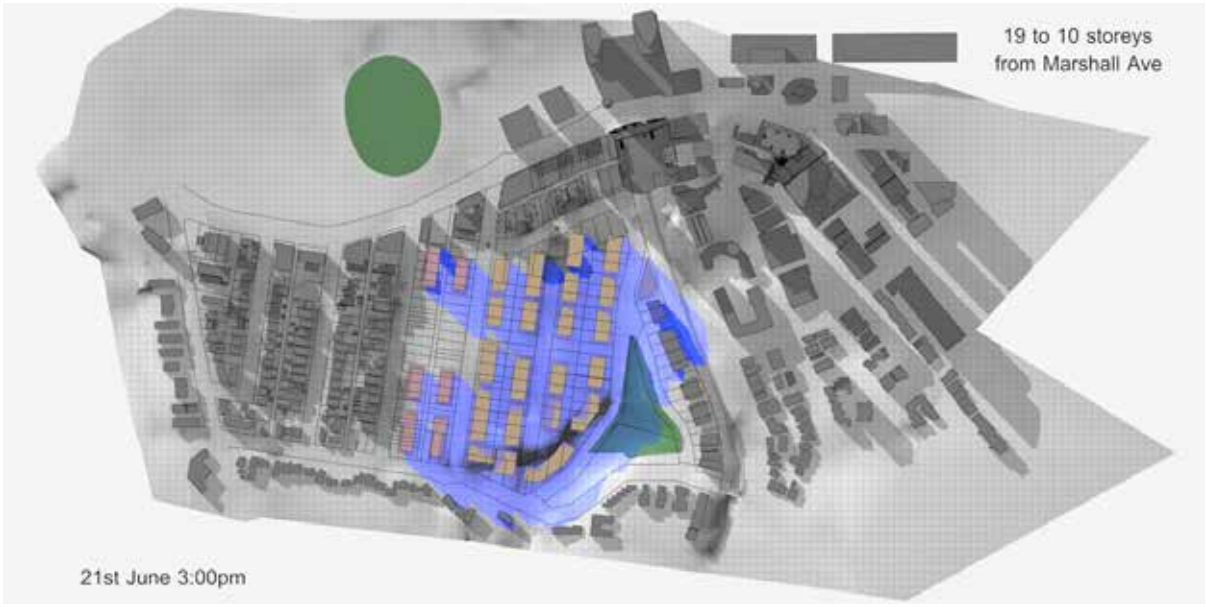

19 to 10 storeys
from Marshall Ave
21st June 12:30pm


19 to 10 storeys
from Marshall Ave
21st June 1:00pm

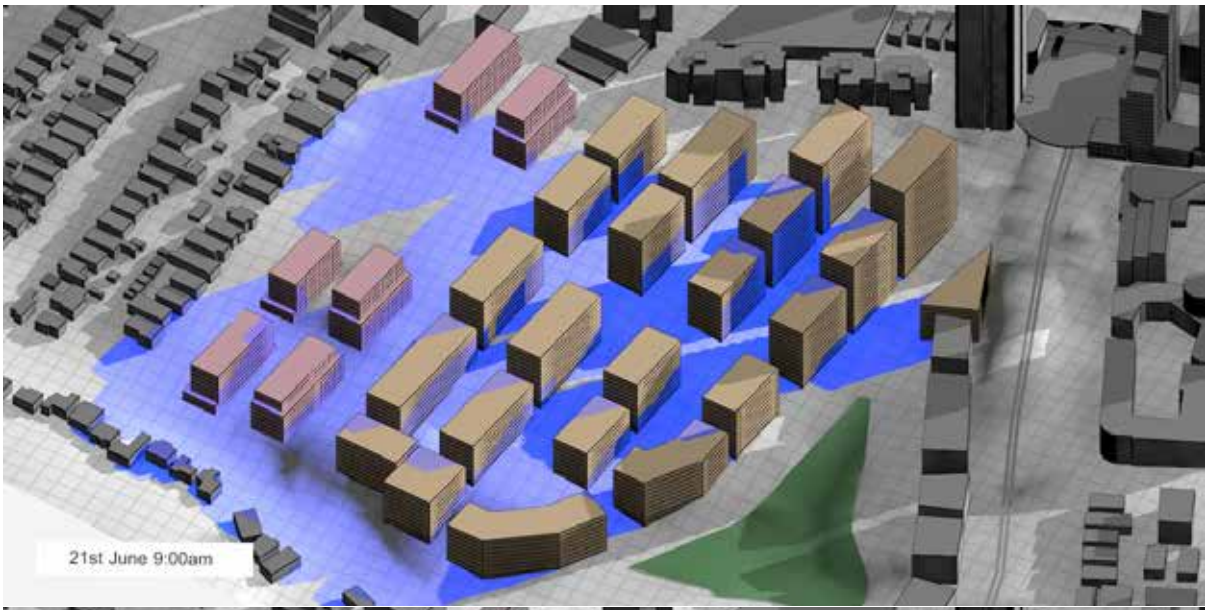

19 to 10 storeys
from Marshall Ave
21st June 1:30pm

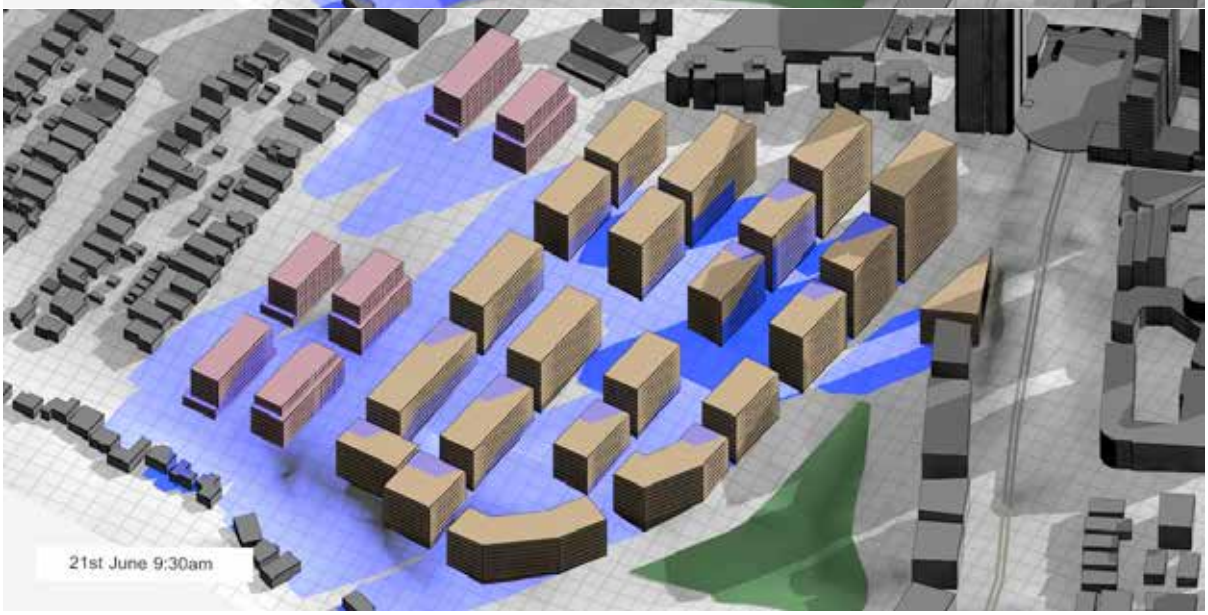

19 to 10 storeys
from Marshall Ave
21st June 2:00pm


19 to 10 storeys
from Marshall Ave
21st June 2:30pm

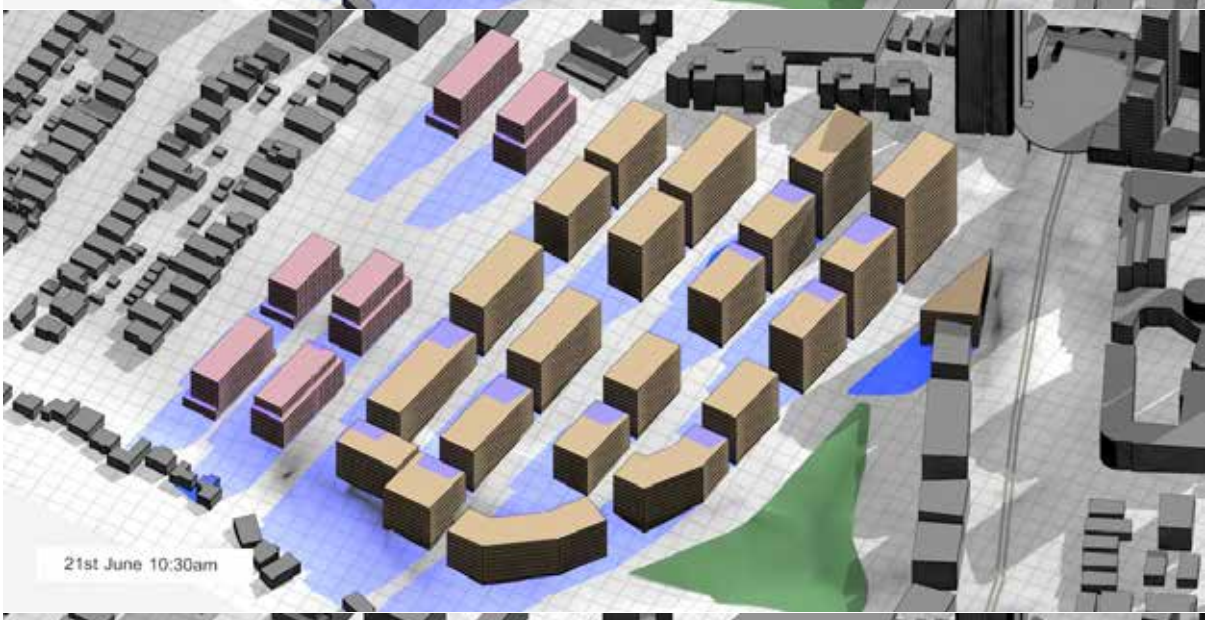


Solar access to east facing facades between 9 and 11:30am.



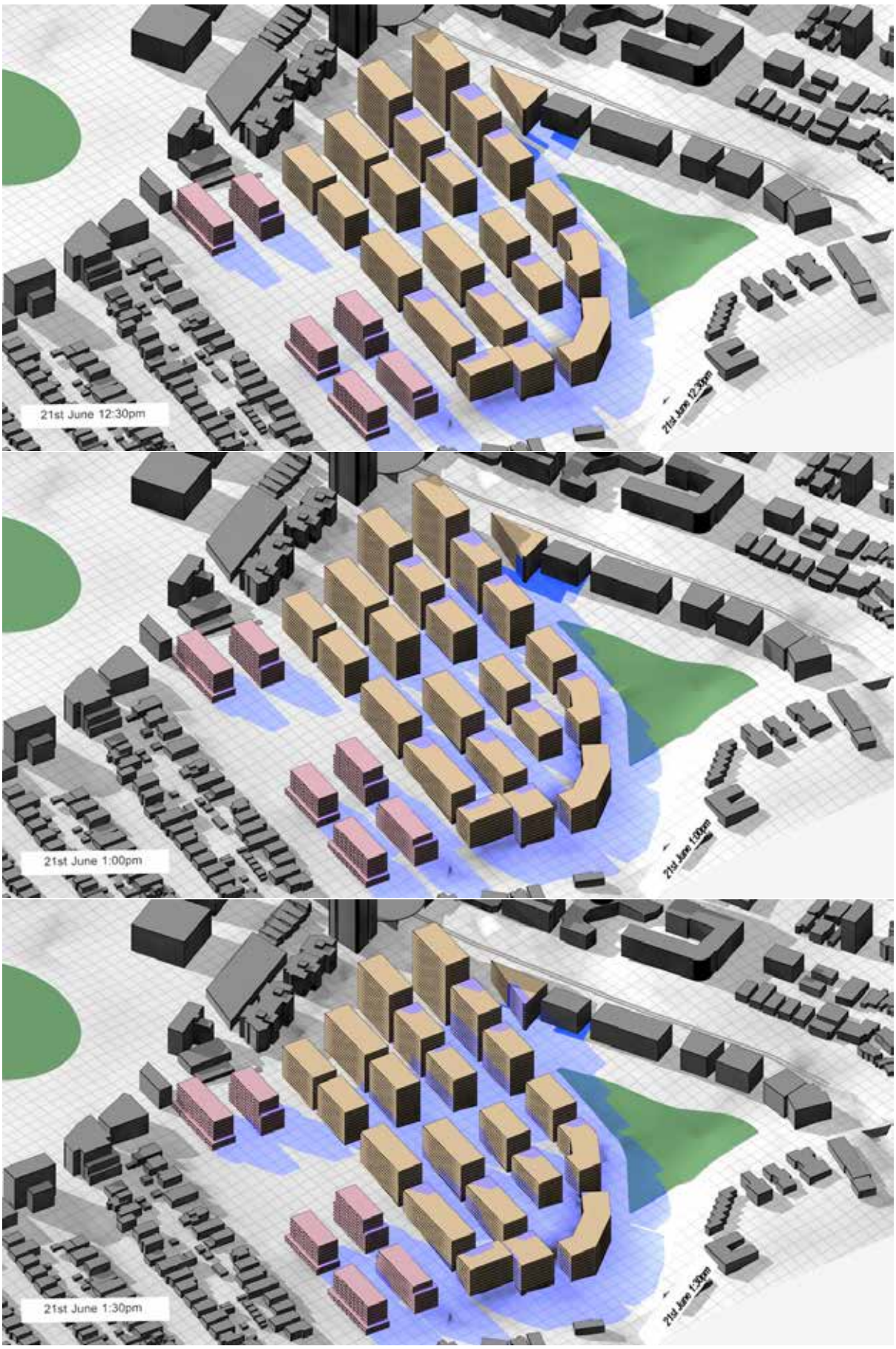


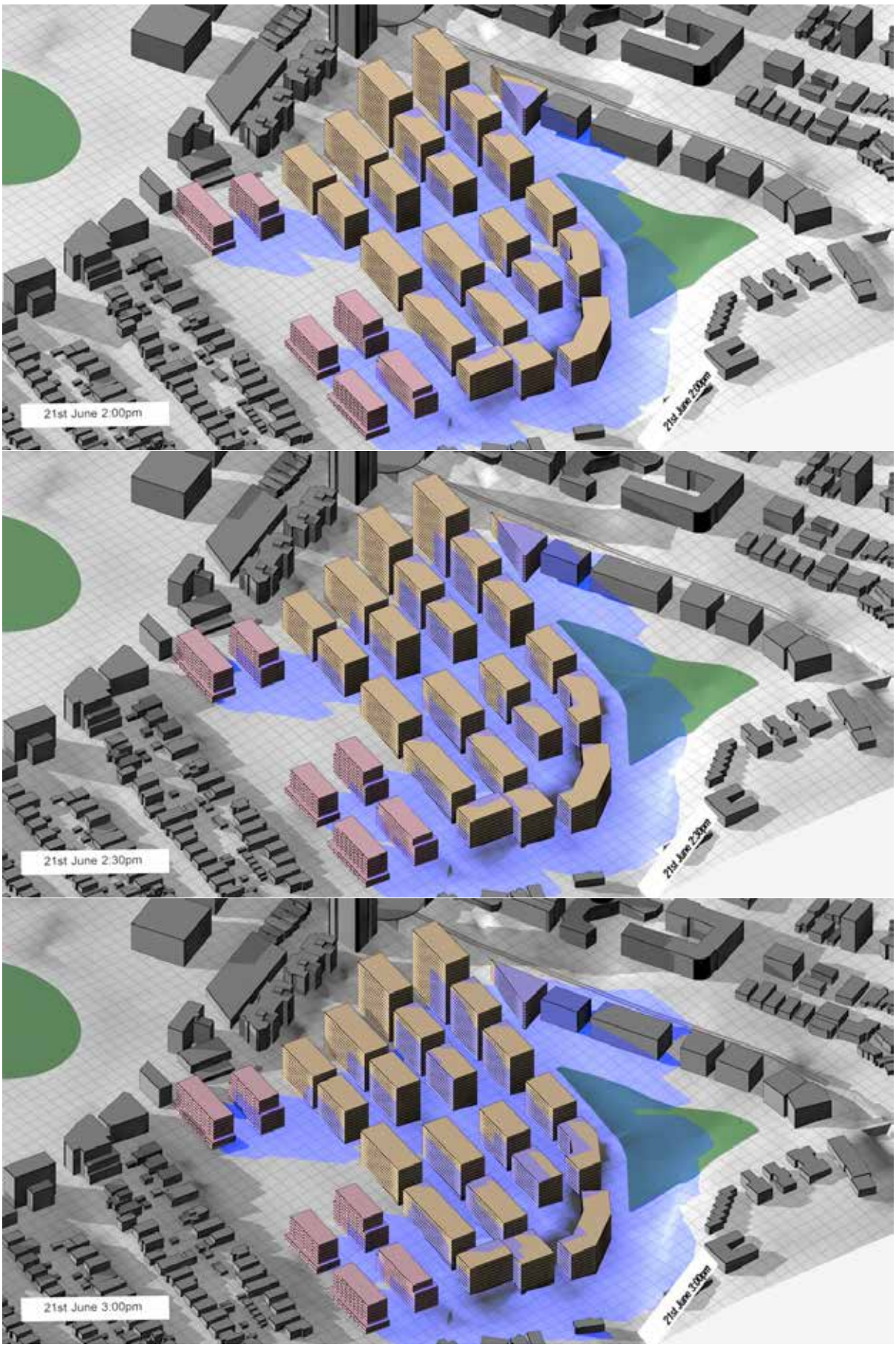

21st June 10:00am


21st June 10:30am


21st June 11:00am

Solar access to west facing facades between 12:30 and 3:00pm.


21st June 12:30pm
21st June 1:00pm
21st June 1:30pm


21st June 2:00pm
21st June 2:30pm
21st June 3:00pm

5.5 Building Height Variations (in storeys)

The following shadow diagrams are based on Council's desire to increase some of the building heights south of Marshall Avenue and tapering down to River Road whilst substantially achieving compliance with sunlight access requirement of a ADG / SEPP65. The purpose is to provide for potential increase in affordable housing and other public benefits. The shadow diagrams show that most of the open space could receive two hours of direct sunlight. The reduced building heights in most instances have achieved at least 70% of units receiving two hours direct sunlight between 9 AM and 3 PM at mid-winter.

Figure 5.5 Building Height Variations

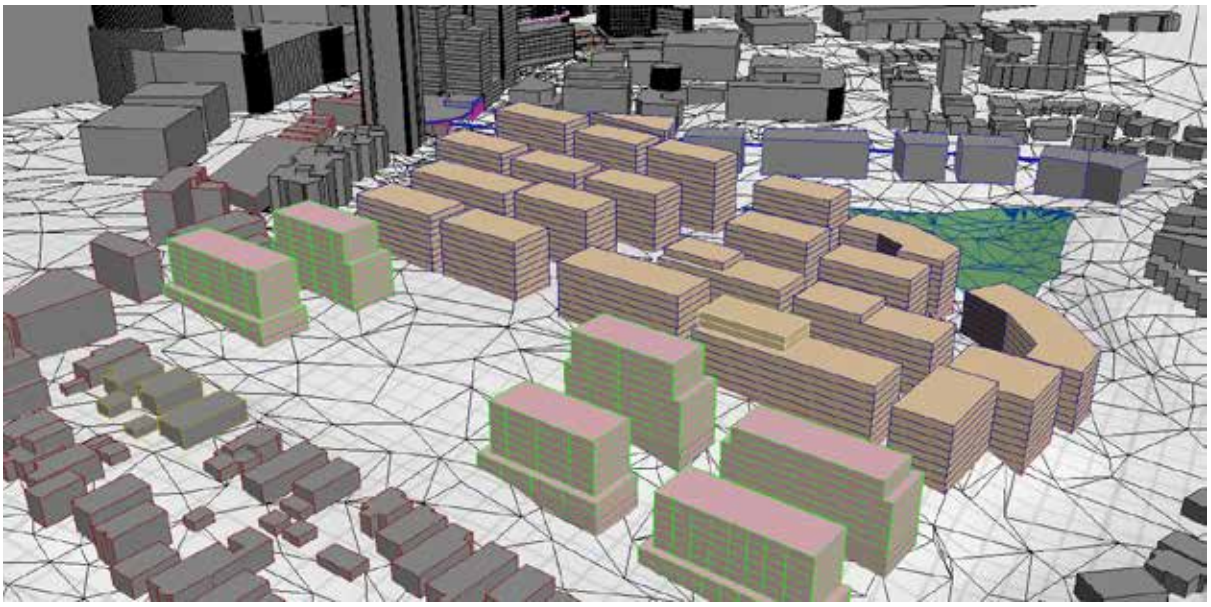
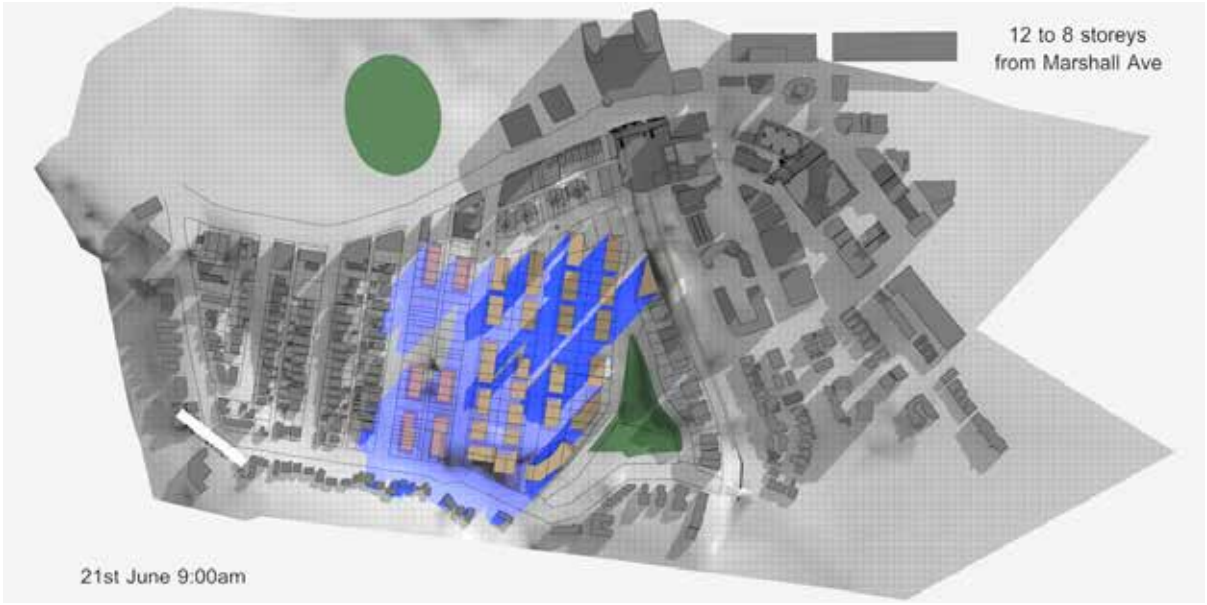
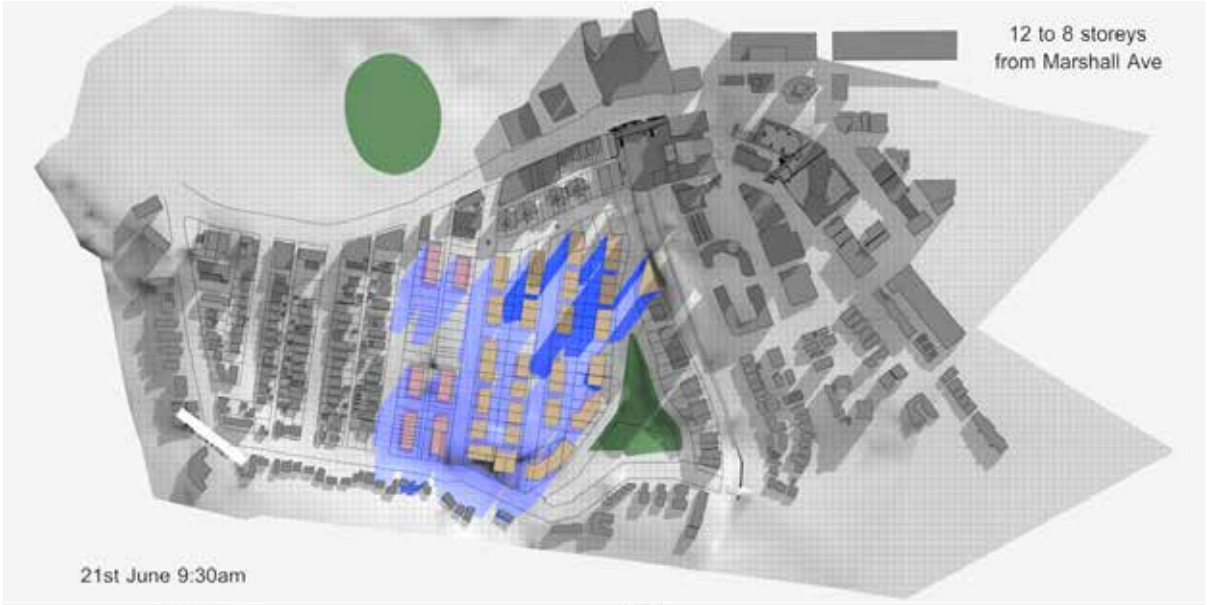
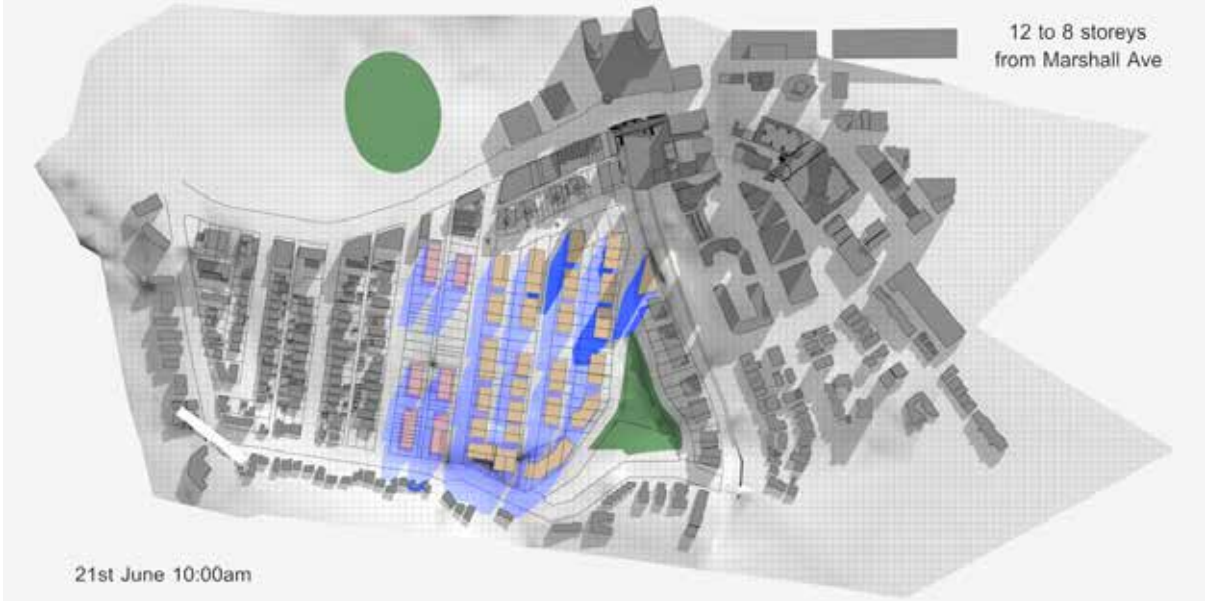


Figure 5.6 - Modified Building Heights

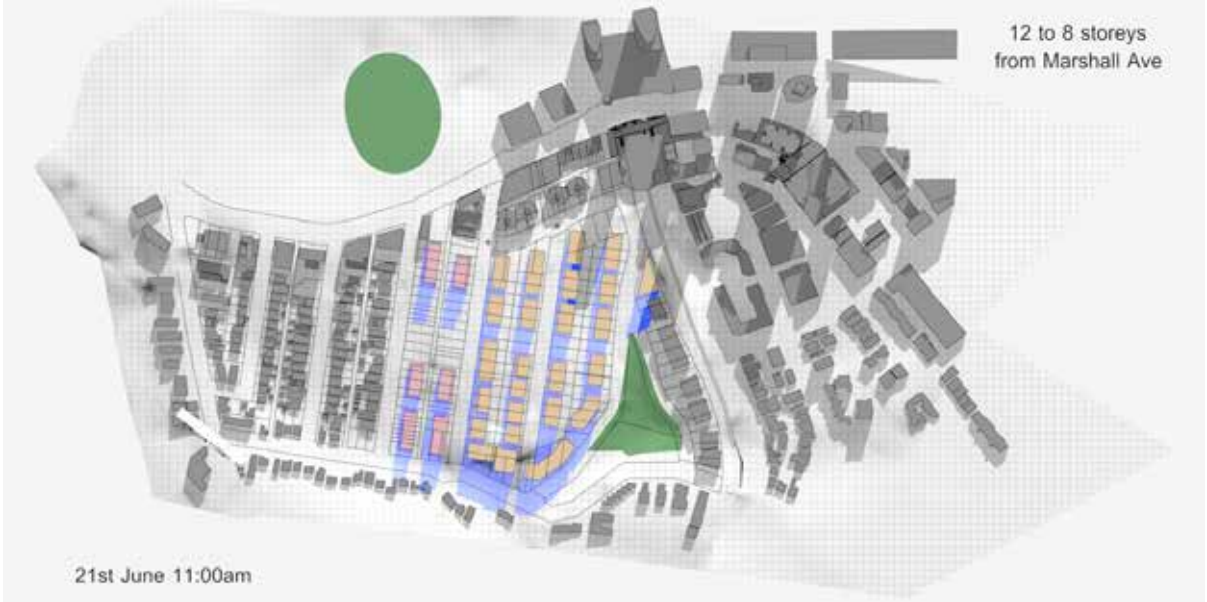
Solar access / shadow impacts winter solstice



