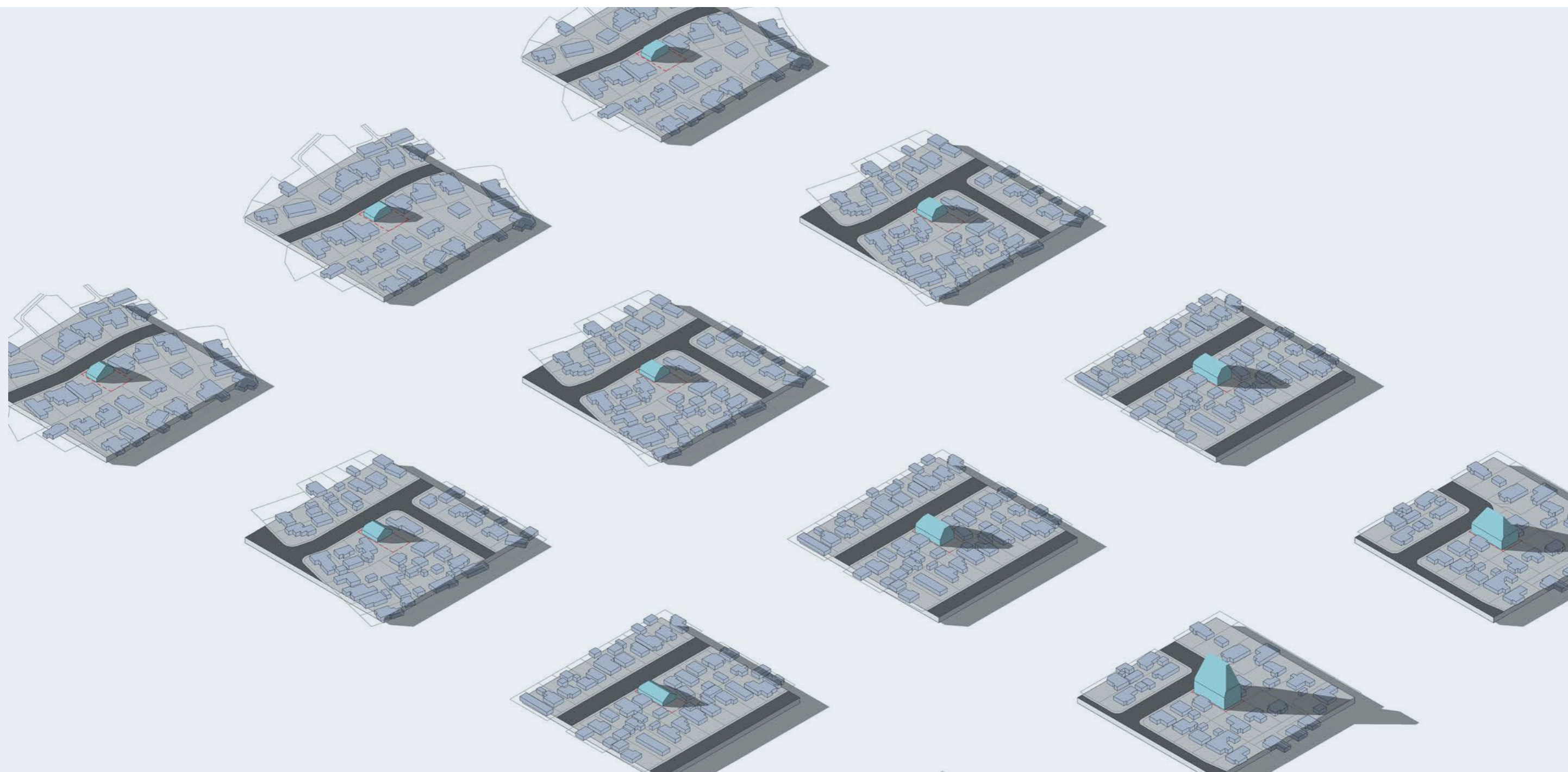


UPPER HUTT INTENSIFICATION EVALUATION

RECESSION PLANE ANALYSIS

5 MAY 2022



DOCUMENT QUALITY ASSURANCE

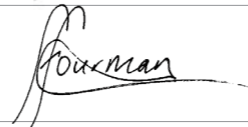
BIBLIOGRAPHIC REFERENCE FOR CITATION:

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Boffa Miskell Ltd

STATUS: FINAL Revision / version: 3

Issue date: 5 May 2022

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Cover photograph: 3D Upper Hutt Intensification Models, © Boffa Miskell, 2021

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UPPER HUTT INTENSIFICATION EVALUATION

MODELLING OUTPUT CONTENTS

		PAGE	CONTROLS			HD ALTERNATIVE 70% SITE COVERAGE			HD ALTERNATIVE HEIGHT SEPARATION RATIO	
			SINGLE SITE	MULTI-SITE	AMALGAMATED	SINGLE SITE	MULTI-SITE	AMALGAMATED	MULTI-SITE	AMALGAMATED
LOW DENSITY	EXISTING	2.7m + 35°+45°	6 + 7							
	OPTION 1	2.7m + 37°	6 + 7	8						
	OPTION 2	2.7m + 45°	6 + 7	8						
GENERAL RESIDENTIAL	EXISTING	2.7m + 35°+45°	9 + 10							
	OPTION 1	2.7m + 45°	9 + 10	11						
	OPTION 2	2.7m + 55°	9 + 10	11						
MEDIUM DENSITY RESIDENTIAL	EXISTING	2.7m + 35°+45°	12 + 13							
	OPTION 1	4m + 60°	12 + 13	14						
	OPTION 2	6m + 55°	12 + 13	14						
HIGH DENSITY RESIDENTIAL	EXISTING	2.7m + 35°+45°	15 + 16							
	OPTION 1	8m + 73°	15 + 16	17				23		
	OPTION 2	6m + 60°	15 + 16		19	18	17	20	24	25
PROPOSED GENERAL RESIDENTIAL	MAY 2022	4m + 60°	30	31						
PROPOSED HIGH DENSITY RESIDENTIAL	MAY 2022	5m + 60°	32	33	34					

UPPER HUTT INTENSIFICATION EVALUATION

INTRODUCTION

Boffa Miskell Ltd was commissioned by the Upper Hutt City Council (UHCC) to provide advice on appropriate recession plane angles to ensure adequate sunlight access to dwellings and options for outdoor living areas within the following zones:

- General residential,
- Low density residential zone,
- Medium density residential zone,
- High density residential zone.

Additionally, appropriate recession plane angles have also been assessed for sites adjacent to:

- Open Space zones,
- Heritage buildings and areas,
- Areas with distinct character,
- Designations (for this assessment limited to a typical school site configuration).

APPROACH

Based on this, we have undertaken the following:

- Analysed typical site dimensions of representative test sites for each of the residential zones. This was done by an in-depth GIS analysis of sample areas provided by UHCC
- Analysed the typical configuration of school sites, heritage buildings and buildings in a distinct character area in Upper Hutt
- Analysed typical shapes and dimensions of parks and reserves in Upper Hutt.
- For the low, general, medium and high density residential zones, 3D building envelopes were modelled, using provisional bulk and location standards associated to the respective zones, as provided by UHCC. Per zone, models were developed with:
 - the existing recession plane controls
 - two hypothetical recession plane options
- Prepared sunlight access diagrams for each model indicating the average sunlight hours over the course of a day in mid-winter, autumn equinox and mid-summer
- Developed recession plane option that creates a transition in built form between a heritage building or character area and medium and high density development
- Assessed the shading implications of different recession plane options, or no recession plane, on adjacent public open space
- A comparison of outdoor open space provisions for medium density, between the District Plans of Auckland, Hamilton and Christchurch (appended)

NOTES

- All 3D diagrams show the time of the year where the shadow effect is the worst of the year, a mid-winter day at 9am.
- The 3D and shading diagrams are based on a building envelope excluding setbacks. The application of the full suite of planning standards, design guidelines and architectural building design considerations on the development will mean that buildings will unlikely be built to the full extent of the building envelope. Therefore, the diagrams shown are indicative of a worst case scenario.
- All modelled building envelopes assume buildings are built towards the front of the site (including front set back rules) with potential for outdoor open space in the back.
- The options and suggestions in this analysis are suggestions that are a result from the undertaken GIS and modelling analysis as well as from comparisons with other New Zealand (second generation) District Plans. Final conclusions and the use of suggested metrics (or combinations therefore) are at the Council's discretion.
- All diagrams include a context that is indicative of the current development pattern within the respective zone. Note that the form and location of these neighbouring buildings have an effect on the outcome of the shading analysis.
- The indicative cross sections show a grid of 3mx3m with an origin in the bottom left corner.



ALL TESTS ARE DONE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

LOW DENSITY RESIDENTIAL - SINGLE SITE

TYPICAL PARCEL SIZE:
22 x 32m

TYPICAL PARCEL AREA:
704 m²

SITE COVERAGE: 30%

HEIGHT LIMIT: 8m

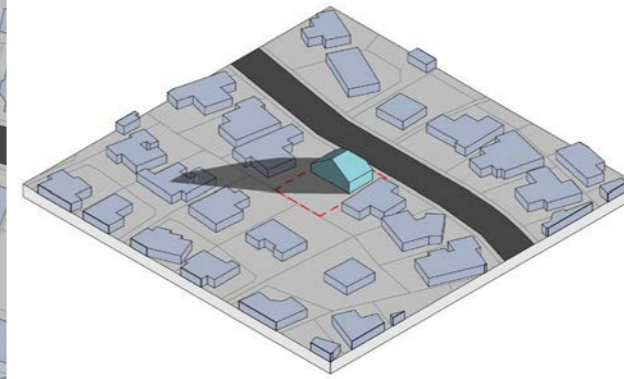
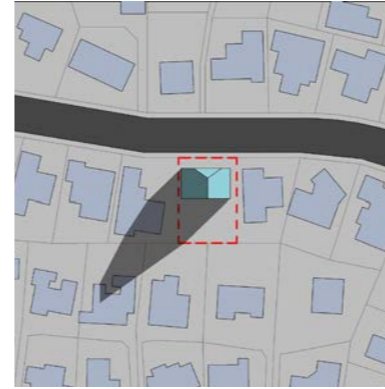
SETBACK FROM
BOUNDARY WITH A
ROAD: 4m

SETBACK FROM OTHER
BOUNDARIES: 1m on
one side, 2.5m on
opposing side (1m
along access ways)

REAR SETBACK: 2.5m

EXISTING SITUATION

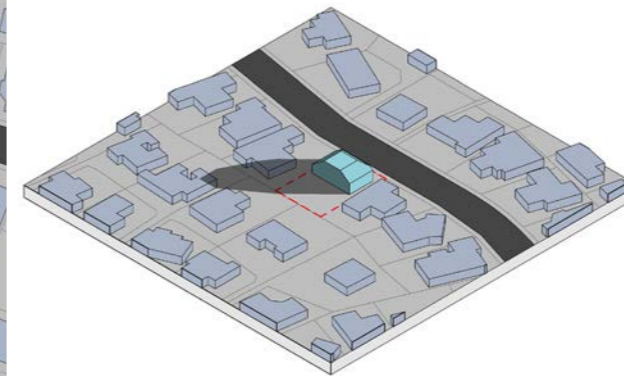
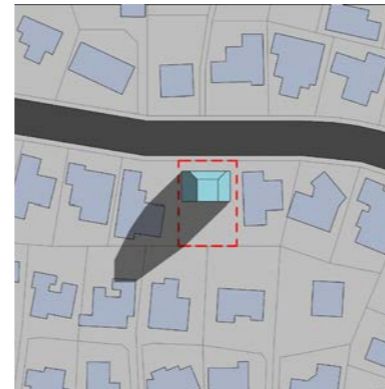
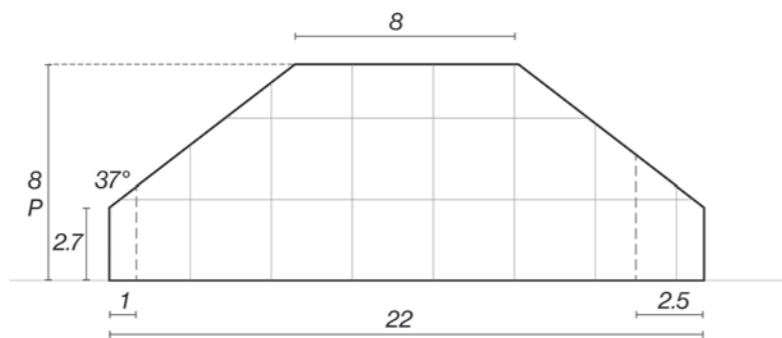
2.7m + 35° + 45° to road boundary



OBSERVATIONS

OPTION 1

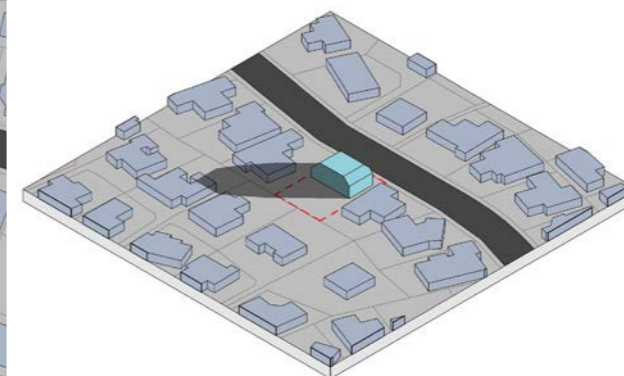
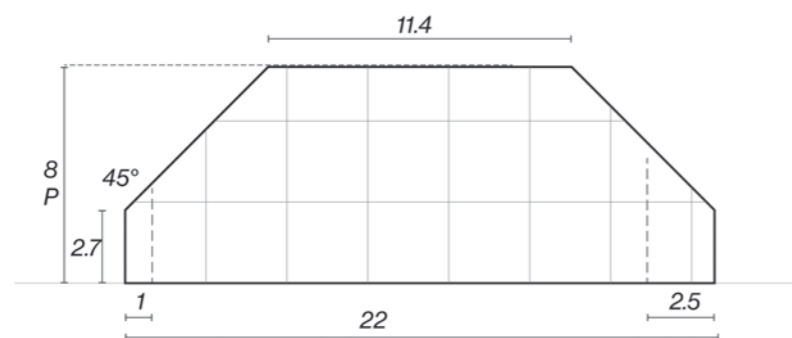
2.7m + 37°



- Will likely result in single and double storey developments - similar to existing residential controls.
- Possible building design outcome more constraint than option 2 with lesser degree in possible variety of the location of upper storeys between developments in this zone.

OPTION 2

2.7m + 45°



- Enables a higher variety in possible building design outcomes, and placement and width of the upper storey.
- Outcome likely to be more bulky than option 1 as upper storey can be built closer to the boundary.
- No significant difference in shading outcome compared to option 1.

UPPER HUTT INTENSIFICATION EVALUATION

LOW DENSITY RESIDENTIAL - SINGLE SITE SHADE STUDIES



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

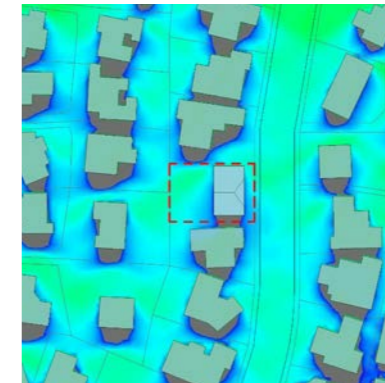
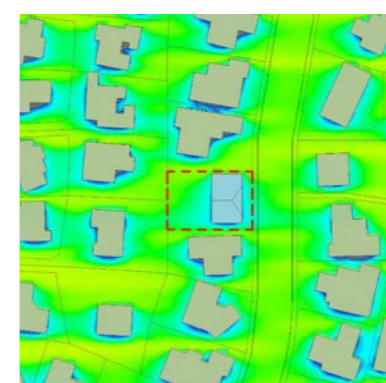
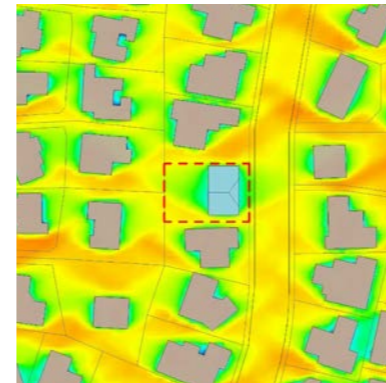
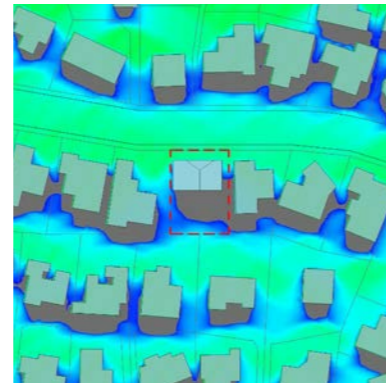
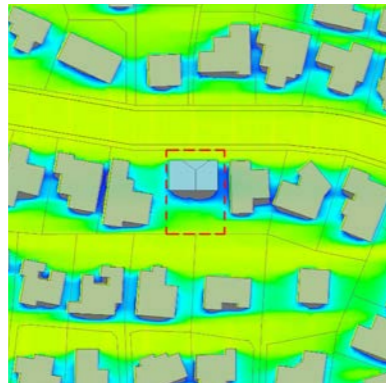
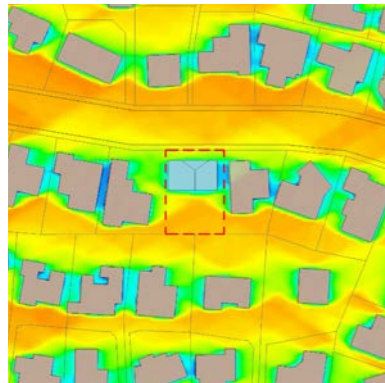
SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

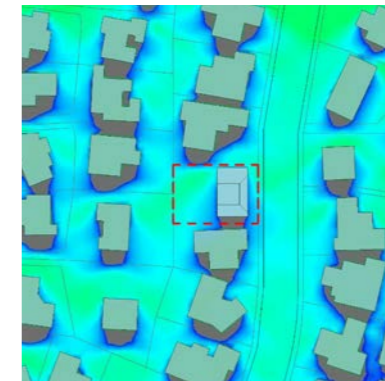
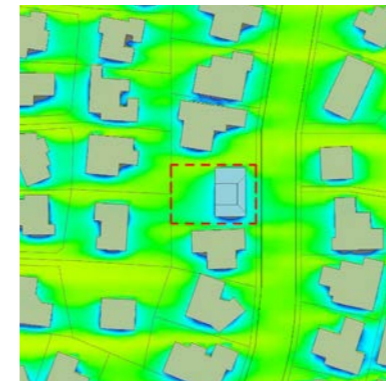
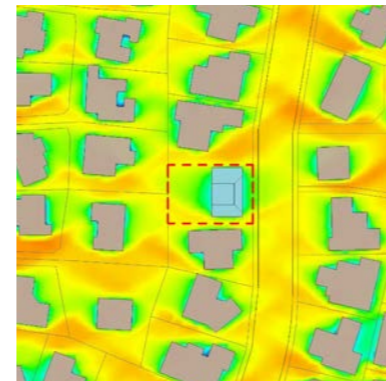
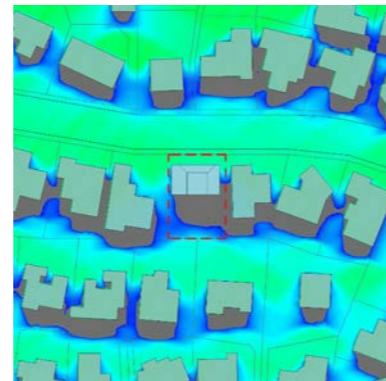
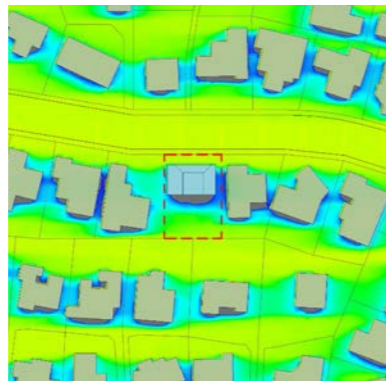
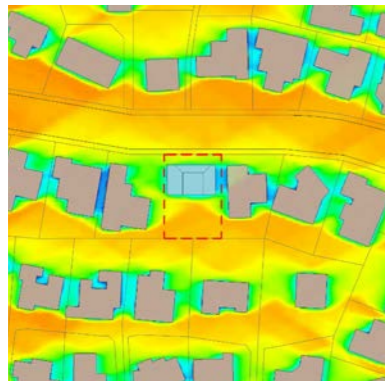
EXISTING SITUATION

2.7m + 35° + 45° to road boundary



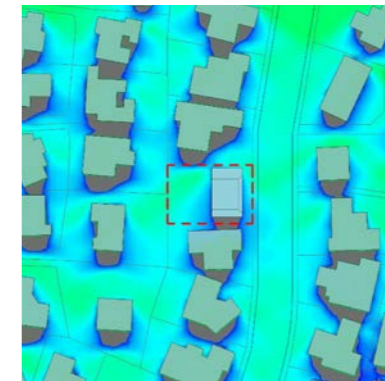
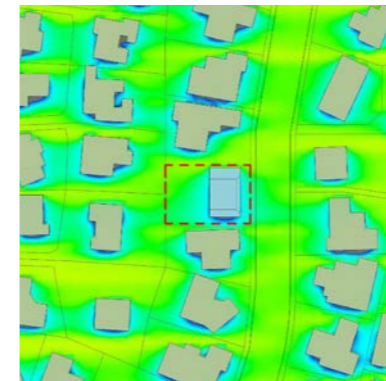
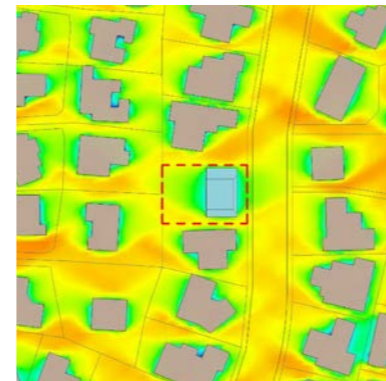
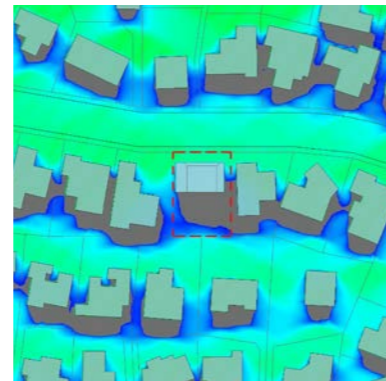
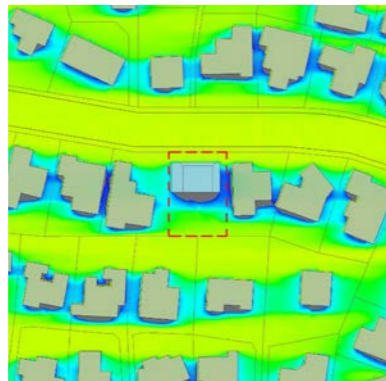
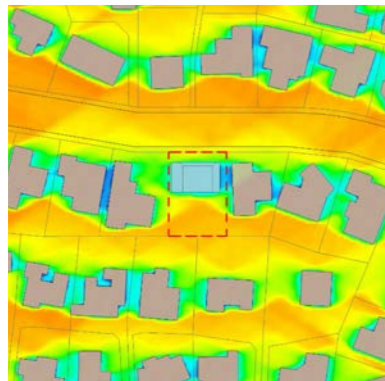
OPTION 1