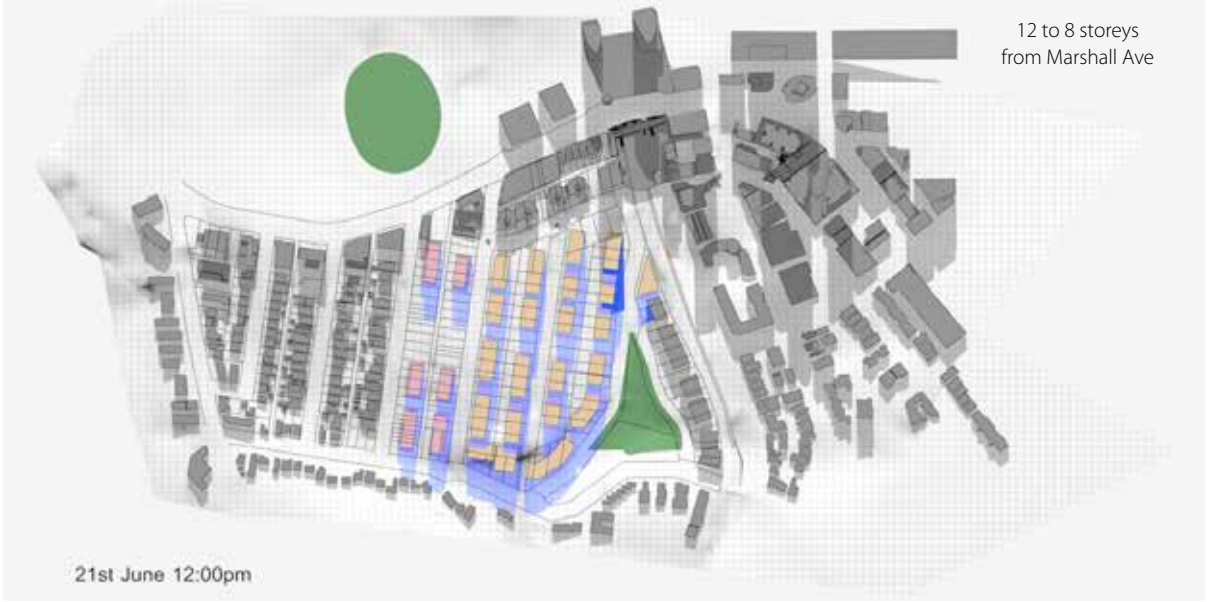





12 to 8 storeys
from Marshall Ave
21st June 10:30am


12 to 8 storeys
from Marshall Ave
21st June 11:00am


12 to 8 storeys
from Marshall Ave
21st June 11:30am

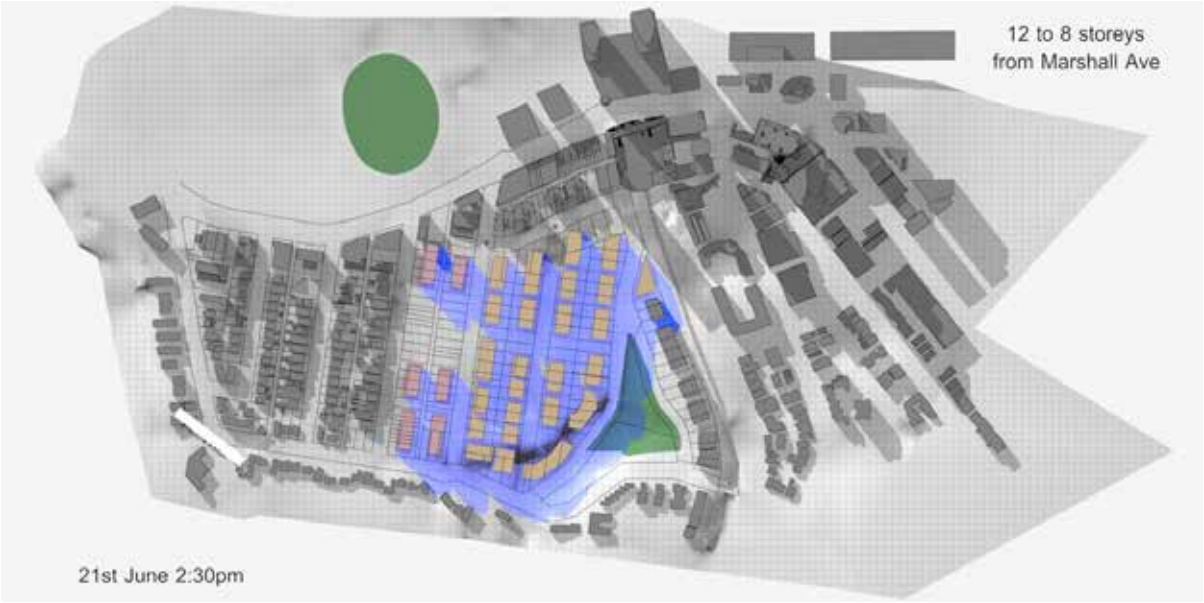

12 to 8 storeys
from Marshall Ave
21st June 12:00pm

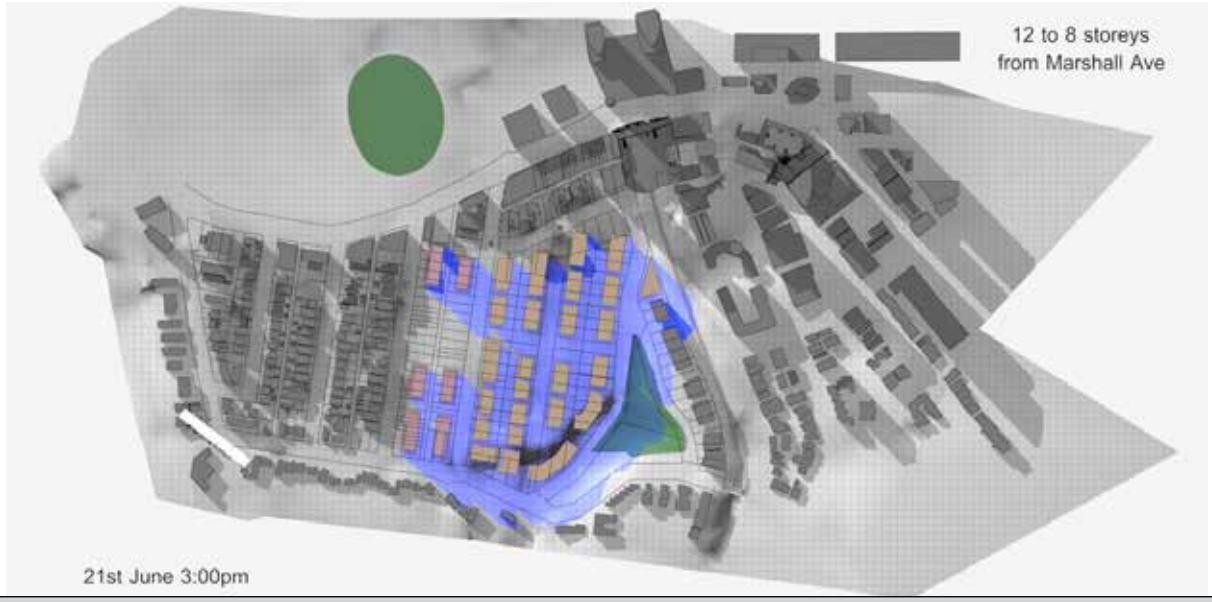

12 to 8 storeys
from Marshall Ave
21st June 12:30pm


12 to 8 storeys
from Marshall Ave
21st June 1:00pm


12 to 8 storeys
from Marshall Ave
21st June 1:30pm

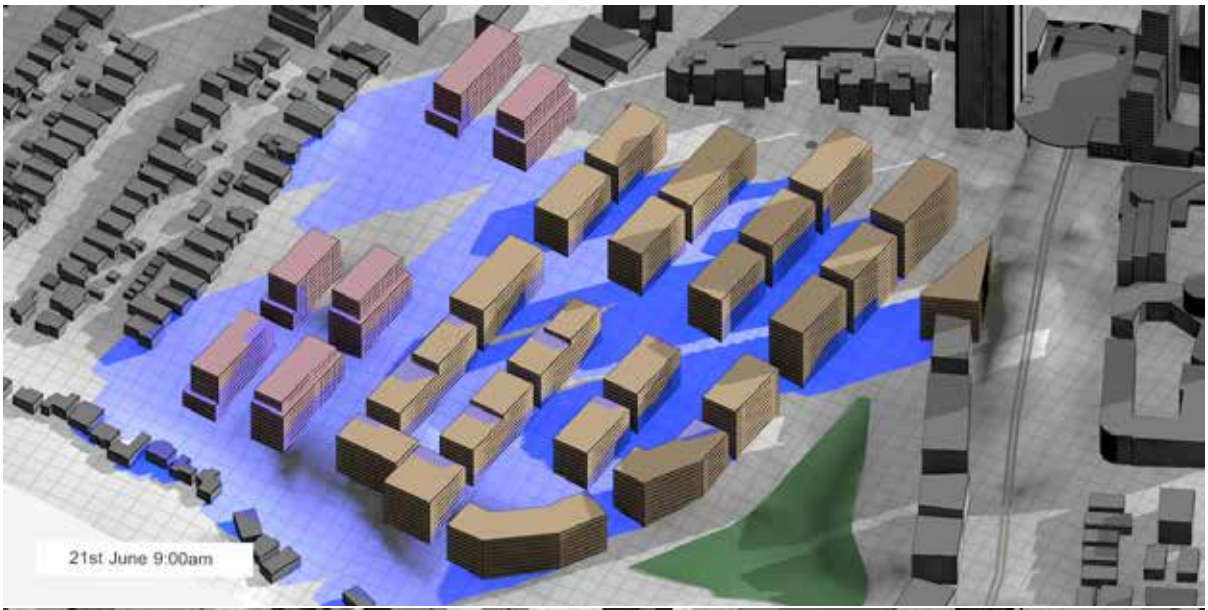

12 to 8 storeys
from Marshall Ave
21st June 2:00pm

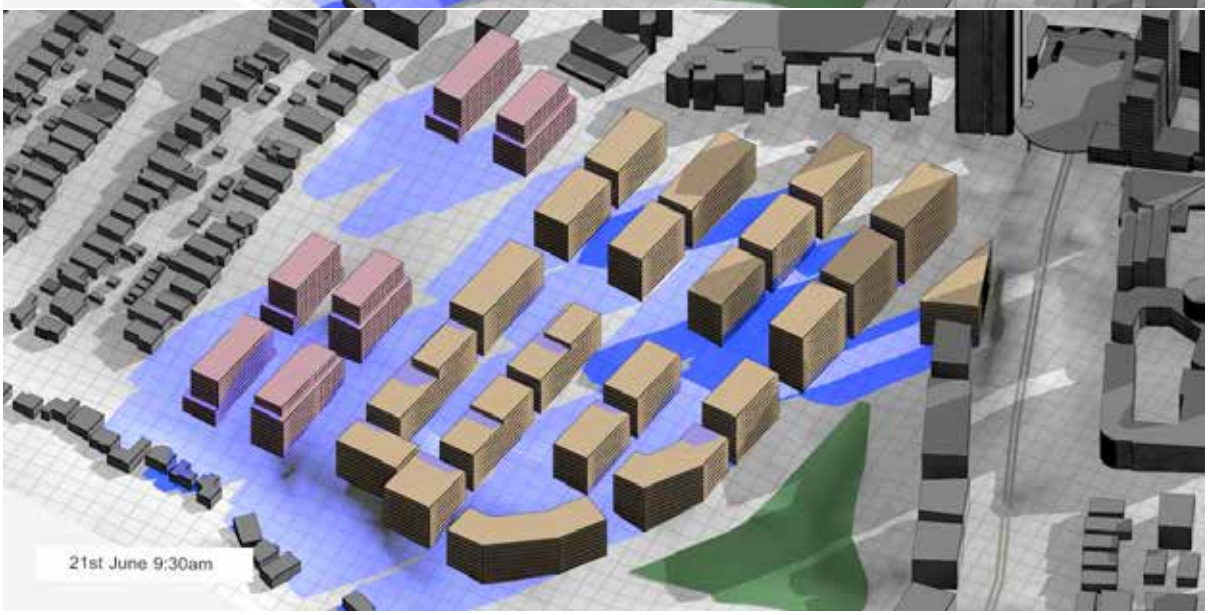

12 to 8 storeys
from Marshall Ave
21st June 2:30pm



This option achieves >2hrs solar access to communal open space (between 10am and 12:30pm).

The east faces of buildings generally receive 2hrs solar access between 9 and 11am.






21st June 10:00am


21st June 10:30am

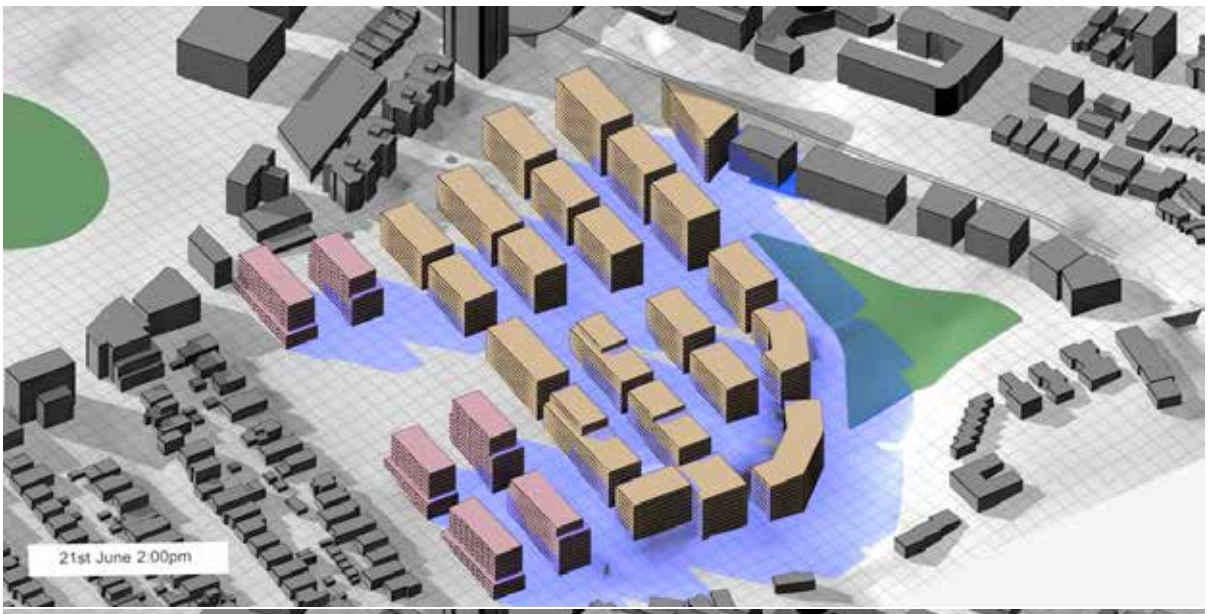

21st June 11:00am

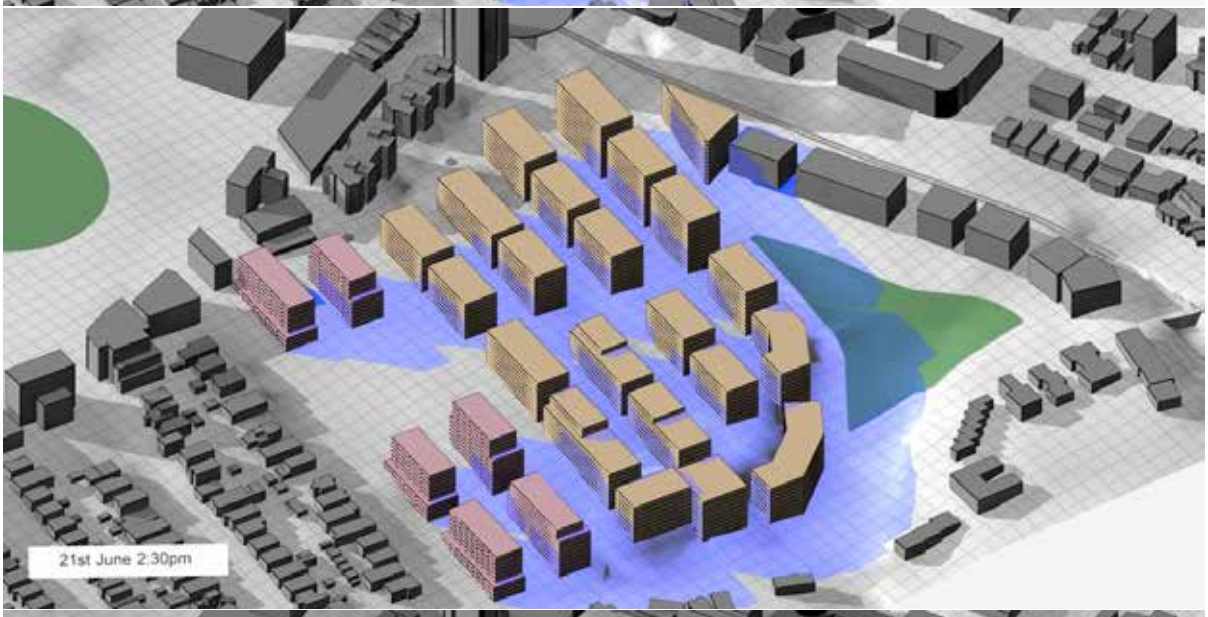
West facing facades generally receive 2hrs of solar access between 12:30 and 2:30pm.

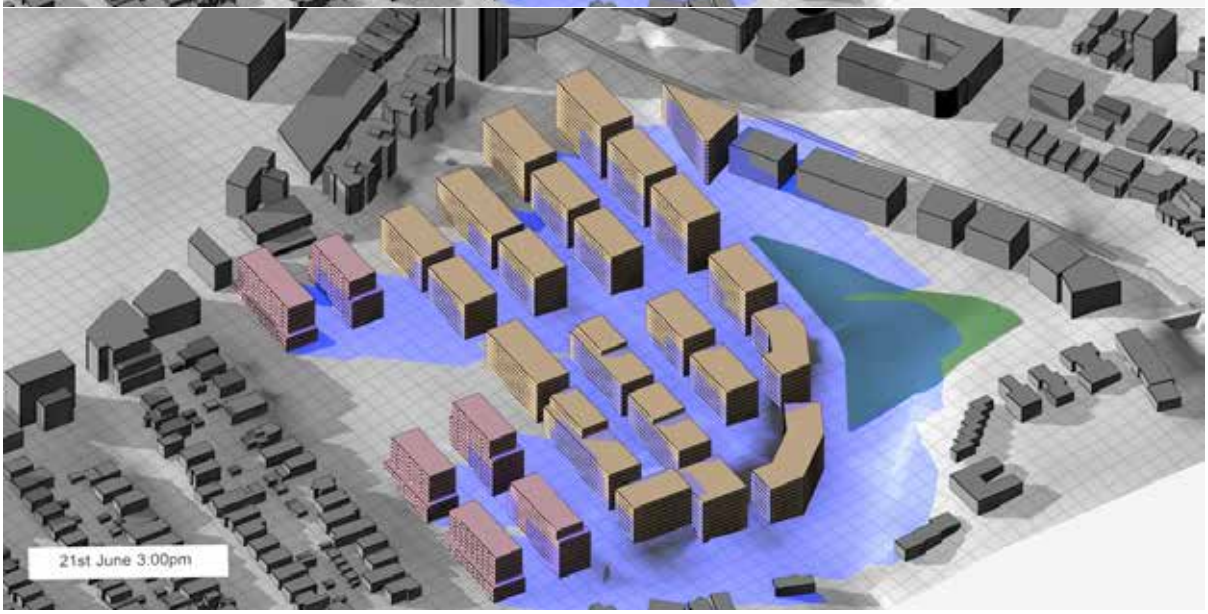

21st June 12:30pm


21st June 1:00pm


21st June 1:30pm


21st June 2:00pm


21st June 2:30pm


21st June 3:00pm

5.6 Conclusions

The above review came to the following conclusions:

- Generally speaking 8 storey street-facing buildings at FSR 2.5-2.75:1 can be developed with ADG compliance
- Compliant solar access to communal open space can be achieved for such buildings
- Existing and already proposed building shadows impact the northern parts of the precinct in early morning (till about 10am) reducing solar opportunity
- Solar access to apartments (particularly at lower levels) becomes problematic with heights above 8 storeys in terms of achieving 2 hours at midwinter. This is because of:
    - South facing slopes
    - Slightly off north grid

    Note however the following:
    - It is possible to get 1.5 hours solar access to most apartments
    - Most of upper levels of buildings are compliant with 2 hours
    - It may be possible to design crossover apartments to improve solar access to lower levels to be 2 hour compliant

5.7 Further Testing

In order to test the solar access implications further we have modeled the months of May and July as well as June mid-winter (see below). This indicates that although the 2 hours solar access compliance is difficult to achieve mid-winter (June), it is possible in both May and July.

Figure 5.7 - Further Testing / Revised Heights

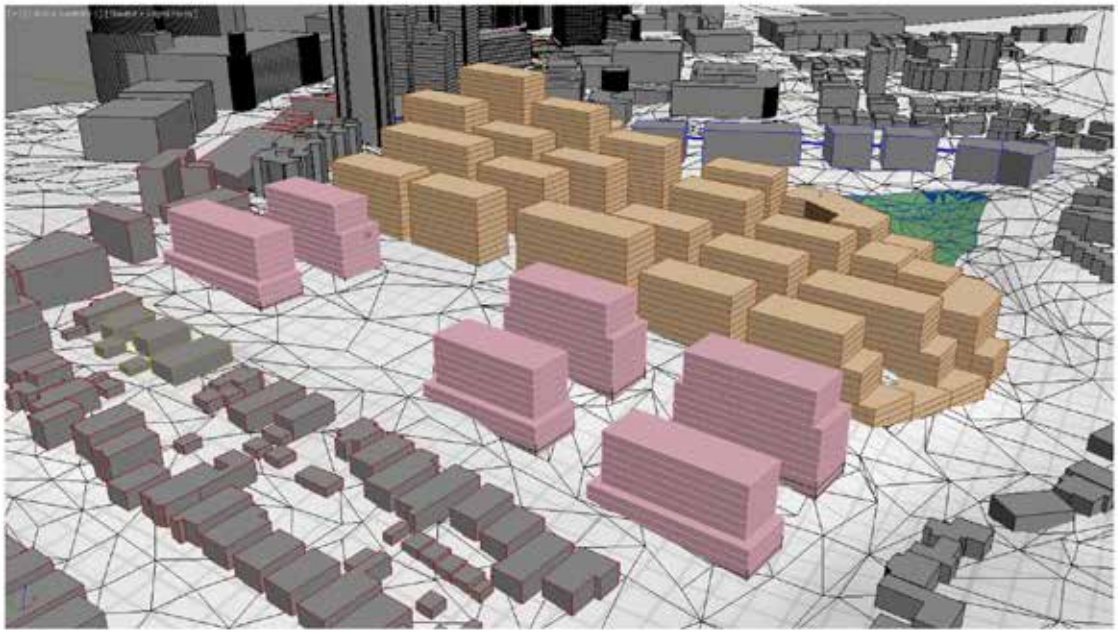
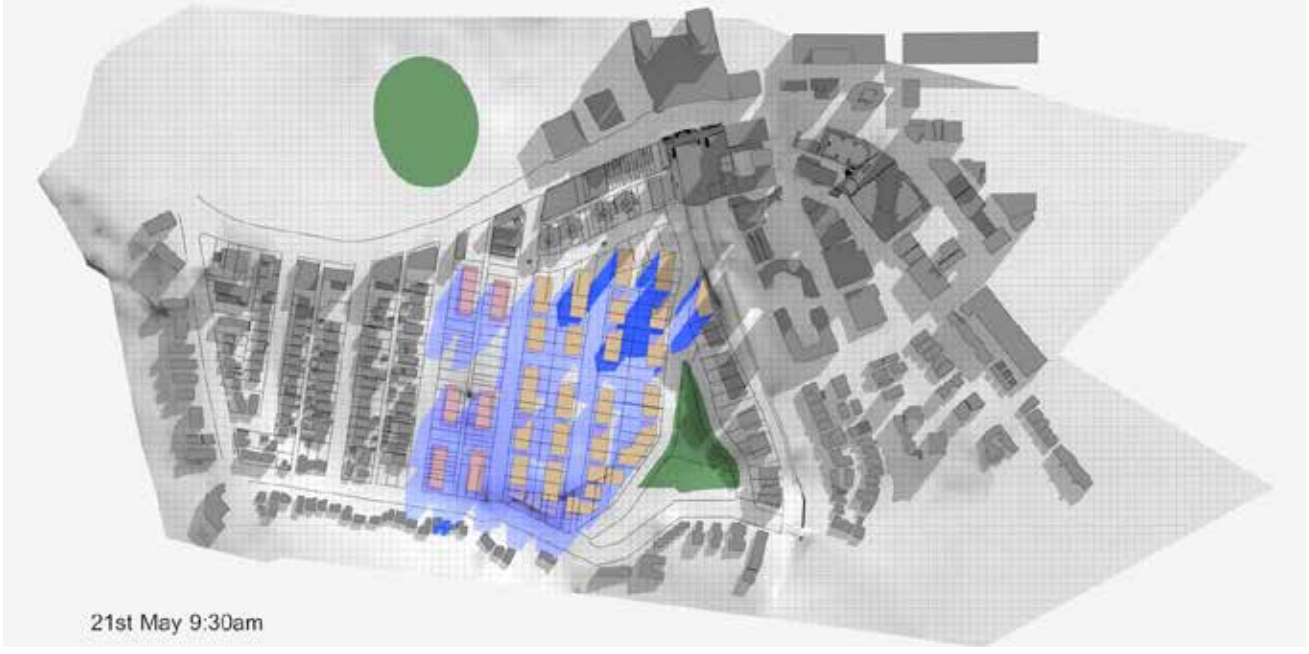
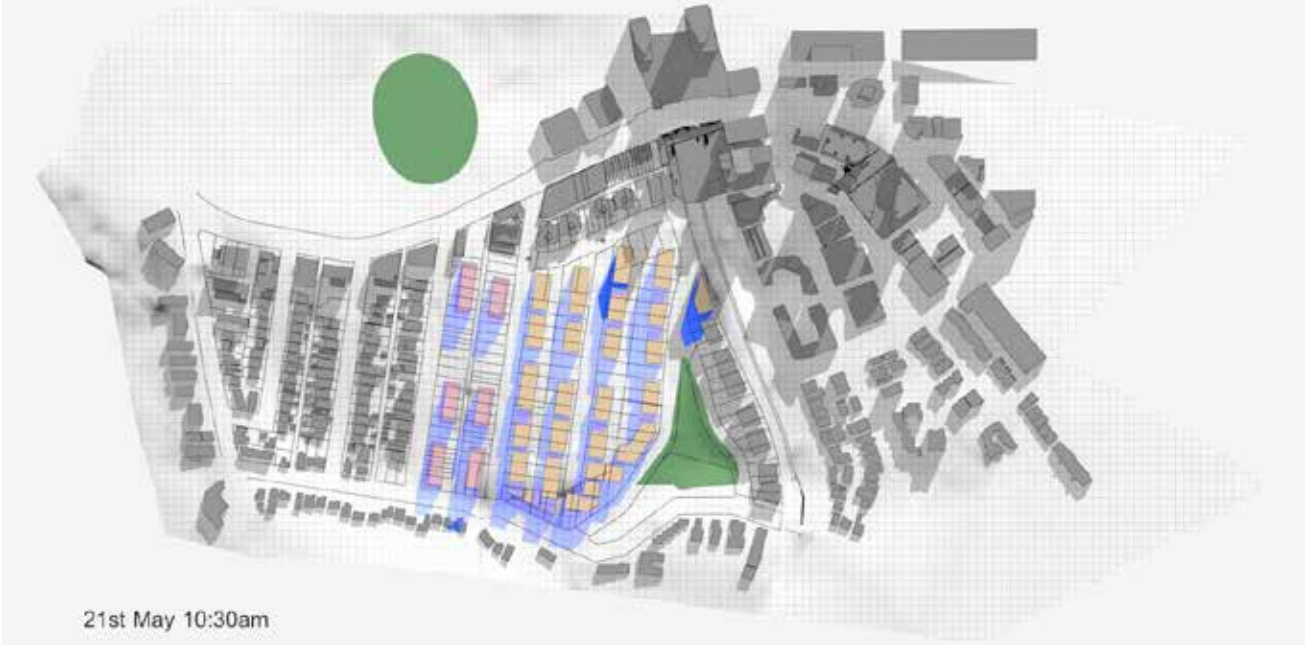


Figure 5.8 - Revised Heights - 3D Model

Solar Access for 21st May



21st May 10:00am



21st May 10:30am

21st May 11:00am

21st May 11:30am

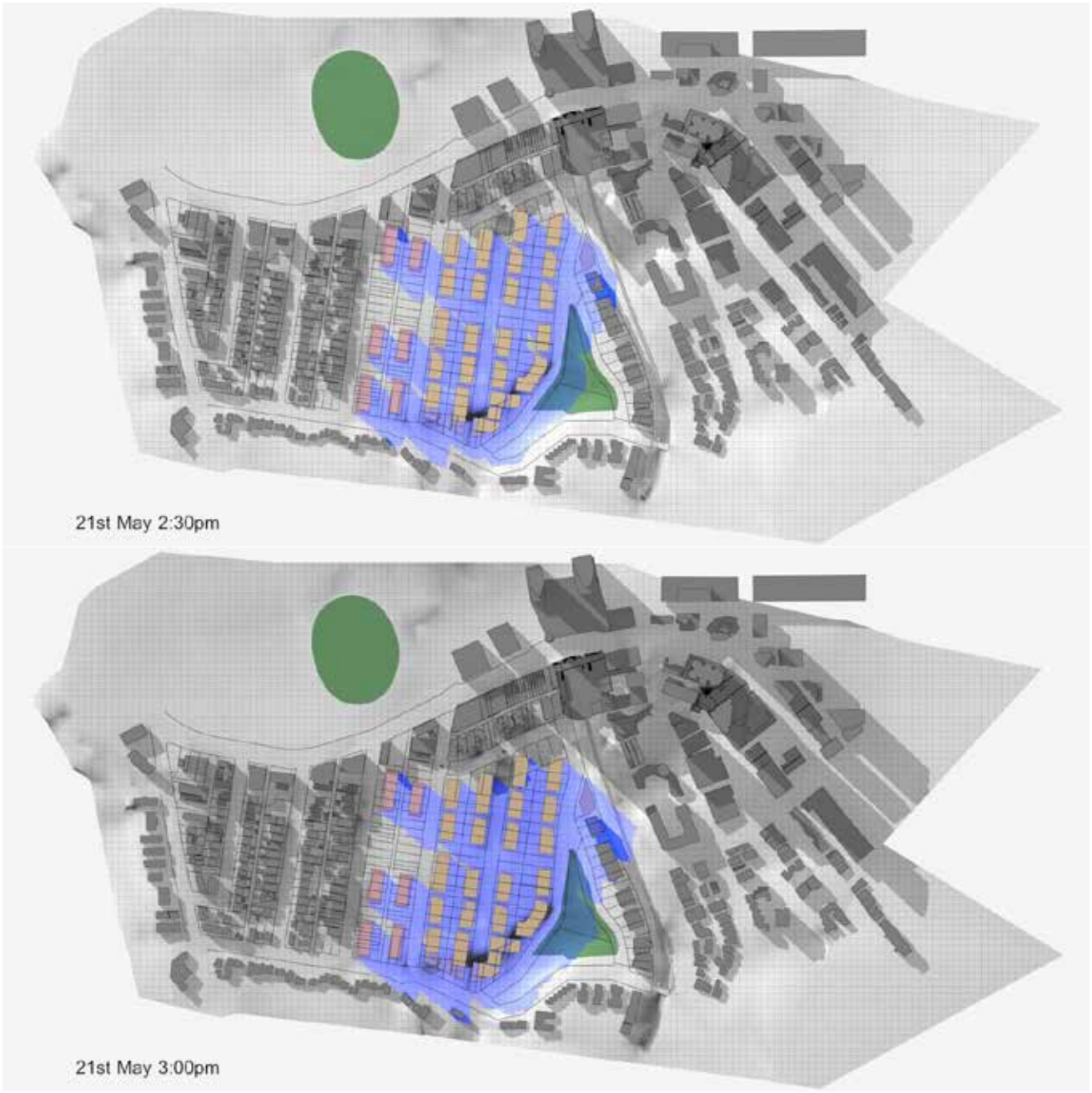
21st May 12:00pm

21st May 12:30pm

21st May 1:00pm

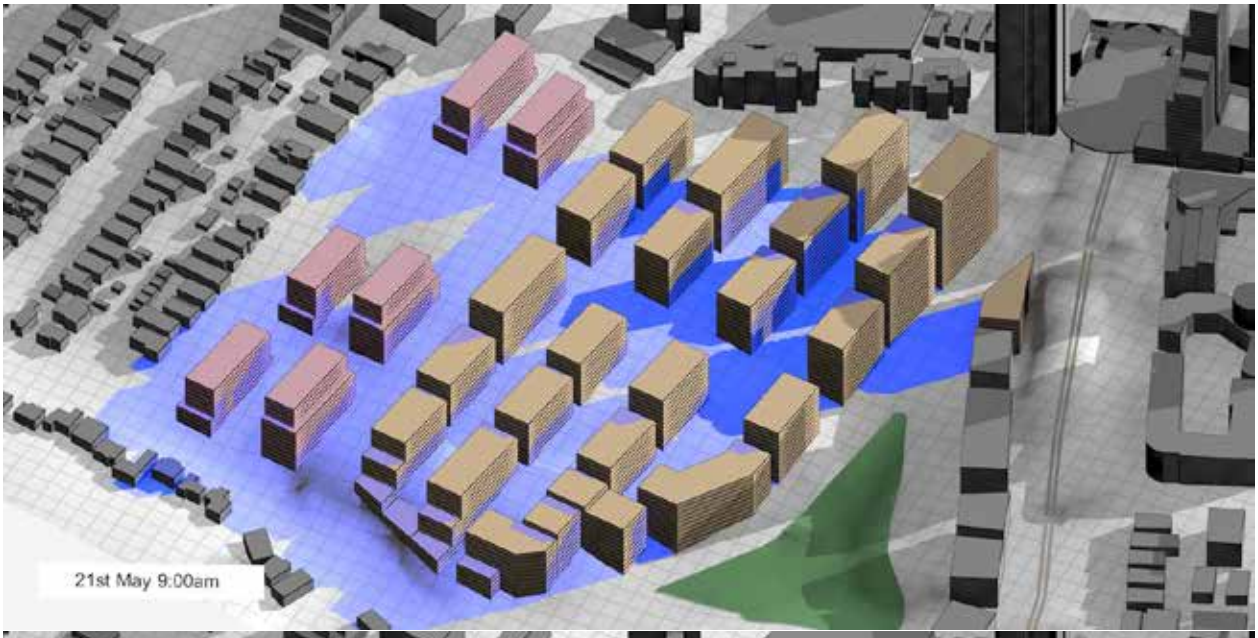
21st May 1:30pm

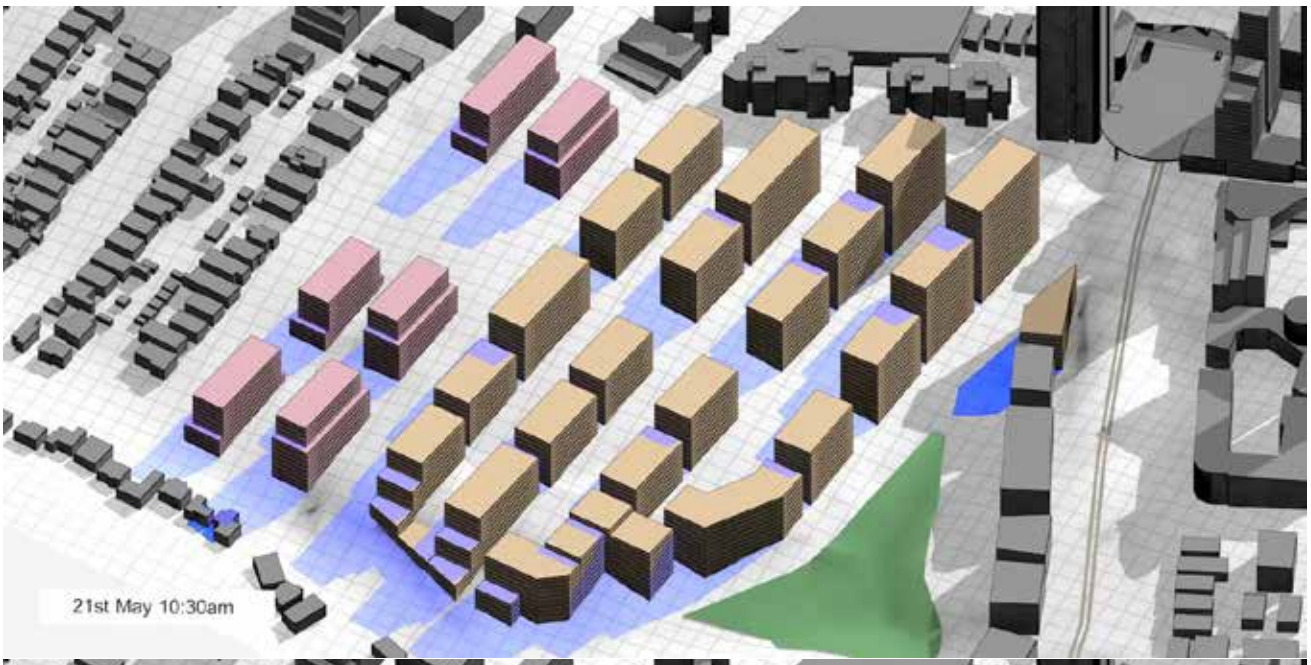
21st May 2:00pm



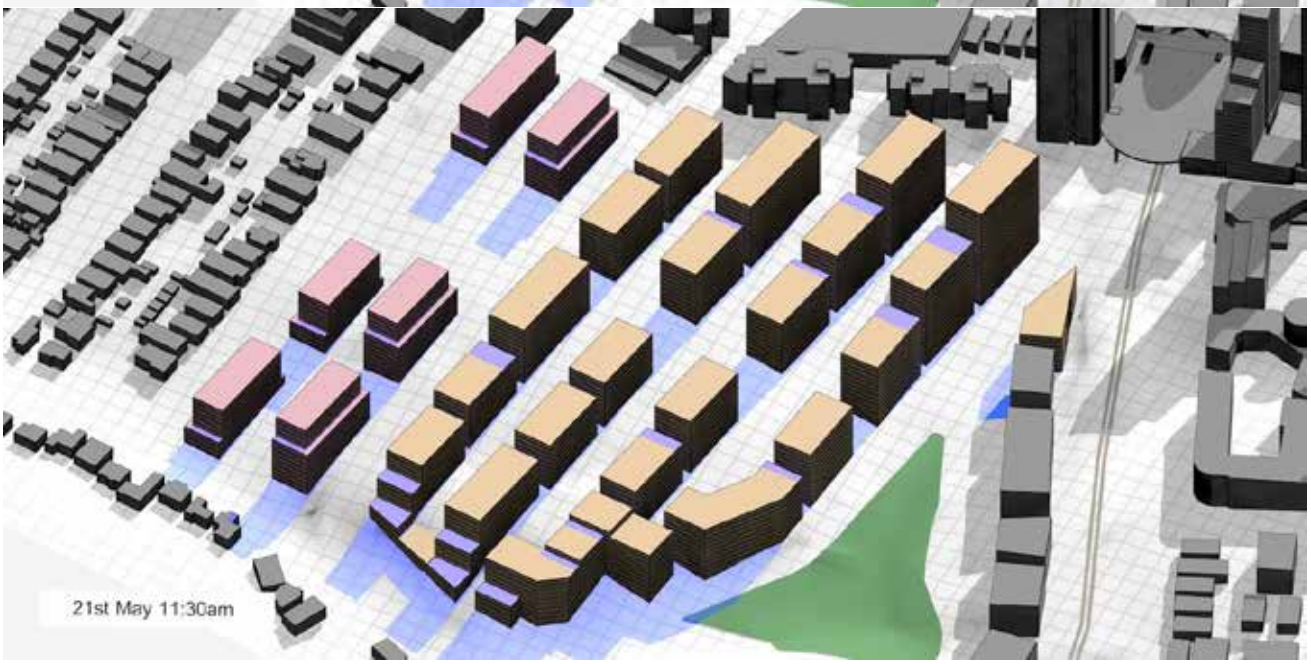
This indicates that improved solar access is available on 21st May to ADG specifications.

East facing buildings

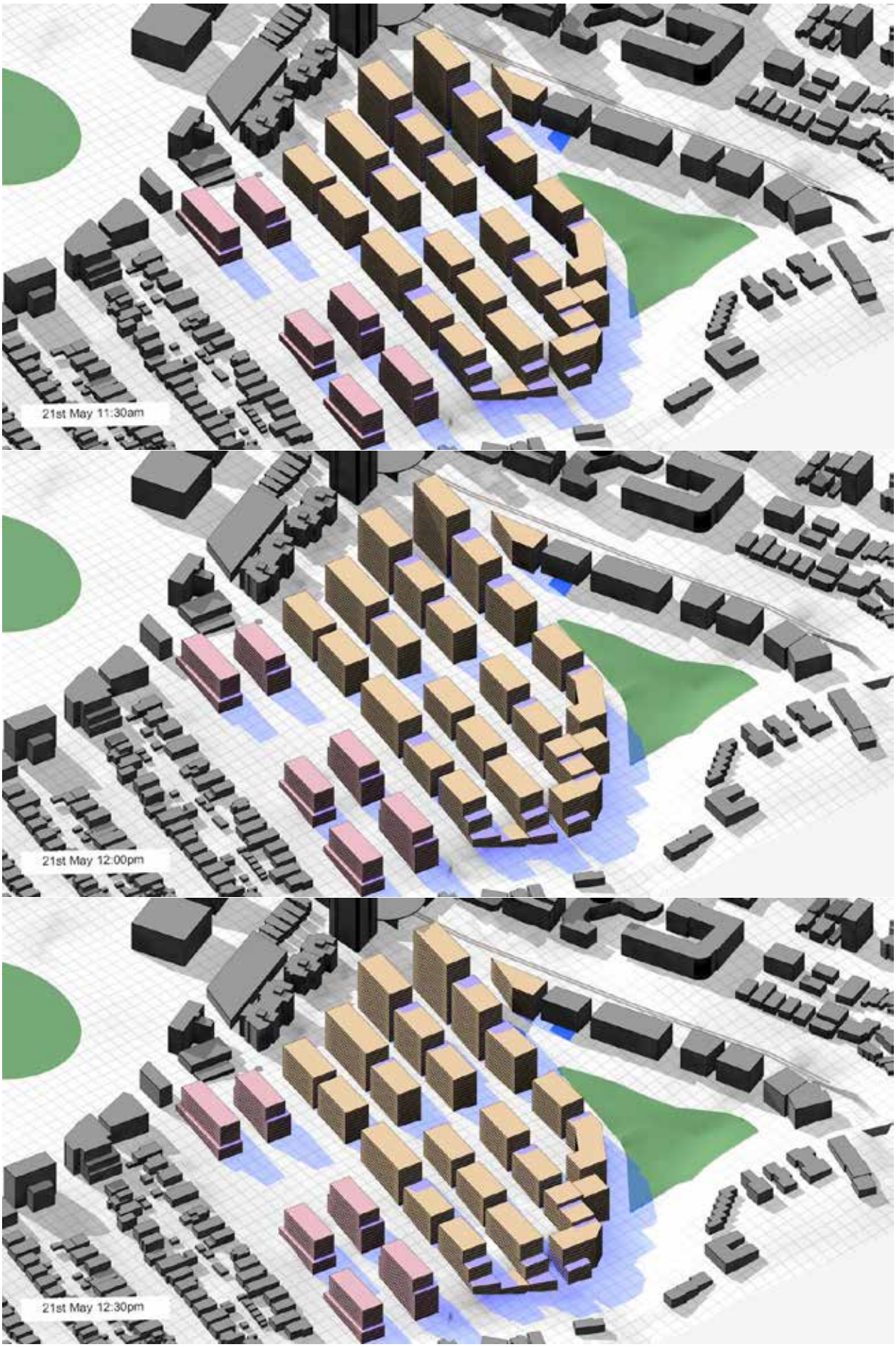



21st May 10:30am


21st May 11:00am


21st May 11:30am

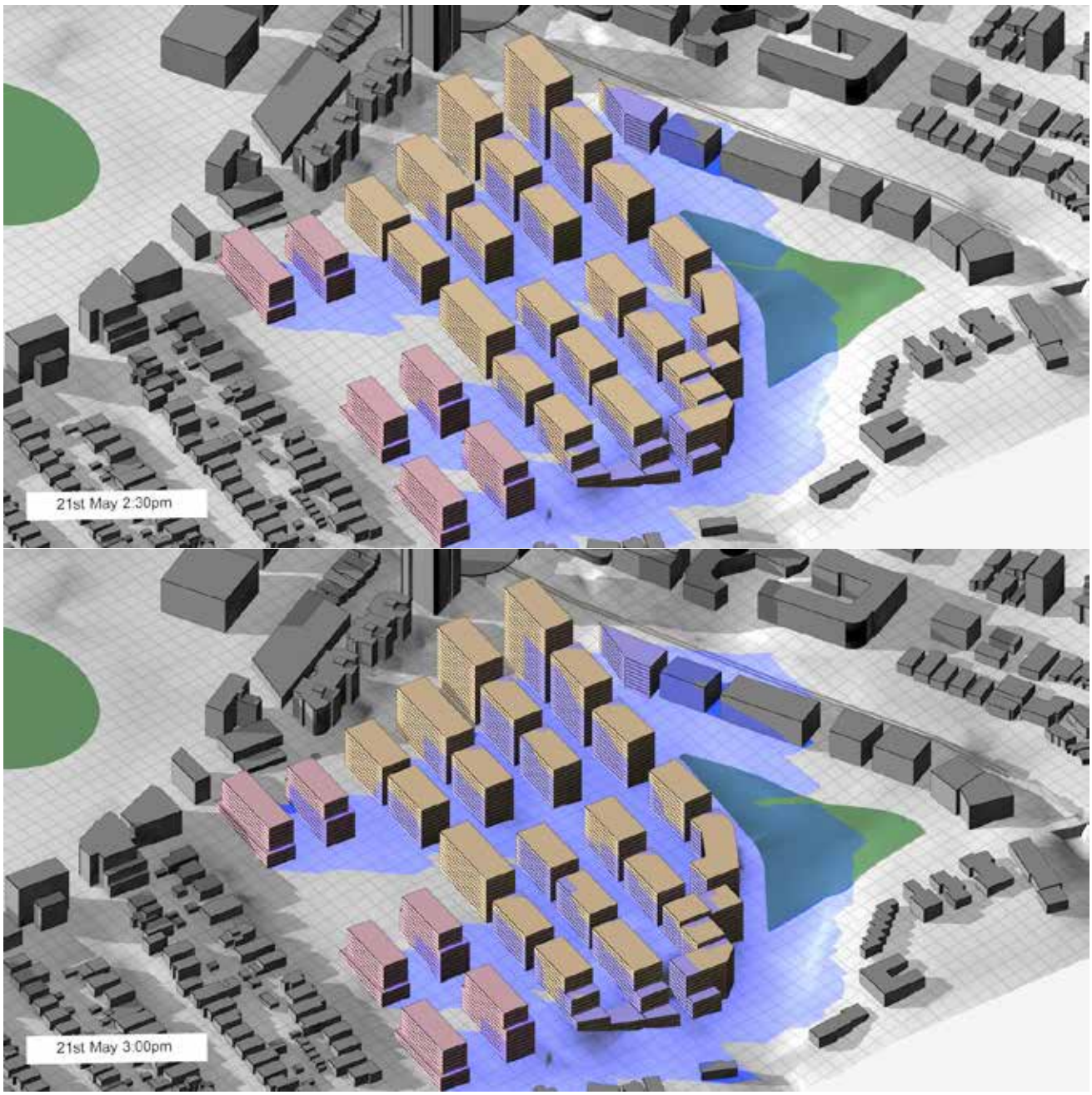
West facing buildings




21st May 1:00pm

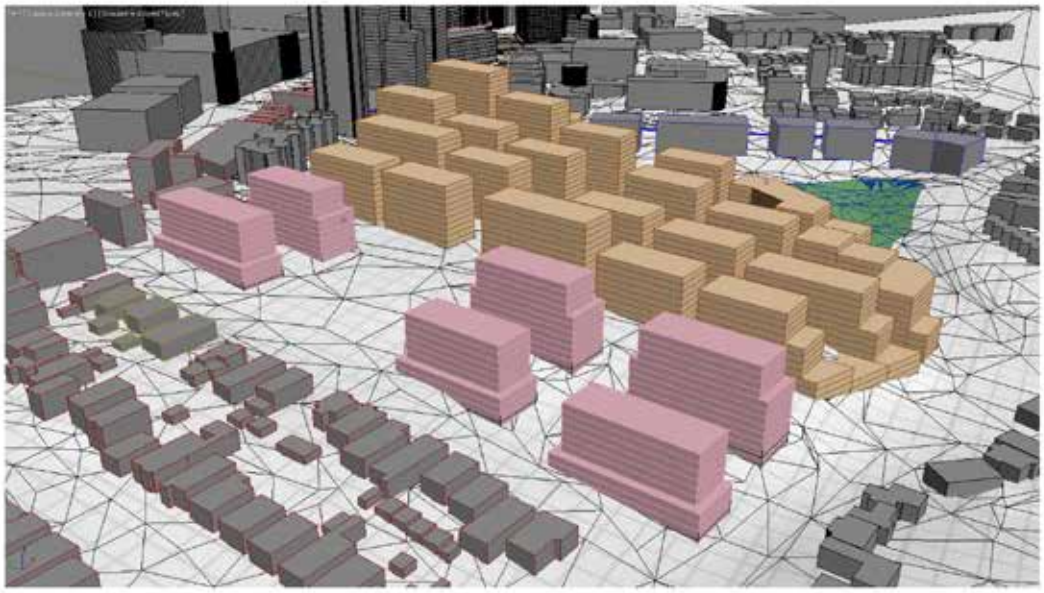

21st May 1:30pm

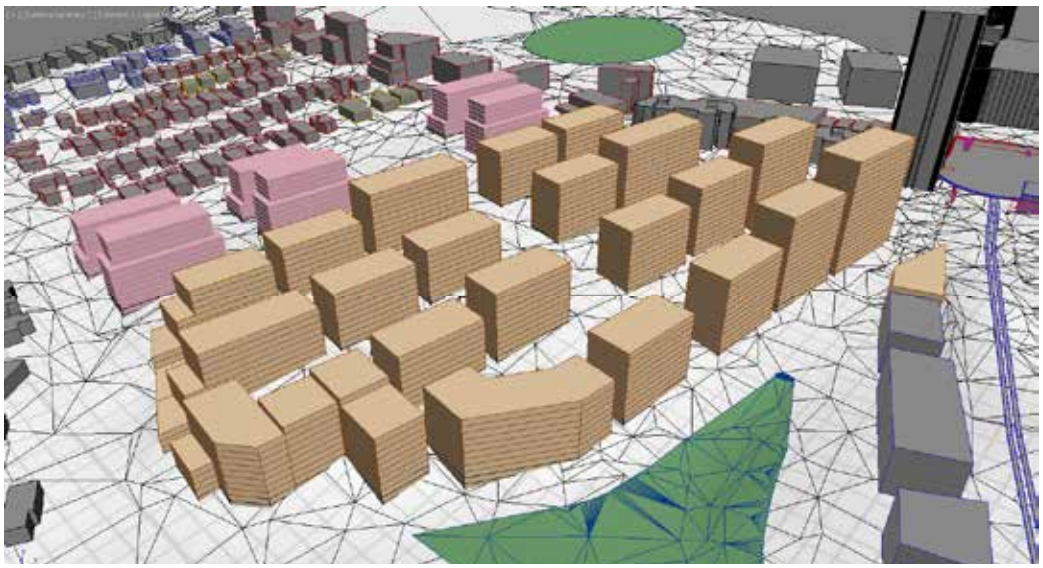

21st May 2:00pm



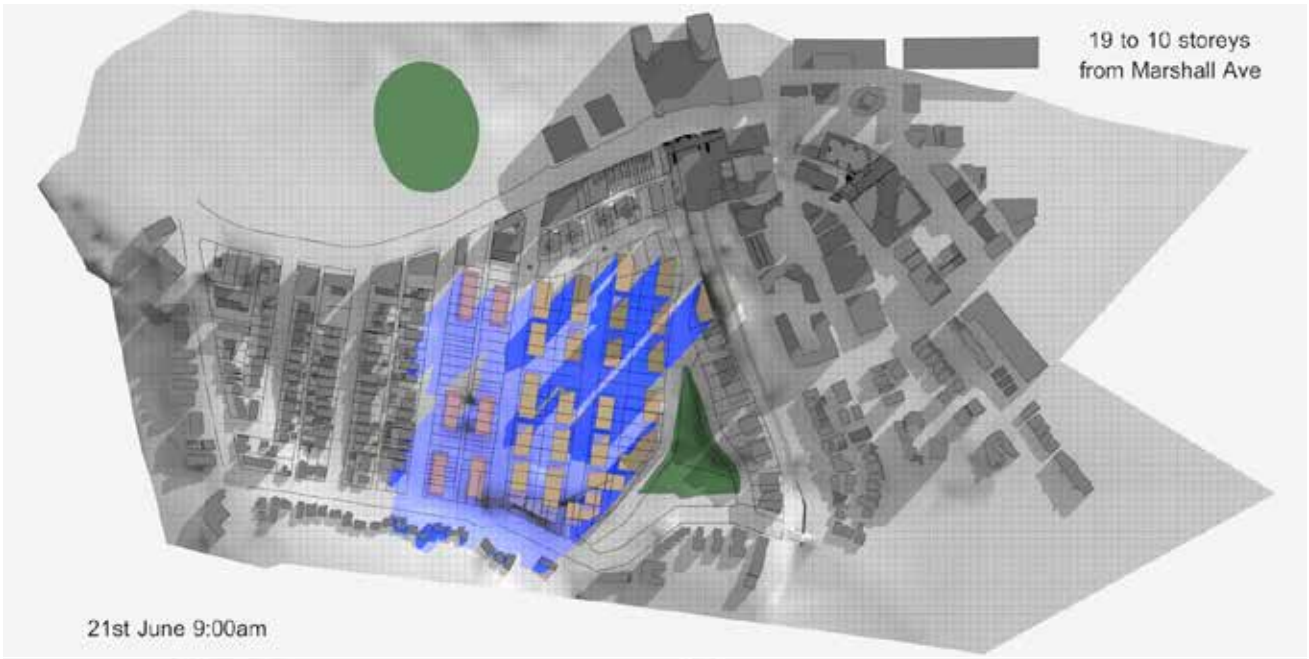
These diagrams illustrate improved solar access to East and West facades on May 21st.

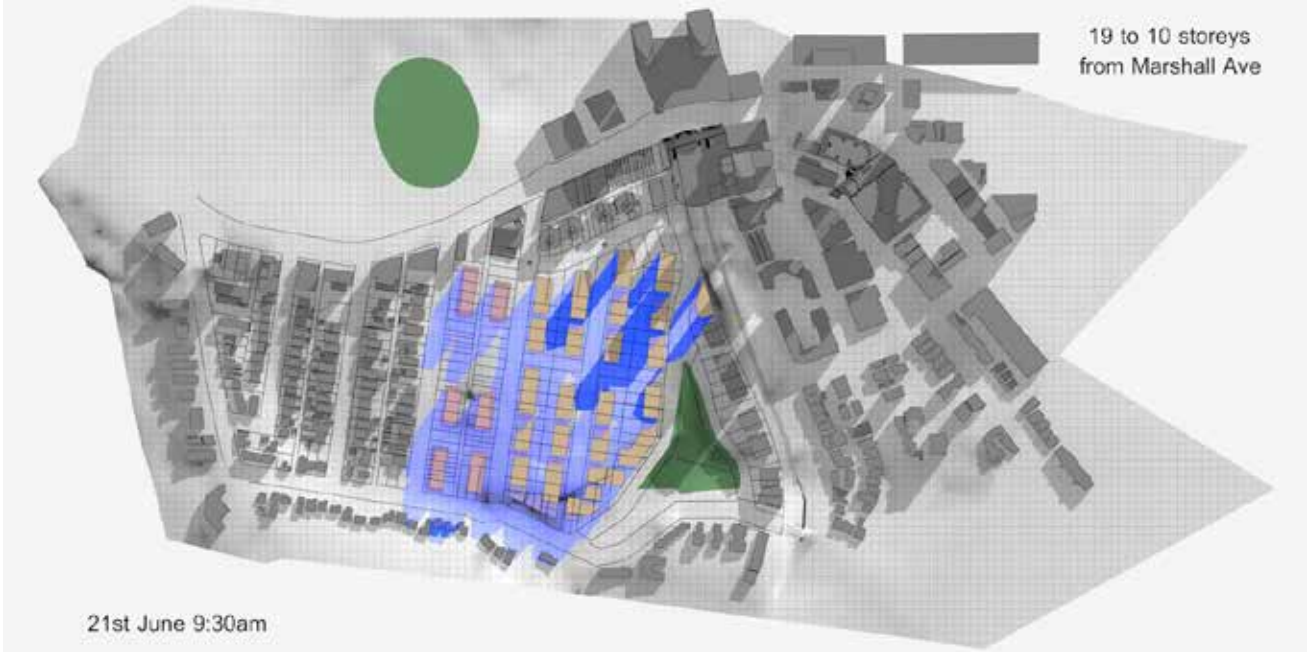
Shadow Diagrams for the 21st June - midwinter

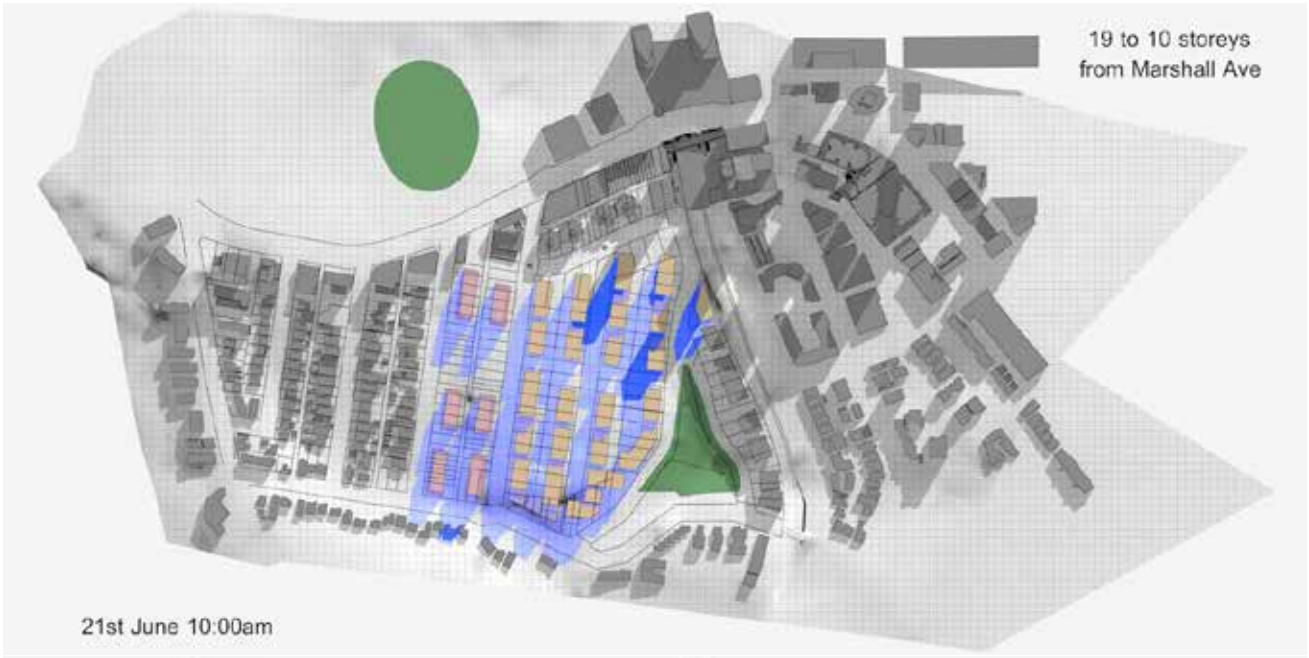


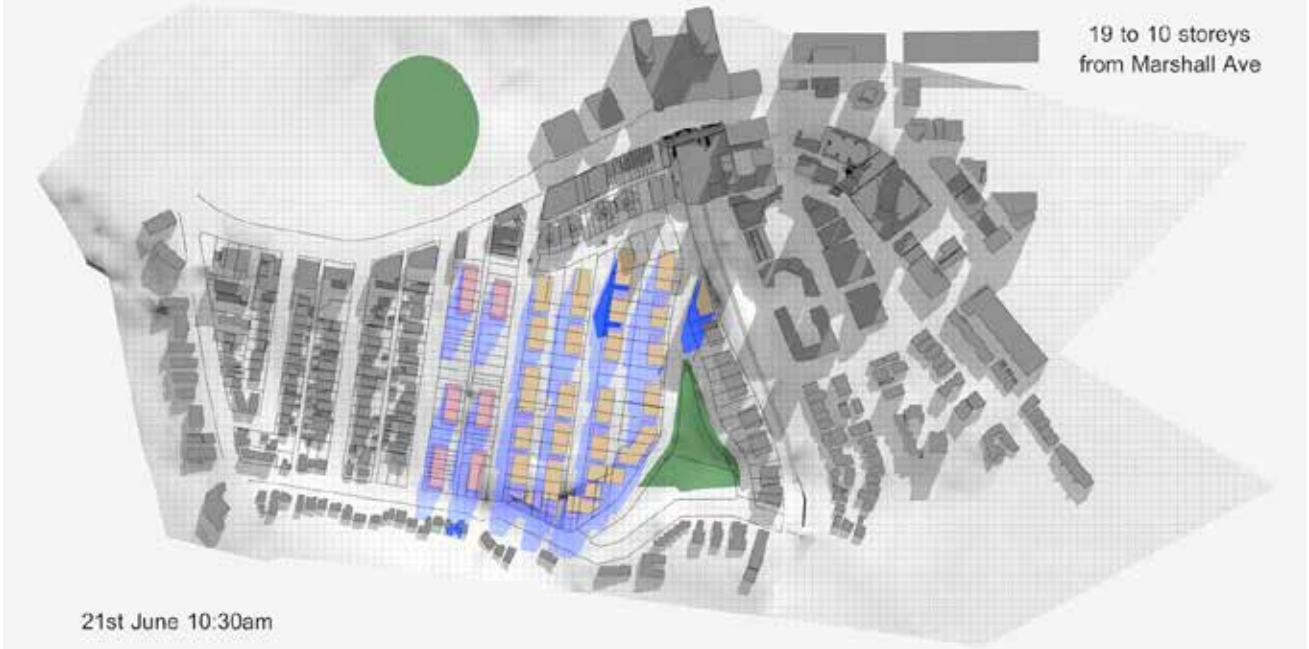


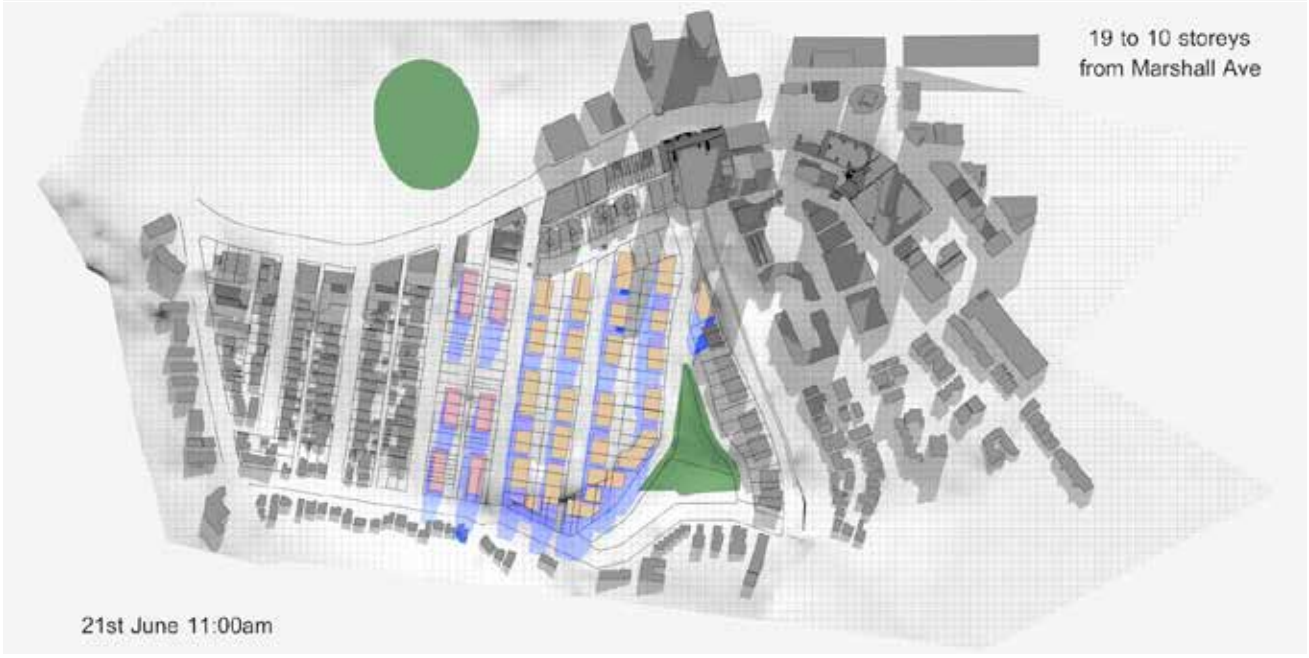
Solar Access 21st June.