2.7m + 37°



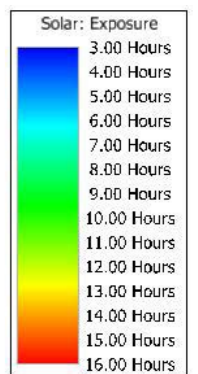
OPTION 2

2.7m + 45°

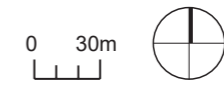


OBSERVATIONS

- The shading analysis shows that the difference in sunlight access between options to potential outdoor open space in the back is negligible
- Suggestions related to outdoor open space provisions are covered on page 13



UPPER HUTT INTENSIFICATION EVALUATION

0 30m  MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900 ALL SITES ARE ORIENTATED TO NORTH

LOW DENSITY RESIDENTIAL - MULTI-SITE

TYPICAL PARCEL SIZE:
22 x 32m

TYPICAL PARCEL AREA:
704 m²

SITE COVERAGE: 30%

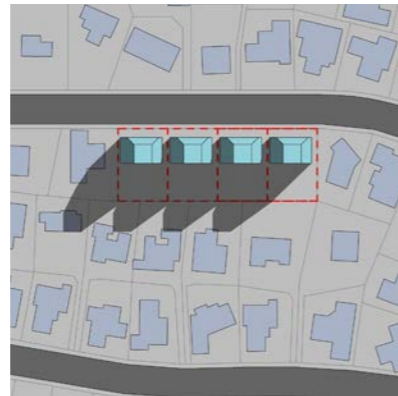
HEIGHT LIMIT: 8m

SETBACK FROM BOUNDARY WITH A ROAD: 4m

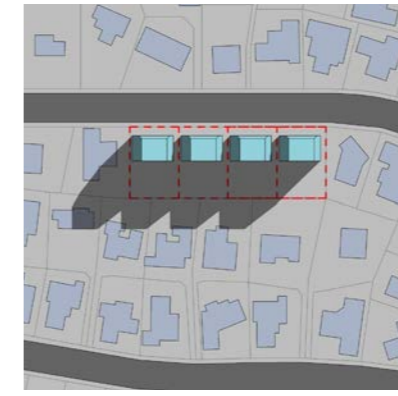
SETBACK FROM OTHER BOUNDARIES: 1m on one side, 2.5m on opposing side (1m along access ways)

REAR SETBACK: 2.5m

OPTION 1
2.7m + 37°



OPTION 2
2.7m + 45°



SHADE STUDIES

NORTH / SOUTH ORIENTATION

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

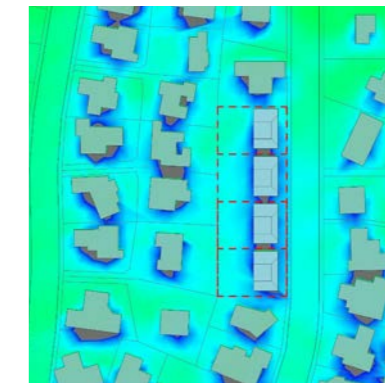
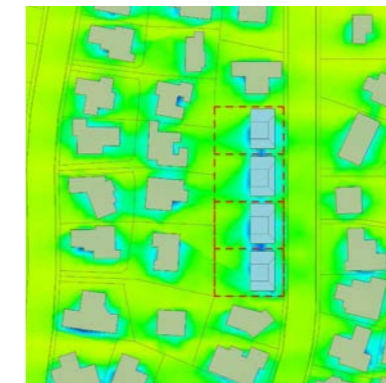
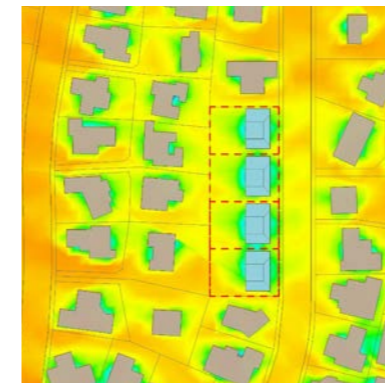
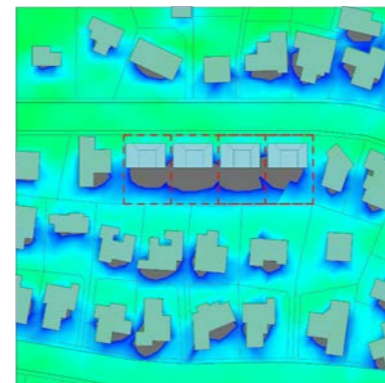
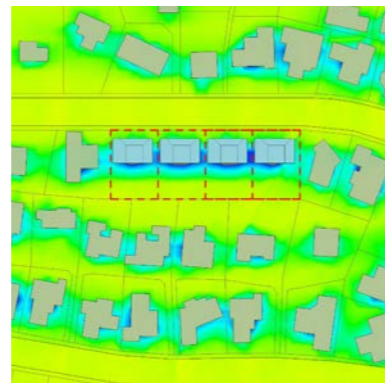
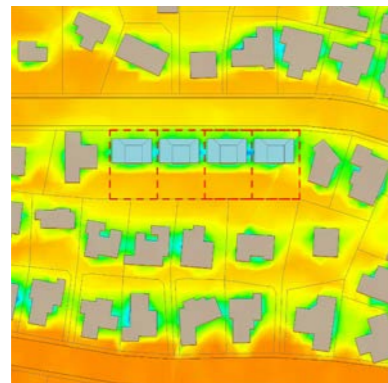
WINTER SOLSTICE
21 JUNE

SUMMER SOLSTICE
21 DECEMBER

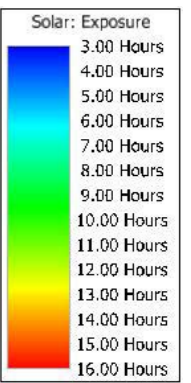
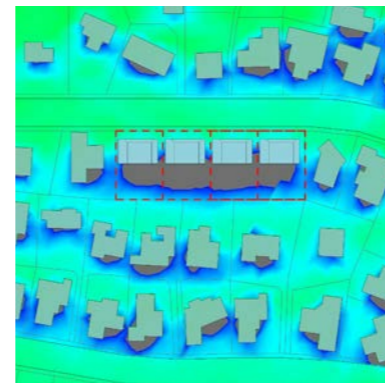
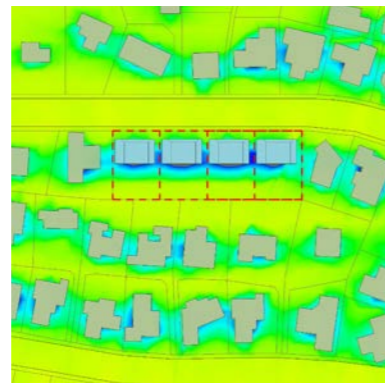
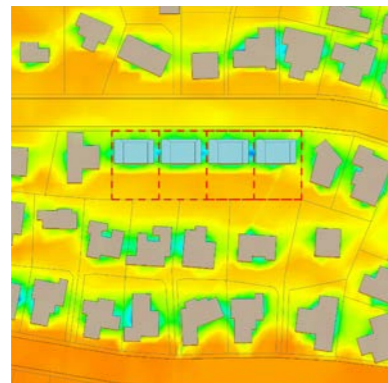
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

OPTION 1
2.7m + 37°



OPTION 2
2.7m + 45°





GENERAL RESIDENTIAL - SINGLE SITE

TYPICAL PARCEL SIZE:
18 x 38m

TYPICAL PARCEL AREA:
684 m²

SITE COVERAGE: 40%

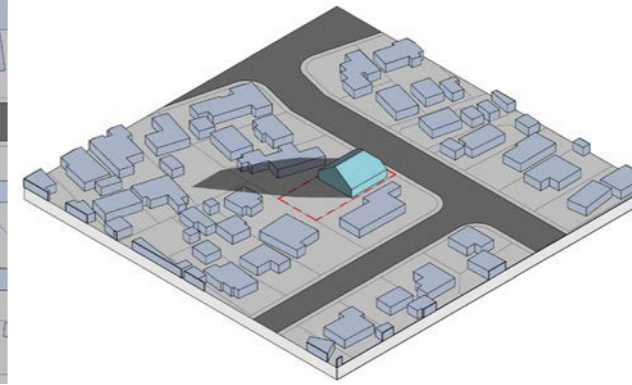
HEIGHT LIMIT:
Permitted: 8m
RDA: 11m

SETBACK FROM
BOUNDARY WITH A
ROAD: 3m

SETBACK FROM OTHER
BOUNDARIES: 1m

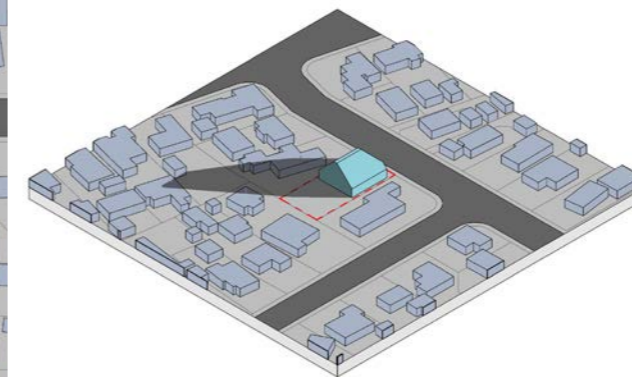
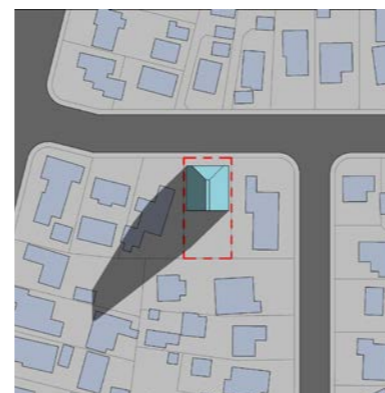
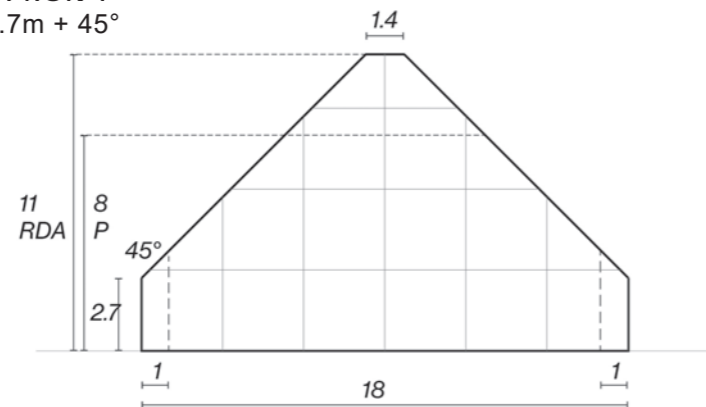
REAR SETBACK: 1m

EXISTING SITUATION
2.7m + 35° + 45° to road boundary



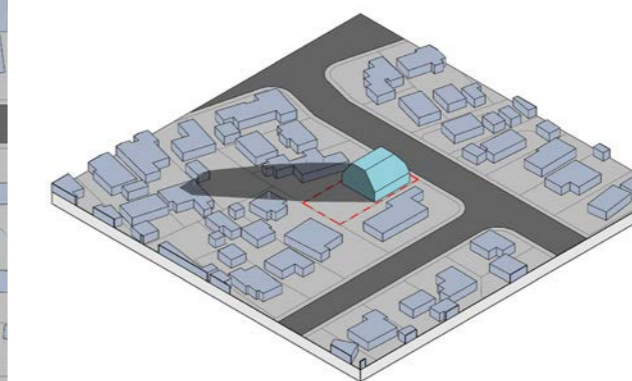
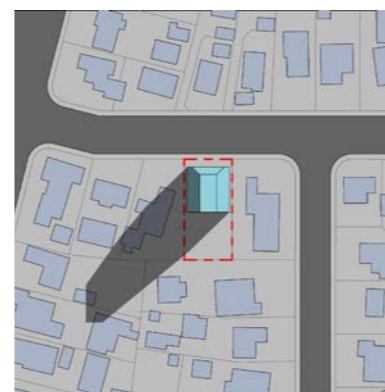
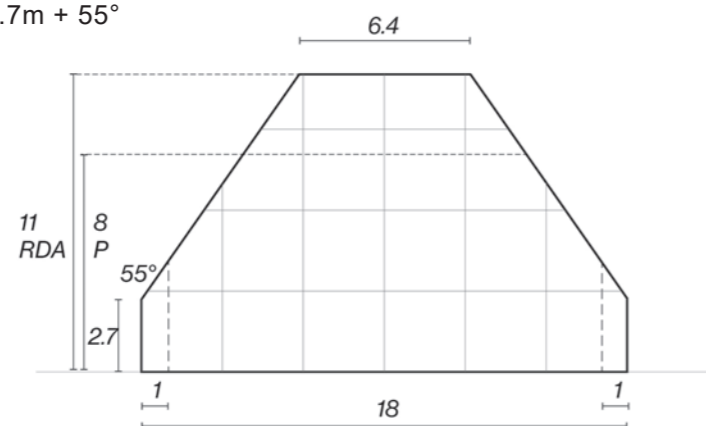
OBSERVATIONS

OPTION 1
2.7m + 45°



- Will primarily result in two storey dwellings with the potential of a third storey as RDA
- It is suggested that bulk and shading effects, and the potential breach of the recession plane as a result of the development of a third storey are treated as a matter of discretion as part of the RDA

OPTION 2
2.7m + 55°



- Promotes the development of two storey developments
- A larger volume, compared to option 1, allows for a higher variety in possible building design outcomes
- Outcome likely to be more bulky and higher mass closer to the boundary, compared to option 1
- Building envelope allows for a more generous third storey under the RDA without breaching the recession plane

UPPER HUTT INTENSIFICATION EVALUATION

GENERAL RESIDENTIAL - SINGLE SITE SHADE STUDIES



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

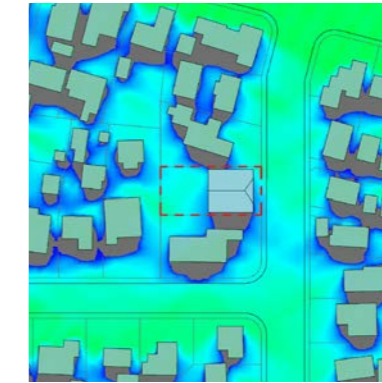
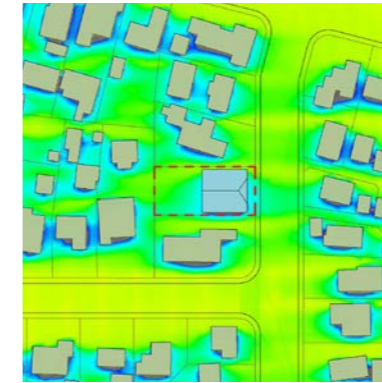
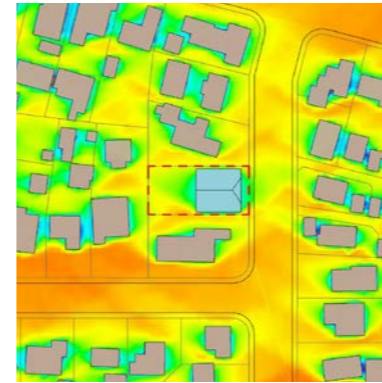
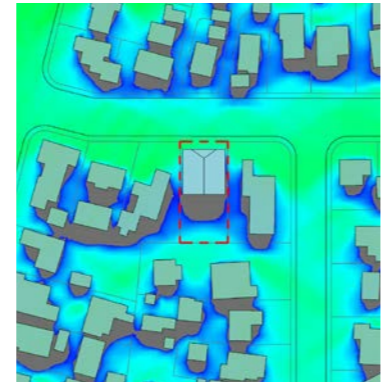
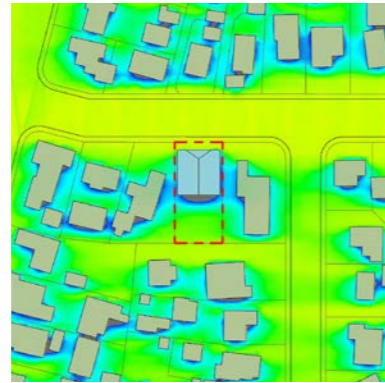
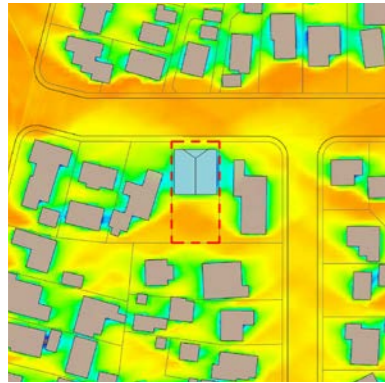
SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

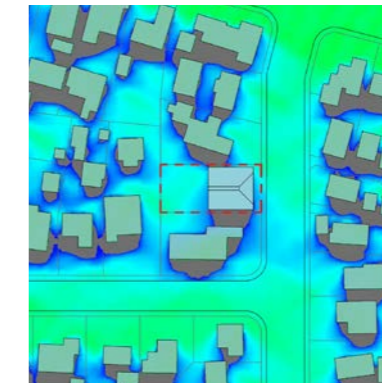
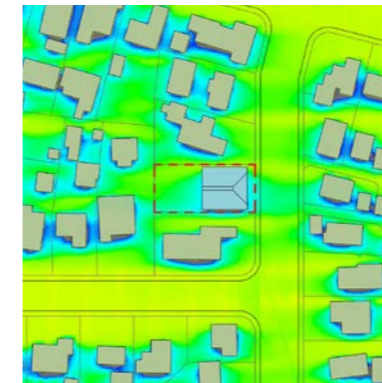
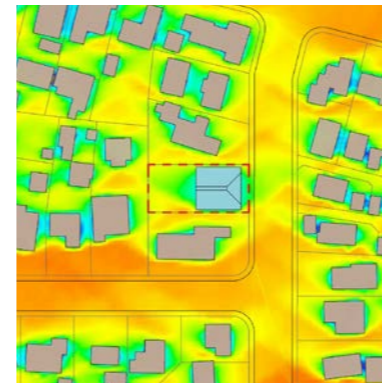
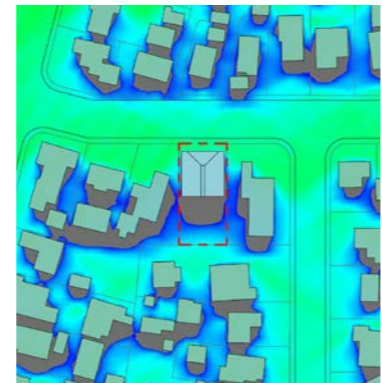
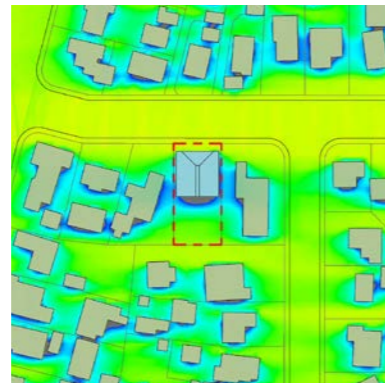
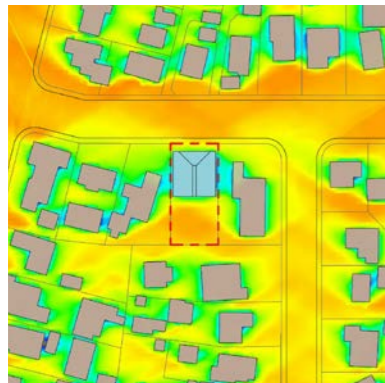
EXISTING SITUATION