19 to 10 storeys
from Marshall Ave
21st June 10:00am


19 to 10 storeys
from Marshall Ave
21st June 10:30am


19 to 10 storeys
from Marshall Ave
21st June 11:00am

21st June 11:30am

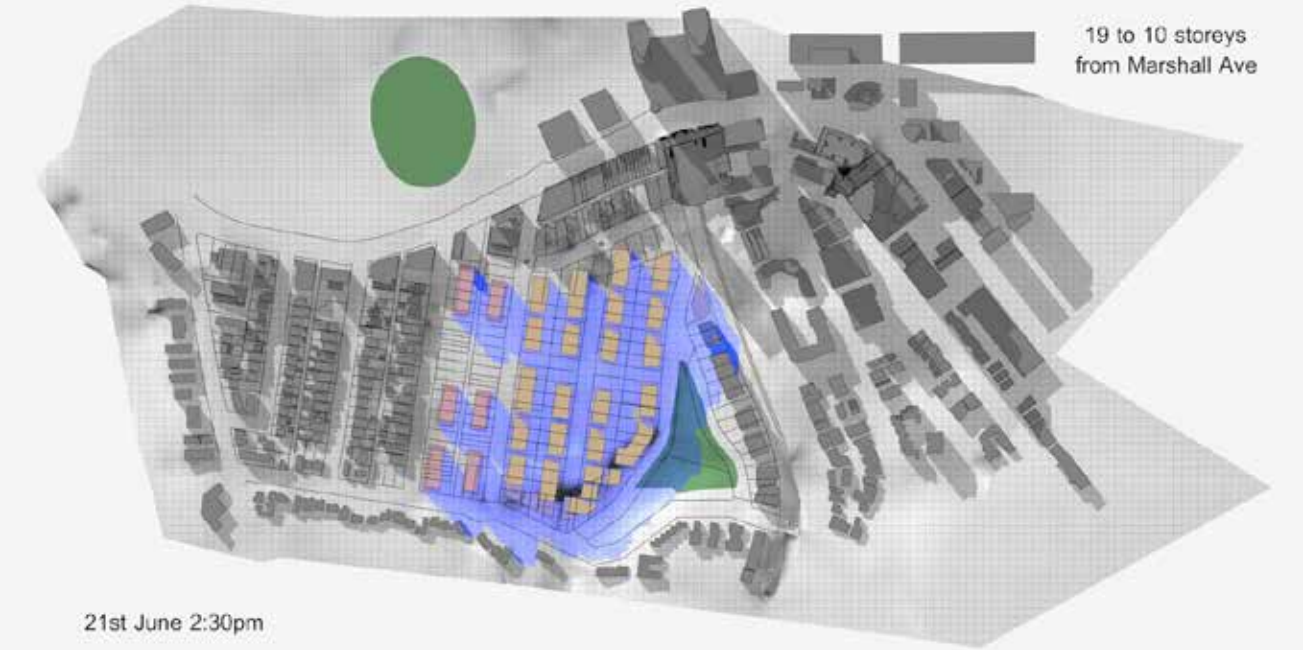
21st June 12:00pm

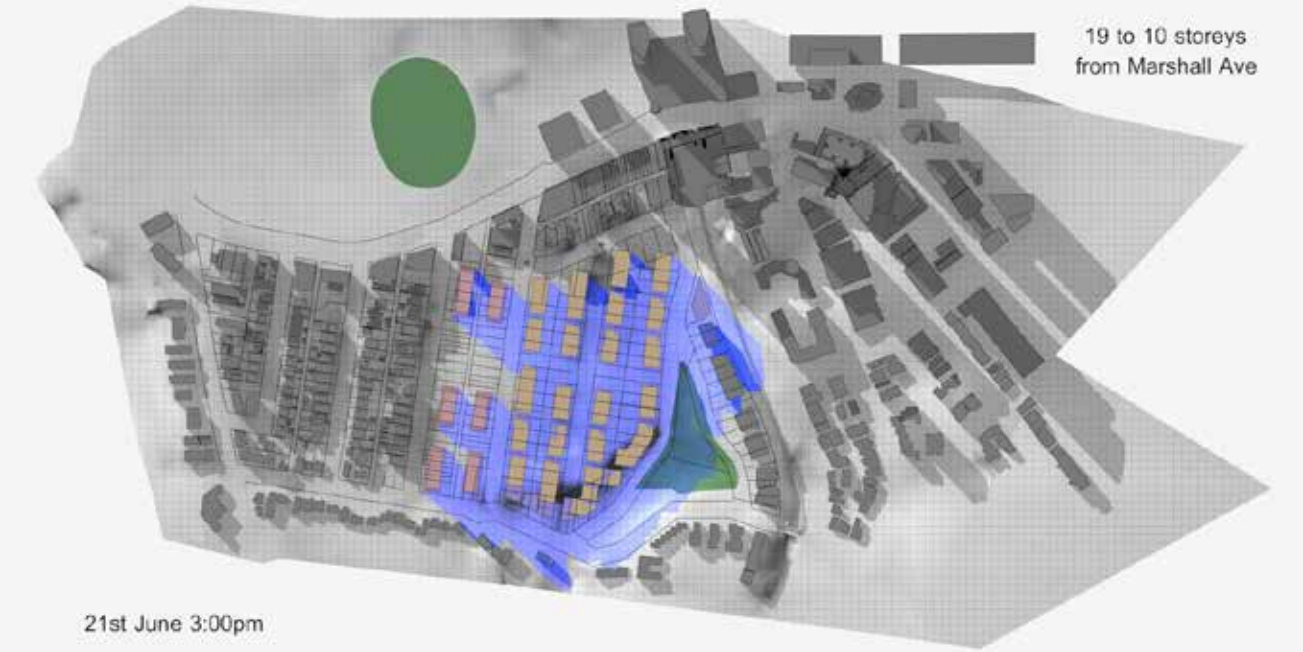
21st June 12:30pm

21st June 1:00pm

21st June 1:30pm

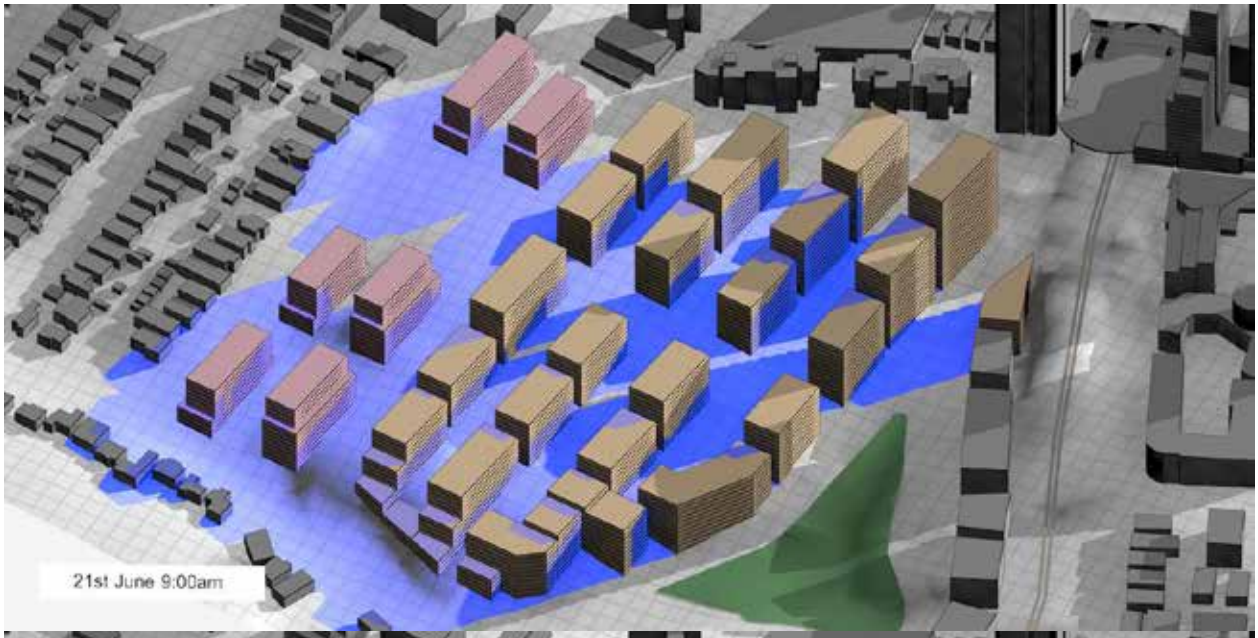
21st June 2:00pm

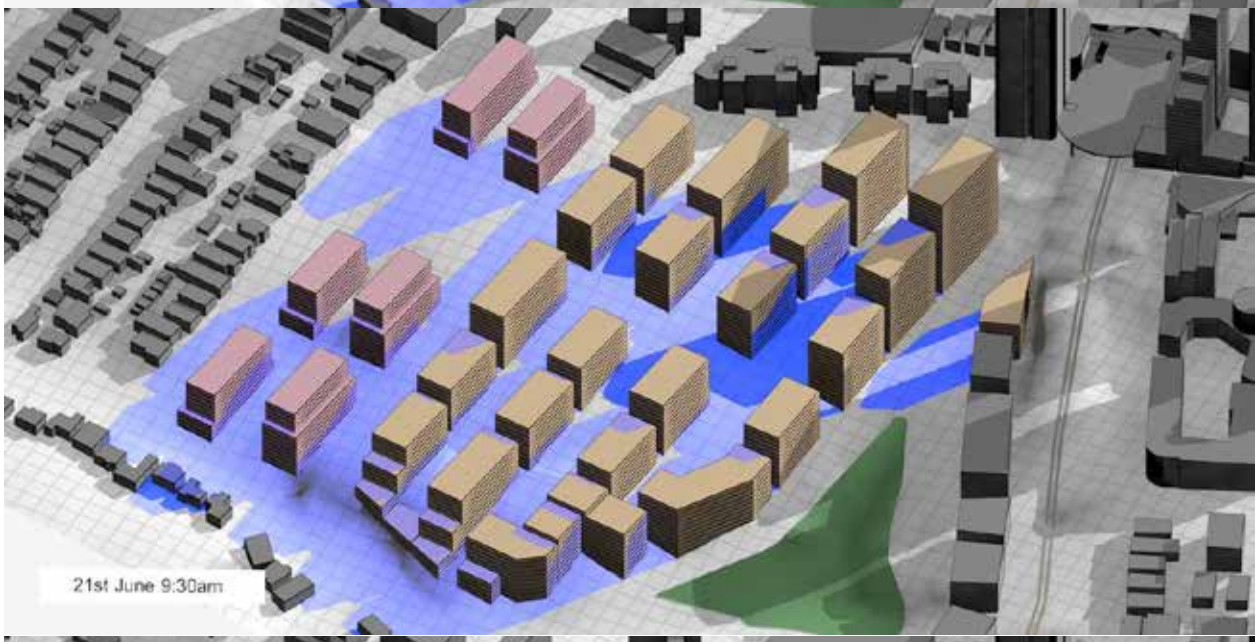


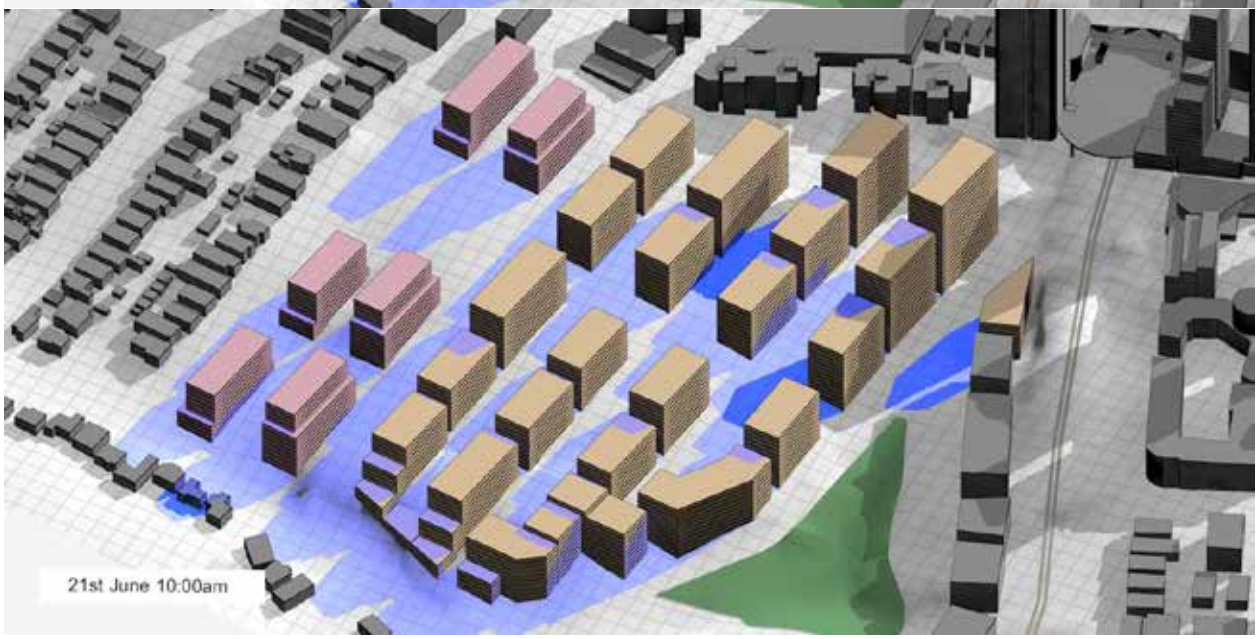


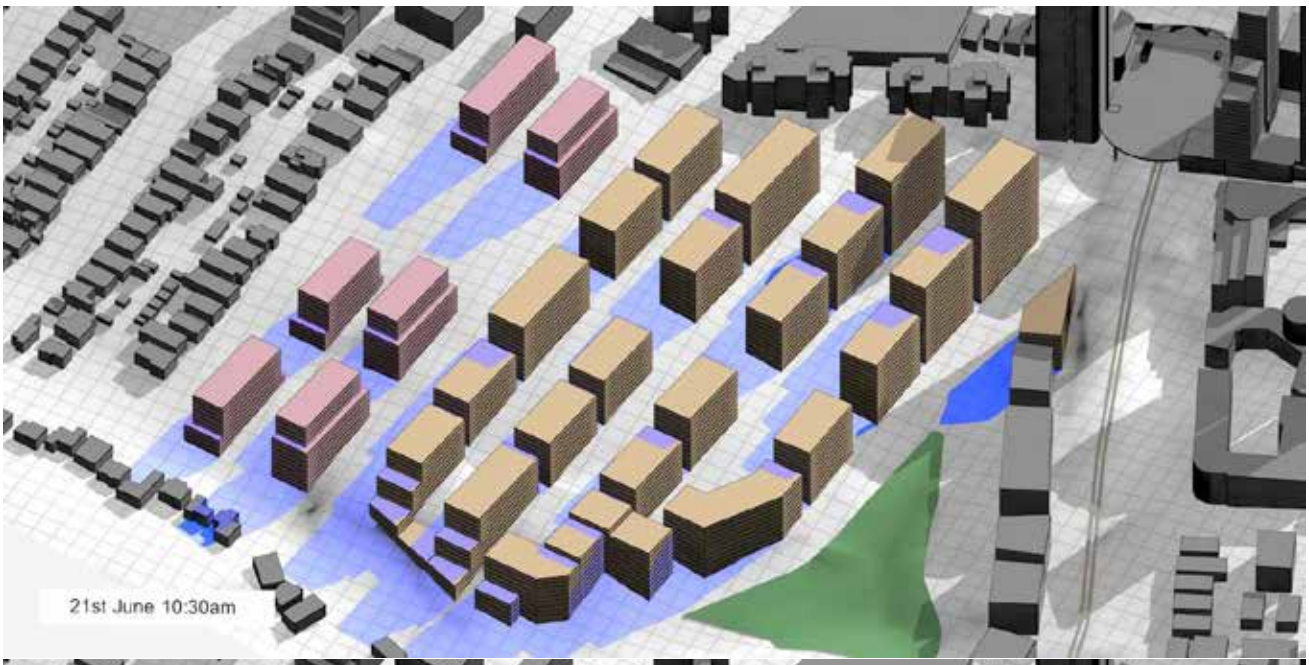
Generally compliant solar access by 21st June.

East Facing Buildings

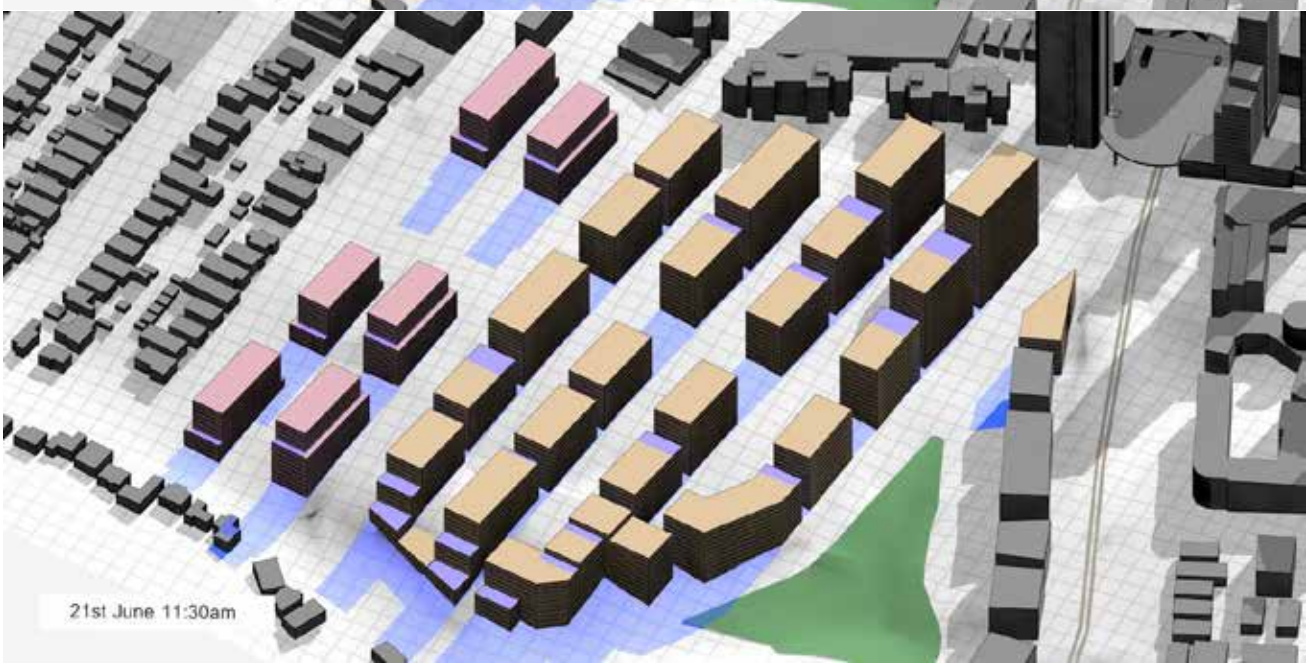




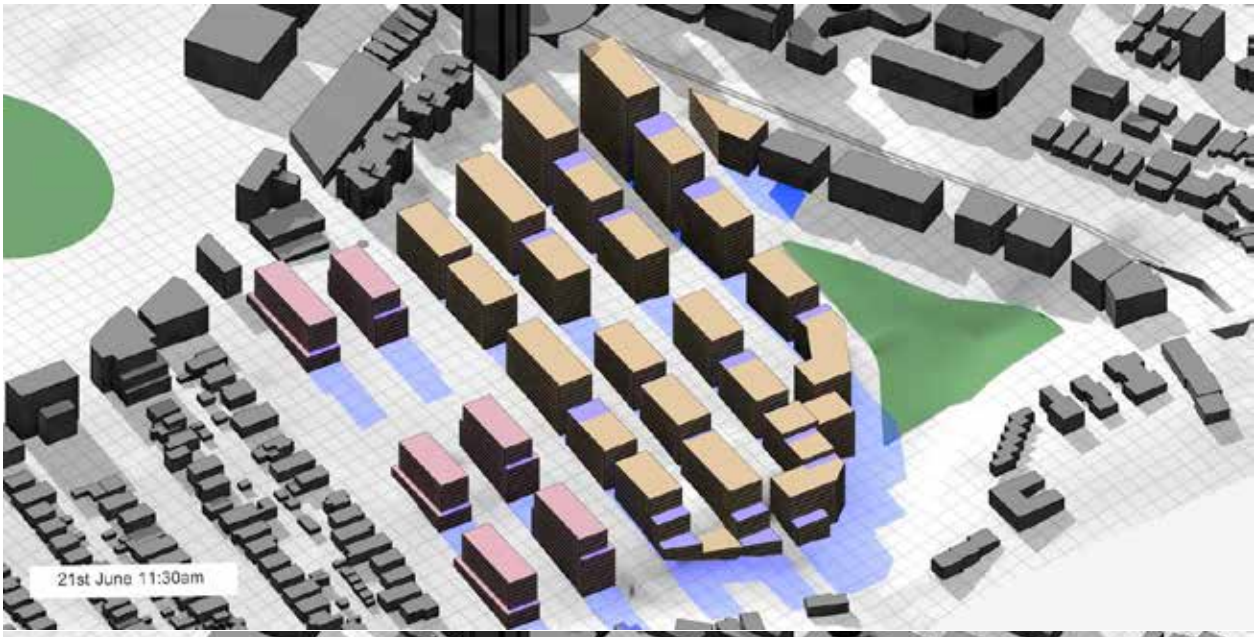



21st June 10:30am


21st June 11:00am


21st June 11:30am

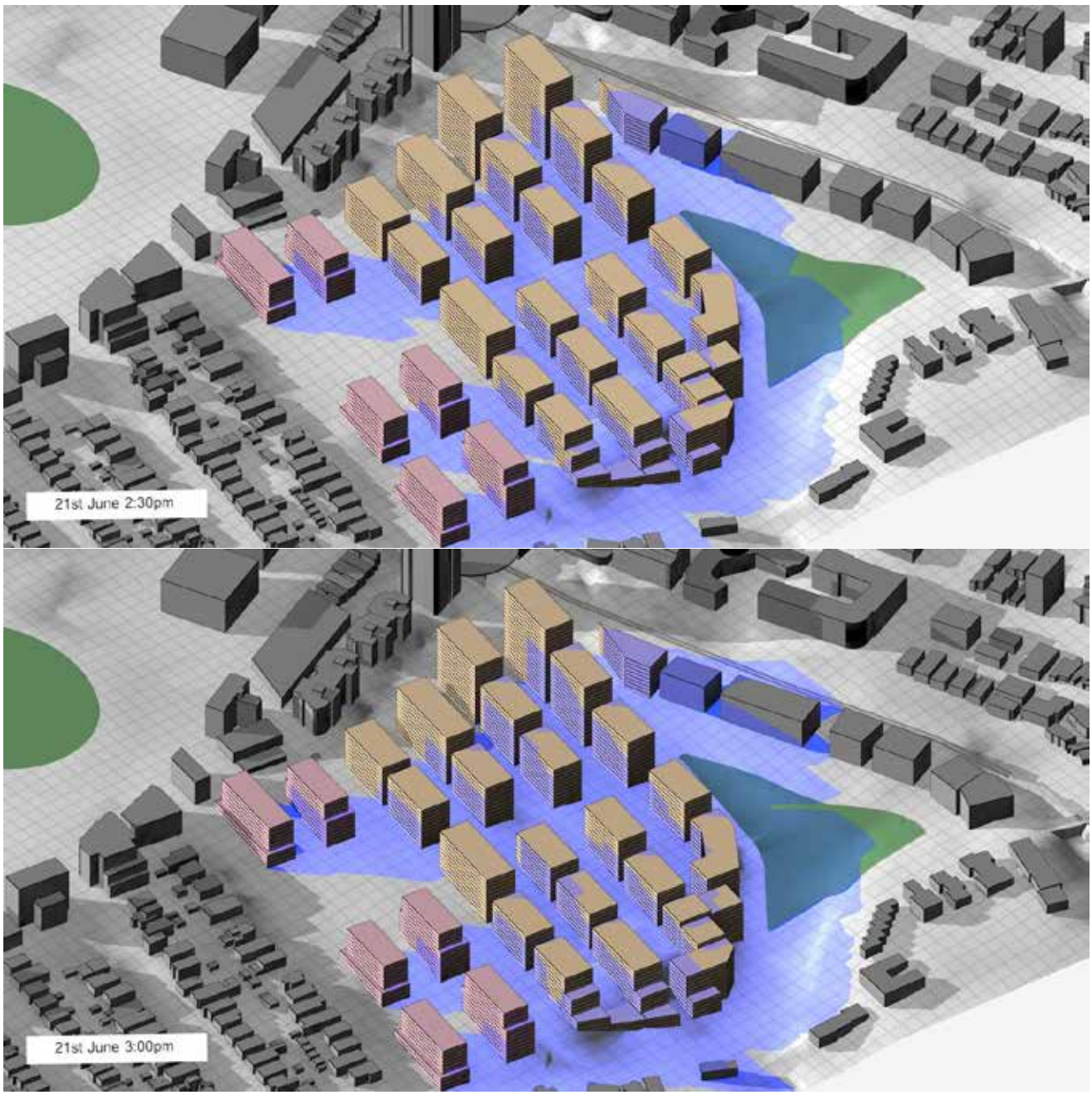
West Facing Buildings




21st June 1:00pm

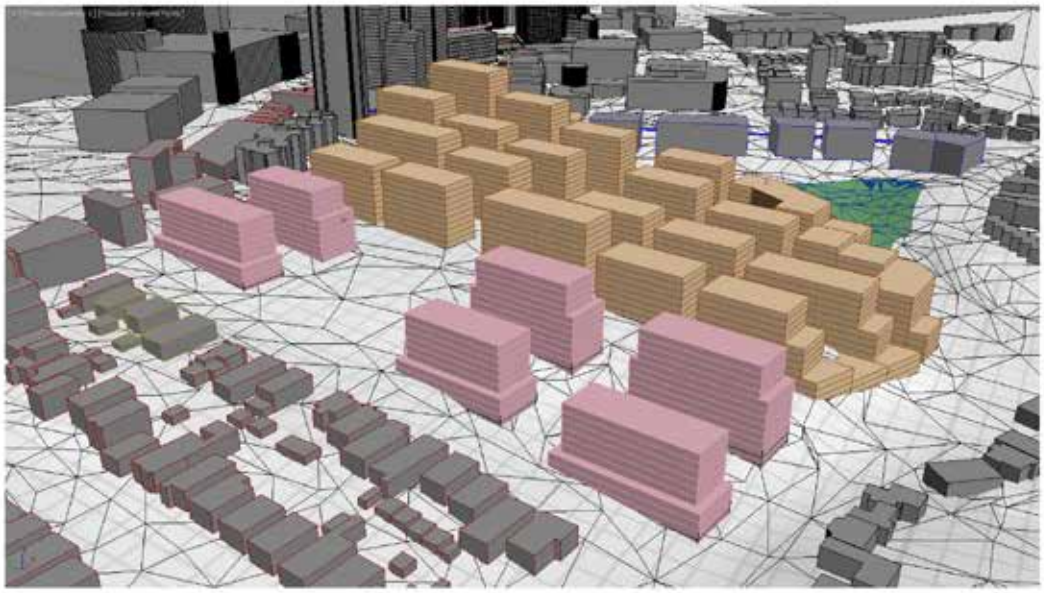

21st June 1:30pm


21st June 2:00pm

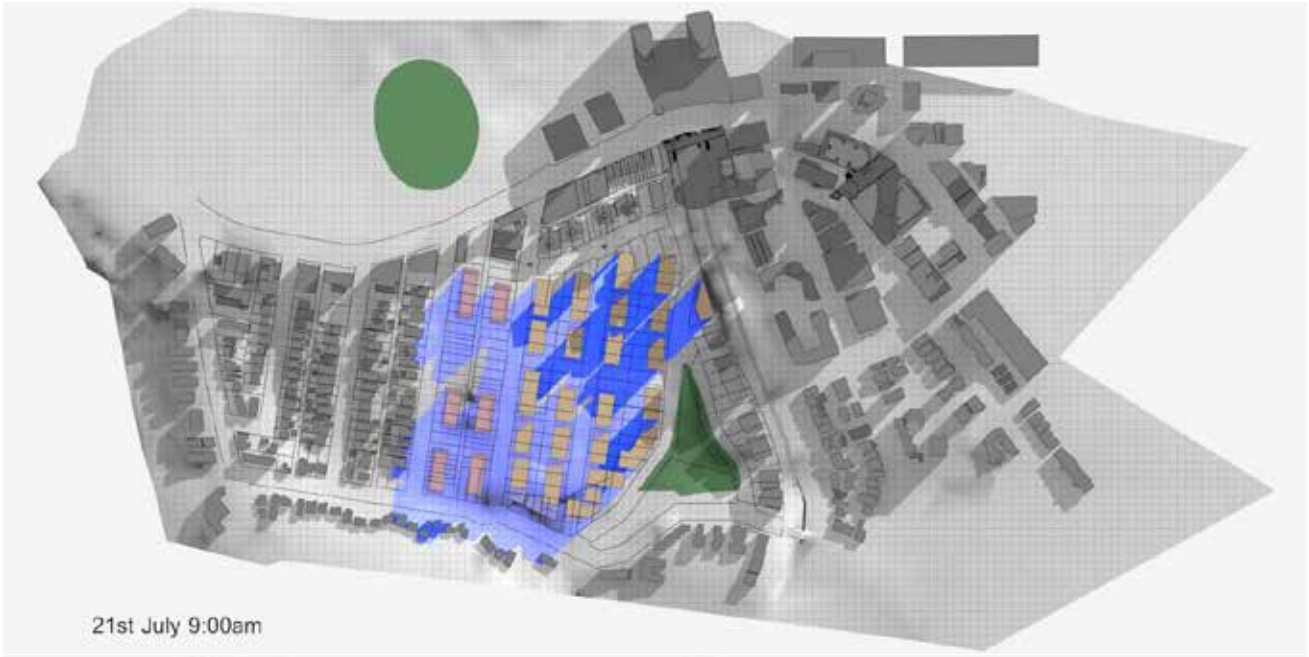


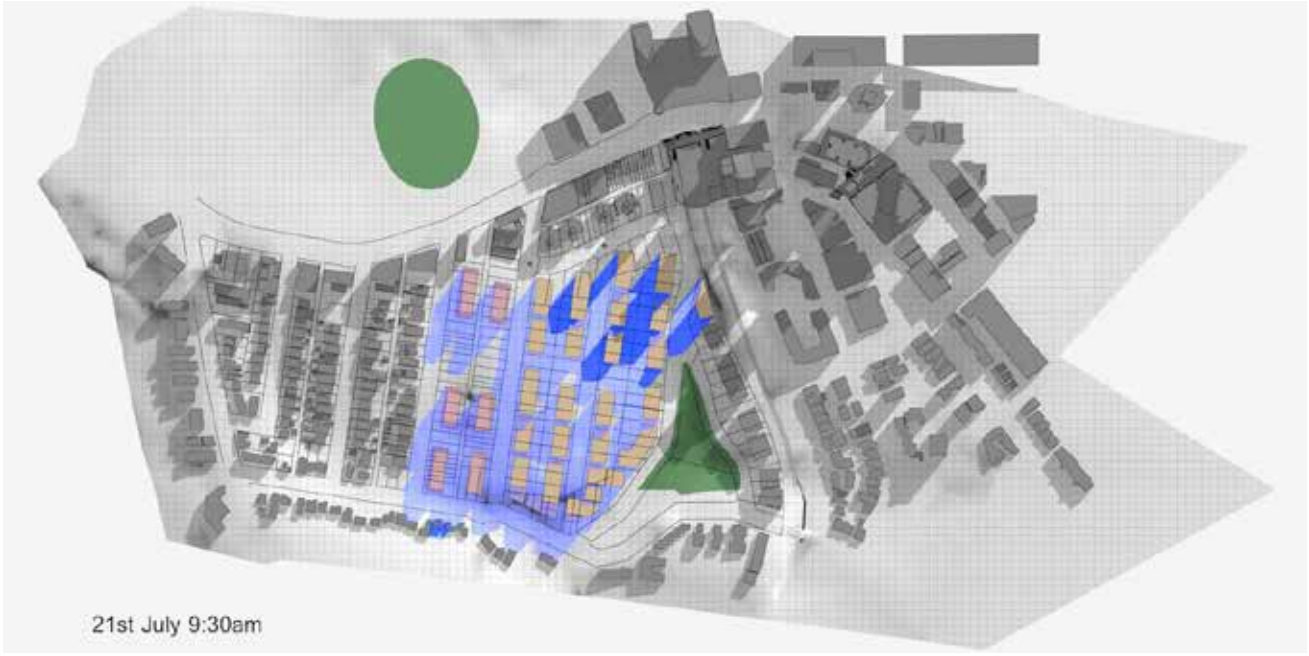
2 hours solar access is generally problematic to 70% of units on 21st June (midwinter).

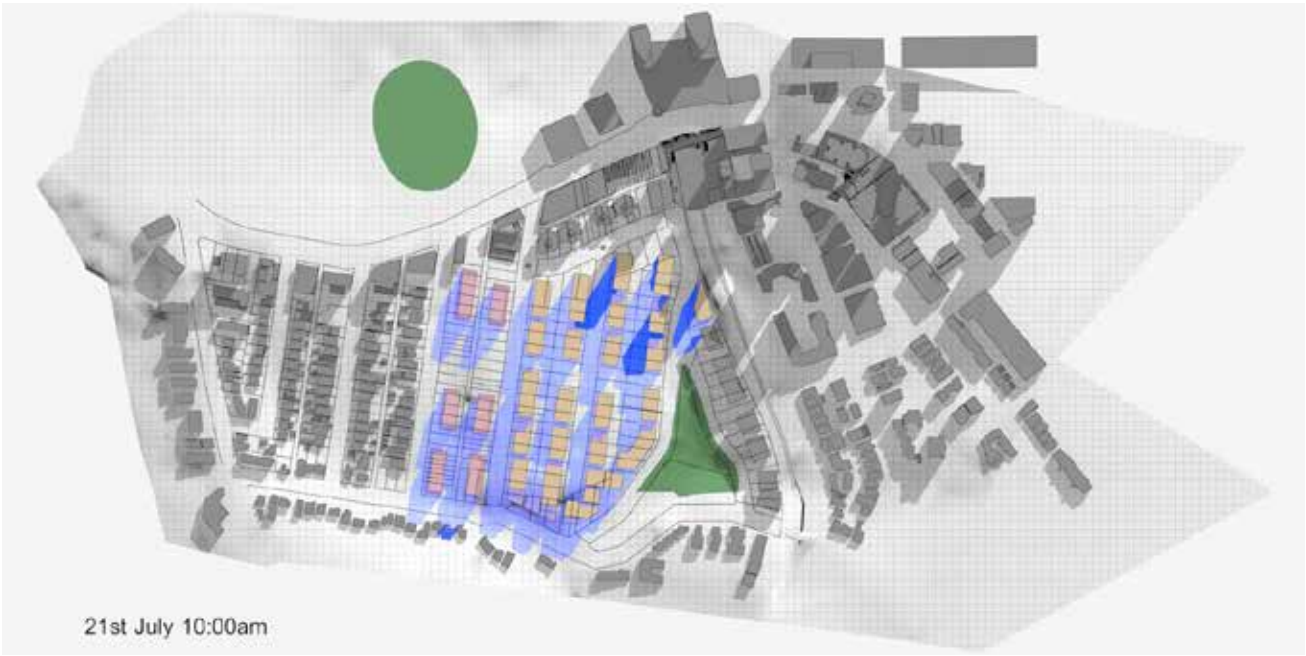
Shadow Diagrams for the 21st July



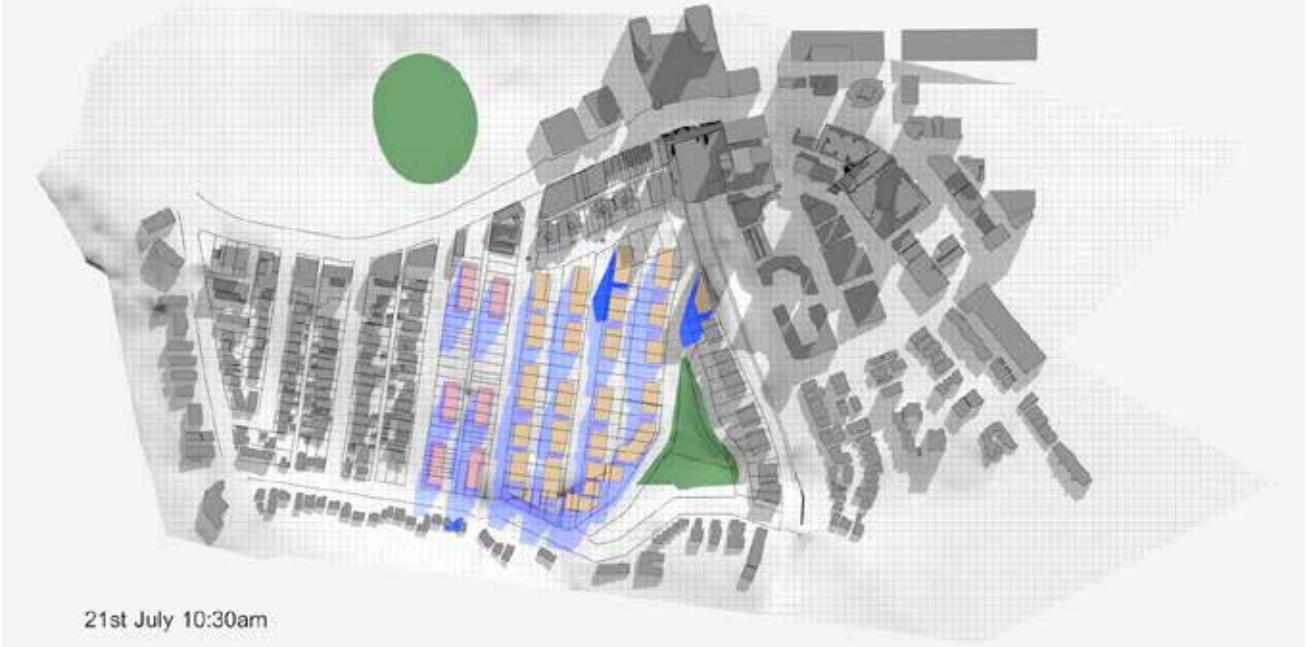
Solar Access 21st July.







21st July 10:00am



21st July 10:30am

21st July 11:00am

21st July 11:30am

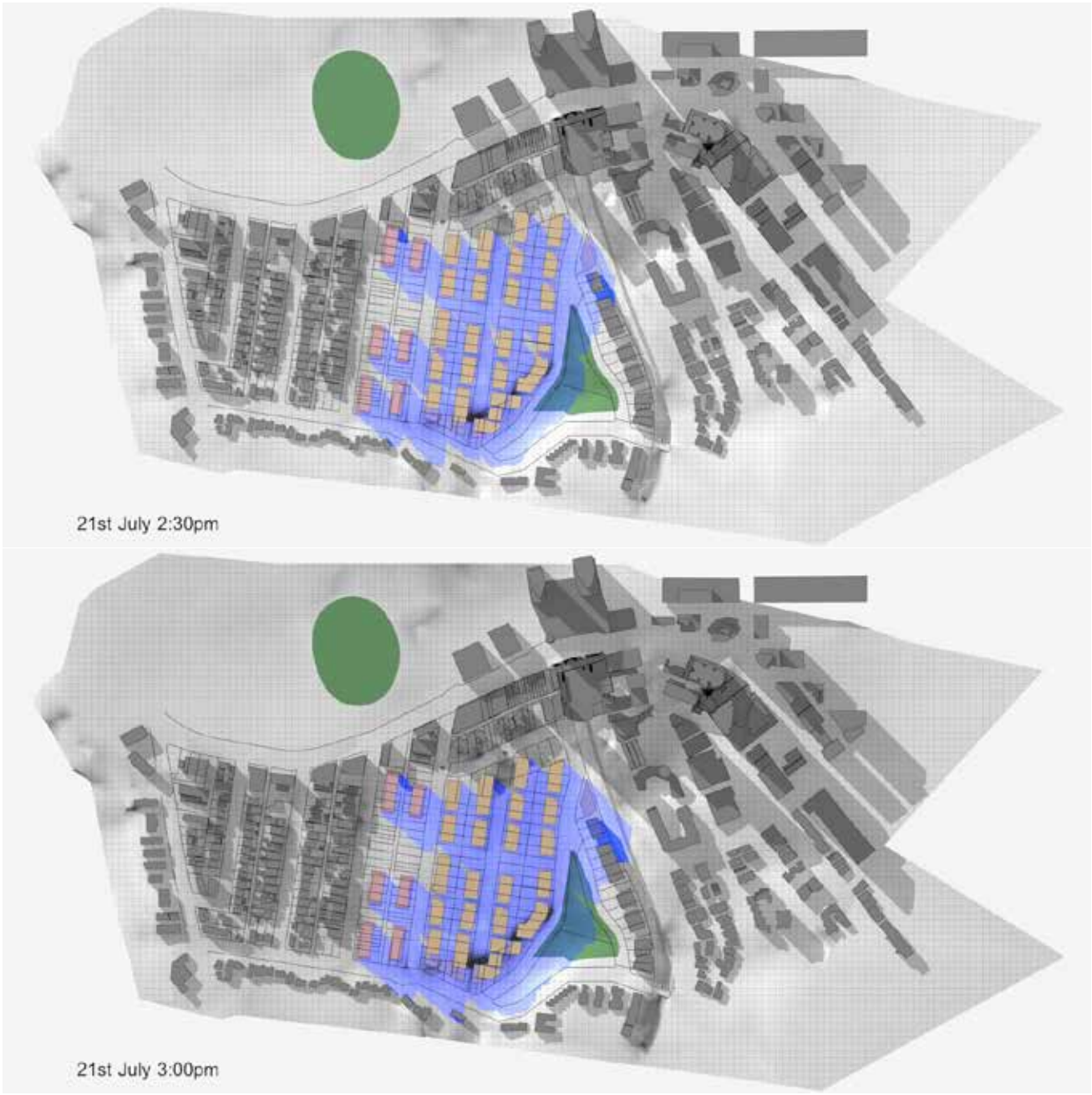
21st July 12:00pm

21st July 12:30pm

21st July 1:00pm

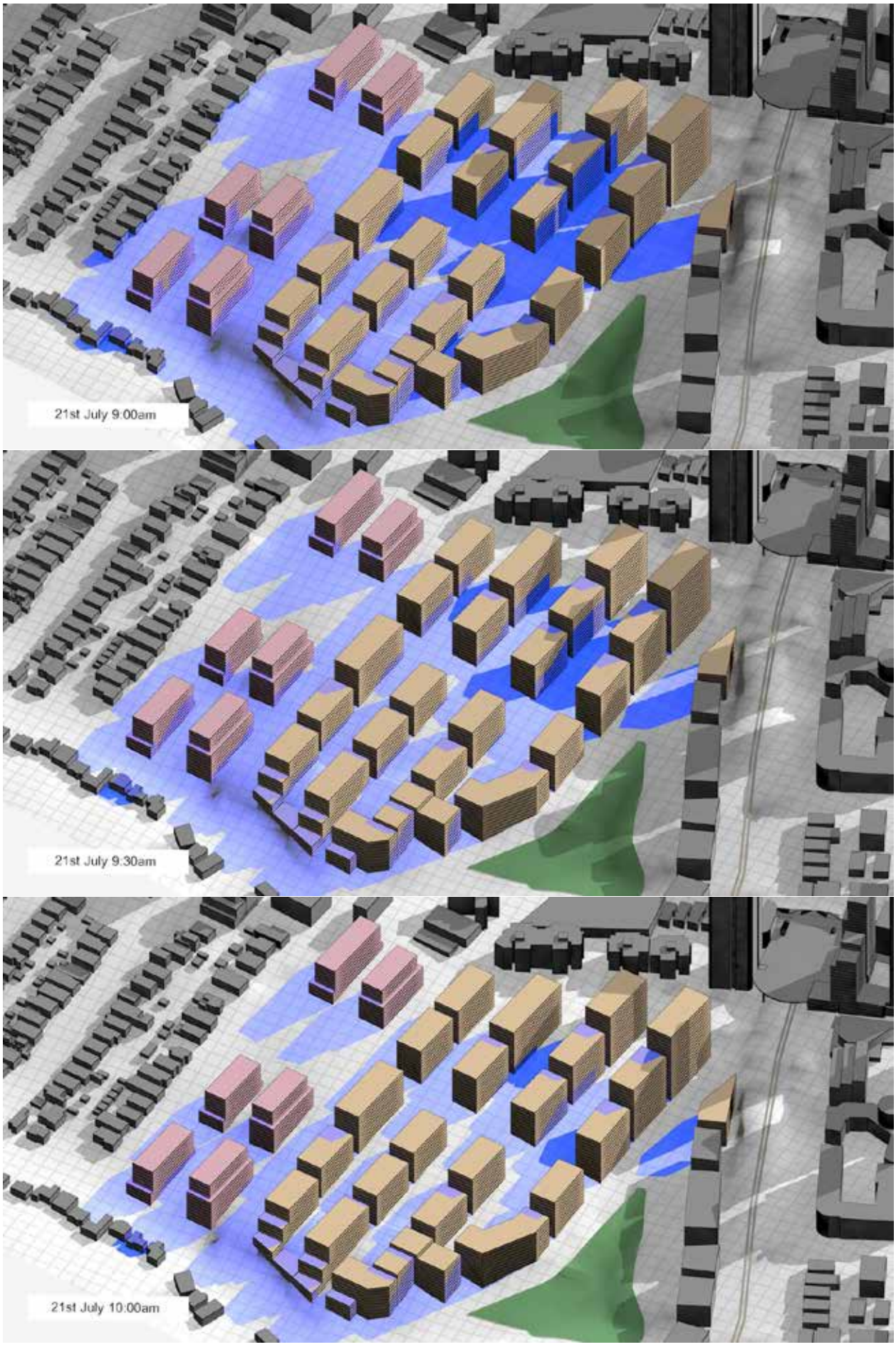
21st July 1:30pm

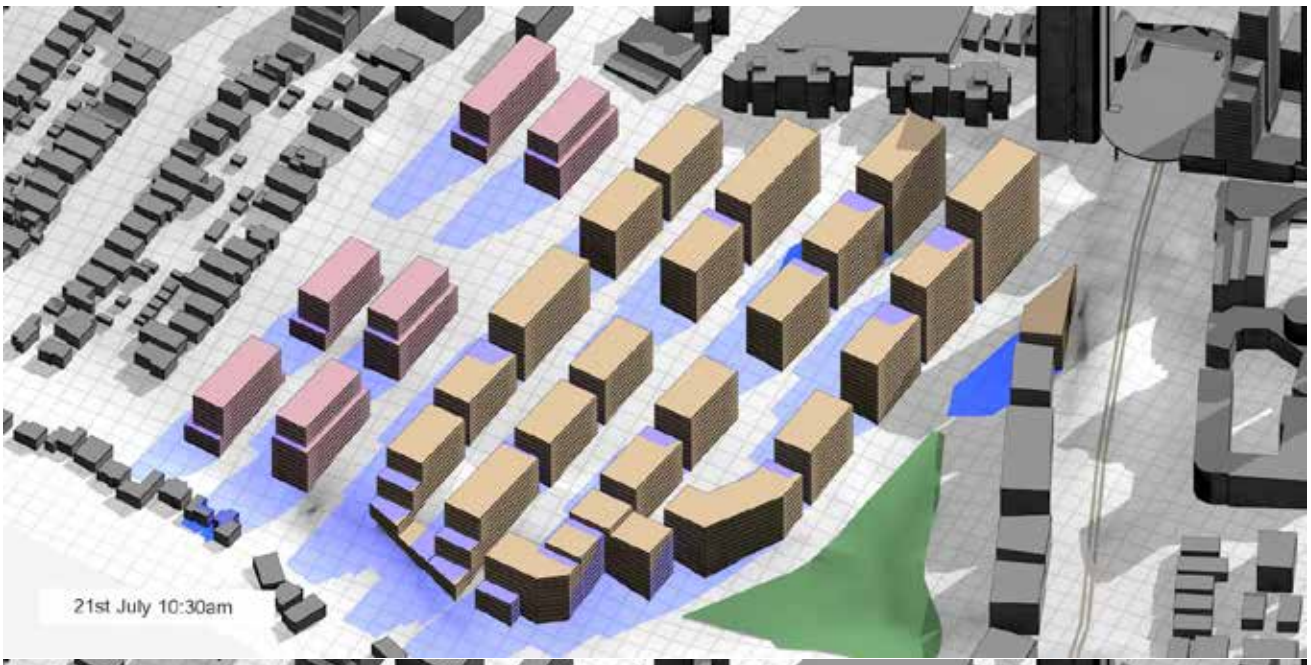
21st July 2:00pm



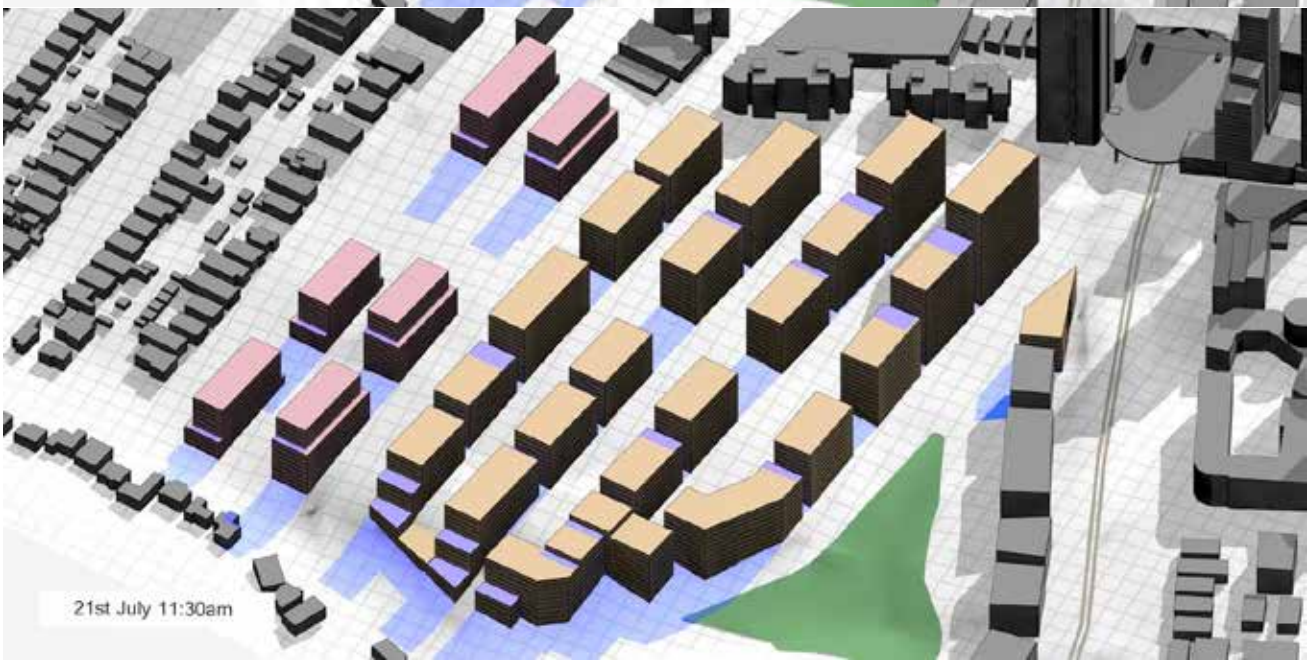
Solar Access is generally available to open space areas on 21st July.

East facing buildings.

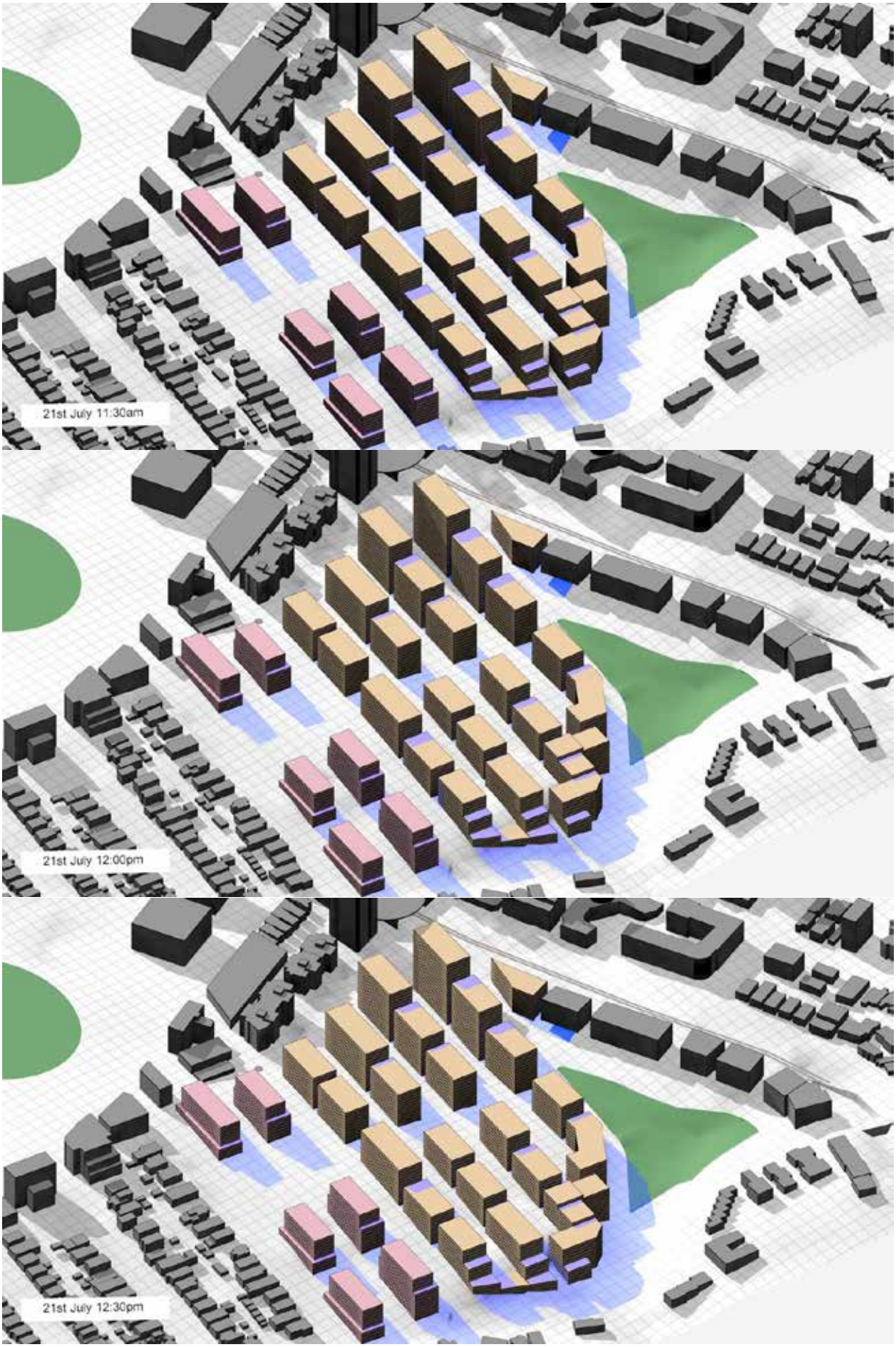



21st July 10:30am


21st July 11:00am


21st July 11:30am

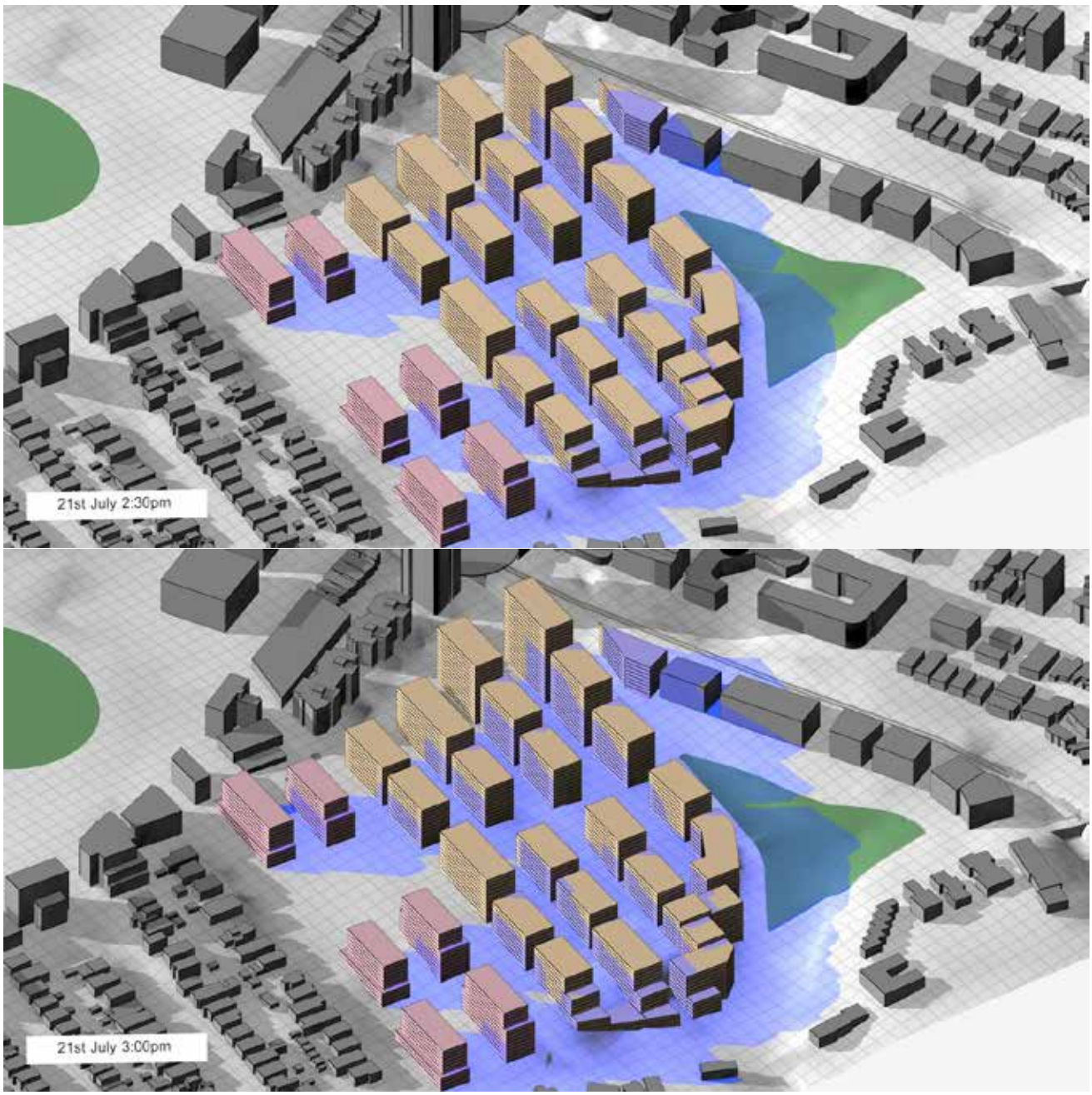
West facing buildings.




21st July 1:00pm


21st July 1:30pm


21st July 2:00pm



5.8 Conclusions - Further Testing

It would seem from this testing that the period of non-compliance of 2hrs solar access to 70% of units (1.5hrs only achieved mid-winter) is only for a relatively short period mid-winter. Compliance is possible in May and July.

6. INITIAL RECOMMENDATIONS ON EARLIER OPTIONS

1. **Park – Berry Road** block can be included with heights and FSR's as shown in Figure 7.2and can generally meet SEPP 65 requirements and Apartment Design Guide compliance. This includes land swap of Berry Lane.
2. **Transition** to single storey residences along Park Road West can be viable with:
   - Increased setback to 10m at ground floor in northern and central areas of the block.
   - Additional 3m setback at 3rd or 5th level within ADG compliance
   - No FSR bonus needed however, some transfer to Berry Road is possible.

   Note the following in terms of transition:

   i. There is an exceptional avenue of street trees in Park Road which will ameliorate visual height and bulk impacts.
   ii. The transition allows for compatible design if the area west of Park Road redevelops in the future for high density.
   iii. Reducing separation between buildings on Berry and Park Roads (by increasing setback to Park Road) will have some minor impacts on solar access to lower units.

3. **Site 4 and Site 5**
   a. The aim is increased width of E-W links and larger open space and significant areas of floor space for community use. As an updated approach since the Master Plan's adoption in July 2015, the sites providing these public benefits within a bonus scheme need to be reconfigured to be most viable.
   b. The building footprints need to be large enough to construct viable buildings.
   c. The E-W walkway can be included in the setback requirements (as part setback) but there will still need to be some building setback from boundary for privacy reasons or will require non-habitable rooms to walkway.
   d. Viable options were found for all sites.