2.7m + 35° + 45° to road boundary



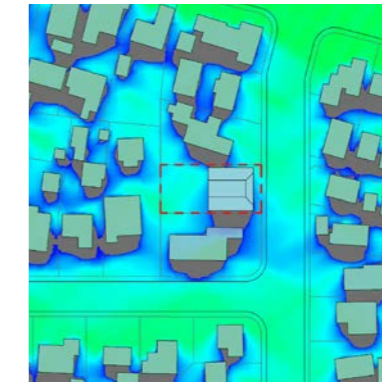
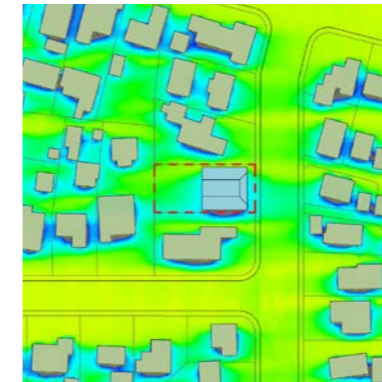
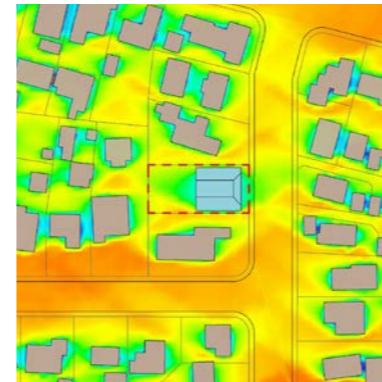
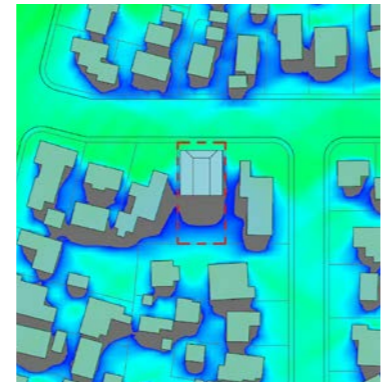
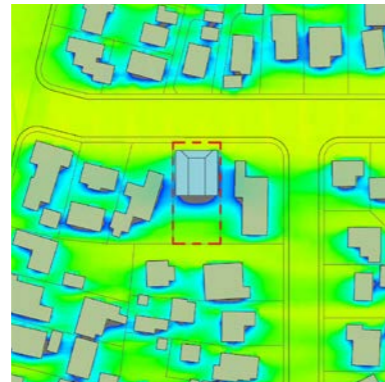
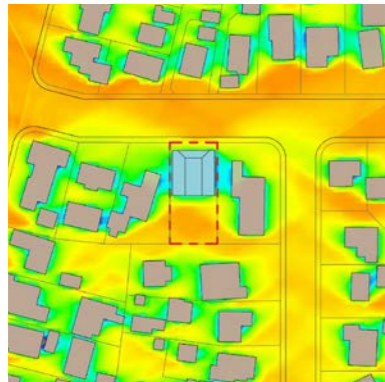
OPTION 1

2.7m + 45°



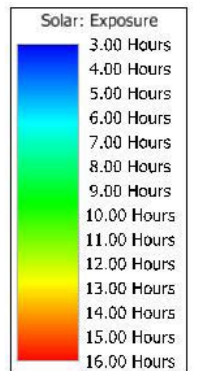
OPTION 2

2.7m + 55°



OBSERVATIONS

- The shading analysis shows that the difference in sunlight access between options to potential outdoor open space in the back is negligible
- Suggestions related to outdoor open space provisions are covered on page 13



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE
DURING THE MID-WINTER SOLSTICE:
21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

GENERAL RESIDENTIAL - MULTI-SITE

TYPICAL PARCEL SIZE:
18 x 38m

TYPICAL PARCEL AREA:
684 m²

SITE COVERAGE: 40%

HEIGHT LIMIT:
Permitted: 8m
RDA: 11m

SETBACK FROM BOUNDARY
WITH A ROAD: 3m

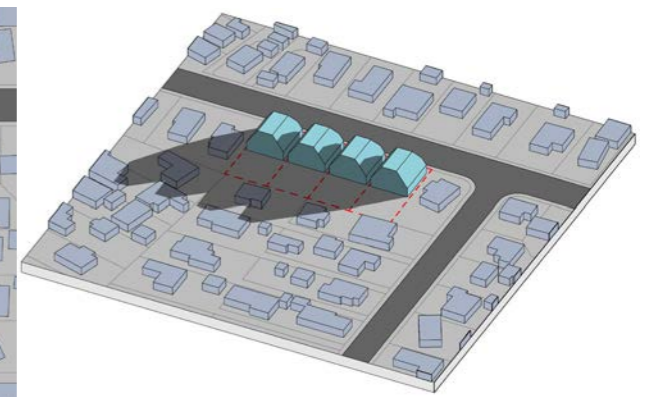
SETBACK FROM OTHER
BOUNDARIES: 1m

REAR SETBACK: 1m

OPTION 1
2.7m + 45°



OPTION 2
2.7m + 55°



SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

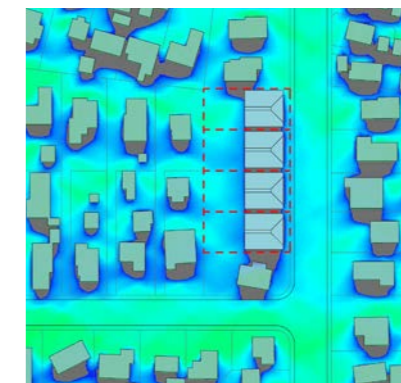
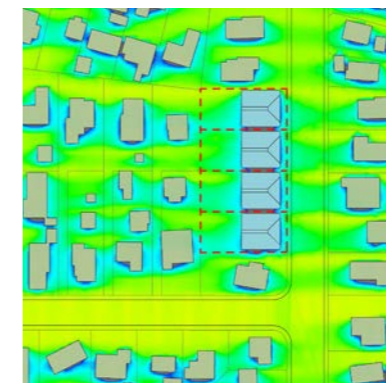
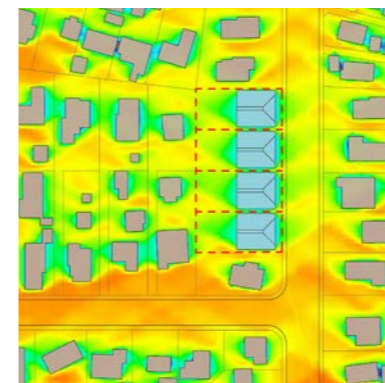
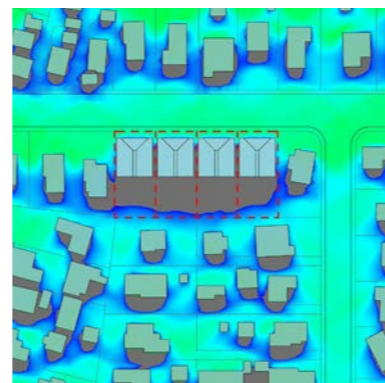
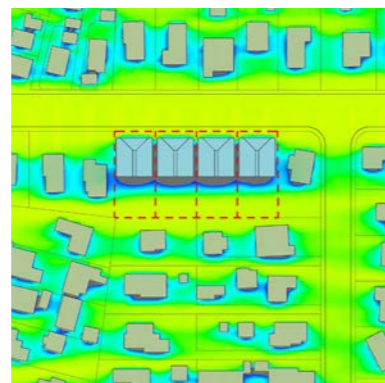
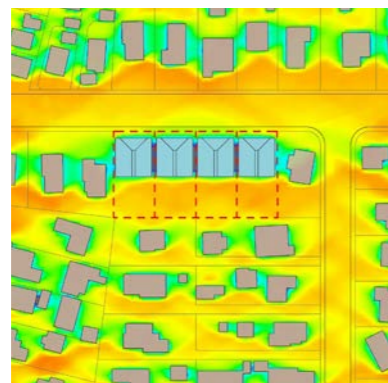
EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

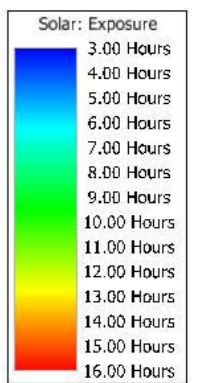
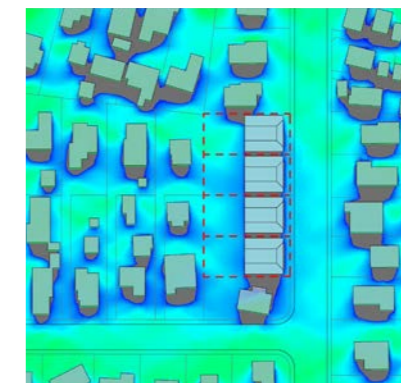
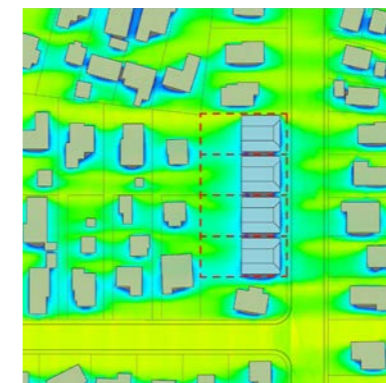
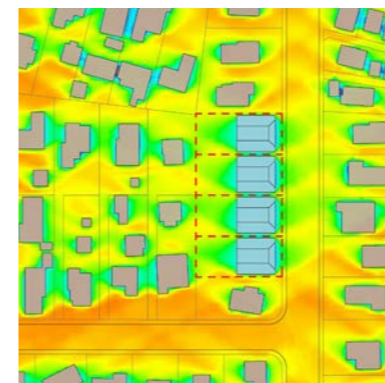
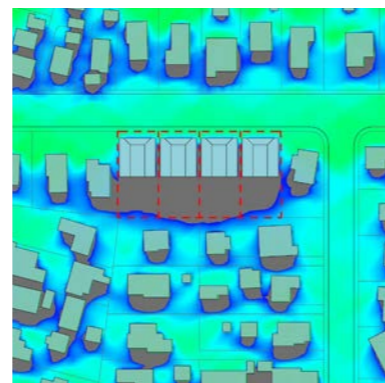
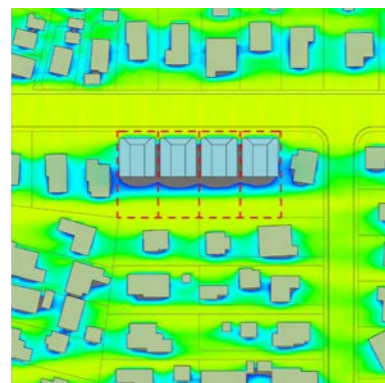
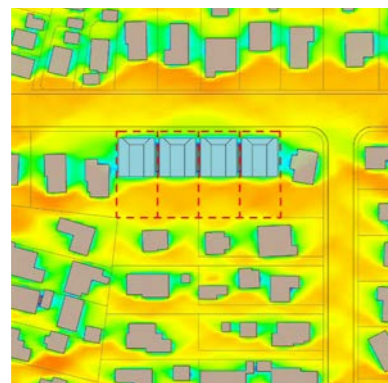
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

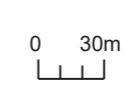
OPTION 1
2.7m + 45°



OPTION 2
2.7m + 55°



UPPER HUTT INTENSIFICATION EVALUATION

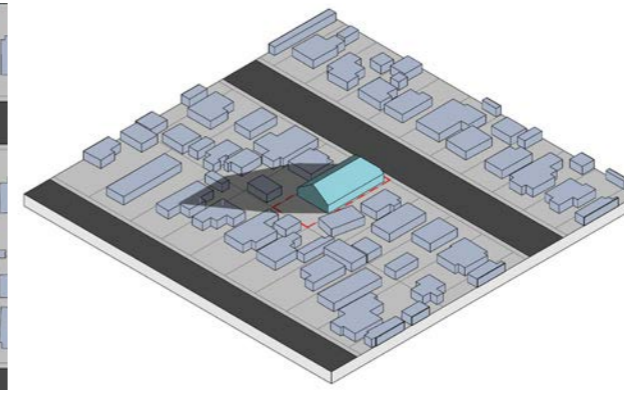
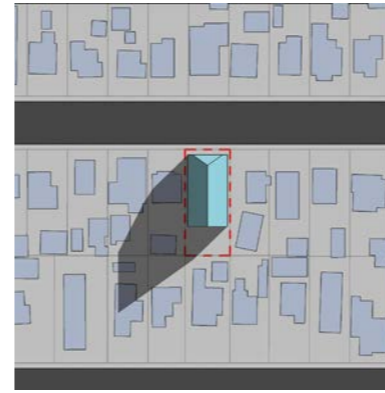


ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

MEDIUM DENSITY RESIDENTIAL - SINGLE SITE

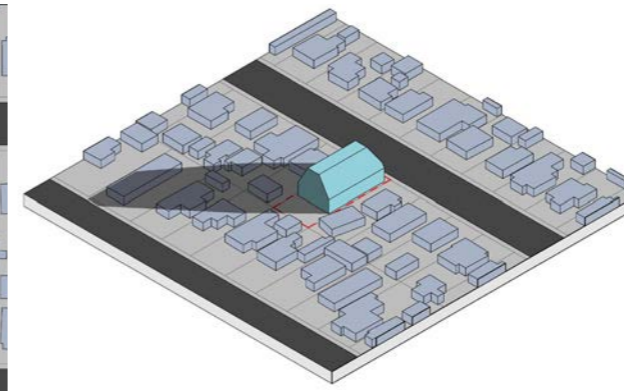
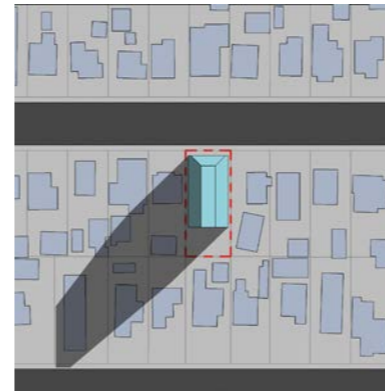
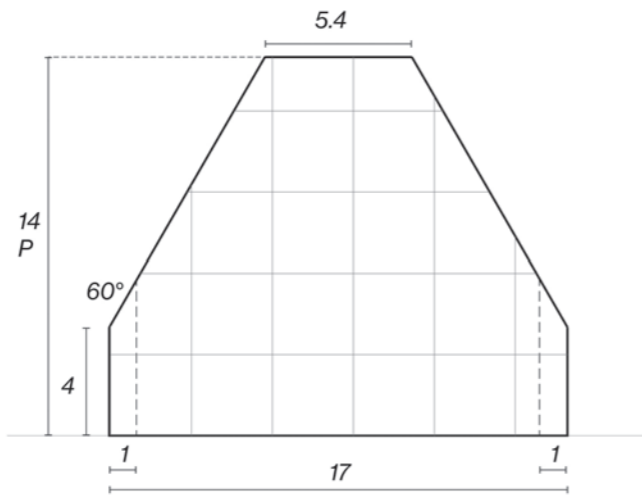
TYPICAL PARCEL SIZE:
17 x 40m
TYPICAL PARCEL AREA:
680 m²
SITE COVERAGE: 60%
HEIGHT LIMIT: 14m
SETBACK FROM
BOUNDARY WITH A
ROAD: 2m
SETBACK FROM OTHER
BOUNDARIES: 1m
REAR SETBACK: 1m

EXISTING SITUATION
2.7m + 35° + 45° to road boundary



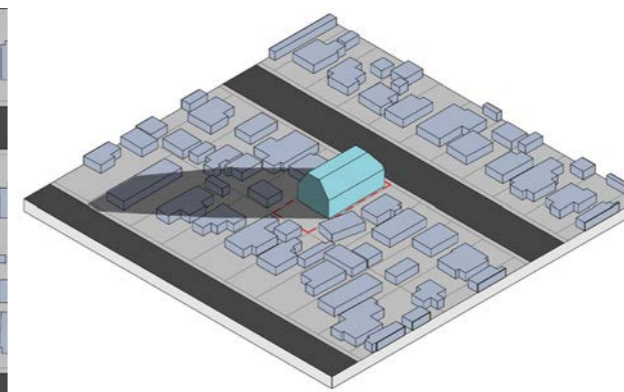
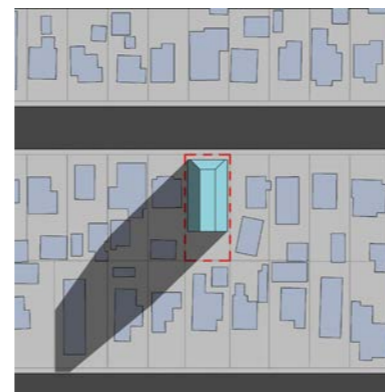
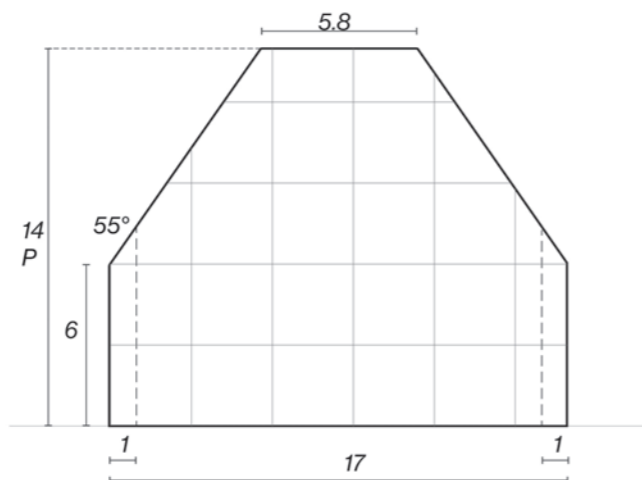
OBSERVATIONS

OPTION 1
4m + 60°



- Likely to result in primarily three storey dwellings with potential for a small fourth storey
- Promotes narrower buildings with wider setbacks from the side boundary compared to option 2.

OPTION 2
6m + 55°



- Likely to result in primarily three storey dwellings with potential for a small fourth storey
- Allows for a higher variety in possible building design outcomes
- Outcome likely to be more bulky and higher mass close to the boundary compared to option 1

UPPER HUTT INTENSIFICATION EVALUATION

MEDIUM DENSITY RESIDENTIAL - SINGLE SITE SHADE STUDIES



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

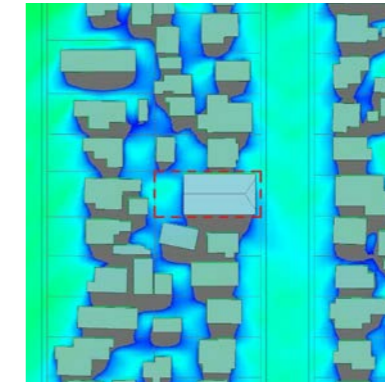
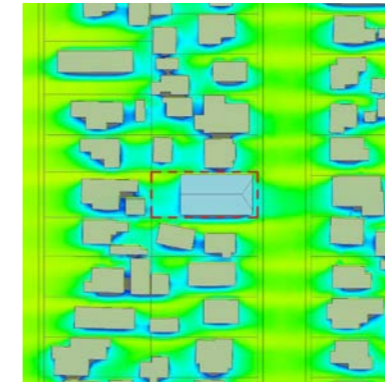
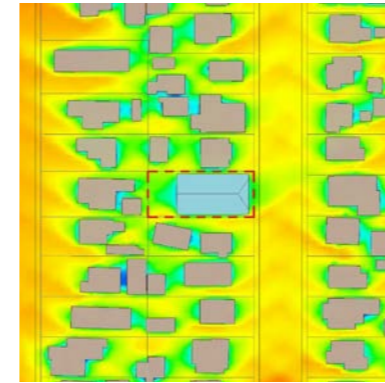
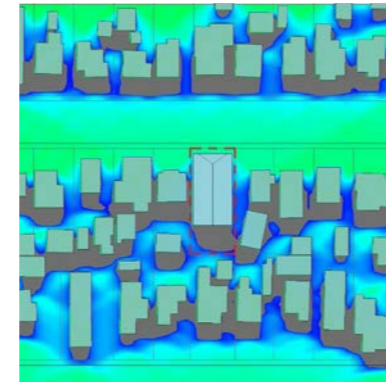
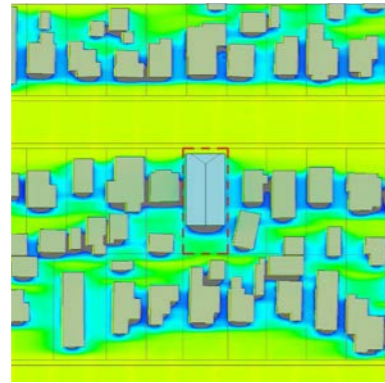
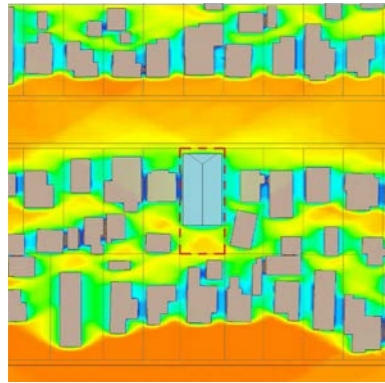
SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

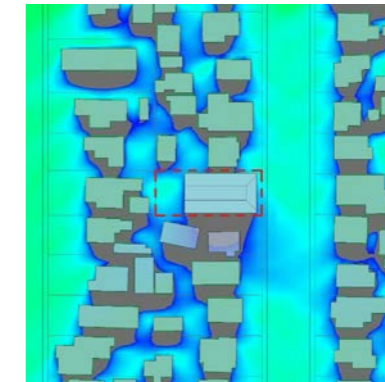
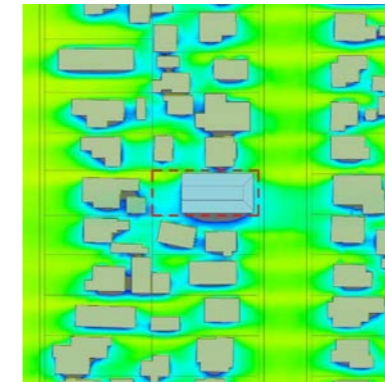
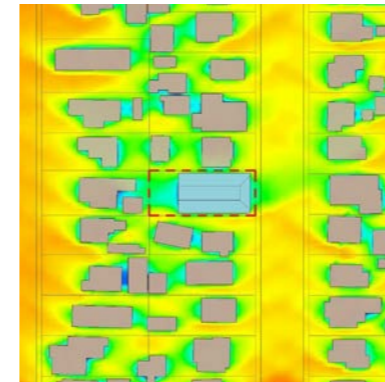
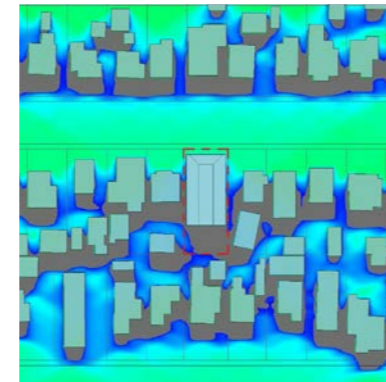
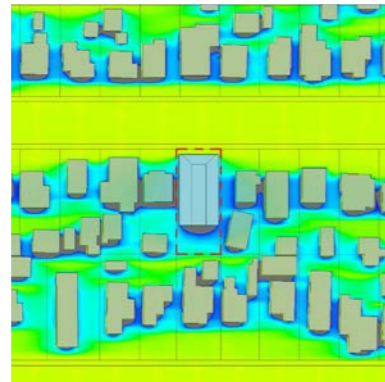
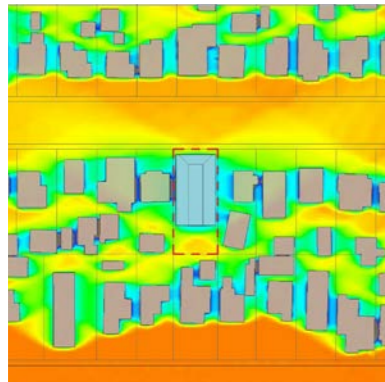
EXISTING SITUATION