Note that in this circumstance the following should be considered:

- do not seek to fund all of these facilities from a single site development
- expand development sites south (or north) of the E-W links to promote more viable building parcels
- be economical with width (area) of E-W link, size and location of open space and community facilities
- locate community facilities where appropriate access (pick up/set down) and circulation are available (not on cul-de-sacs)
- ensure child care can have access to at-grade open space
- ensure adequate parking can be provided for community facilities
- the E-W link between Canberra and Holdsworth will by necessity be a pedestrian link (due to steep cross fall) with an accessible lift in the community facility
- the E-W link between Holdsworth and Berry should desirably be a shareway in order that:
  - traffic using the community facility does not have to U-turn in Berry Road
  - off-street pick up/drop off can be provided to the community facility on Site 4

5. River Road Transition

Building heights can most probably be reduced along River Road and setbacks increased but at a cost. It should be noted that for Sites 6 & 7 the north-south cross fall makes SEPP No 65 compliant development quite difficult (south facing slopes). It will be difficult for buildings to address River Road and remain ADG compliant.

It is likely that for Site 6 it will be possible to achieve a viable and compliant development in spite of the awkward site shape (shallow depth) in association with steep cross slope. Reduced building heights along River Road are desirable in order to prevent overshadowing of houses on the south side of River Road.

Note that Site 6 may desirably expand to the north. Alternatively a multi-facetted building of varying height (low at River Road and 8 storeys to the north) may be viable (see attached calculations).

Note that Site 7 will require some northern expansion in order to be viable. South facing buildings addressing River Road are likely to be problematic. We would suggest N-S buildings fronting Holdsworth and Berry Streets (to optimise solar access) perhaps with a low (poor solar accessed) E-W building to River Road. An increased site amalgamation as shown will be viable but may not reach FSR of 2.75 : 1 within 8 storeys and reduced height to River Road.

6. Canberra Avenue / Holdsworth Avenue Transition

We have modeled the shadows of existing and approved development around the railway station. These have relatively little shadow impact across the precinct except in the early-mid morning.

We have also modeled the master plan proposed heights provided as part of this brief. These will have shadow impacts and may make absolute compliance with ADG (SEPP 65) difficult.

We have also modeled (p.39) an optimum yield solution of the whole area within 200m and 400m of the railway station in order to estimate potential additional development yield (over 2.75:1 and 8 storeys) which might be able through development contributions to achieve the following:

- provision of E-W links
- provision of public open space
- provision of community facilities
- provision of affordable housing

These building heights will contribute to a logical height graduation stepping down from the station, however have compliance implications with respect to solar access.

We have modeled a reduced height option which will largely comply with the ADG requirements (Option on page 52). The above ideas will be tested further in the next section.

7. PREFERRED OPTION FOR DEVELOPMENT

7.1 Preferred Option

Based on the foregoing analysis and on the desire to optimise Transit-Oriented Development, we recommend the following conceptual layouts, heights and FSRs.

These are analysed for solar and shadow impacts (Figure 7.2) and laid out in a spreadsheet (Figure 7.3) which summarise:

- Site area
- Footprint dimension
- Number of storeys
- Gross Building Area / GBA
- Gross Floor Area (GFA) (90% of GBA)
- Net Floor Area (NFA) (80% of GFA)
- Achievable FSR
- Apartment Yield
- Uplift in terms of GFA
- Uplift in yield

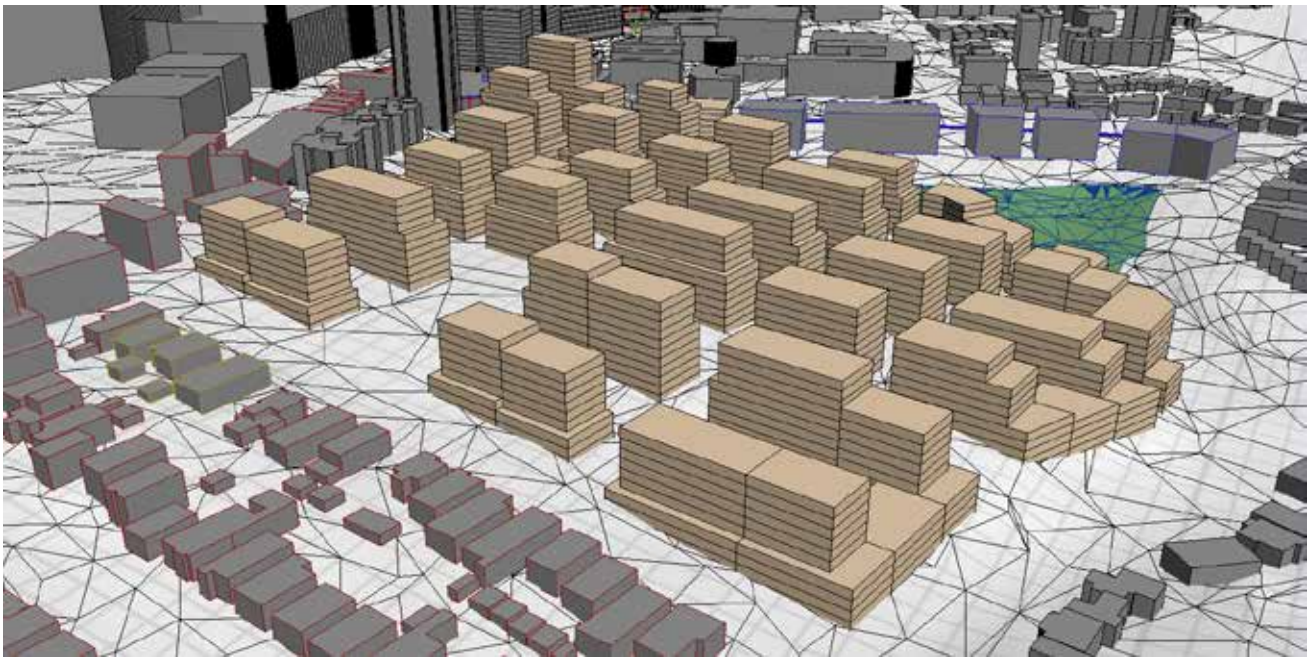
This provides Council with the necessary data to establish the FSR and Building Heights for inclusion in statutory mapping but also to calculate uplift as input to development contributions/ bonus scheme which will contribute substantially to the funding of desirable infrastructure (open space, connecting paths, lanes, roads and shareways, community facilities and of affordable housing).

7.2 Testing

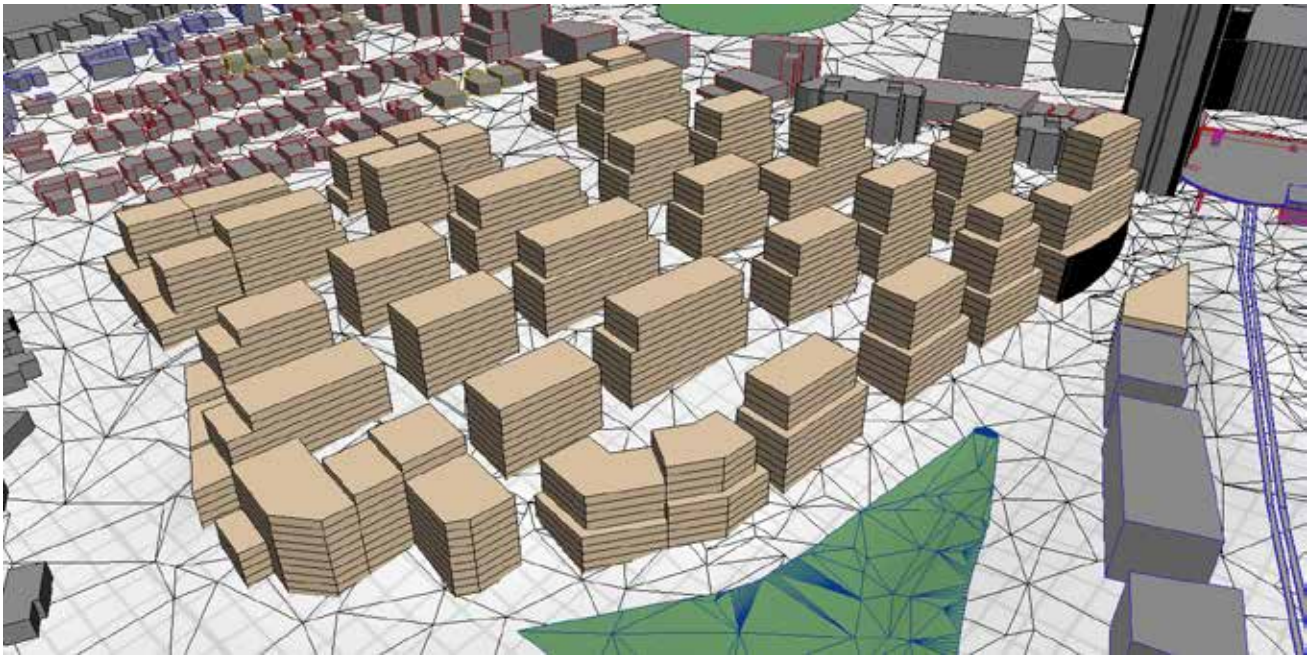
The following pages provide solar access and shadow impact testing for May, June and July.

Figure 7.1 - Building Numbers

Figure 7.2 - Building Height



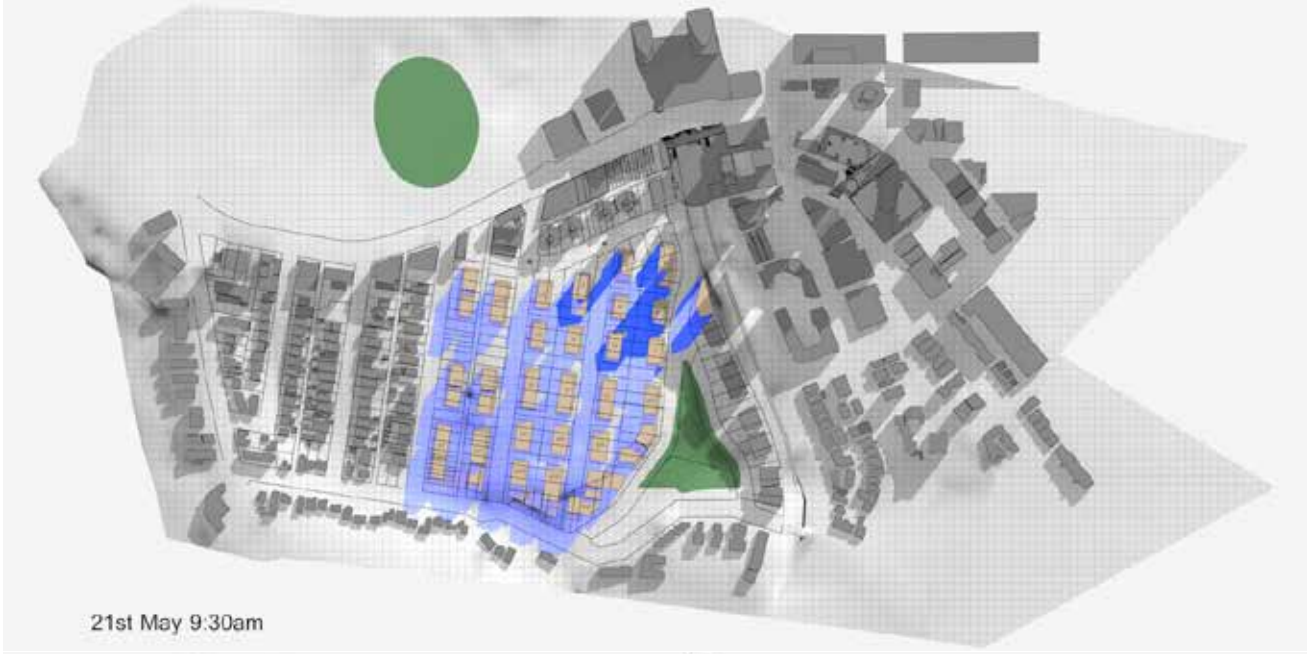
View looking North-East



View looking North-West

The following analysis examines solar access for 21st May, 21st June (winter solstice) and 21st July against solar access criteria in ADG.

21st May Analysis



21st May 10:30am

21st May 11:00am

21st May 11:30am

21st May 12:00pm

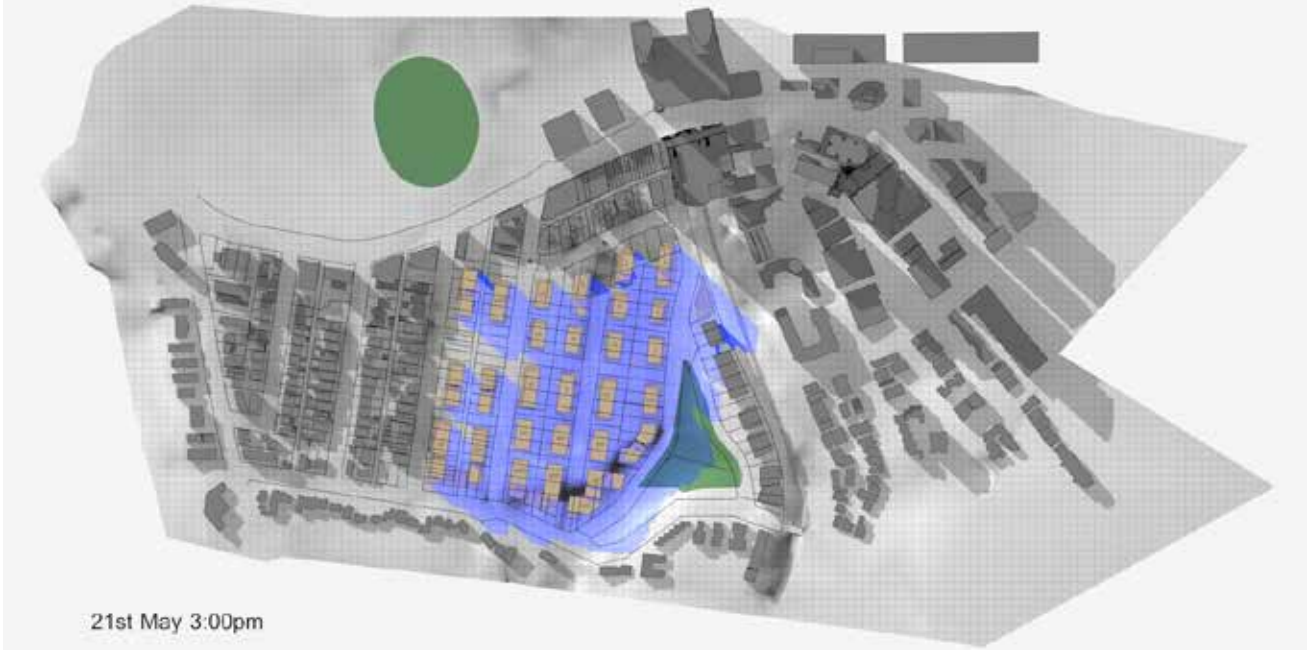
21st May 12:30pm

21st May 1:00pm

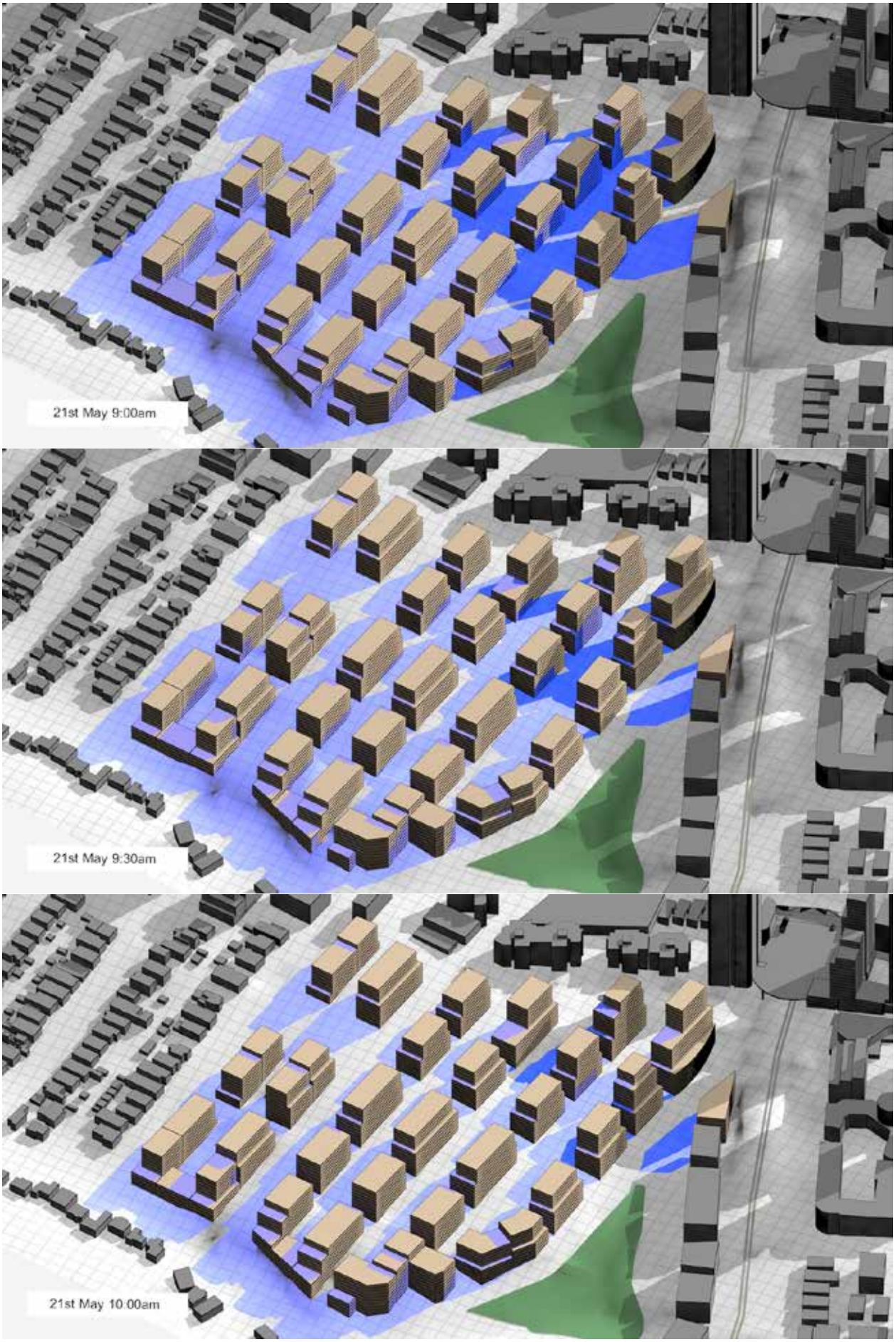

21st May 1:30pm


21st May 2:00pm


21st May 2:30pm

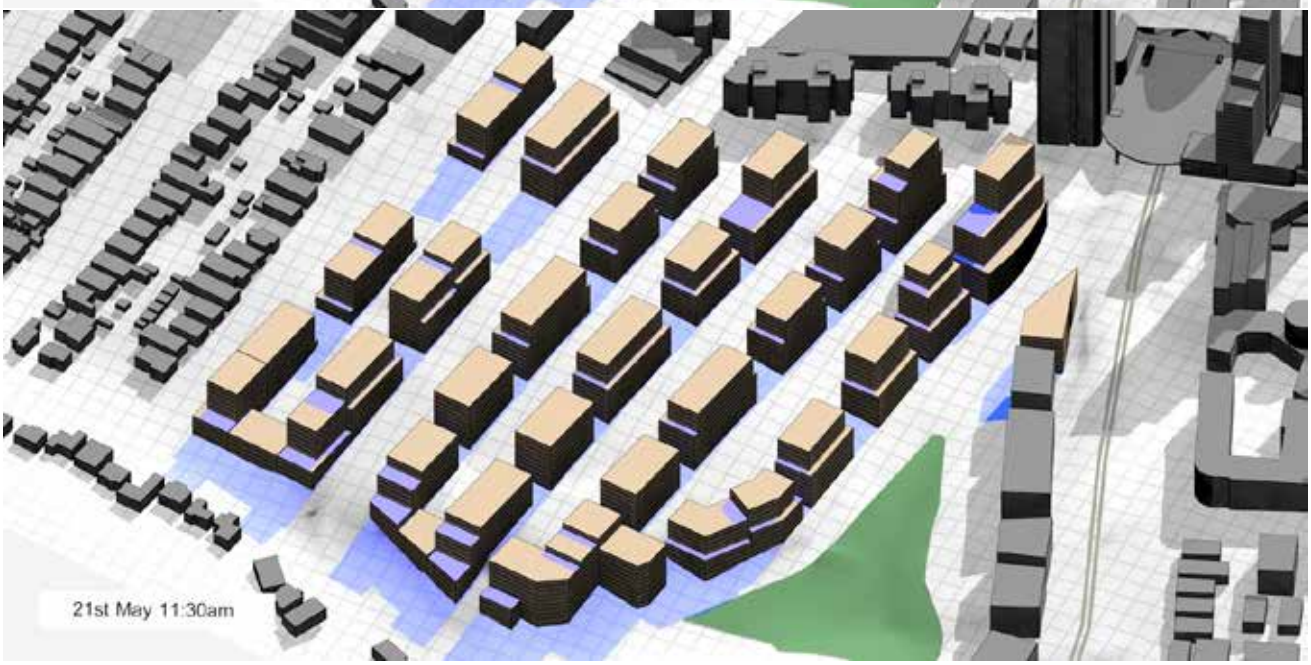

21st May 3:00pm

East facing buildings.

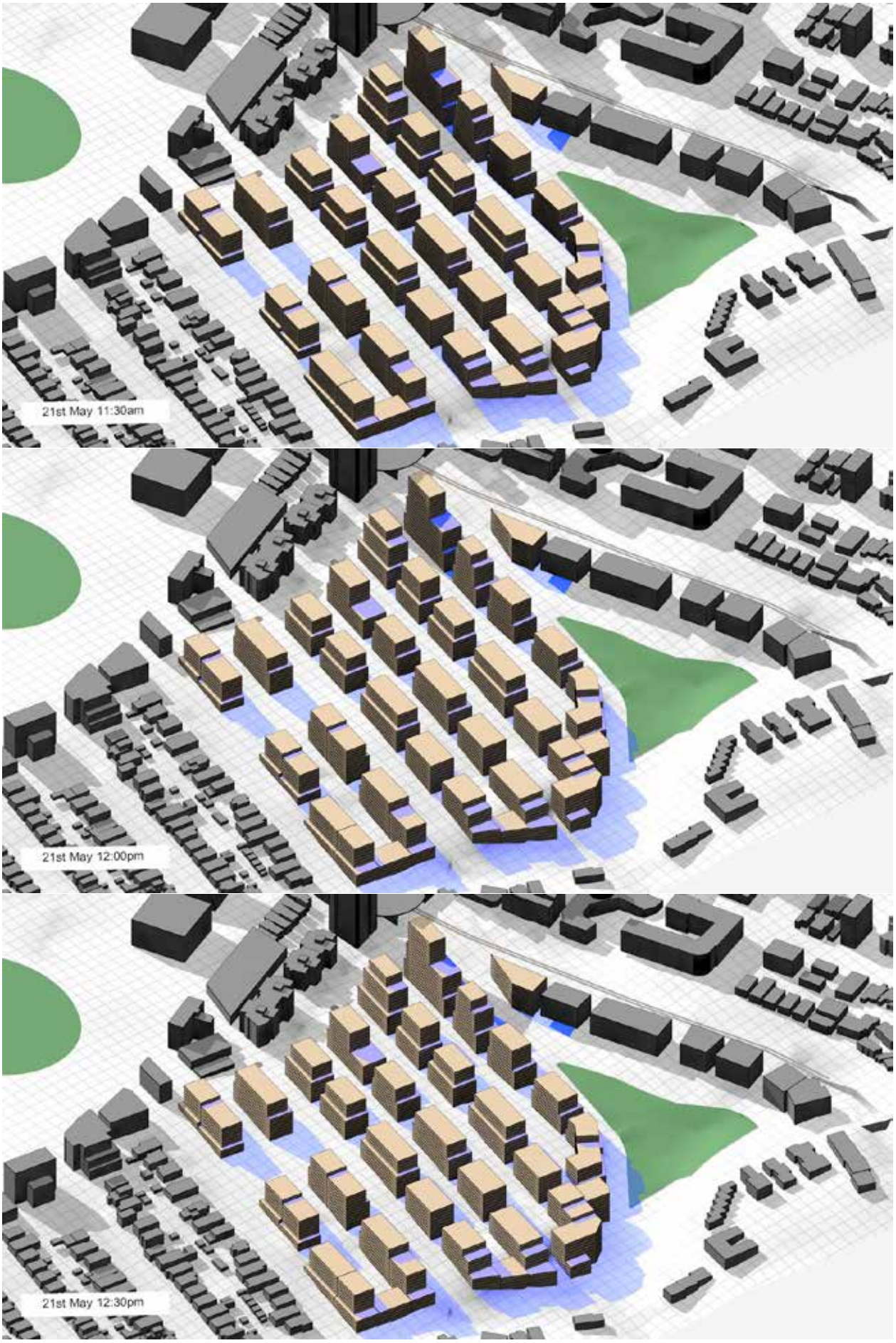



21st May 10:30am


21st May 11:00am


21st May 11:30am

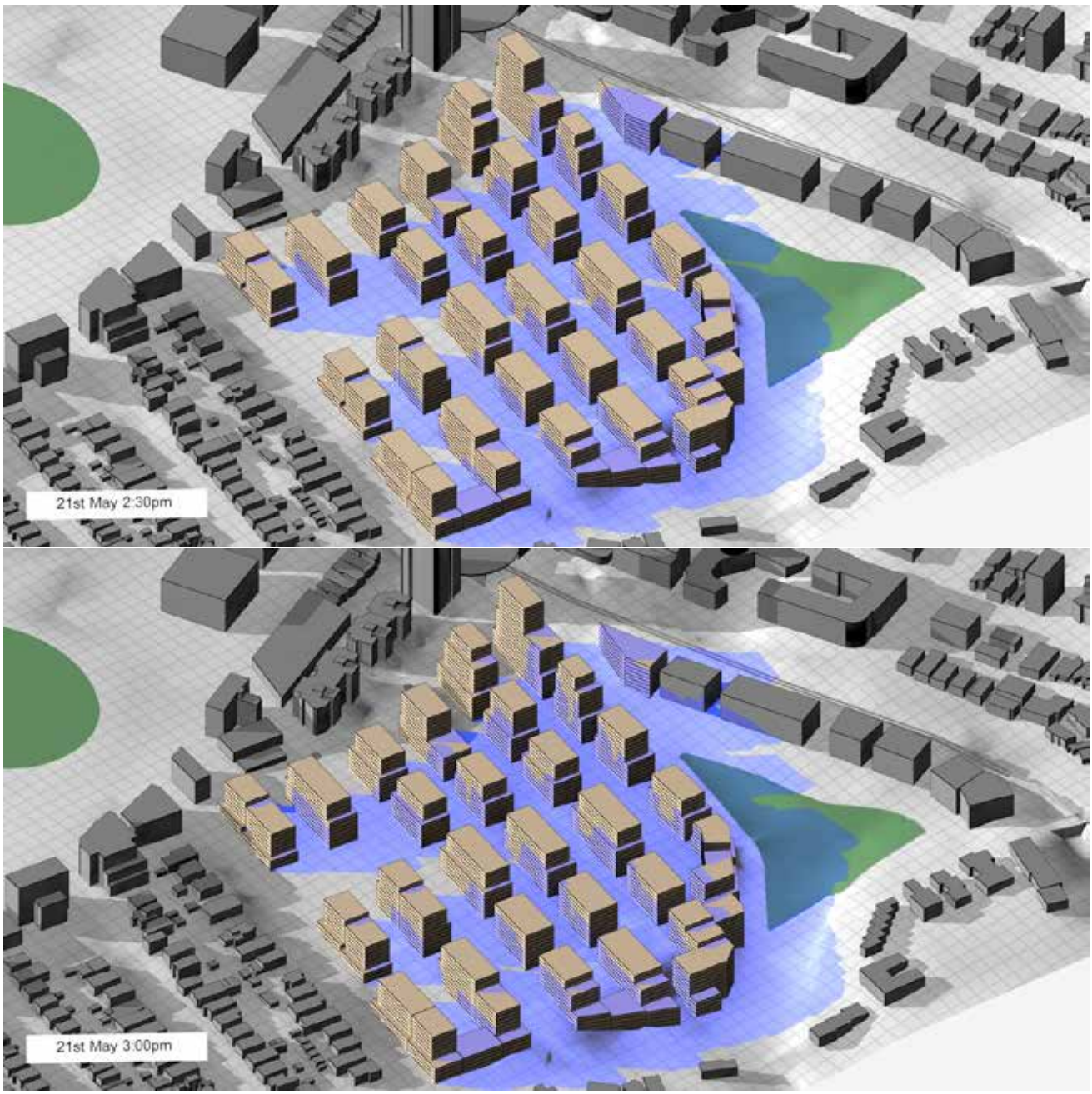
West facing buildings.