2.7m + 35° + 45° to road boundary



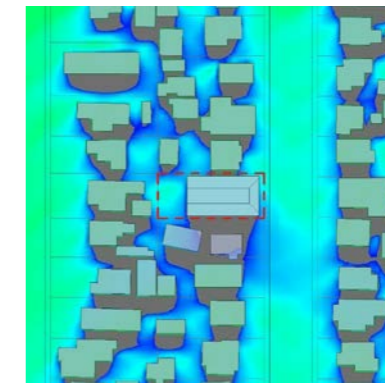
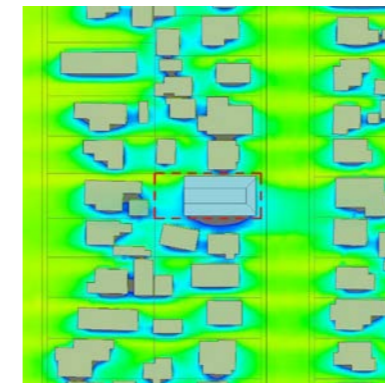
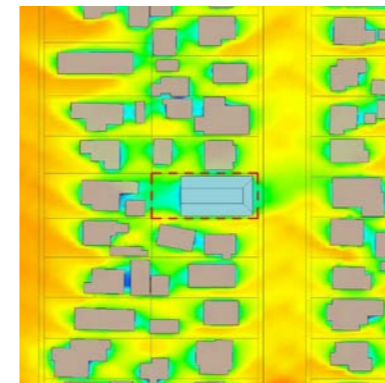
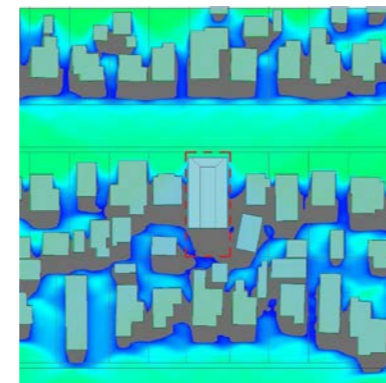
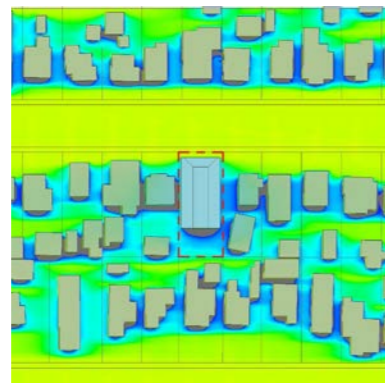
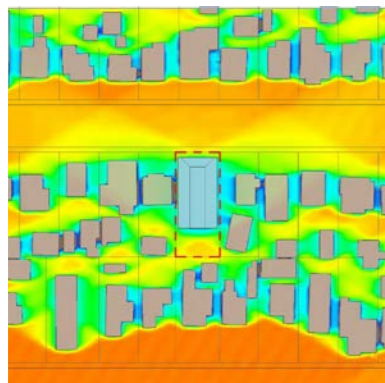
OPTION 1

4m + 60°



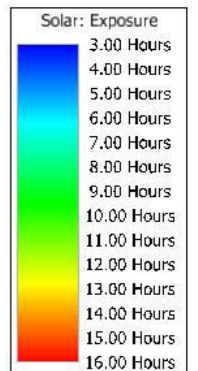
OPTION 2

6m + 55°



OBSERVATIONS

- The shading analysis shows that the difference in sunlight access between options to potential outdoor open space in the back is negligible
- Modelling output shows that sunlight access into the rear yard at mid-winter is limited.
- Suggestions related to outdoor open space provisions are covered on page 13



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

MEDIUM DENSITY RESIDENTIAL - MULTI-SITE

TYPICAL PARCEL SIZE:
17 x 40m

TYPICAL PARCEL AREA:
680 m²

SITE COVERAGE: 60%

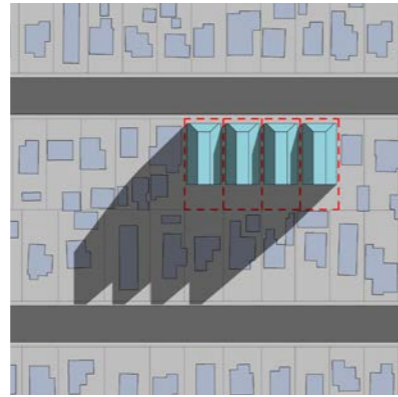
HEIGHT LIMIT: 14m

SETBACK FROM BOUNDARY WITH A ROAD: 2m

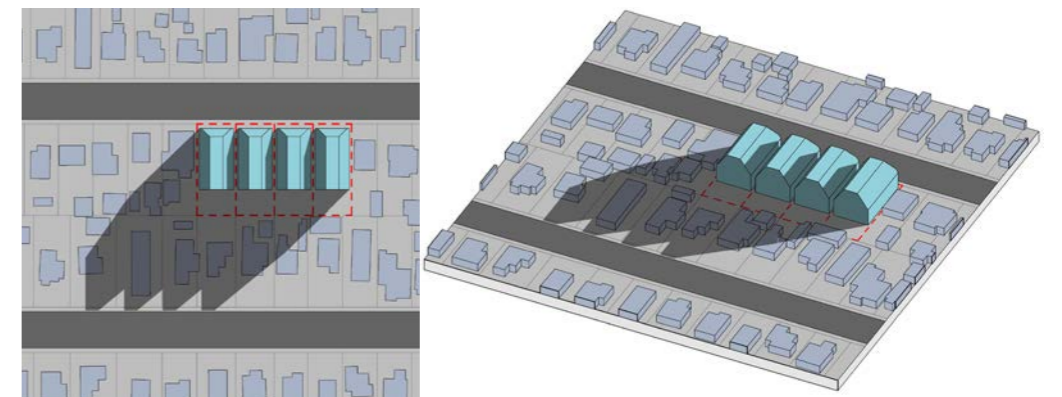
SETBACK FROM OTHER BOUNDARIES: 1m

REAR SETBACK: 1m

OPTION 1
4m + 60°



OPTION 2
6m + 55°



SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

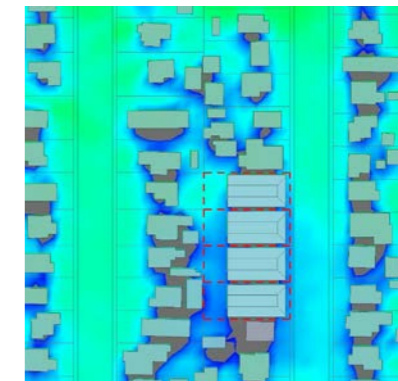
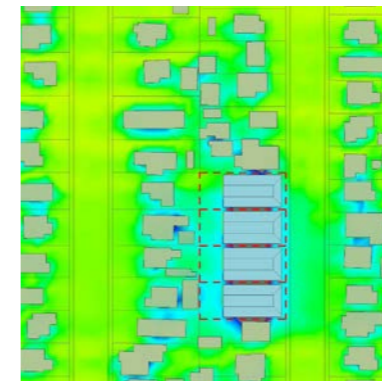
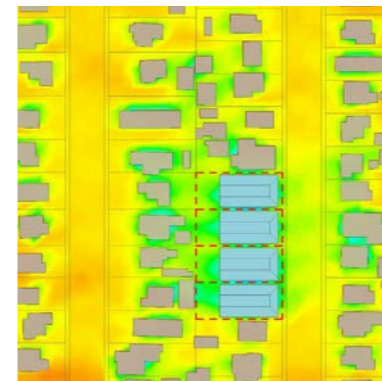
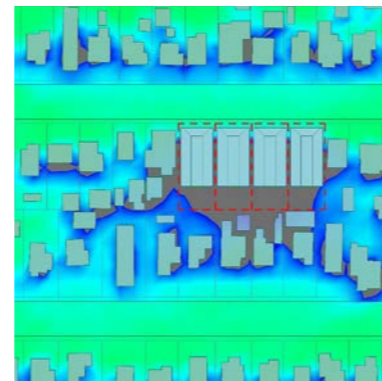
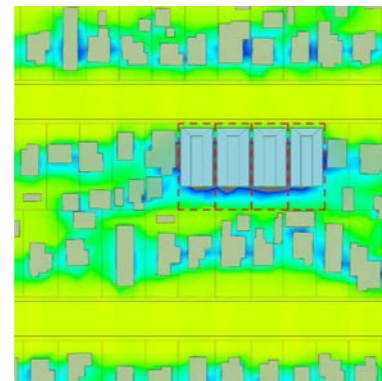
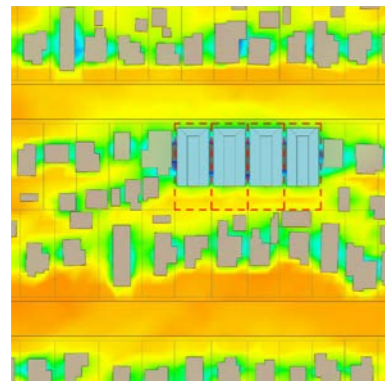
EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

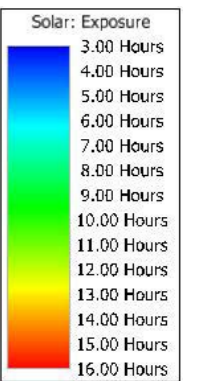
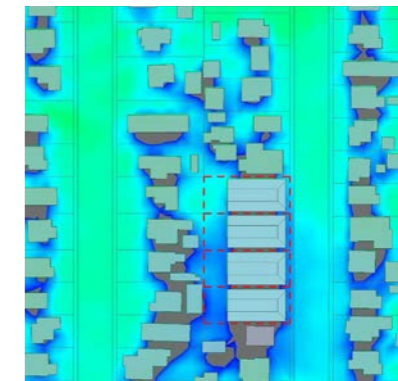
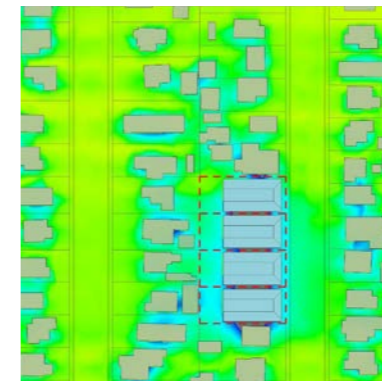
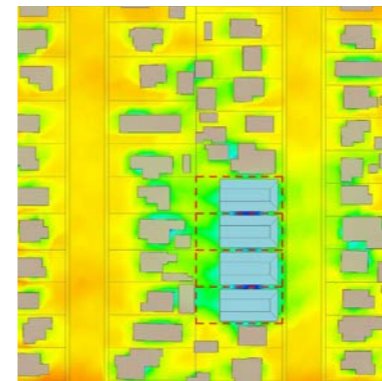
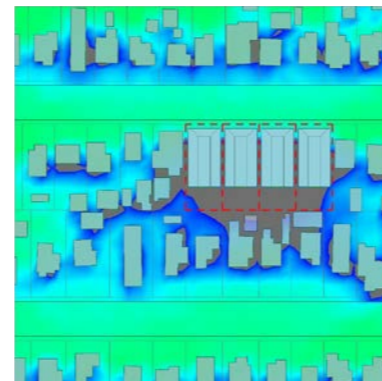
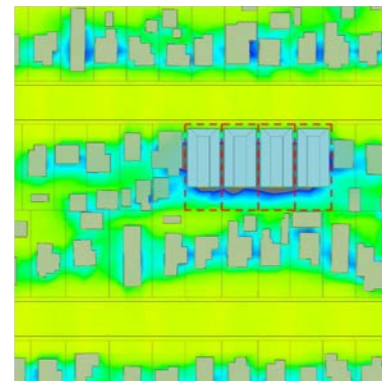
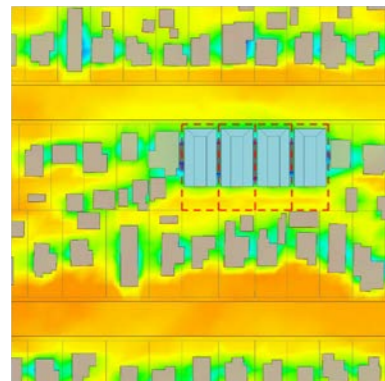
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

OPTION 1
4m + 60°



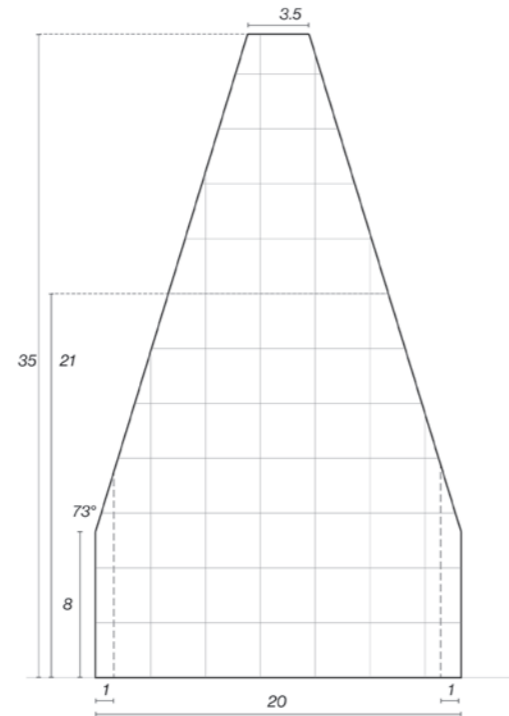
OPTION 2
6m + 55°



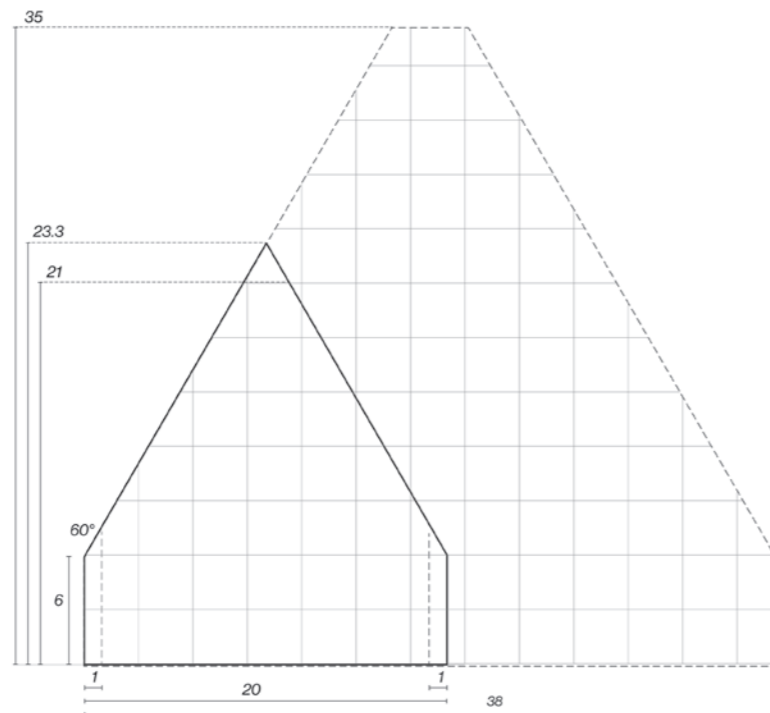
HIGH DENSITY RESIDENTIAL - SINGLE SITE

TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
740 m²
SITE COVERAGE: 80%
HEIGHT LIMIT: 35m
SETBACK FROM BOUNDARY WITH A ROAD: 1.5m
SETBACK FROM OTHER BOUNDARIES: 1m
REAR SETBACK: 1m

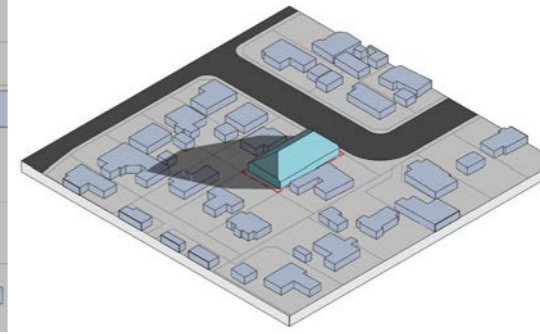
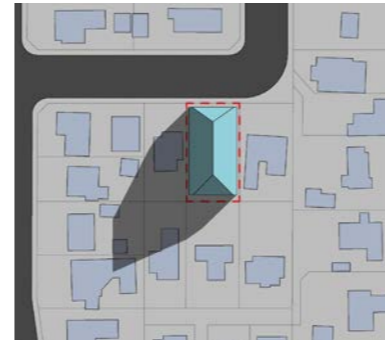
OPTION 1
8m + 73°



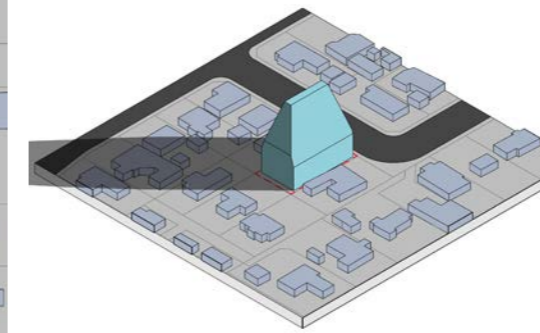
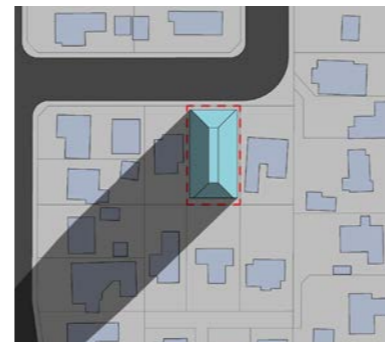
OPTION 2
6m + 60°



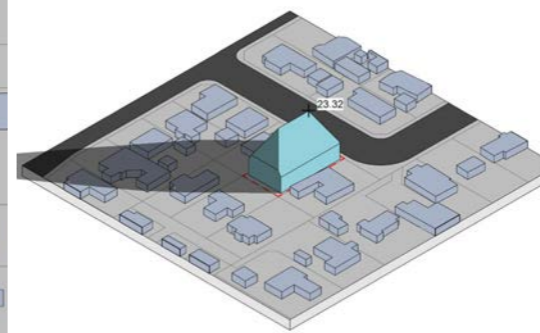
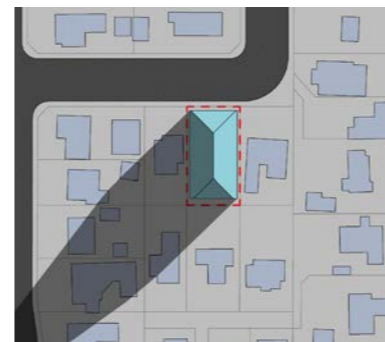
EXISTING SITUATION
2.7m + 35° + 45° to road boundary



OPTION 1
8m + 73°



OPTION 2
6m + 60°



OBSERVATIONS

- Option 1 building shows the recession plane required to accommodate a building up to 35m on a typical site
- With a maximum height of 21m, these metrics allow for the possibility to build a feasible six storey building on typical site
- The 73° recession plane angle does not necessarily provide for sufficient, daylight or sunlight access onto open space or neighbouring properties. It does provide for a reduction in mass and potentially privacy.
- Option 2 envelope allows for a 5 storey building on a typical site. The development of a six storey building or higher is feasible on a wider site.
- A 60° angle ensures a reasonable level of amenity (e.g. shading, daylight access, privacy and mass)
- Modelling shows that with the option 2 metrics, a 38m wide site is required to accommodate a building within a 35 high envelope.