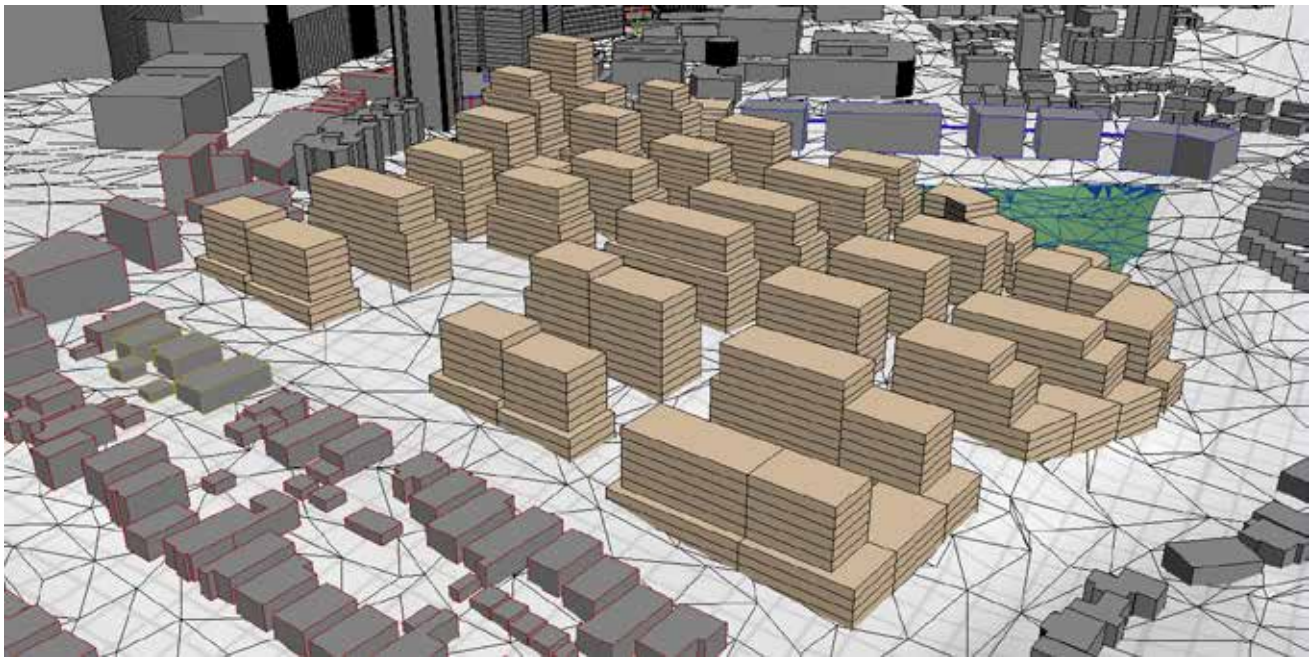

21st May 1:00pm


21st May 1:30pm

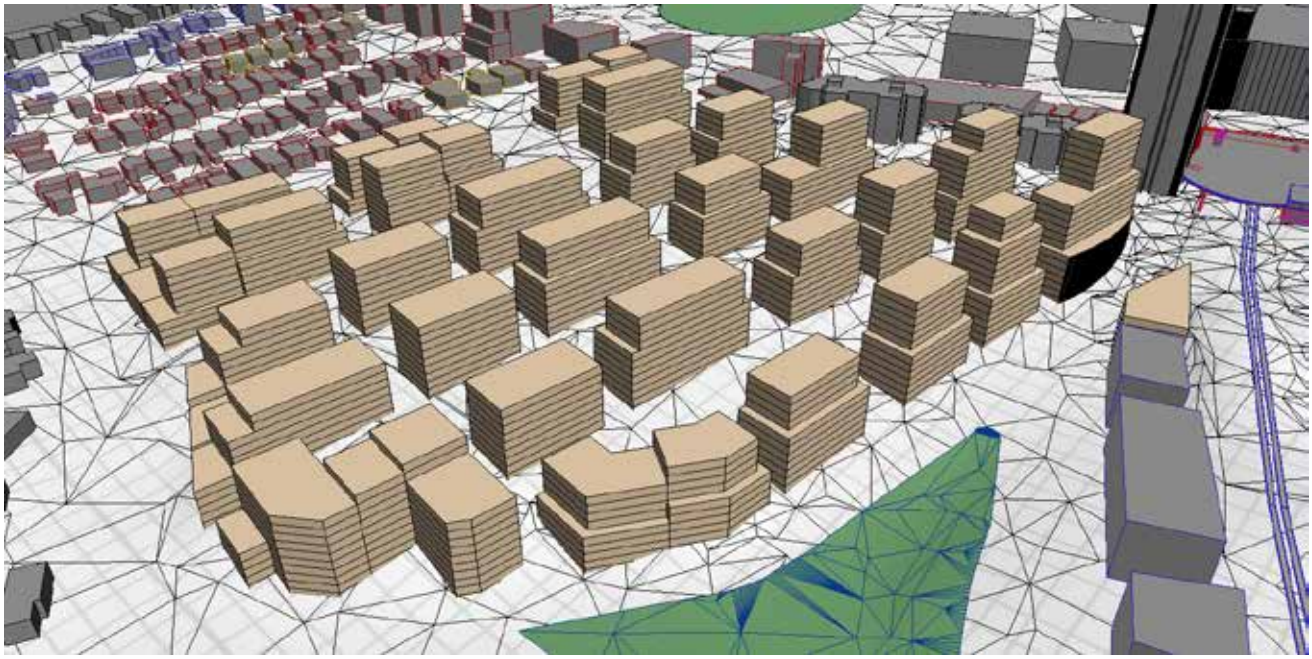

21st May 2:00pm



Solar Access criteria under SEPP 65 / ADG can generally be met on 21st May (1 month prior to midwinter solstice)



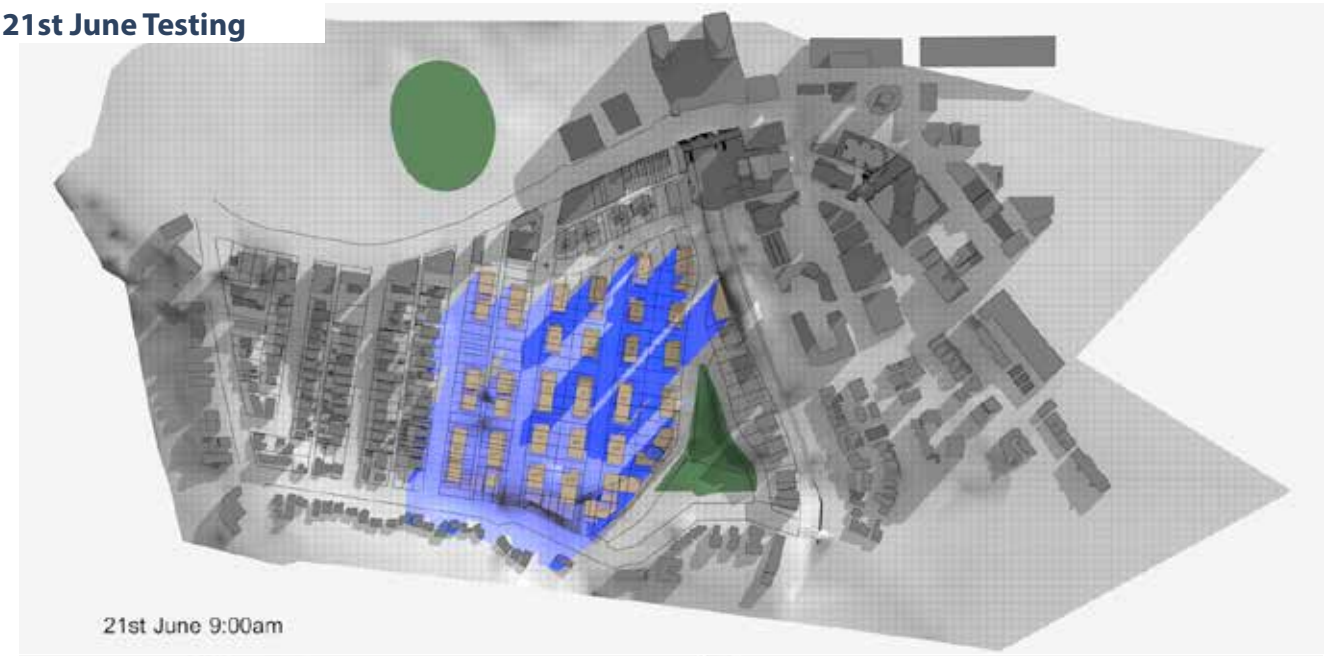
View looing North-East

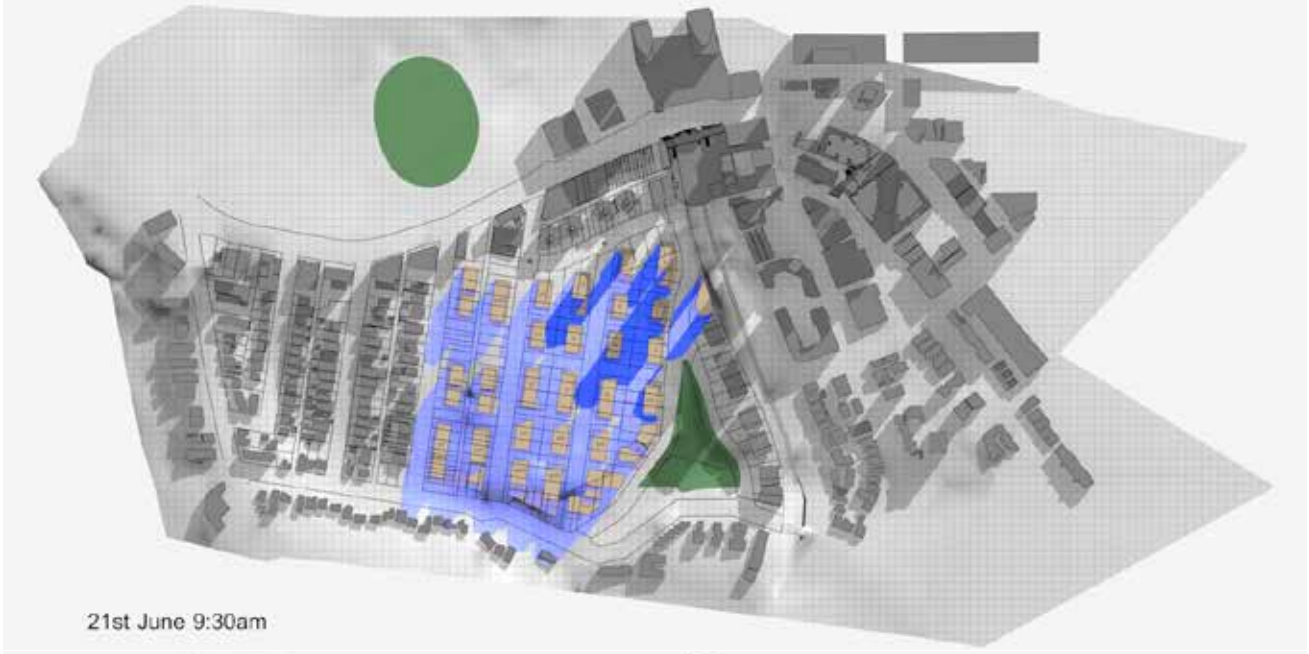


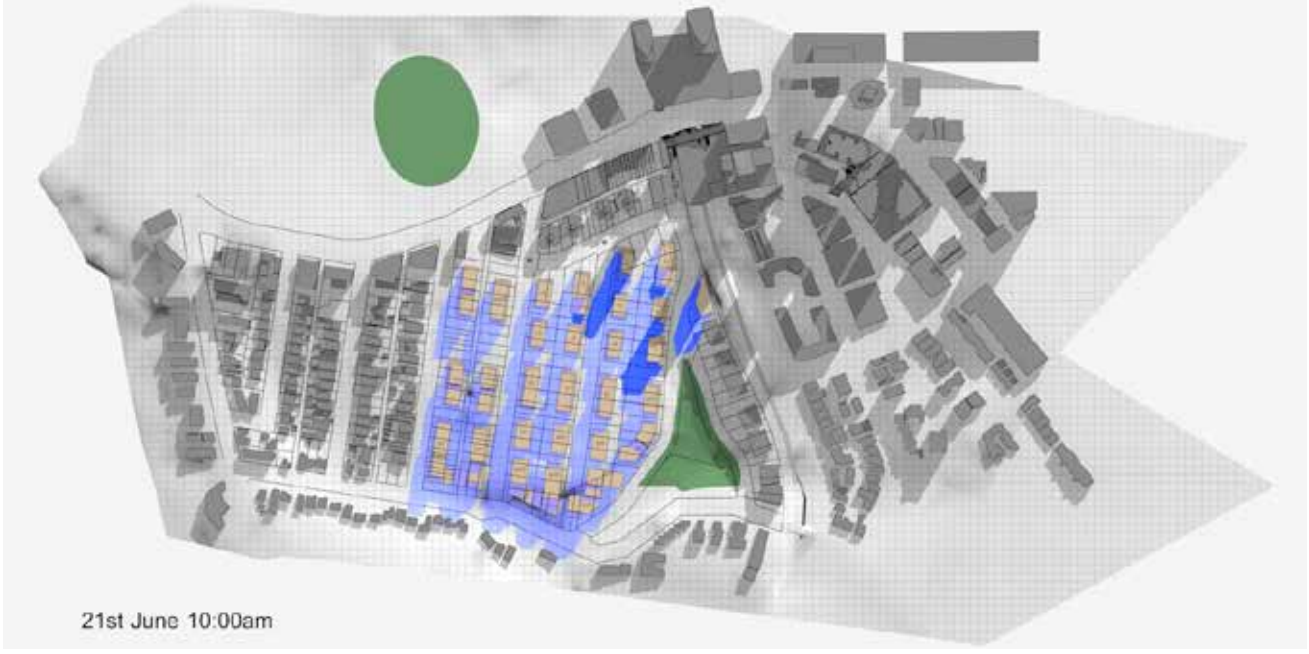
View looking North-West

Testing for comparative solar access at winter solstice 21st June.

21st June Testing







21st June 10:30am

21st June 11:00am

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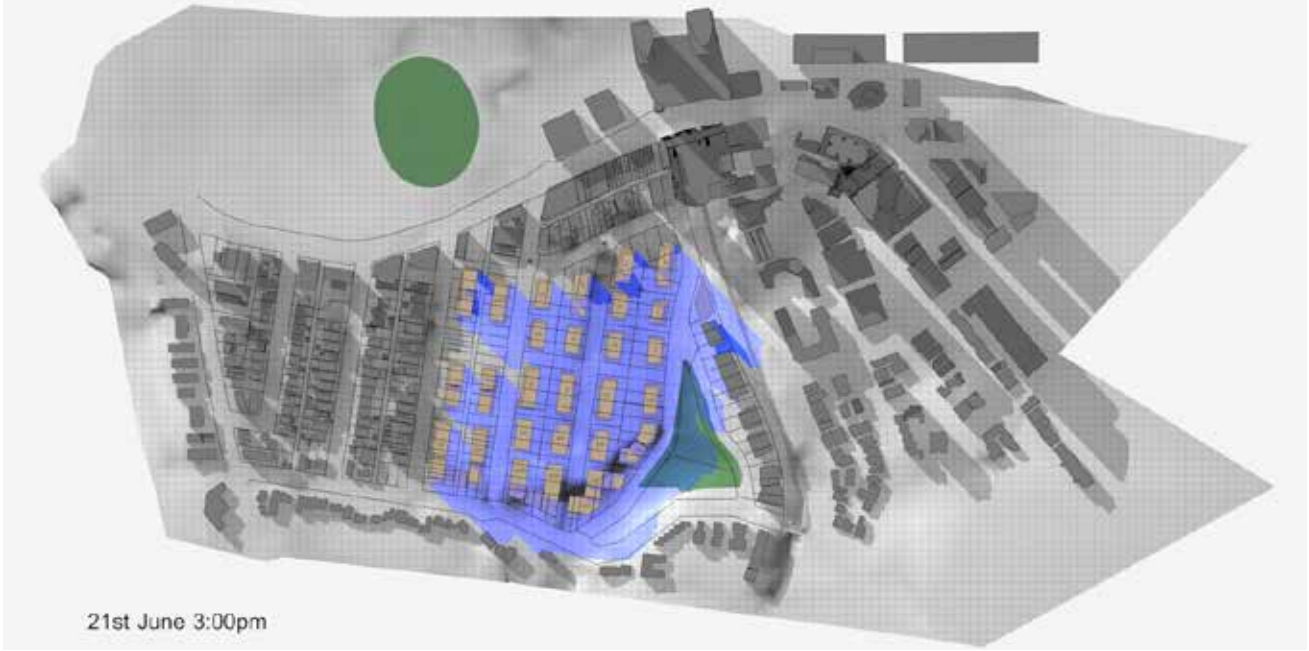
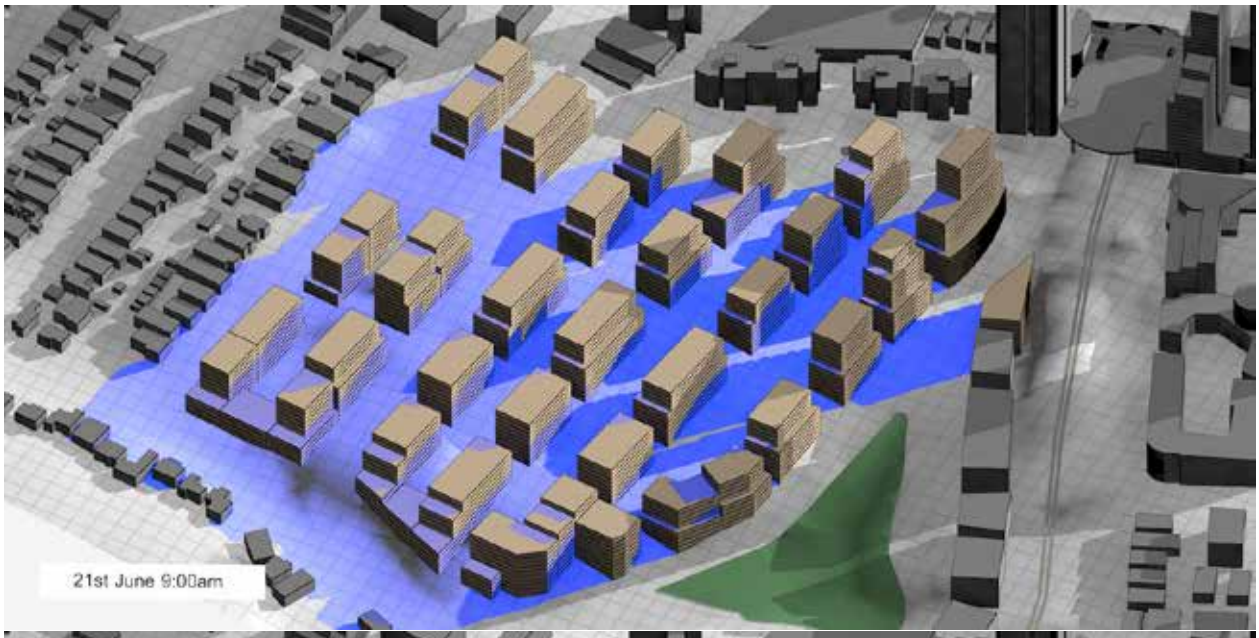
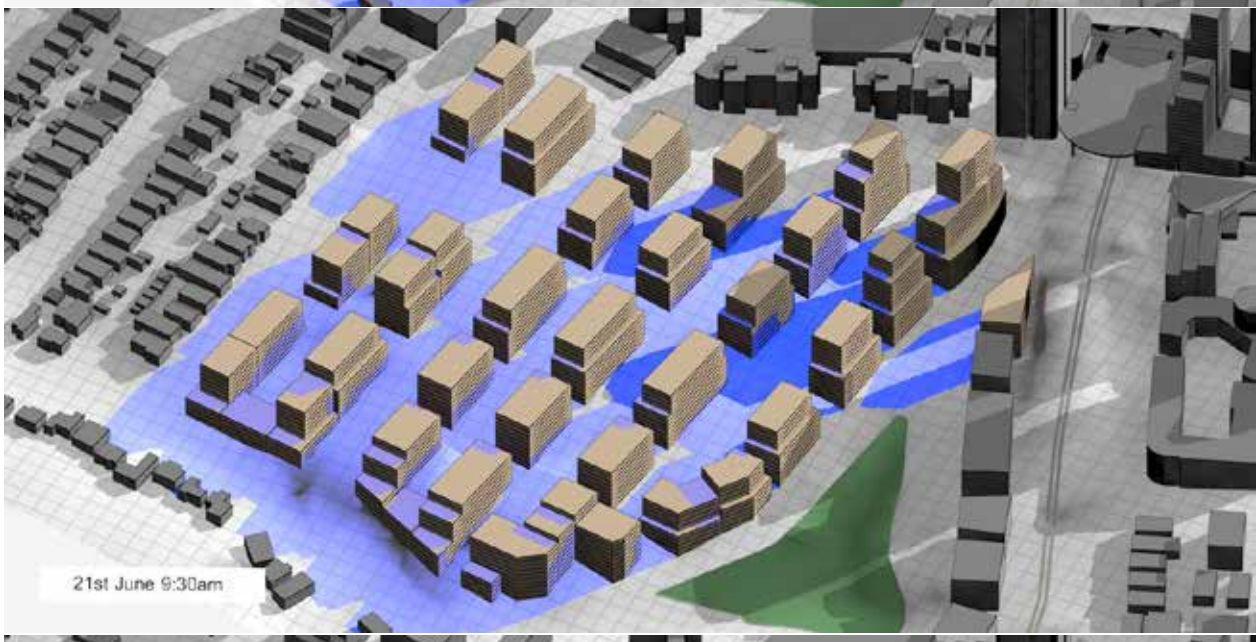
21st June 2:30pm


21st June 3:00pm

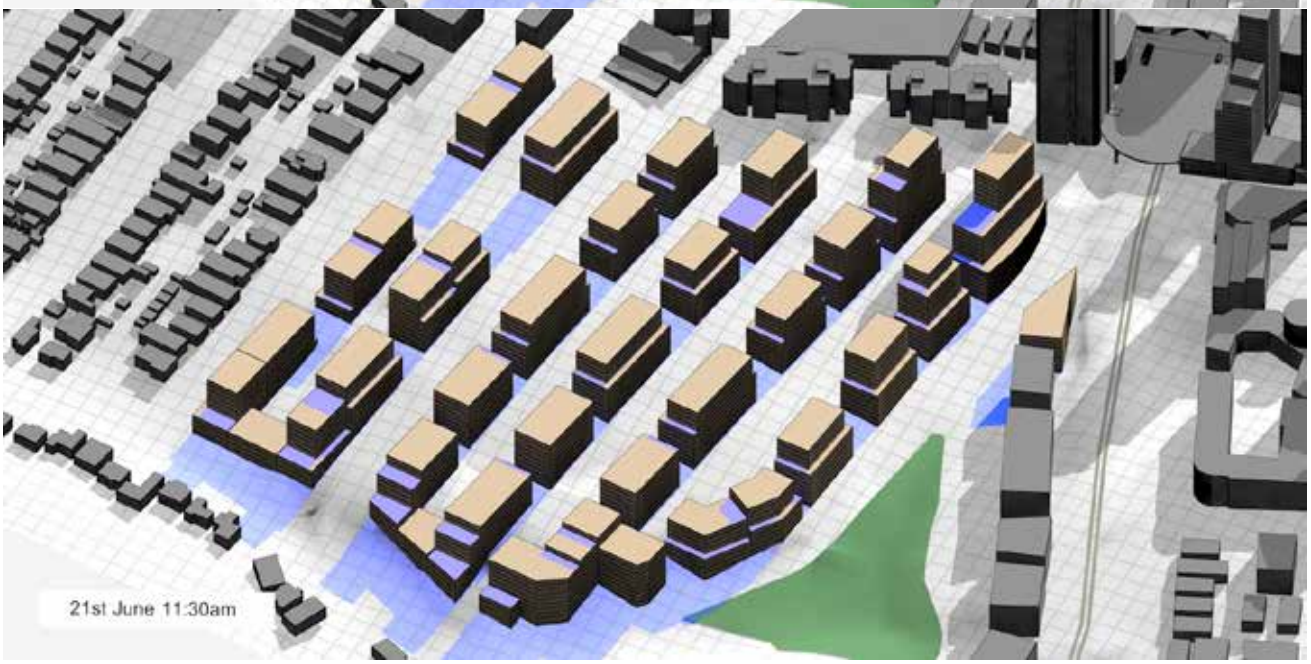
East facing buildings.



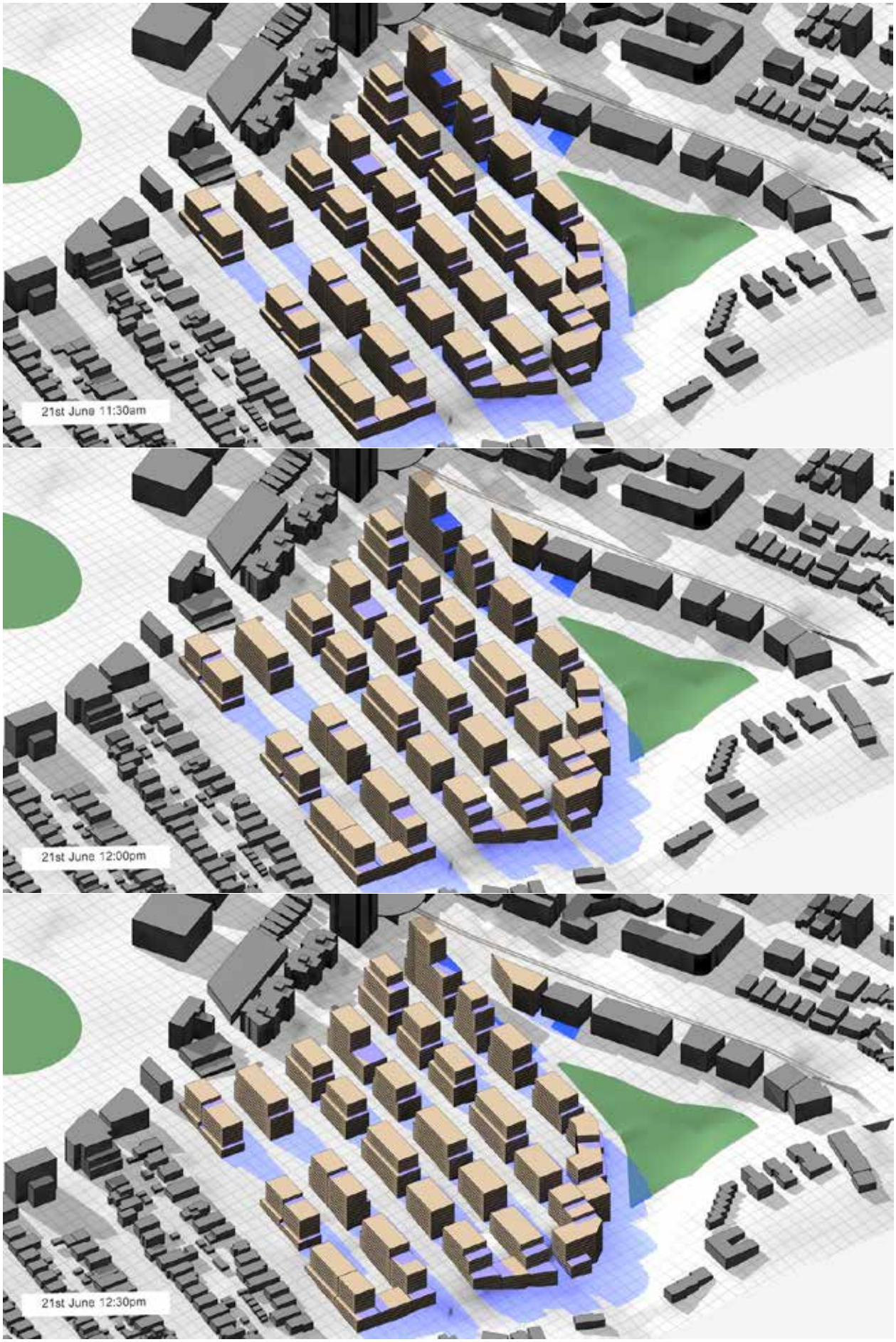



21st June 10:30am


21st June 11:00am


21st June 11:30am

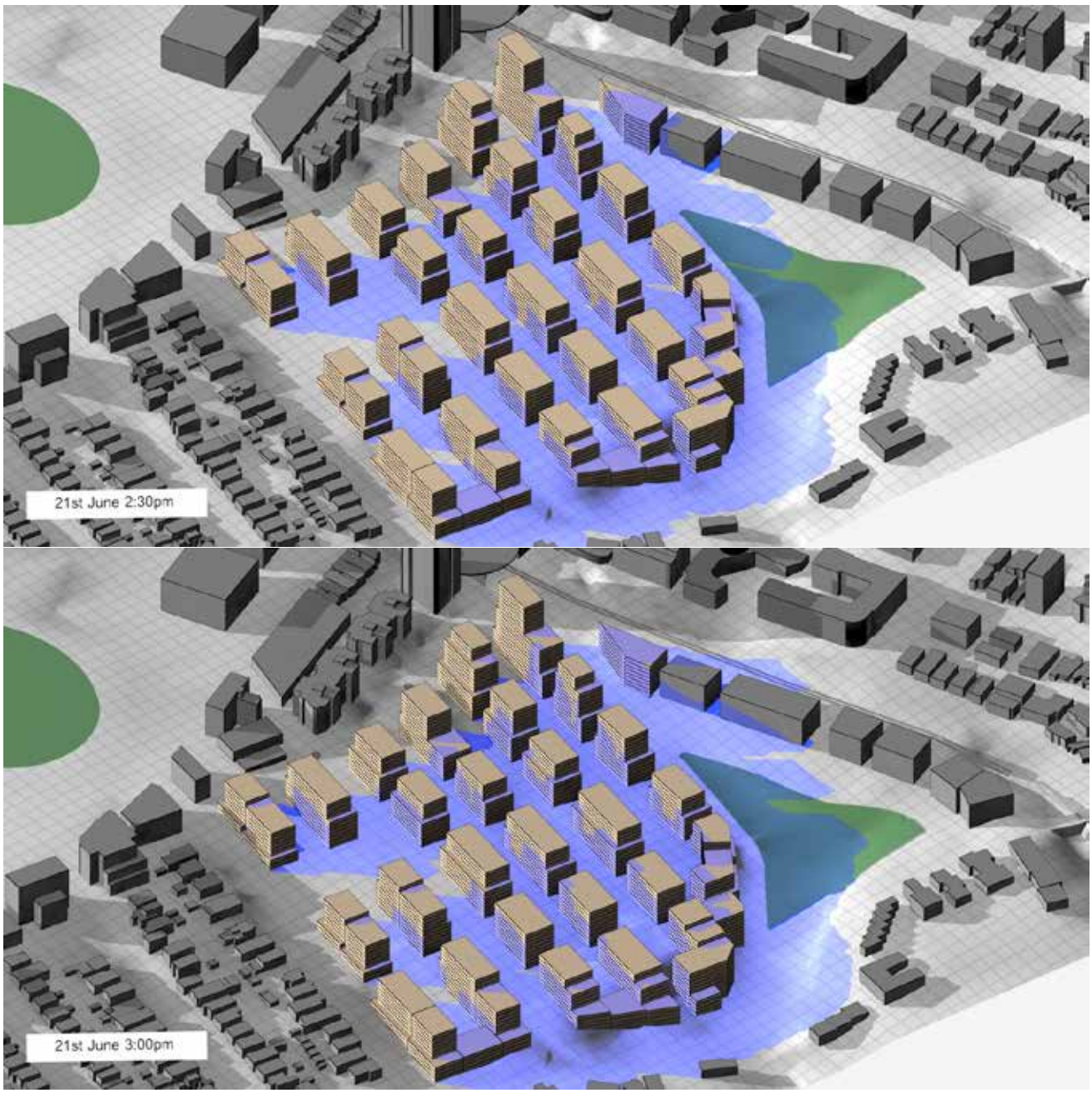
West facing buildings.