UPPER HUTT INTENSIFICATION EVALUATION

HIGH DENSITY RESIDENTIAL - SINGLE SITE SHADE STUDIES



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

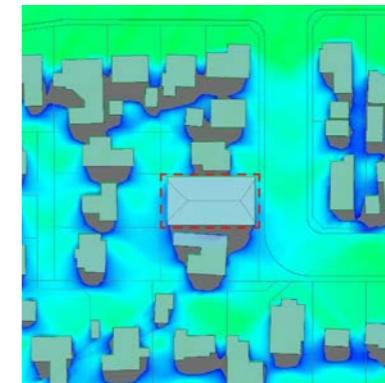
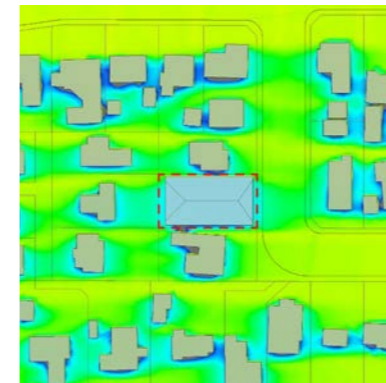
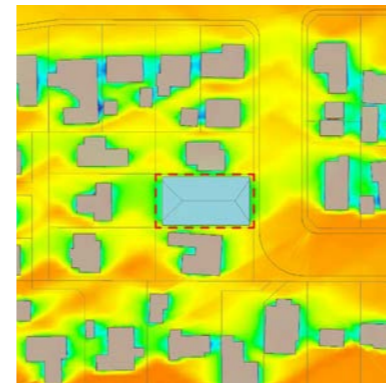
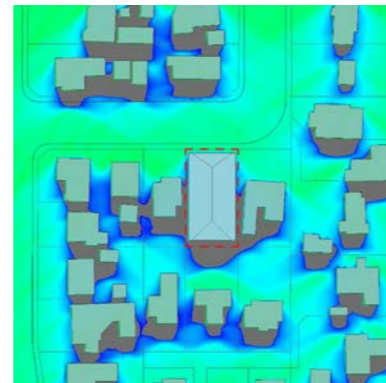
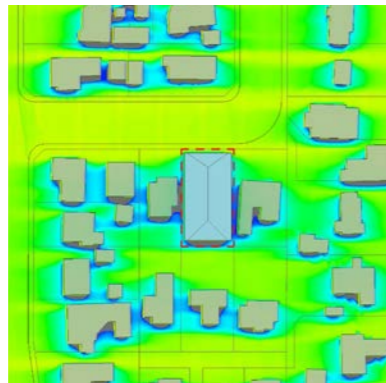
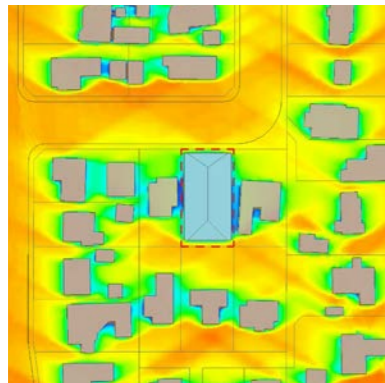
SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

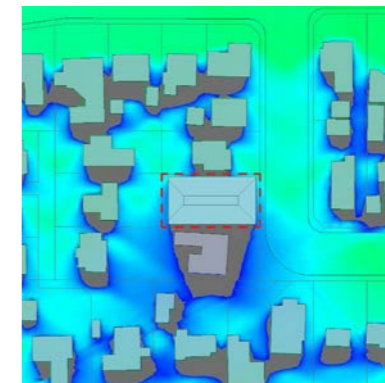
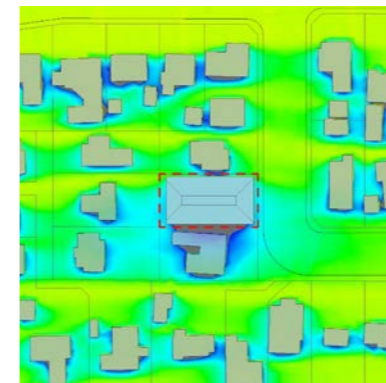
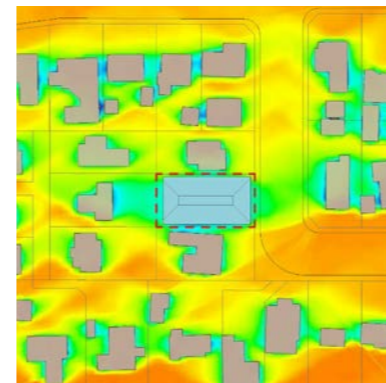
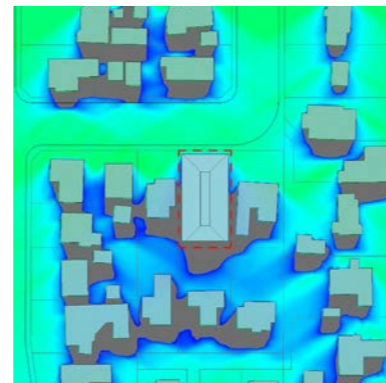
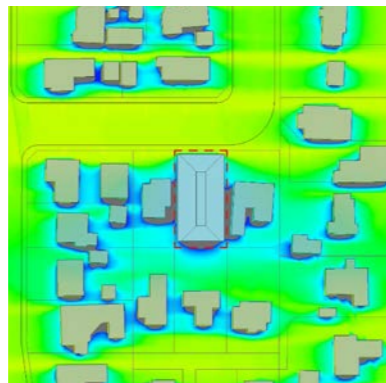
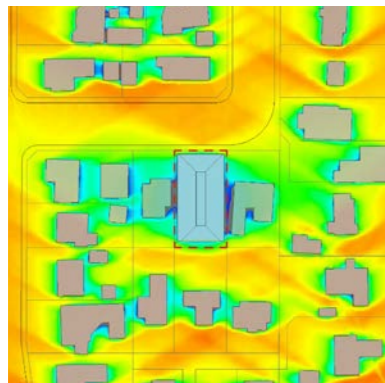
EXISTING SITUATION

2.7m + 35° + 45° to road boundary



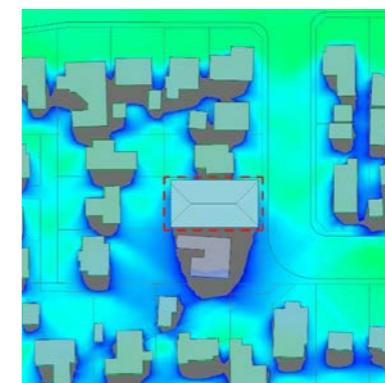
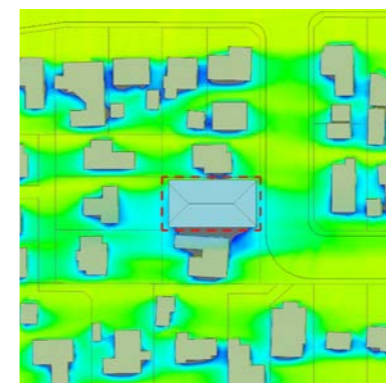
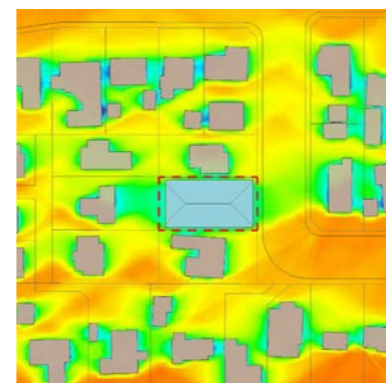
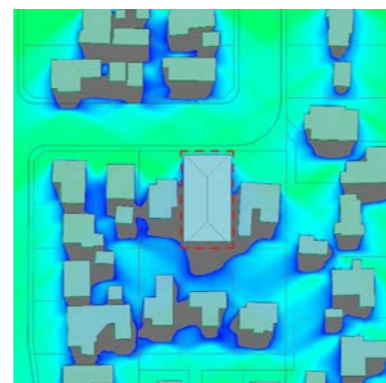
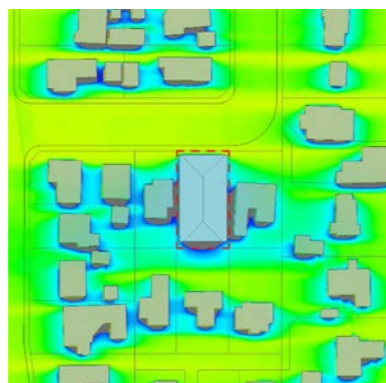
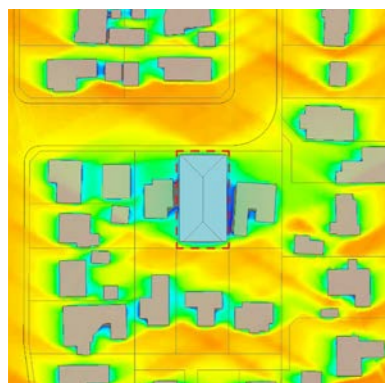
OPTION 1

8m + 73°



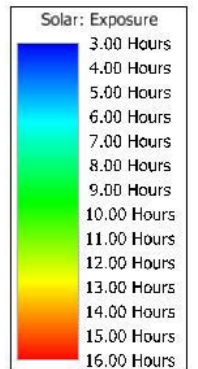
OPTION 2

6m + 60°




OBSERVATIONS

- The shading analysis shows that, even though there is difference in height in the envelopes between the two options (35m vs 23m) the average cumulative shading of potential outdoor open space in the back is relatively similar
- The shading output shows that the neighbouring property south of the site, particularly in a east/ west orientation is most affected high density development. As this is mostly a result of the maximum height, a variation in recession plane will have negligible effect
- Suggestions related to outdoor open space provisions are covered on page 13



UPPER HUTT INTENSIFICATION EVALUATION

0 30m  MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900 ALL SITES ARE ORIENTATED TO NORTH

HIGH DENSITY RESIDENTIAL - MULTI-SITE

TYPICAL PARCEL SIZE:
20 x 37m

TYPICAL PARCEL AREA:
740 m²

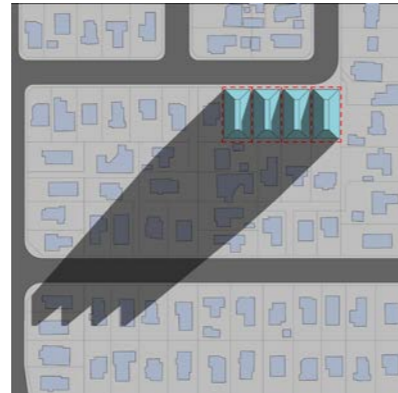
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY
WITH A ROAD: 1.5m

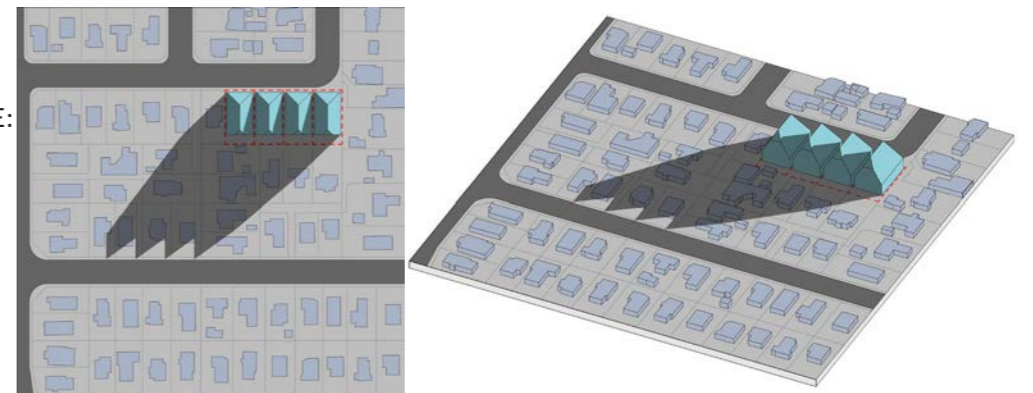
SETBACK FROM OTHER
BOUNDARIES: 1m

REAR SETBACK: 1m

OPTION 1
8m + 73°
SITE
COVERAGE:
80%



OPTION 2
6m + 60°
SITE
COVERAGE:
70%



SHADE STUDIES

NORTH / SOUTH ORIENTATION

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

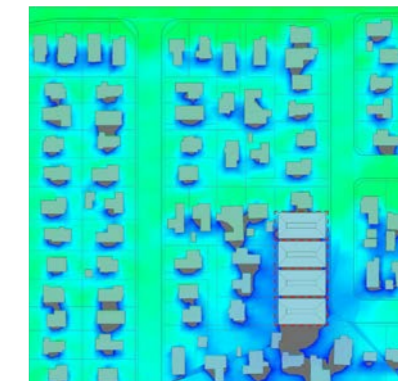
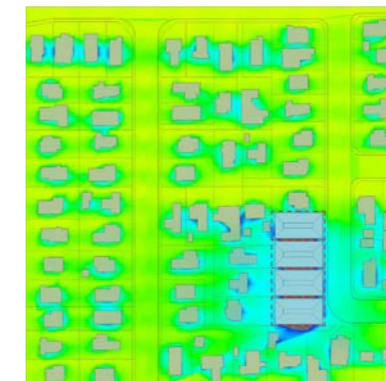
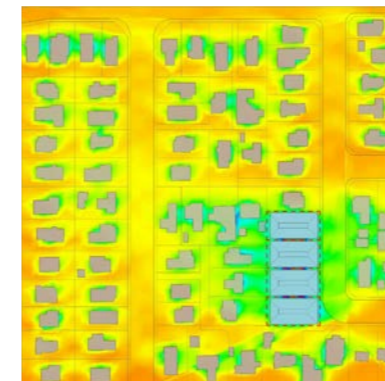
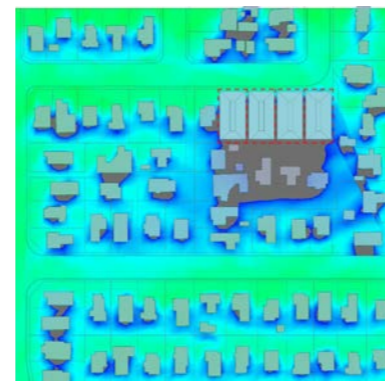
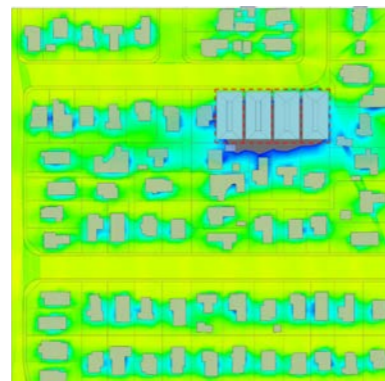
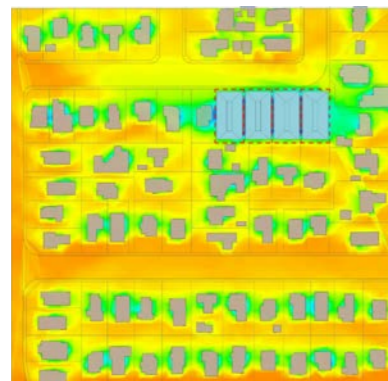
WINTER SOLSTICE
21 JUNE

SUMMER SOLSTICE
21 DECEMBER

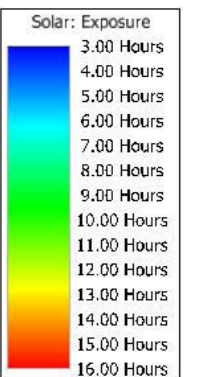
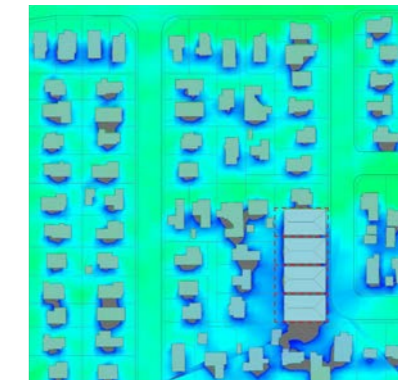
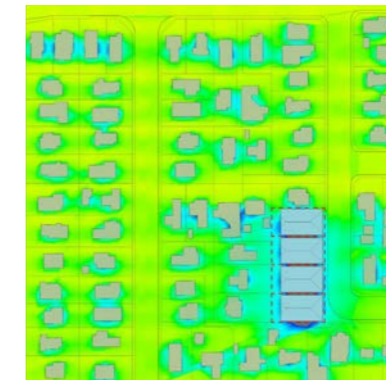
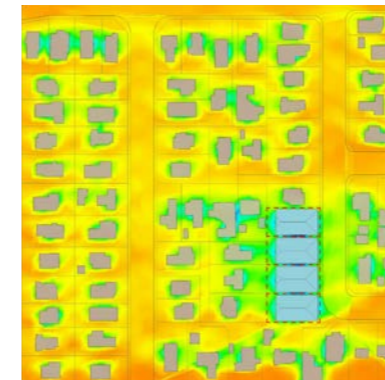
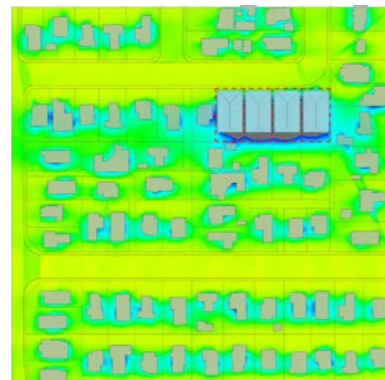
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

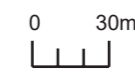
OPTION 1
8m + 73°
SITE
COVERAGE:
80%



OPTION 2
6m + 60°
SITE
COVERAGE:
70%



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

HIGH DENSITY RESIDENTIAL - SINGLE SITE - 70%

TYPICAL PARCEL SIZE:
20 x 37m

TYPICAL PARCEL AREA:
740 m²

SITE COVERAGE: 70%

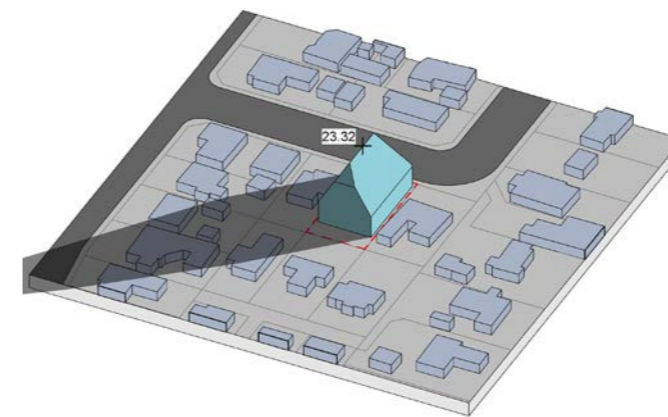
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m

SETBACK FROM OTHER BOUNDARIES: 1m

REAR SETBACK: 1m

OPTION 2
6m + 60°, 70% coverage



OBSERVATIONS

- The distance between the building and the rear boundary is approximately 7m.
- As this open space would not receive sunlight in the winter, it is suggested that ground floor open space requirements are combined with providing private balconies that receive sunlight during (part of) the day.
- The level of shading is mainly a result of the bulk and height of the building and is only marginally affected by the site coverage.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

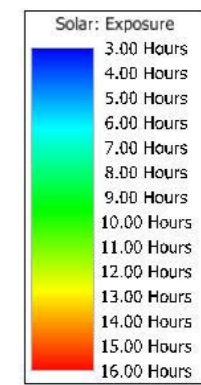
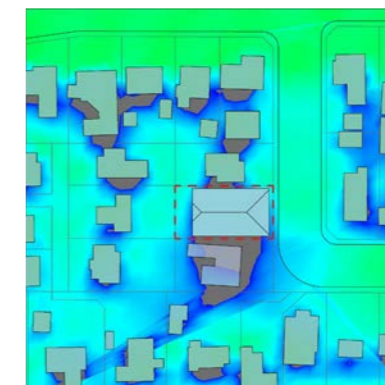
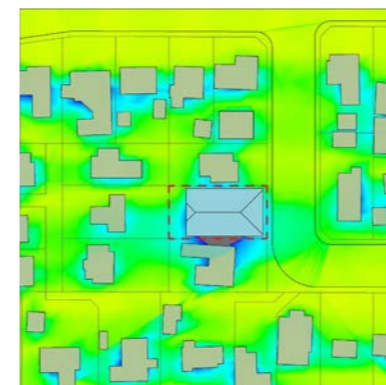
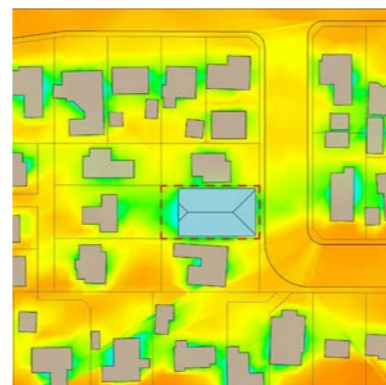
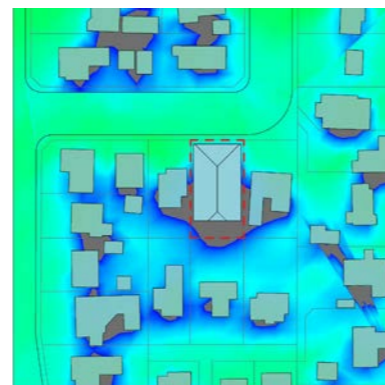
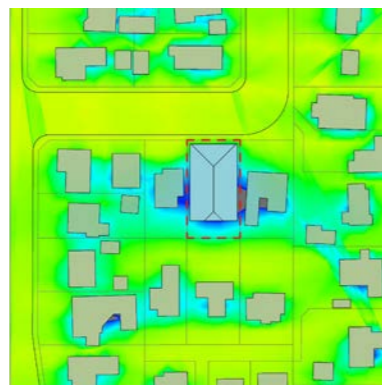
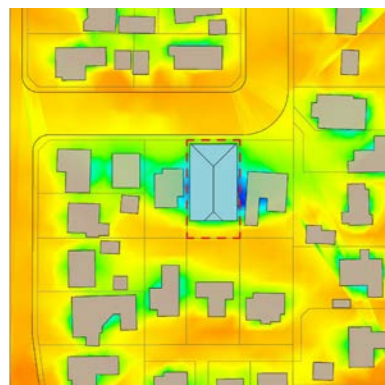
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

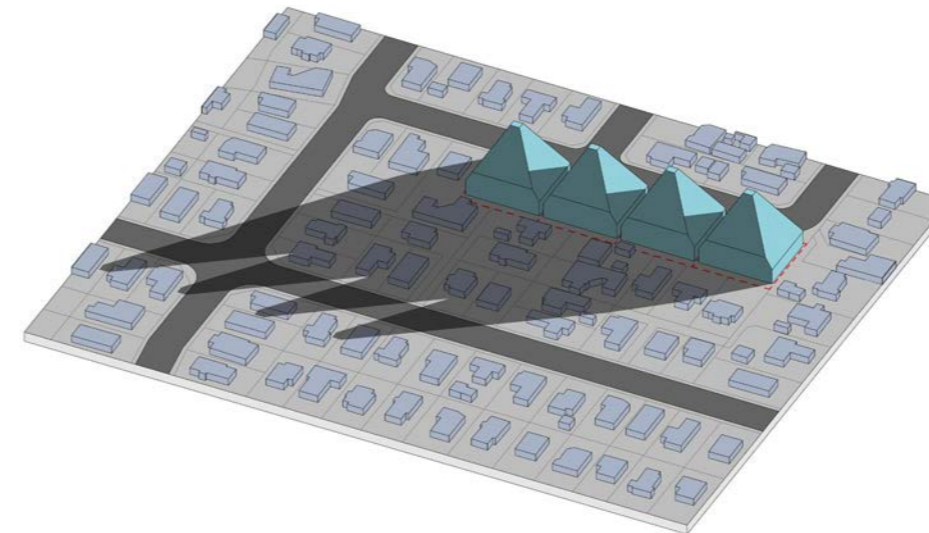
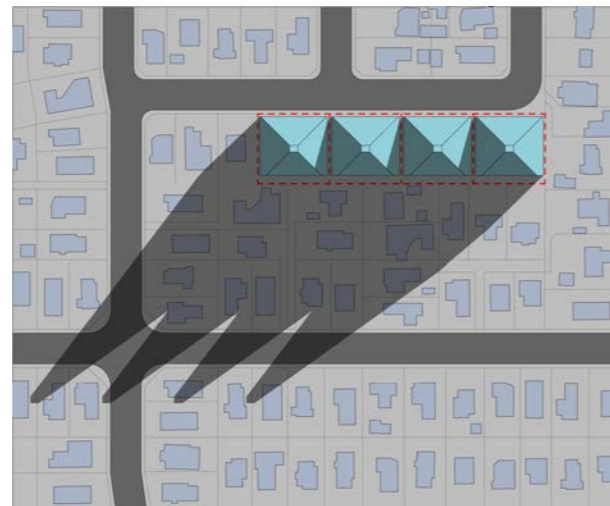
HIGH DENSITY RESIDENTIAL - AMALGAMATED SITE - 80%

TYPICAL PARCEL SIZE:
38 x 37m
TYPICAL PARCEL AREA:
1406 m²

SITE COVERAGE: 80%
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m
SETBACK FROM OTHER BOUNDARIES: 1m
REAR SETBACK: 1m

OPTION 2
6m + 60°, 38m wide site, 80% coverage



OBSERVATIONS

- Similar as with the single site 80%, the building envelope resulting from the 80% site coverage does not result in sufficient outdoor open space on the site.
- It is suggested that alternative or additional controls would be needed to achieve an appropriate level of outdoor open space.
- Alternatively, if ground floor open space is not available, all required private outdoor space can be provided through balconies on side(s) of the building that receive sunlight during (part of) the day.
- In the winter, the shading not only affects the development site, but also covers a significant area of neighbouring properties in the south. This is a result of the bulk and height of the building and it is considered that reducing site coverage and/or recession plane angle controls will not result in a significant improvement.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

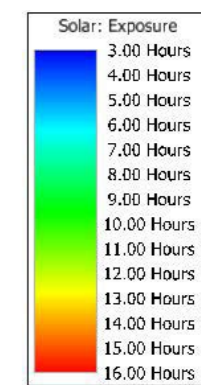
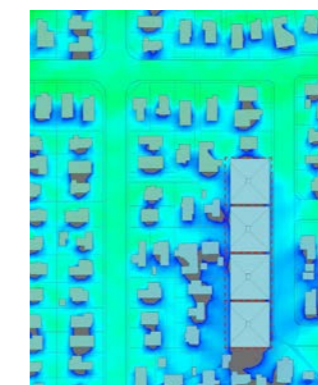
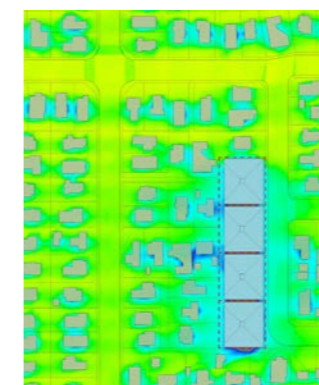
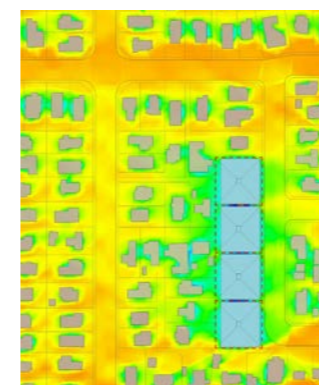
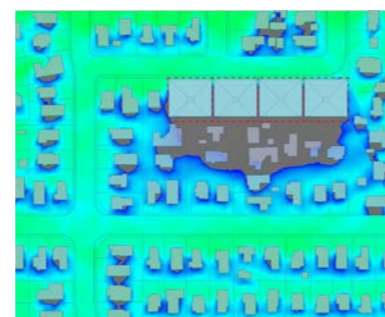
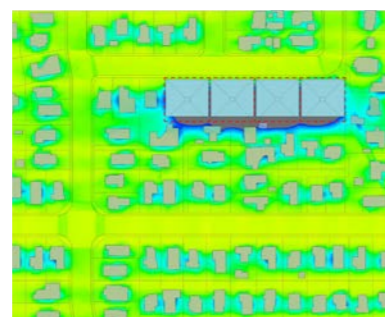
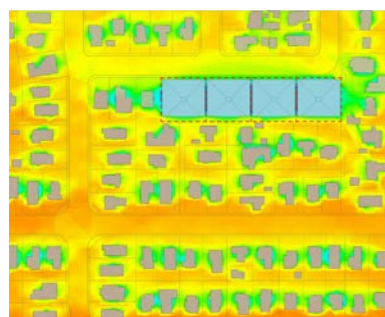
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

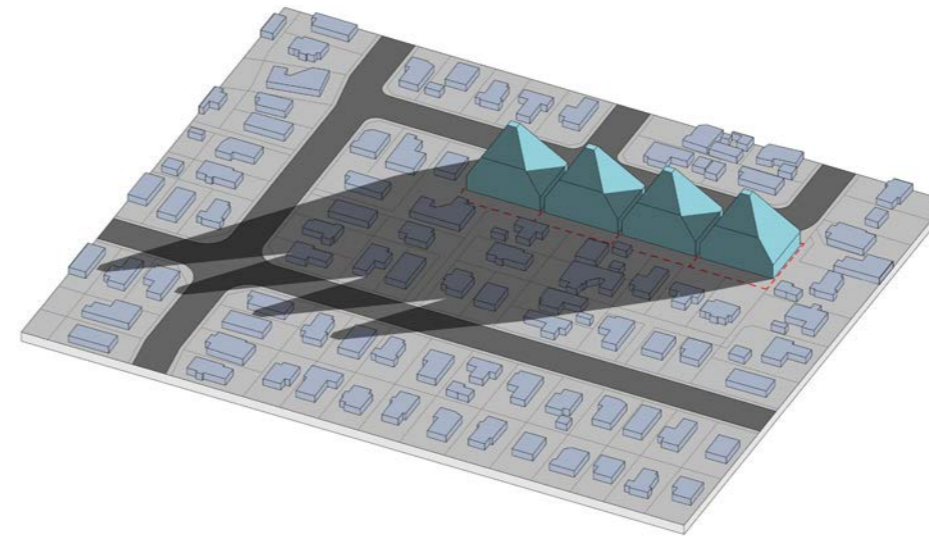
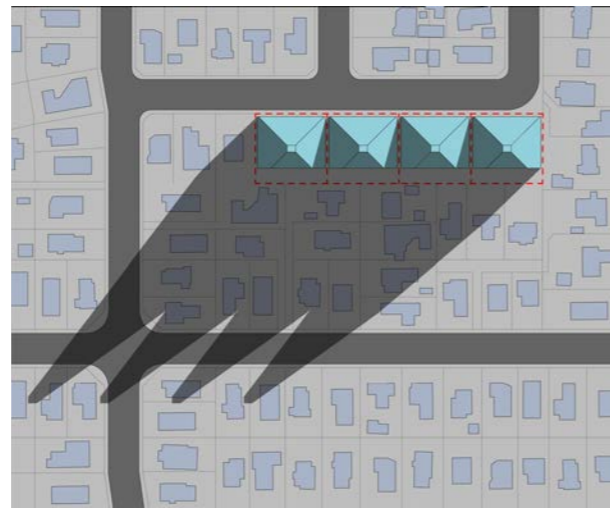
HIGH DENSITY RESIDENTIAL - AMALGAMATED SITE - 70%

TYPICAL PARCEL SIZE:
38 x 37m
TYPICAL PARCEL AREA:
1406 m²

SITE COVERAGE: 70%
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m
SETBACK FROM OTHER BOUNDARIES: 1m
REAR SETBACK: 1m

OPTION 2
6m + 60°, 38m wide site, 70% coverage



OBSERVATIONS

- The distance between the building and the rear boundary is approximately 9m.
- As this open space would not receive sunlight in the winter, it is suggested that ground floor open space requirements are combined with providing private balconies that receive sunlight during (part of) the day (as suggested on page 22).
- In the winter, the shading not only affects the development site, but also covers a significant area of neighbouring properties in the south. This is a result of the bulk and height of the building and it is considered that reducing site coverage and/or recession plane angle controls will not result in a significant improvement.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

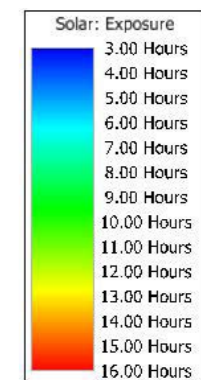
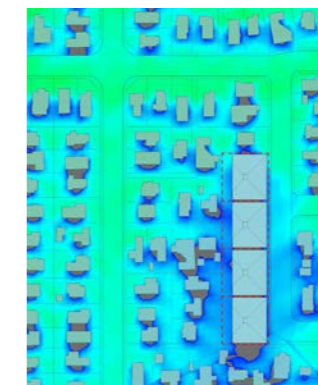
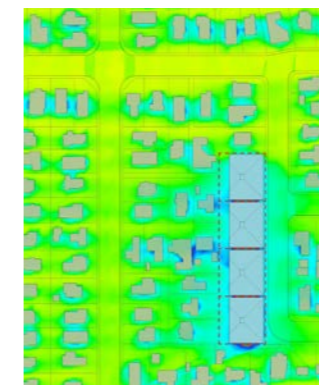
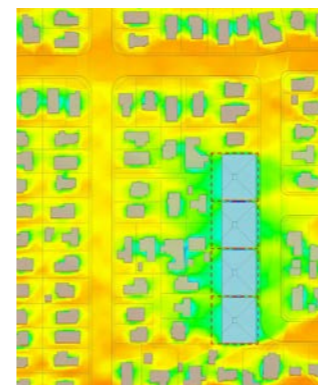
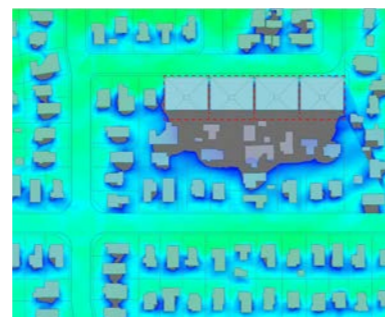
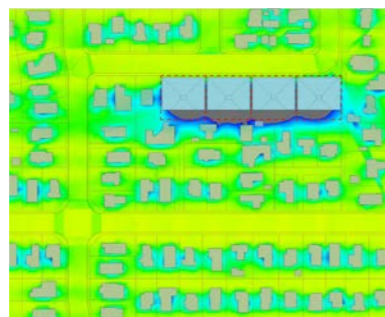
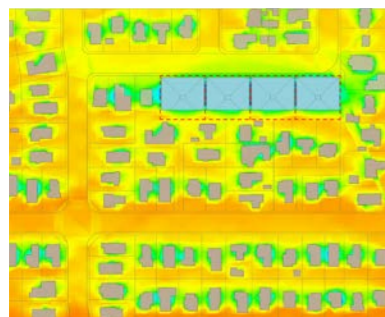
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



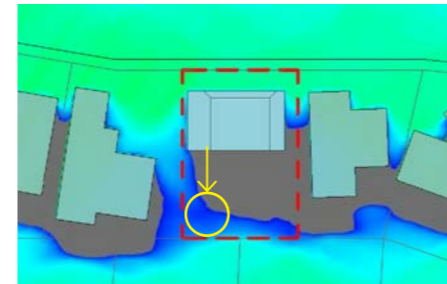
OUTDOOR LIVING SPACE SUGGESTIONS LOW AND GENERAL DENSITY

- The suggested minimum dimensions are derived from a combination of standards used in other relevant District Plans and the modelling outcomes from the typical sites in Upper Hutt.
- In an east/west orientation, the rear yard generally receives more sunlight than a north/south orientation (depending on the location and height of neighbouring buildings). By using the north/south orientation as a measure for sunlight access the same metrics can be applied for different orientations.
- In an east/west scenario, the optimal location for outdoor living space is in the northwestern corner of the site
- Outdoor open spaces should be directly connected to adjacent habitable rooms

LOW DENSITY RESIDENTIAL OPTION 2 2.7m + 45°

	Area	Minimum width
Minimum ground floor open space per unit	50m ²	5m

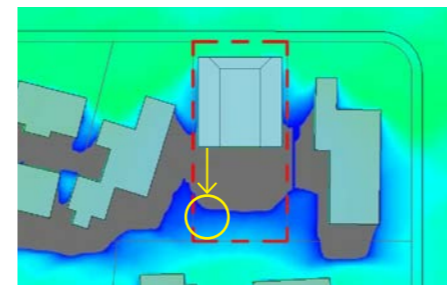
North/ south - mid winter



- An area of approximately 5m wide along the rear boundary will receive at least 3 hours of sunlight in mid-winter
- This indicates that with the modelled typical context the southwestern corner is the optimal location for outdoor living space with sunlight access throughout the year
- Regardless of minimum requirements, the modelled standards indicate that there is ample open space available on site
- A minimum outdoor open space of 50m² might constraint future infill opportunities

GENERAL RESIDENTIAL OPTION 2 2.7m + 55°

	Area	Minimum width
Minimum ground floor open space per unit	35m ²	4m



- An area of approximately 6.5m wide along the rear boundary will receive at least 3 hours of sunlight in mid-winter
- This indicates that with the modelled typical context the area along the southern boundary can accommodate outdoor living space with sunlight access throughout the year
- Regardless of minimum requirements, the modelled standards indicate that there is ample open space available on site



ALL TESTS ARE DONE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

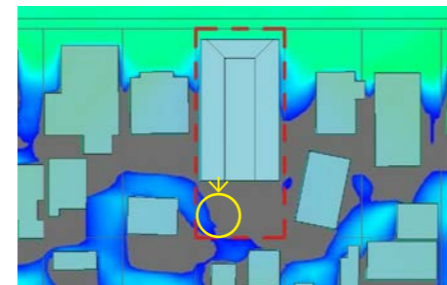
OUTDOOR LIVING SPACE SUGGESTIONS MEDIUM AND HIGH DENSITY

- For medium and high density, outdoor open space can be achieved with sufficient sunlight access by a combination of private (ground floor, balconies) and communal (ground floor, rooftop) open space.
- The text in *italic* is not a necessary requirement for open space provisions but are suggestions that can be used to further enhance the amenity levels in the provided ground floor open space. Modelling outputs of this suggestion are included in the following pages.
- Consider a maximum building length in combination with a minimum separation distance between buildings or building and boundary (at least on one side) that is relative to the height of the adjacent building.
- A maximum building length enables ground floor open space, privacy and outlook and also breaks down visual building bulk.

North/ south - mid winter

MEDIUM DENSITY RESIDENTIAL OPTION 1 4m + 60°

	Area	Width
Total minimum open space per unit (combination of private and communal)	20m ²	minimum 4m for communal
Minimum private open space		
ground floor	10m ²	3m
balcony	8m ²	2m
<i>Suggested: Maximum building length</i>		20m
<i>Suggested: if outdoor open space is south of a building a minimum distance between buildings on site or between the building and the boundary</i>		0.x (height adjacent building) + 2m



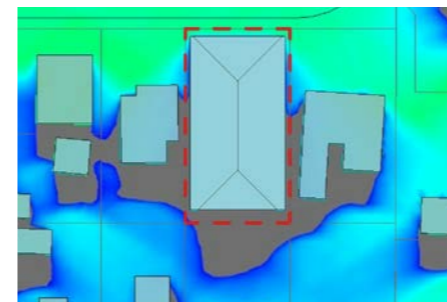
- In the modelled typical site, an area of approximately 2m wide, for a length of 7m along the western boundary, will receive at least 3 hours of sunlight in mid-winter
- This indicates that sunlight access into the outdoor ground level in the rear of the property is negligible and affected by surrounding buildings. Therefore it is suggested to use a combination of private (balcony) space and communal space (outdoor, roofgarden)

COMPREHENSIVE RESIDENTIAL DEVELOPMENT

- The open space provisions used for the Medium density residential zone can also be used to guide open space provisions in the Comprehensive residential development zone. Residual space between units can be used as shared open space if all units on side have an equal direct or visual connection with the space.

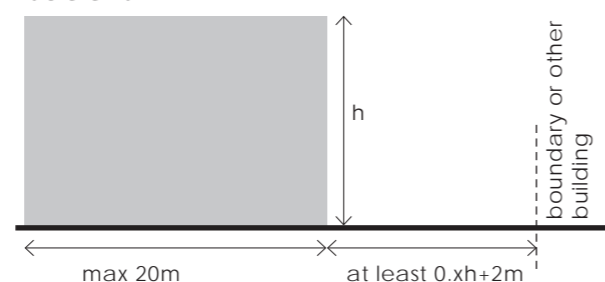
HIGH DENSITY RESIDENTIAL OPTION 2 6m + 60°

	Area	Width
Total minimum open space per unit (combination of private and communal)	15m ²	minimum 4m for communal
Minimum private open space		
ground floor	10m ²	3m
balcony	6m ²	2m
<i>Suggested: Maximum building length</i>		20m
<i>Suggested: if outdoor open space is south of a building a minimum distance between buildings on site or between the building and the boundary</i>		0.x (height adjacent building) + 2m



- As a result of the 80% site coverage, the area between the modelled hypothetical building envelope and the rear boundary is 2.5m wide, which will be too small to receive sufficient sunlight
- Open space can be provided entirely as balcony and/or rooftop space. However, privacy, outlook and daylight access into lower storeys would benefit from a minimum distance between buildings on at least one side of the building

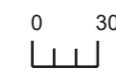
SUGGESTED:



The value x can depend on the height of the building:

up to 4 storeys:	0.8h+2m	approximate separation up to 13.2m
from 5 storeys up to 7 storeys:	0.6h+2m	approximate separation between 10.2m and 15.2m
from 8 storeys up to 35m high:	0.4h+2m	approximate separation between 10.8m and 16m

UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

HIGH DENSITY RESIDENTIAL - MULTI-SITE: HEIGHT SEPARATION RATIO

TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
740 m²

SITE COVERAGE: N/A

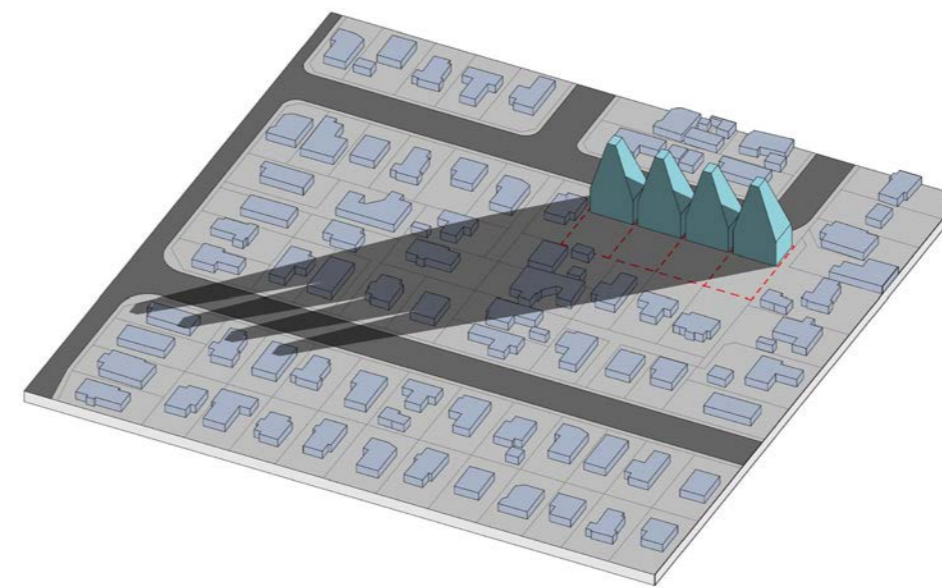
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m

SETBACK FROM OTHER BOUNDARIES: 1m

REAR SETBACK:
0.6 (35m height) + 2m = 23m

OPTION 1
8m + 73°
for modelling purposes a 0.6h+2m height separation ratio has been applied



OBSERVATIONS

- If a 0.6h+2m ratio is used, a 35m high building would result in a 23m set back from the rear. This means that on a typical site of 37m deep, the building can have a maximum length of only 14m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 460m² (62% of the site).

- If, as suggested on the previous page, a 0.4h+2m ratio is used, the building will have a maximum length of 19m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 360m² (49% of the site).

Overall it is considered that in this scenario the 0.4h+2m results in a generous outdoor open space space. In the winter this area will not be able to achieve sufficient sunlight access. This can be balanced with balconies that receive sunlight during (part of) the day.