21st June 1:00pm

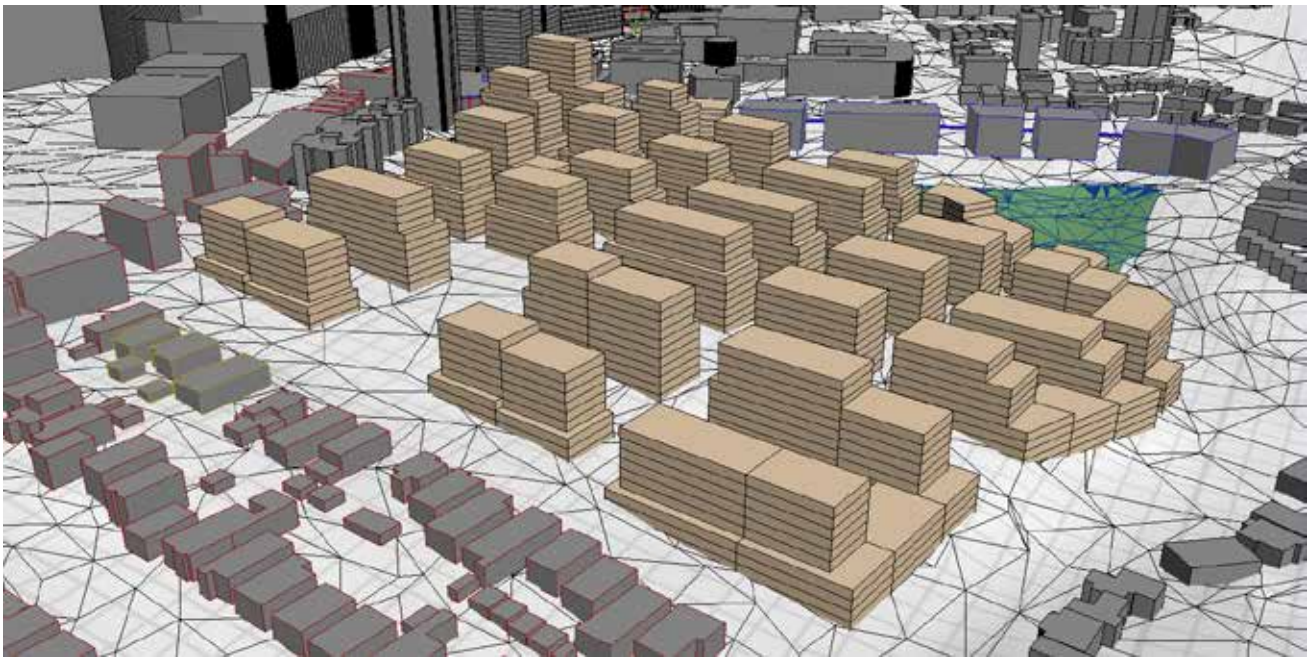

21st June 1:30pm


21st June 2:00pm

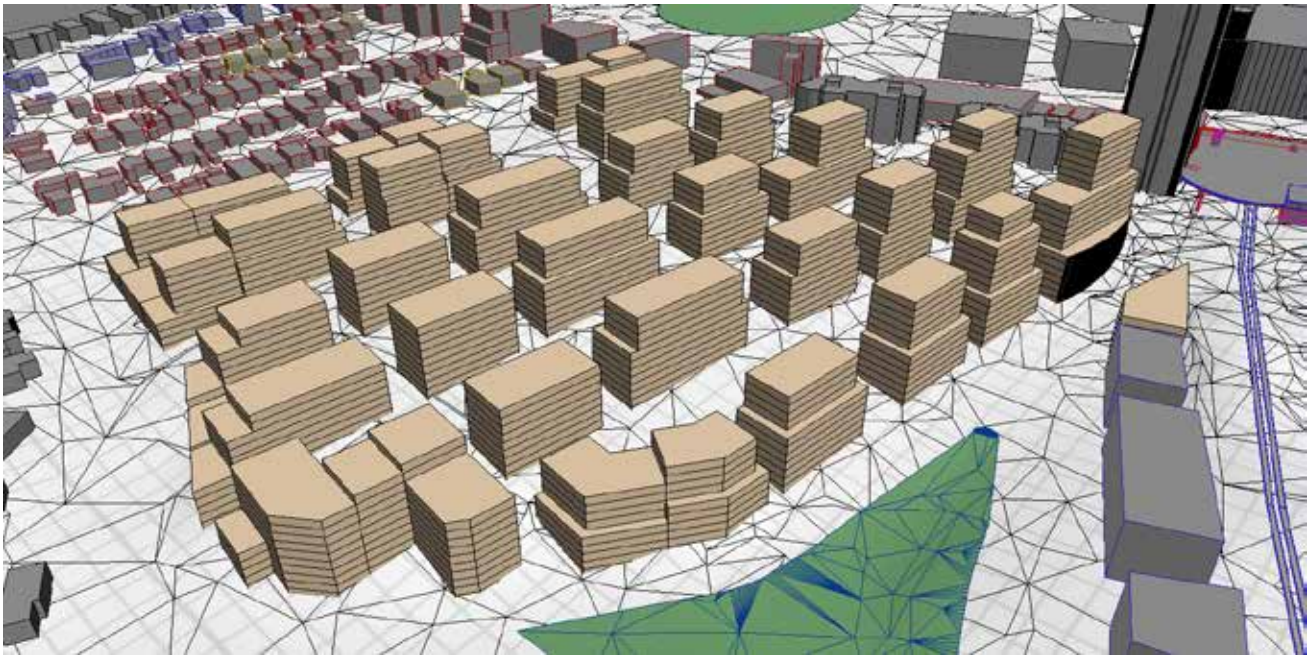


Absolute compliance with SEPP65 / ADG requirements for solar access are difficult at winter solstice due to south facing slopes and street orientation.

BUILDING ENVELOPES for solar access testing 21st July



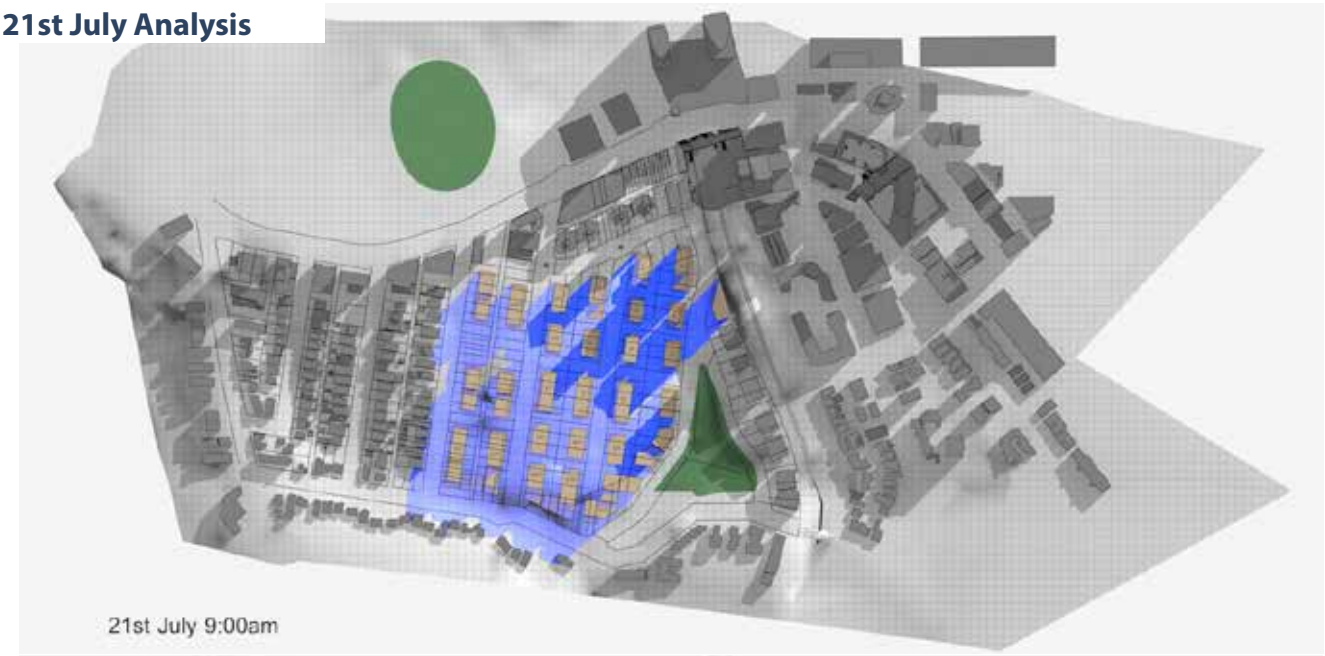
View looing North-East

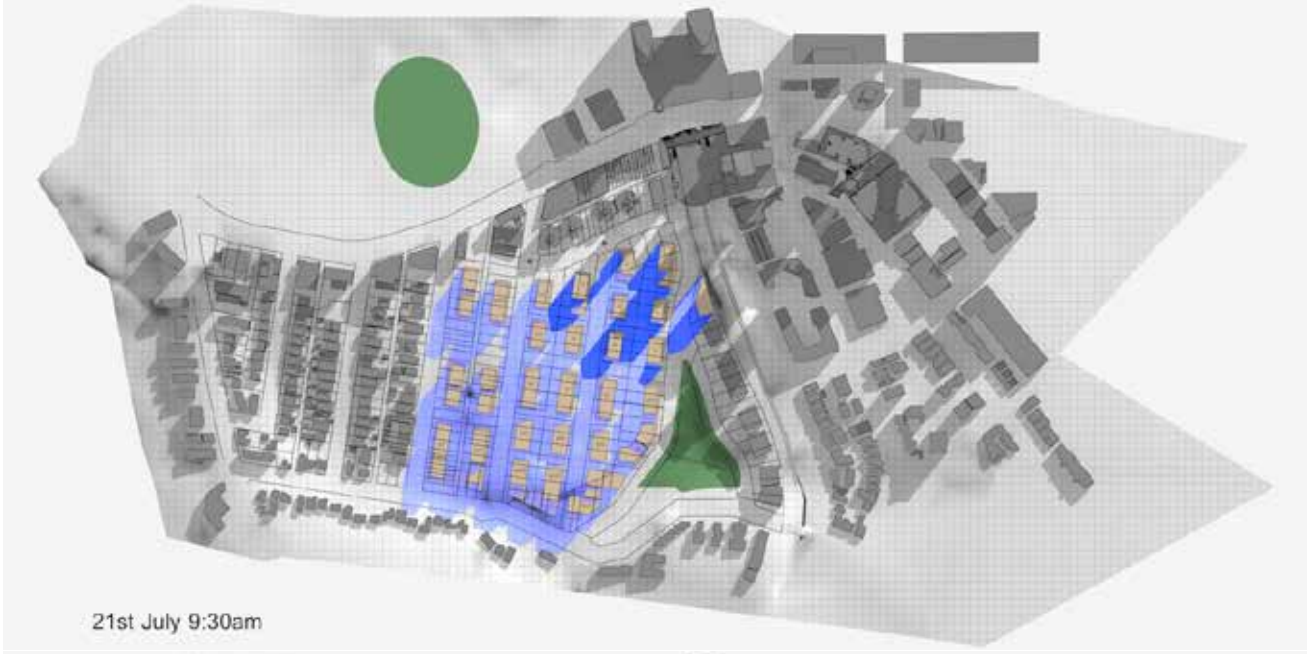


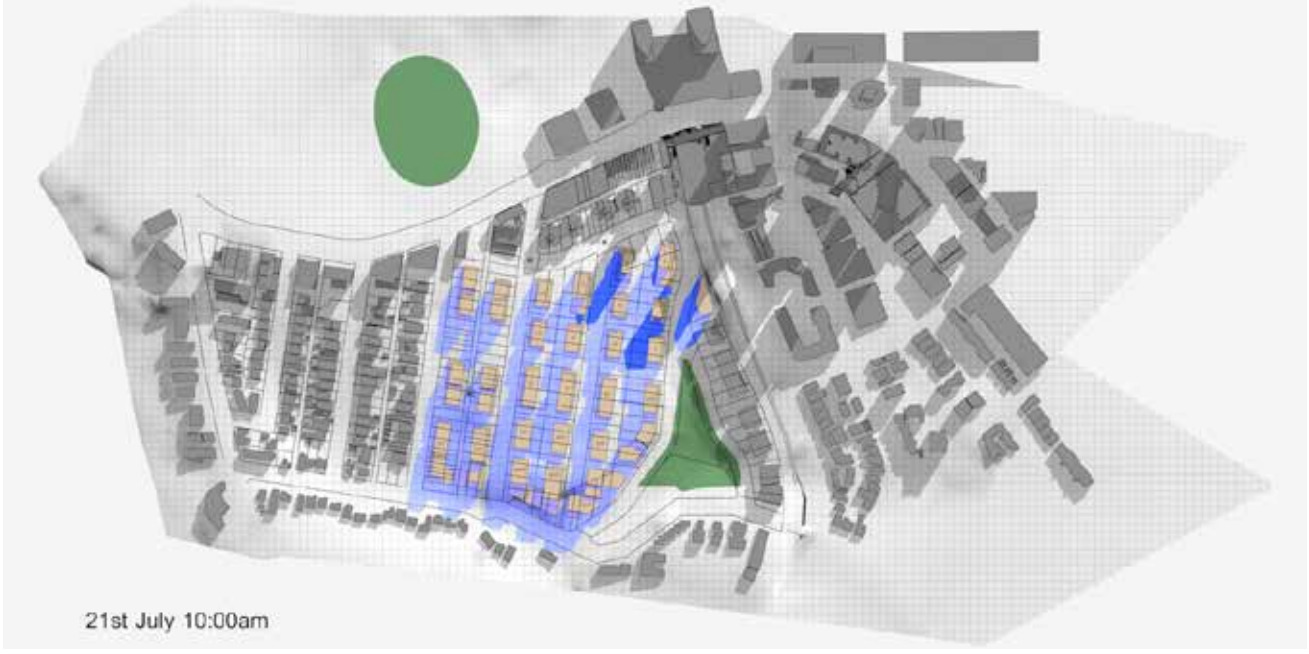
View looking North-West

Testing for solar access on 21st July (1 month after winter solstice)

21st July Analysis







21st July 10:30am

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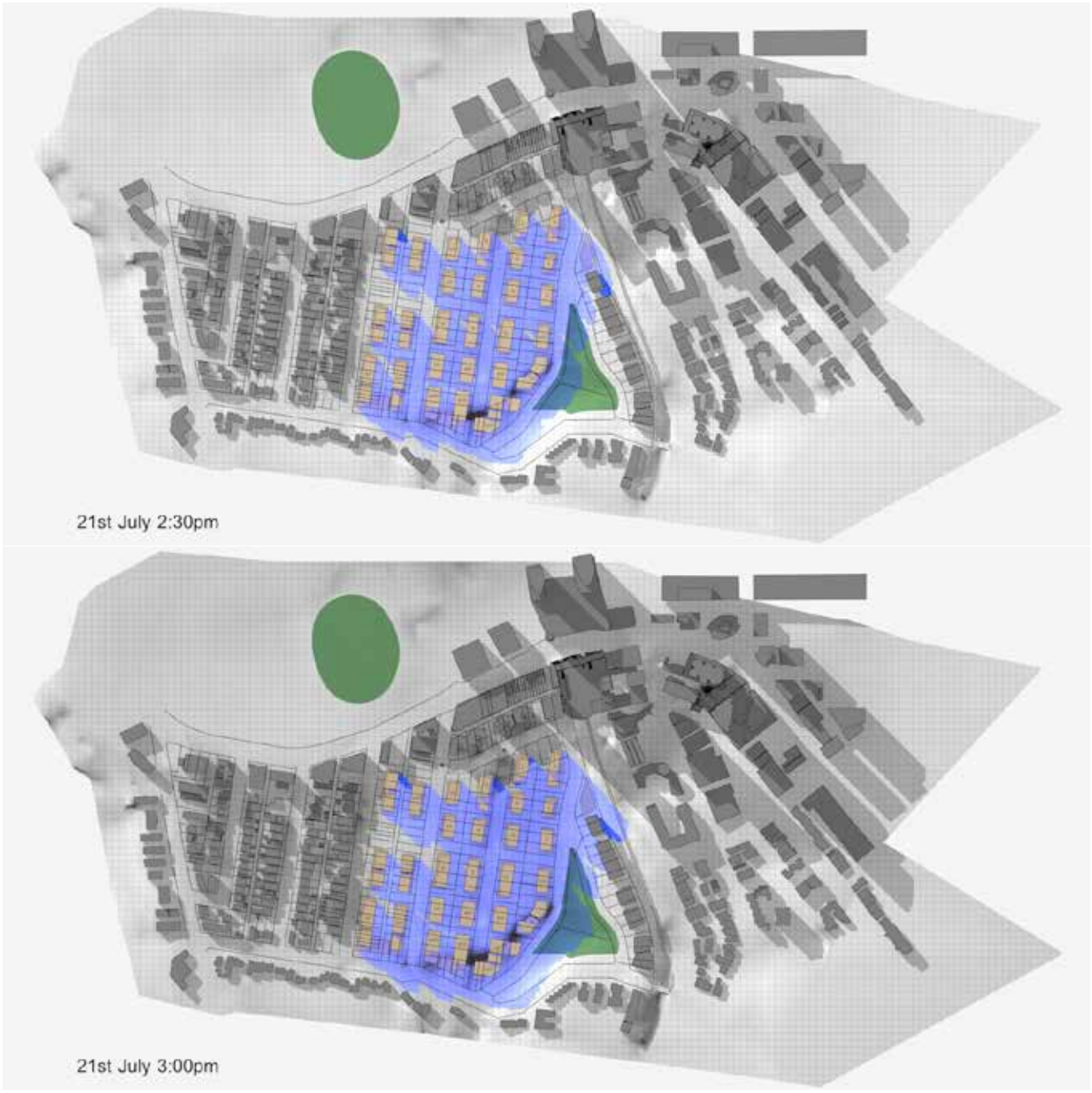
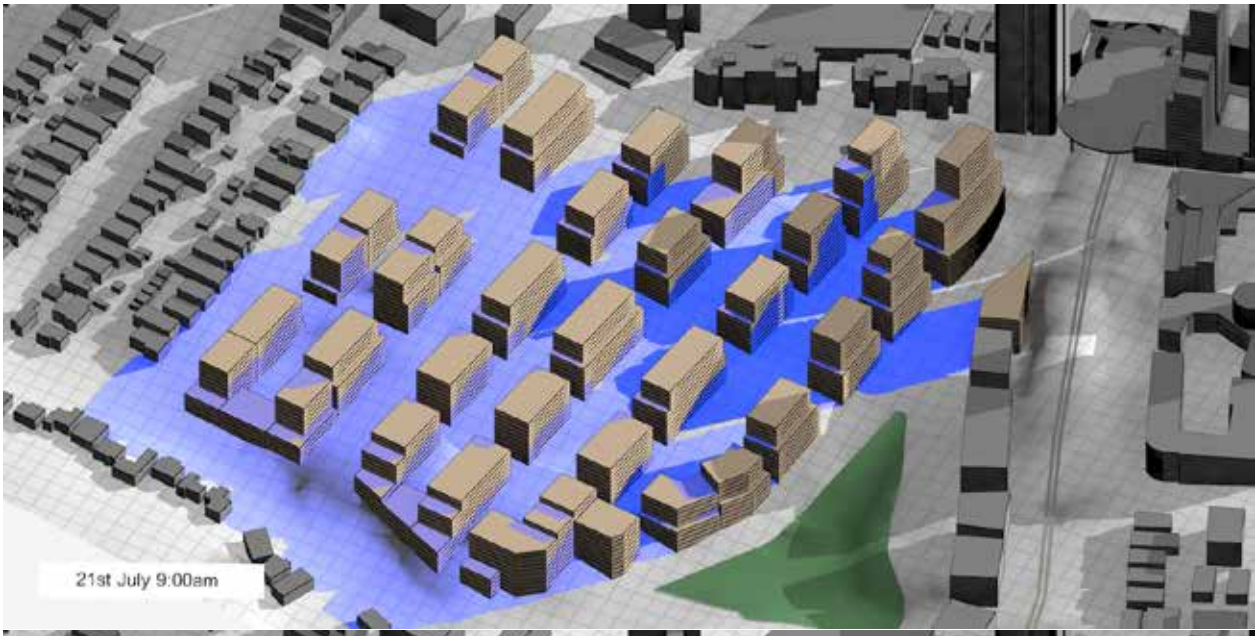


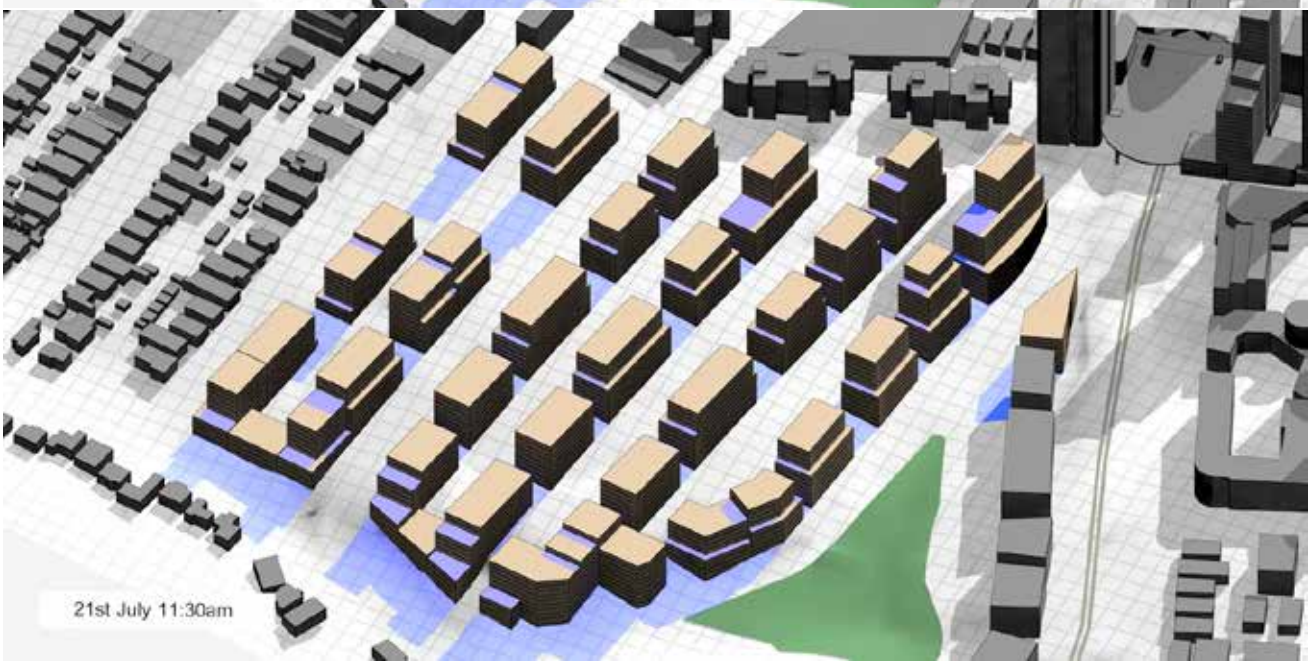
Generally compliant solar access to open space areas is available for 21st July.

East facing buildings.

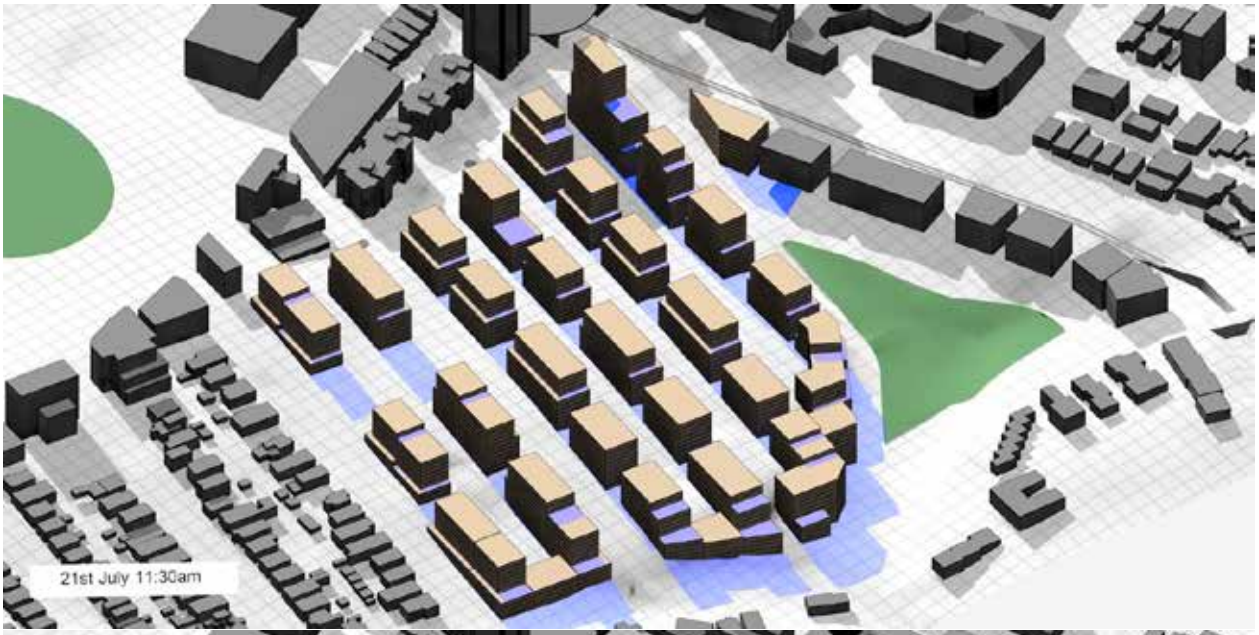



21st July 10:30am


21st July 11:00am


21st July 11:30am

West facing buildings.

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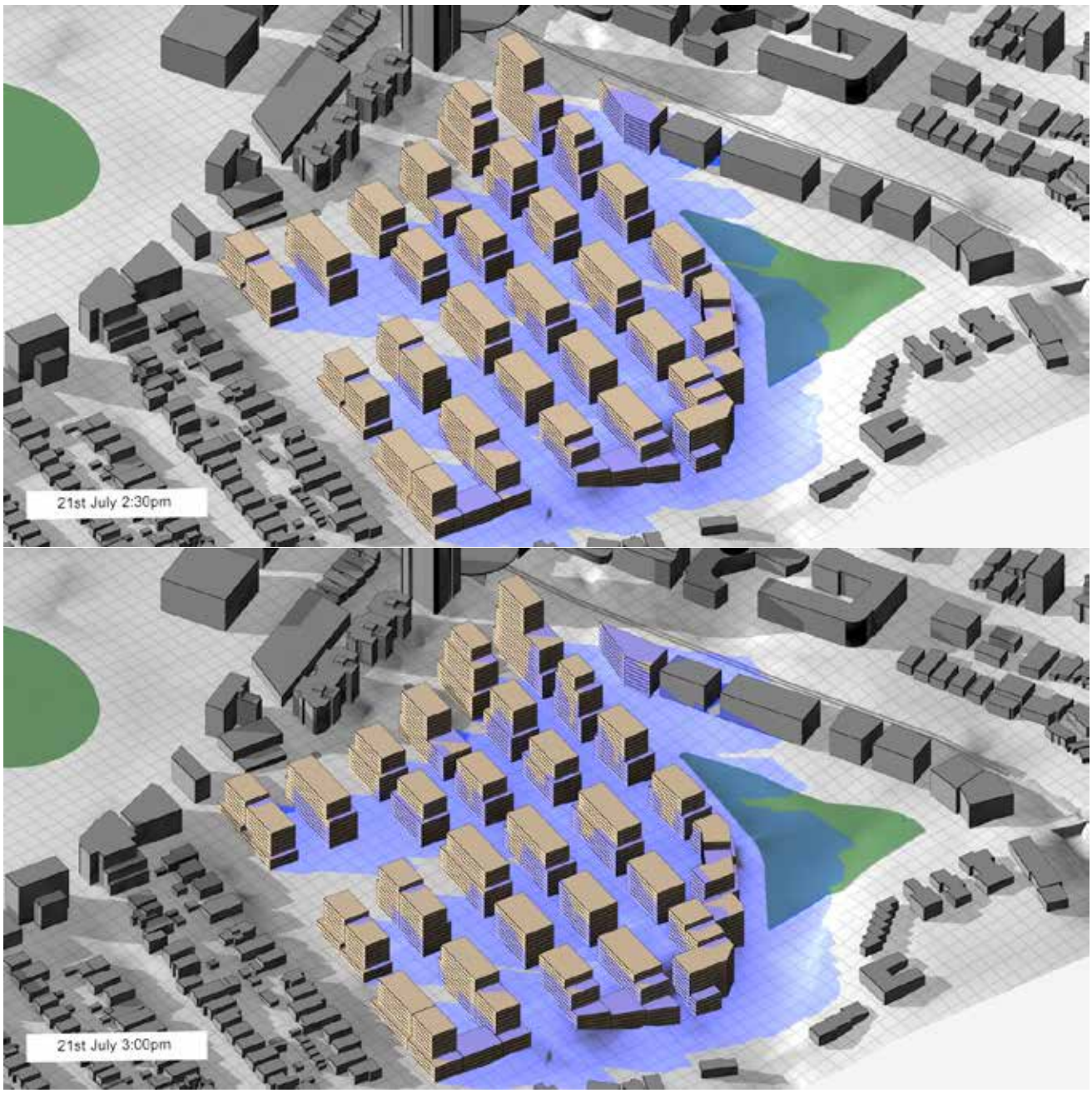

This testing shows that solar access criteria to open space and habitable rooms can generally be met by 21st July.

Development Assumptions		
Envelope to GFA	90%	
GFA to NSA	80%	
Average Gross Unit Size (m2)	90	2 br unit

Area Name	dimension	Areas (m2)	Storeys	Envelope (m2)	Total GFA (m2)	FSR : 1
Site 1. - site area		**3415**	**19**	**15666**	**14099**	**4.13**
Levels 1-6	57 x 22	1254	6	7524		
Levels 7-12	50 x 17	867	6	5202		
Levels 13-19	30 x 14	420	7	2940		
Site 2. - site area		**2315**	**15**	**9762**	**8786**	**3.80**
Levels 1-6	42 x 20	840	6	5040		
Levels 7-12	36 x 17	612	6	3672		
Levels 13-15	25 x 14	350	3	1050		
Site (i) - site area		**1897**	**15**	**7776**	**6998**	**3.69**
Levels 1-6	34 x 20	680	6	4080		
Levels 7-12	28 x 17	476	6	2856		
Levels 13-15	20 x 14	280	3	840		
Site (iii) - site area		**1669**	**12**	**6936**	**6242**	**3.74**
Levels 1-6	34 x 20	680	6	4080		
Levels 7-12	28 x 17	476	6	2856		
Site (ii) - site area		**1941**	**12**	**7380**	**6642**	**3.42**
Levels 1-6	36 x 20	720	6	4320		
Levels 7-12	30 x 17	510	6	3060		
Site (iv) - site area		**1669**	**10**	**6548**	**5893**	**3.53**
Levels 1-6	37 x 20	740	6	4440		
Levels 7-10	31 x 17	527	4	2108		
Site (viii) - site area		**2106**	**10**	**6736**	**6062**	**2.88**
Levels 1-6	38 x 20	760	6	4560		
Levels 7-10	32 x 17	544	4	2176		
Site (viii) - with E-W Link		**2782**	**10**	**6736**	**6062**	**2.18**
Levels 1-6	38 x 20	760	6	4560		
Levels 7-10	32 x 17	544	4	2176		
Site (ix) - site area		**2226**	**10**	**9368**	**8431**	**3.79**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-10	46 x 17	782	4	3128		
Site (ix) - with E-W Link		**2782**	**10**	**9572**	**8615**	**3.10**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-10	49 x 17	833	4	3332		
Site 3. - site area		**2624**	**12**	**9300**	**8370**	**3.19**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-12	30 x 17	510	6	3060		
Site (vi) - site area		**1967**	**10**	**6548**	**5893**	**3.00**
Levels 1-6	37 x 20	740	6	4440		
Levels 7-10	31 x 17	527	4	2108		
Site (v) - site area		**1669**	**10**	**6548**	**5893**	**3.53**
Levels 1-6	37 x 20	740	6	4440		
Levels 7-10	31 x 17	527	4	2108		
Site (vii) - site area		**1670**	**10**	**6548**	**5893**	**3.53**
Levels 1-6	37 x 20	740	6	4440		
Levels 7-10	31 x 17	527	4	2108		
Site (vii) - with E-W Link		**2226**	**10**	**6548**	**5893**	**2.65**
Levels 1-6	37 x 20	740	6	4440		
Levels 7-10	31 x 17	527	4	2108		
Site (x) - site area		**2226**	**8**	**7804**	**7024**	**3.16**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-8	46 x 17	782	2	1564		
Increased Height - link included		**2782**	**10**	**9436**	**8492**	**3.05**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-10	47 x 17	799	4	3196		
Site (xi) - site area		**2220**	**10**	**9368**	**8431**	**3.80**
Levels 1-6	52 x 20	1040	6	6240		
Levels 7-10	46 x 17	782	4	3128		

7.3 Conclusions on Preferred Proposition

Further analysis of the modified TOD proposal reveals that the height and footprints proposed can be supported because:

- They optimize development yield concentrating tallest buildings nearest to the railway station.
- They generally provide good solar access to open space areas.
- They have some solar access to building façade issues however this is only for the relatively short duration during midwinter and only to some lower level units (which can largely be ameliorated through careful detailed design).