However, it is unsure if the building envelope would be able to accommodate a feasible high density outcome.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

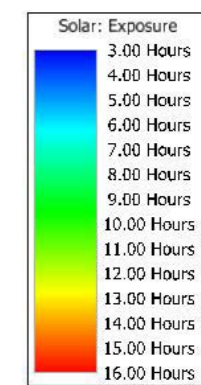
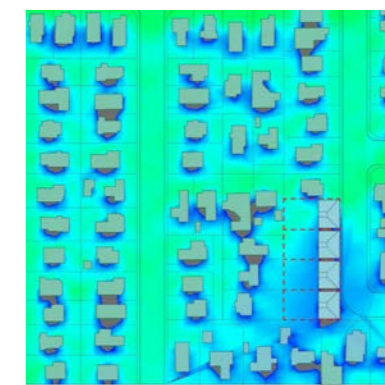
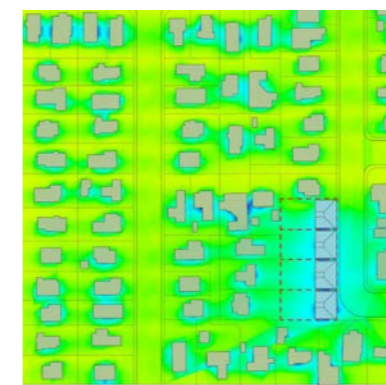
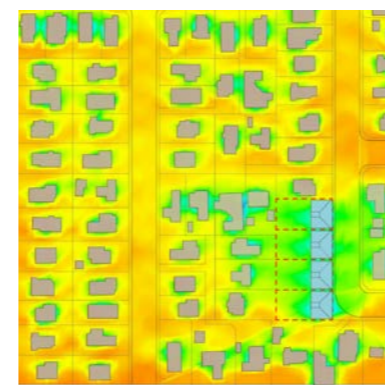
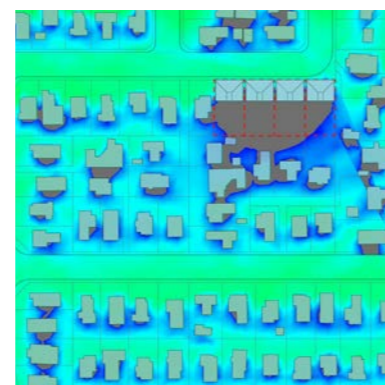
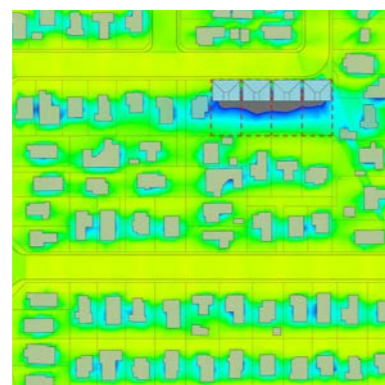
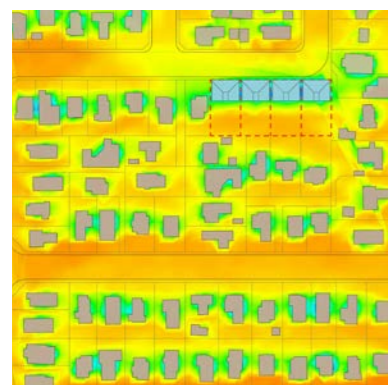
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

HIGH DENSITY RESIDENTIAL - MULTI-SITE: HEIGHT SEPARATION RATIO

TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
740 m²

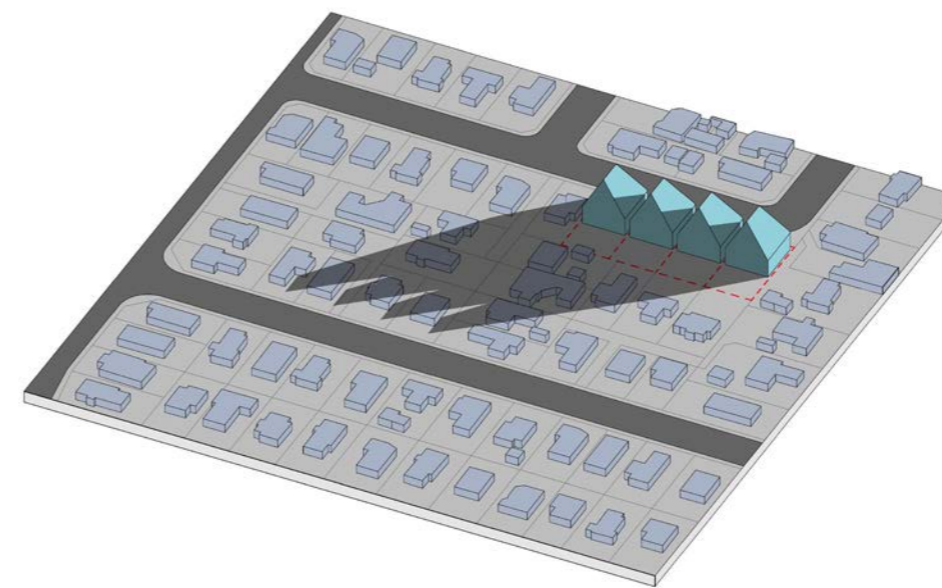
SITE COVERAGE: N/A
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m

SETBACK FROM OTHER BOUNDARIES: 1m

REAR SETBACK:
0.6 (23.32 height) + 2m = 16m

OPTION 2
6m + 60°
for modelling purposes a 0.6h+2m height separation ratio has been applied



OBSERVATIONS

- If a 0.6h+2m ratio is used, a 23m high building would result in a 16m set back from the rear. This means that on a typical site of 37m deep, the building can have a theoretical maximum length of 21m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 320m² (43% of the site).

- If, as suggested on the previous page, a 0.4h+2m ratio is used, the building will have a maximum theoretical length of 26m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 220m² (30% of the site).

Overall it is considered that in this scenario the 0.4h+2m results in a comfortable building/open space ratio that only in the winter will not be able to achieve sufficient sunlight access into the outdoor open space. This can be balanced with balconies that receive sunlight during (part of) the day.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

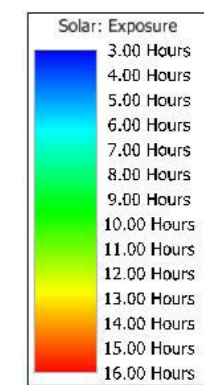
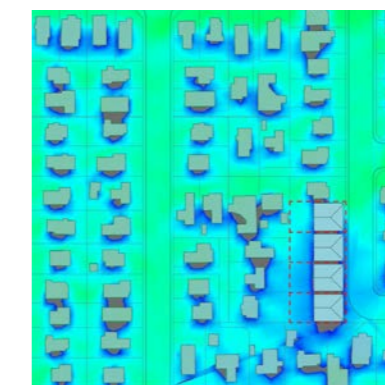
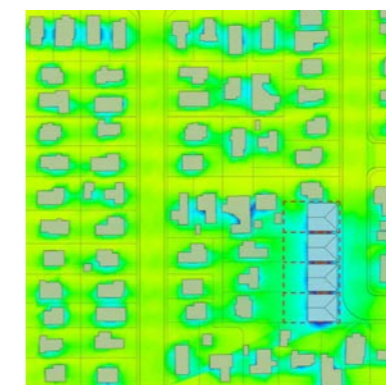
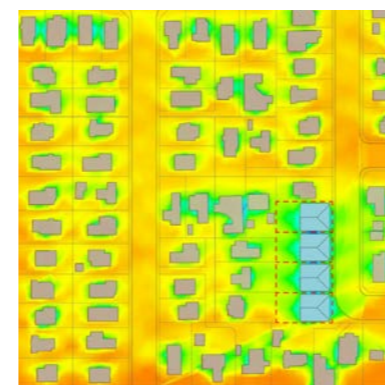
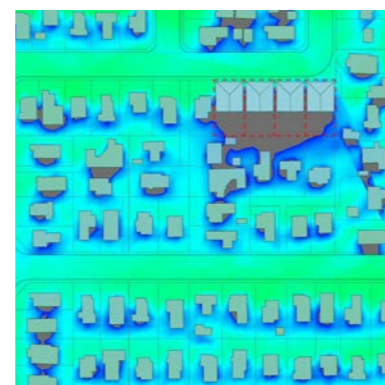
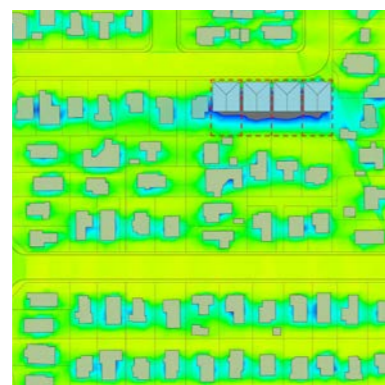
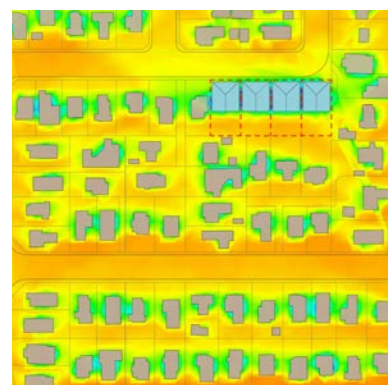
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



MODEL SHADOWS SHOWN ARE DURING THE MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

HIGH DENSITY RESIDENTIAL - AMALGAMATED SITE: HEIGHT SEPARATION RATIO

TYPICAL PARCEL SIZE:
38 x 37m
TYPICAL PARCEL AREA:
1406 m²

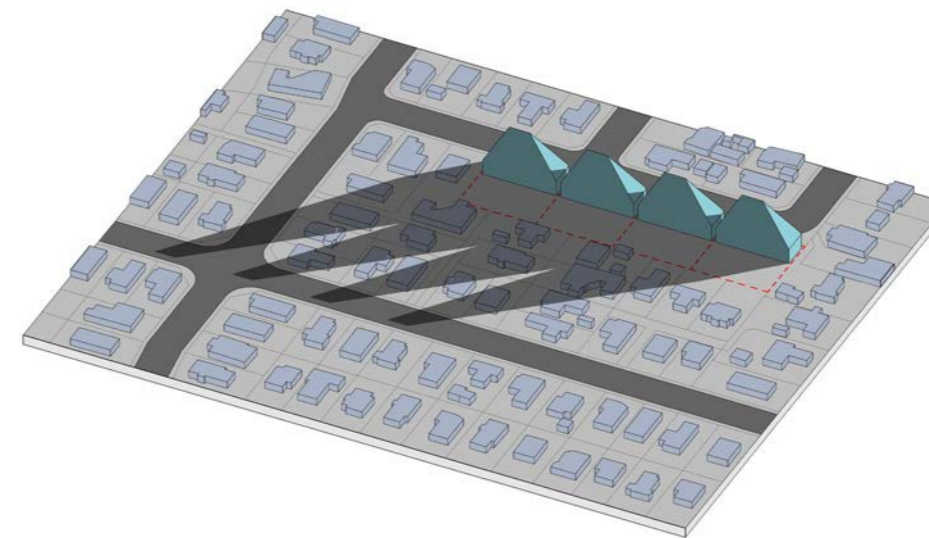
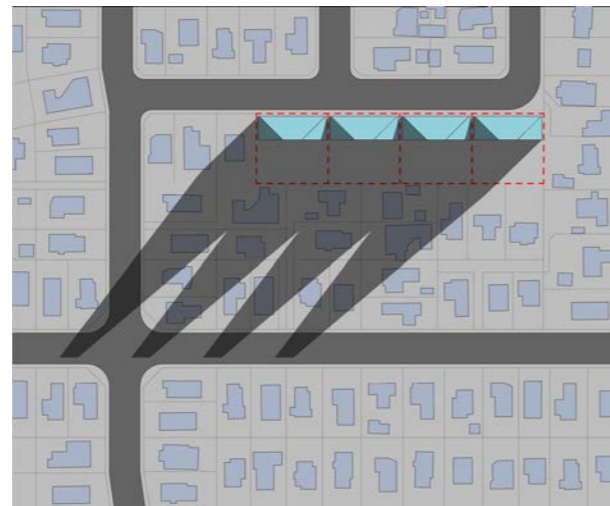
SITE COVERAGE: N/A
HEIGHT LIMIT: 35m

SETBACK FROM BOUNDARY WITH A ROAD: 1.5m

SETBACK FROM OTHER BOUNDARIES: 1m

REAR SETBACK:
0.6 (35m height) + 2m = 23m

OPTION 2
6m + 60°, 38m wide site
for modelling purposes a 0.6h+2m height separation ratio has been applied



OBSERVATIONS

- If a 0.6h+2m ratio is used, a 35m high building would result in a 23m set back from the rear. This means that on a typical site of 37m deep, the building can have a maximum length of 14m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 874m² (62% of the site).

- If a 0.4h+2m ratio is used, the building will have a maximum theoretical length of 21m.

Assuming the full width of the site will be used for outdoor open space, this equates to an open space of 608m² (43% of the site).

Overall it is considered that in this scenario the 0.4h+2m results in a comfortable building/open space ratio that only in the winter will not be able to achieve sufficient sunlight access into the outdoor open space. This can be balanced with balconies that receive sunlight during (part of) the day.

SHADE STUDIES

NORTH / SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

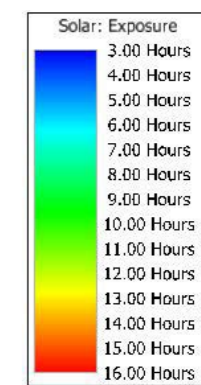
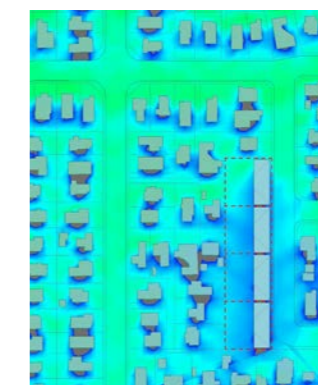
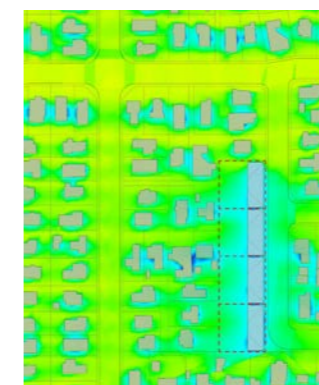
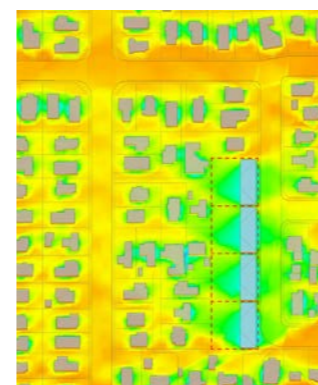
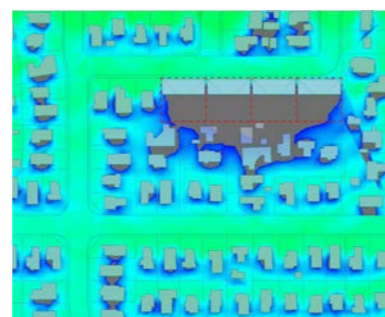
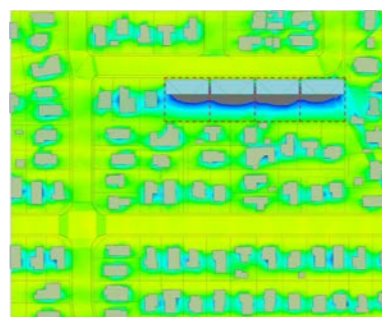
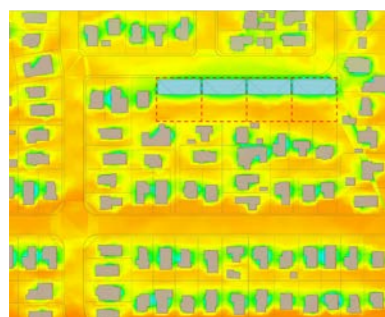
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

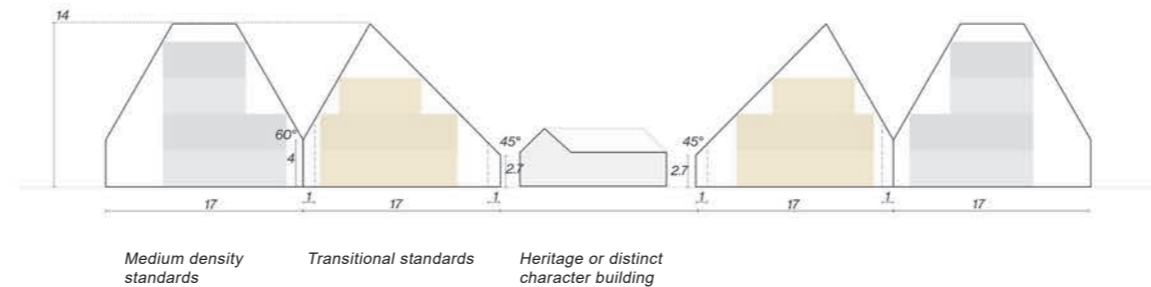


SITE ADJOINING A HERITAGE / CHARACTER BUILDING OR SCHOOL

HERITAGE/ DISTINCT CHARACTER

TYPICAL PARCEL SIZE:
17 x 40m
TYPICAL PARCEL AREA:
680 m²
SITE COVERAGE: 60%
HEIGHT LIMIT: 14m

MEDIUM DENSITY
RESIDENTIAL
2.7m + 45° adjoining
the heritage /
character building,
4m + 60° to
remaining three
sides



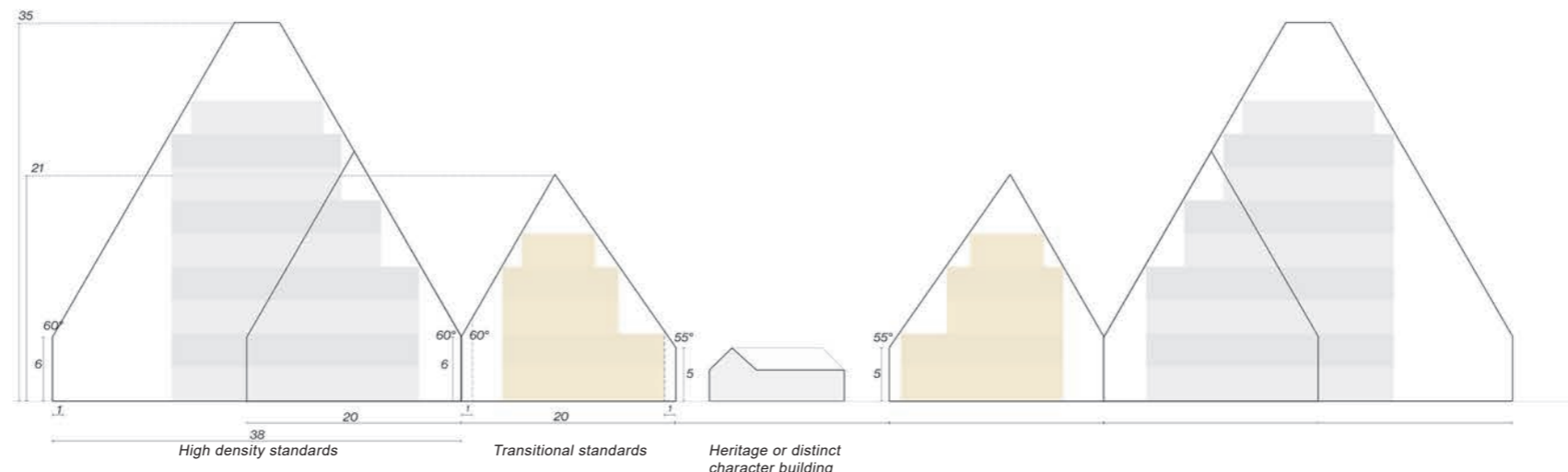
OBSERVATIONS

- Based on a transition in bulk from one/two storey dwelling to four storeys.

HERITAGE/ DISTINCT CHARACTER

TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
740 m²
SITE COVERAGE: 80%
HEIGHT LIMIT: 35m

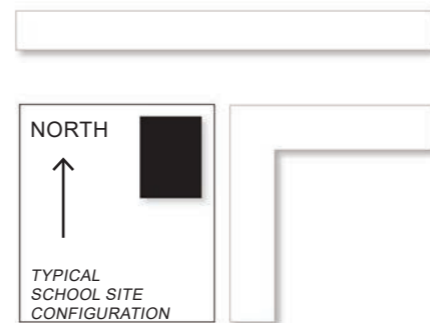
HIGH DENSITY
RESIDENTIAL
5m + 55° adjoining
the heritage /
character building,
6m + 60° to
remaining three
sides



- Based on a transition in bulk from one/two storey dwelling to six storeys or higher.

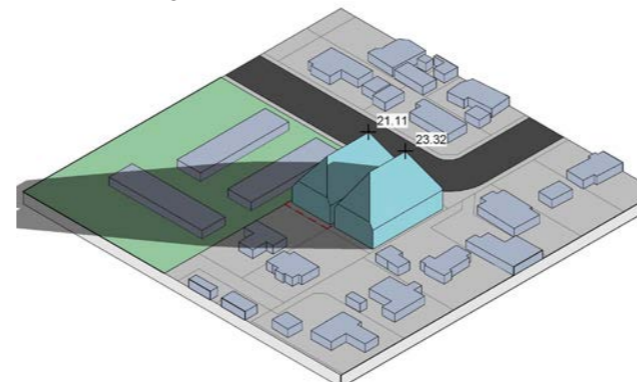
SCHOOL

TYPICAL
SCHOOL SITE
The majority of
school buildings
in Upper Hutt are
located along
the eastern or
northeastern
boundary,

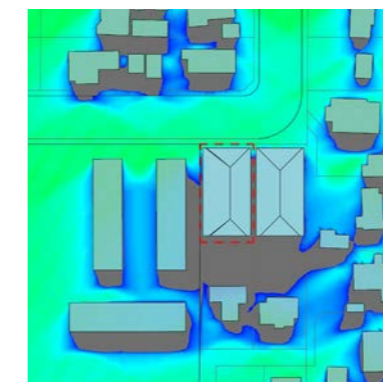


HYPOTHETICAL - TWO HIGH DENSITY
DEVELOPMENTS ADJACENT TO A SCHOOL SITE
6m + 60° (for illustration only)

Mid-winter 9am



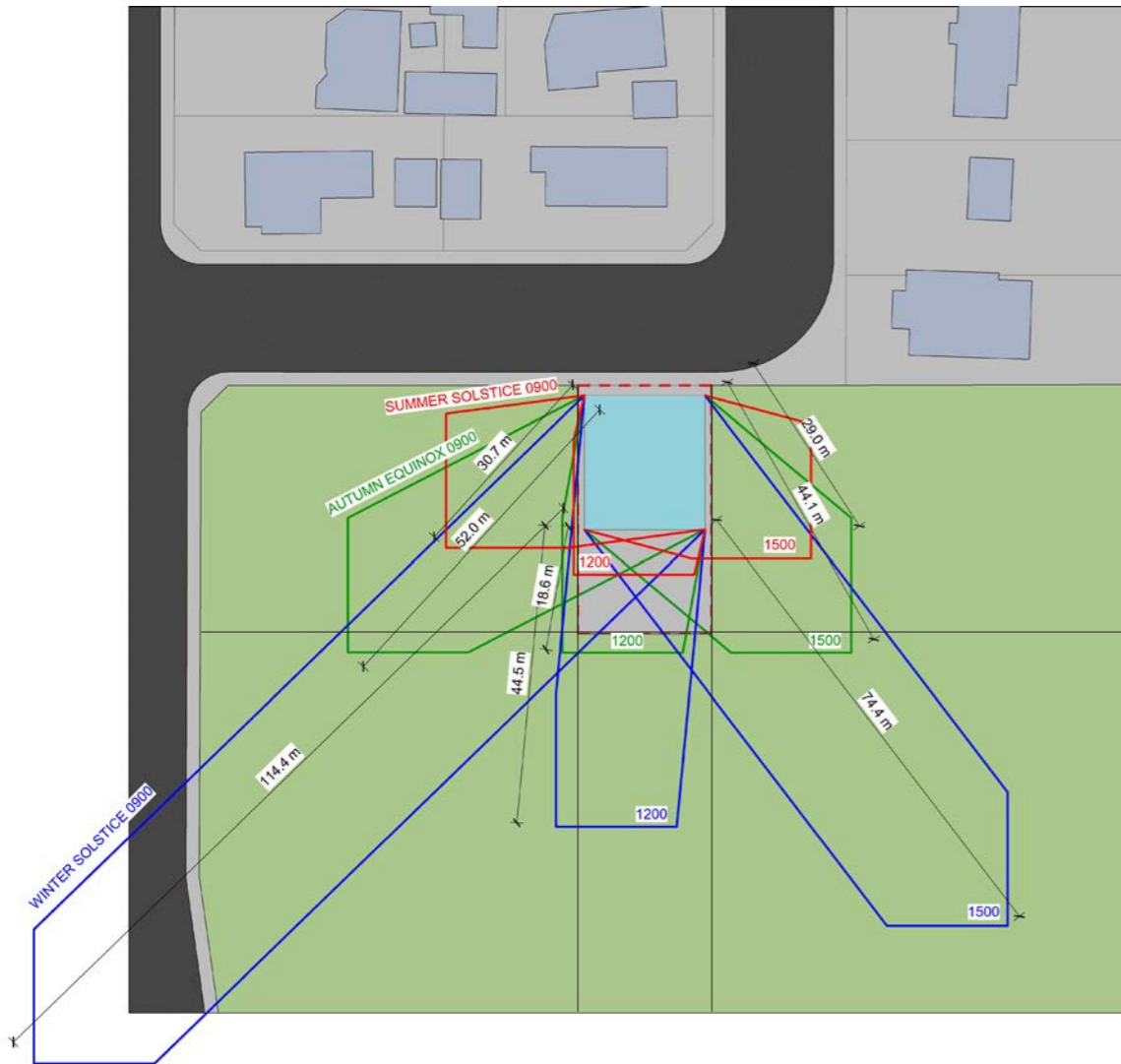
MID-WINTER SUNLIGHT HOURS



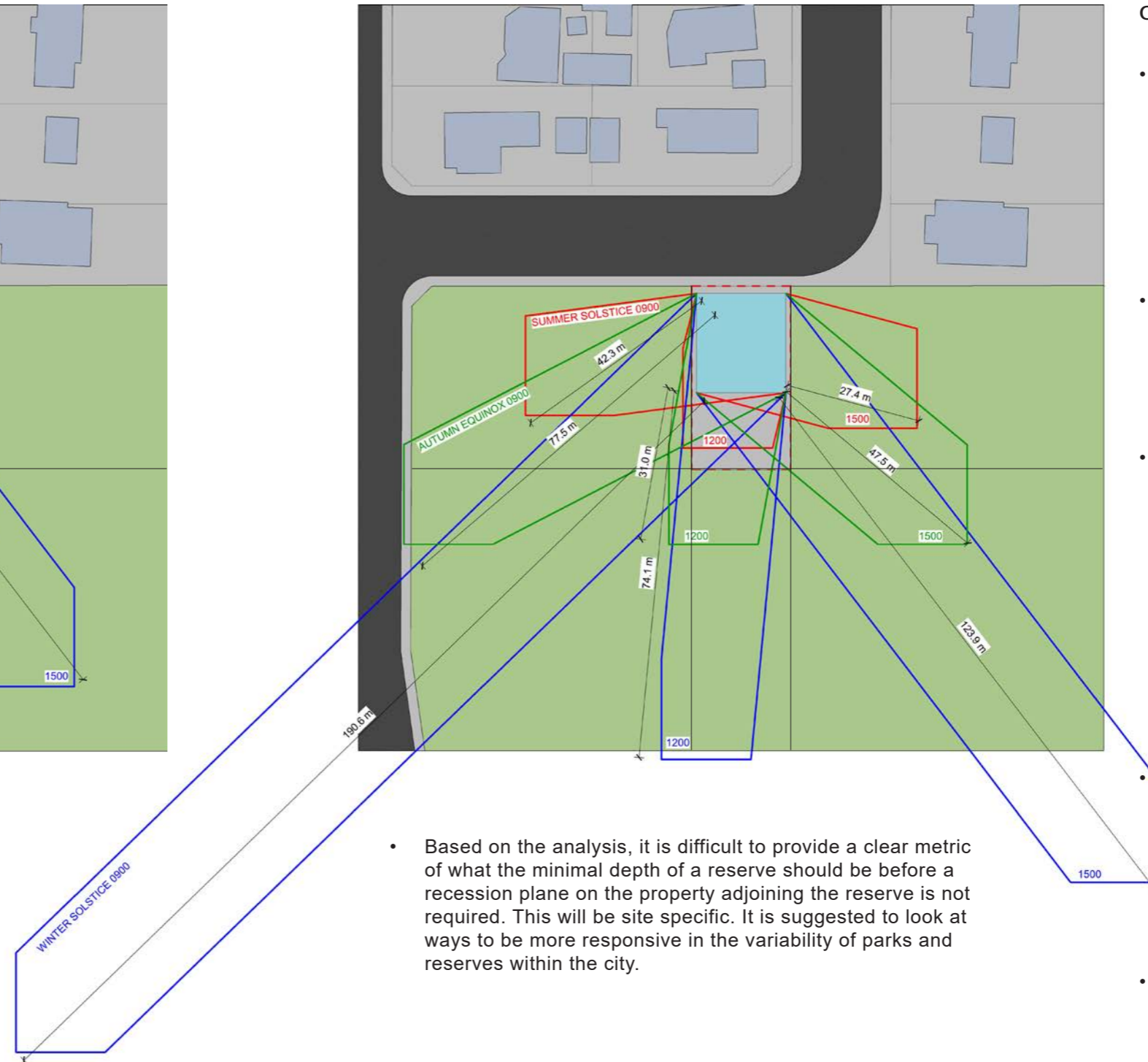
- Considering the size of typical school sites and the typical location of the buildings on the site, the school buildings will only be shaded part of the day. Therefore no special recession plane consideration is necessary and standard rules that are associated with the corresponding zone can be applied.
- The shading diagrams shown here are only illustrative.

HIGH DENSITY RESIDENTIAL NEXT TO A LARGE PARK OR RESERVE - SHADOW LENGTH STUDY

21m high building envelope, no recession planes



35m high building envelope, no recession planes



OBSERVATIONS

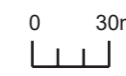
- The shading extents correspond with the maximum length of shadows cast by a hypothetical building (without recession plane) of 21m and 35m high at 9am, 12pm and 3pm on a mid-winter, equinox and mid-summer day.
- It should be noted that the shading extents shown are based on an envelope and that a feasible building in reality will consist of less mass.
- The longest shadow is 9am mid-winter in southwestern direction (114m and 190m long). This indicates that a reserve deeper than 190m (measured from the edge of the building) will have sunlight the whole year through every time of the day, even if the edge adjacent to the reserve is developed by 35m tall buildings along the whole boundary.
- Assuming six storey developments without recession plane on the edge, a reserve that is deeper than 90m will receive sunlight for most of the day and throughout the year except for early morning mid winter.
- Applying a recession plane will likely not shorten the length of the shadow unless it results in a decreased height of the building, but as separation between the buildings will increase this will allow sunlight penetration between buildings.

HIGH DENSITY

TYPICAL PARCEL SIZE: 20 x 37m
 TYPICAL PARCEL AREA: 740 m²
 HYPOTHETICAL MAX BUILDING LENGTH: 20M
 NO RECESSION PLANE APPLIED
 HEIGHT LIMIT: 21M AND 35M

NOTE: The open space layout as shown represents a variety of possible configurations relative to residential development, allowing to assess the shading effects on large open space located on either east, west or south side of high density development

- Based on the analysis, it is difficult to provide a clear metric of what the minimal depth of a reserve should be before a recession plane on the property adjoining the reserve is not required. This will be site specific. It is suggested to look at ways to be more responsive in the variability of parks and reserves within the city.



ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

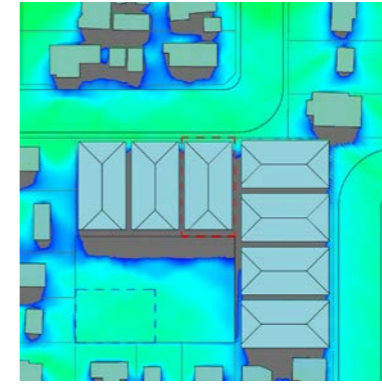
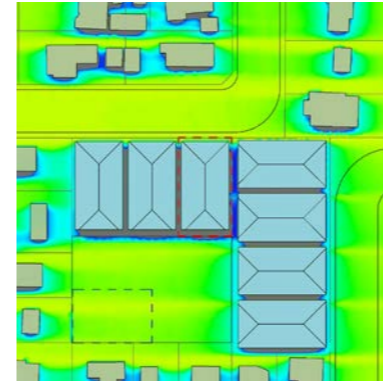
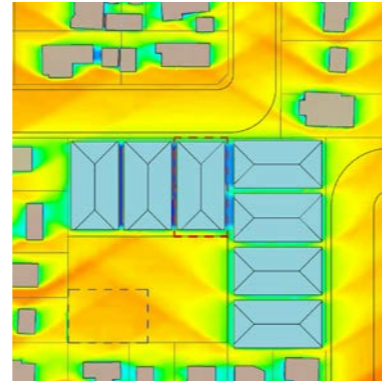
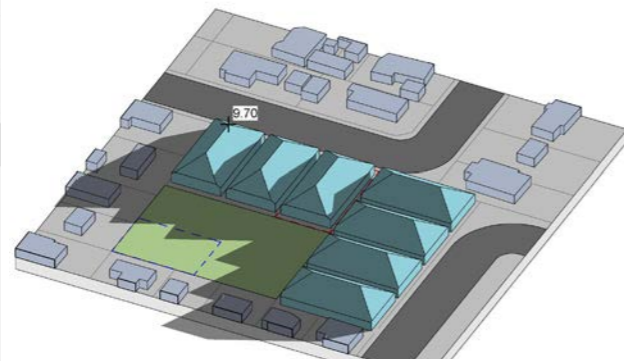
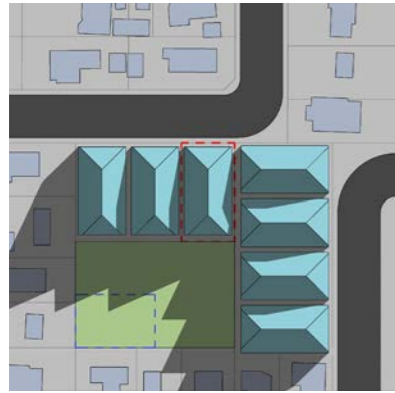
MEDIUM OR HIGH DENSITY RESIDENTIAL NEXT TO A TYPICAL SMALL PARK (40M DEEP)

SUMMER SOLSTICE
21 DECEMBER

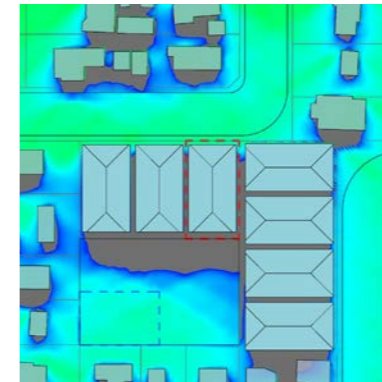
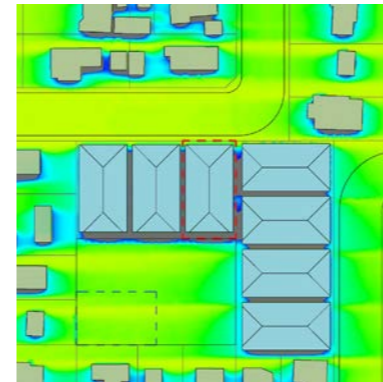
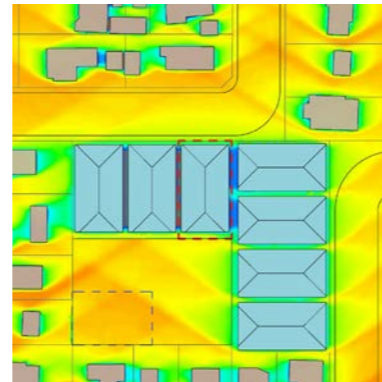
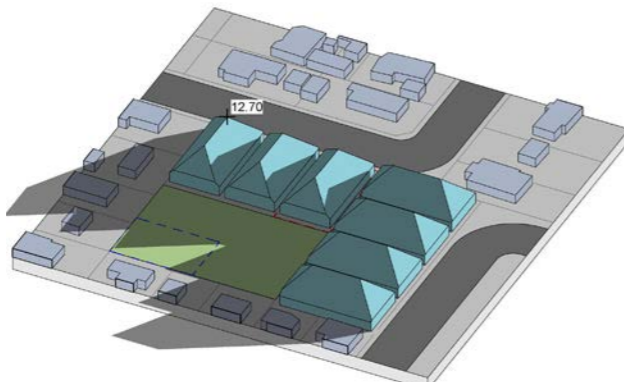
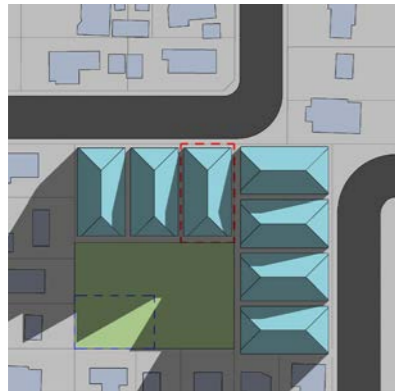
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

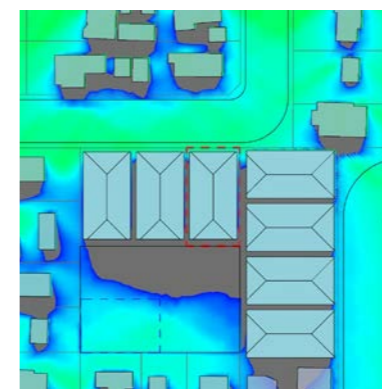
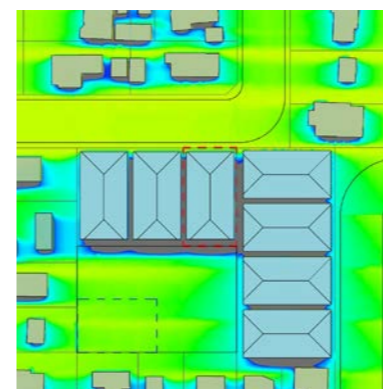
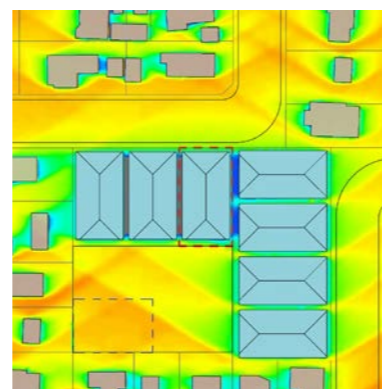
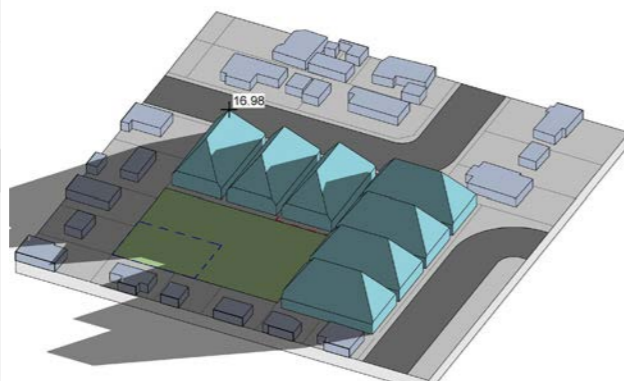
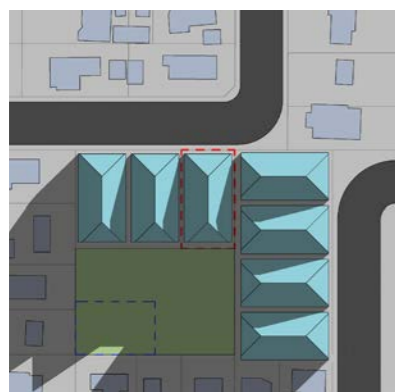
2.7m + 35°



2.7m + 45°



2.7m + 55°

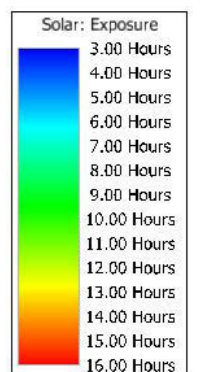


OBSERVATIONS

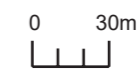
- Different configurations have been modelled to test the shading effect on a 'small' park of approximately 40m deep
- The modelled configuration is based on the provided high density metrics ('worst case') with varying recession plane options
- As the shadow length study on the previous page indicates, mid-winter 9am casts the longest shadow, in southwestern direction. Therefore the hypothetical building configuration tests the sunlight access into the southwestern corner of the park
- 2.7m and 35° (the existing recession plane metric for the residential zone) is the only option that ensures sunlight into at least approximately 25% of the park at any time of the year. This implies that sunlight access of this level into the park throughout the year can only be achieved by zoning the adjacent area as low density residential (and nearby medium and high density residential zones outside of the shading reach)
- The options 45° and 55° show that the park might be shaded mid-winter at 9am, however these will get respectively between 5 and 8 hours of sunlight in the southwestern corner over the course of the day

STANDARDS USED FOR THIS EXERCISE:

- TYPICAL PARCEL SIZE: 20 x 37m
- TYPICAL PARCEL AREA: 740 m²
- SITE COVERAGE: 80%
- HEIGHT LIMIT: 35m



UPPER HUTT INTENSIFICATION EVALUATION



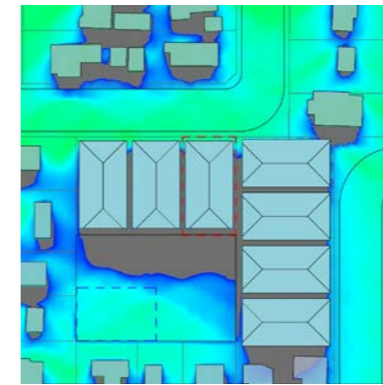
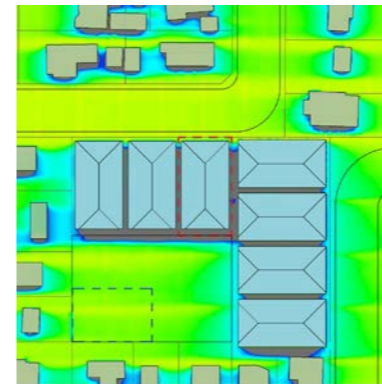
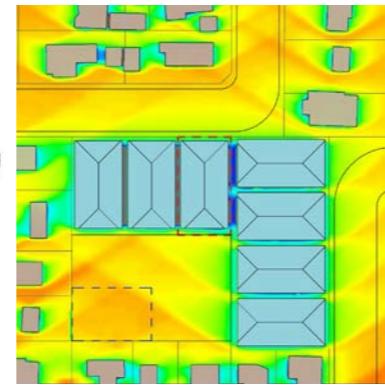
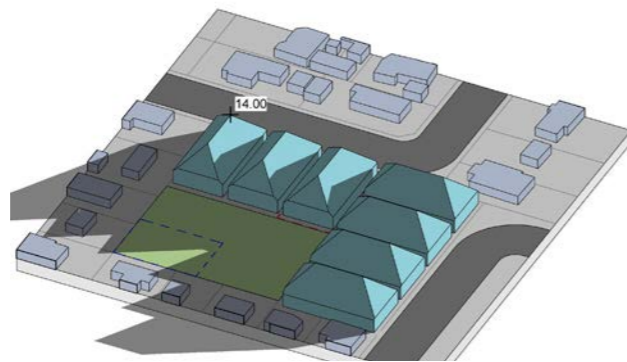
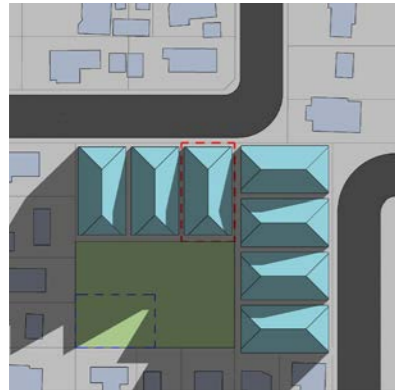
ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

SUMMER SOLSTICE
21 DECEMBER

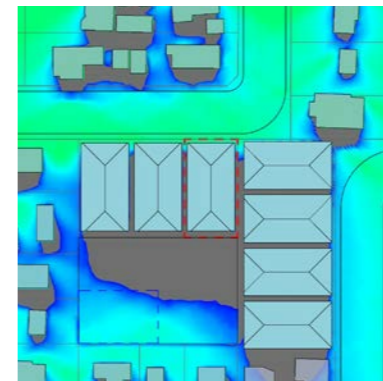
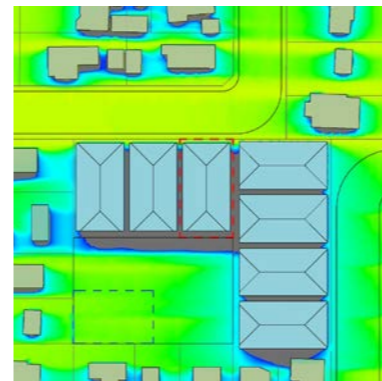
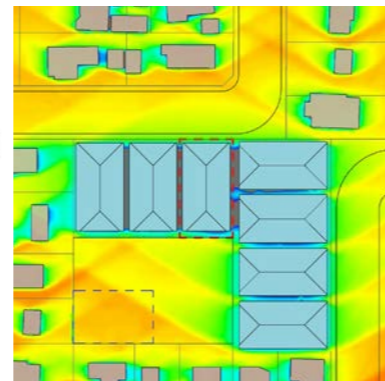
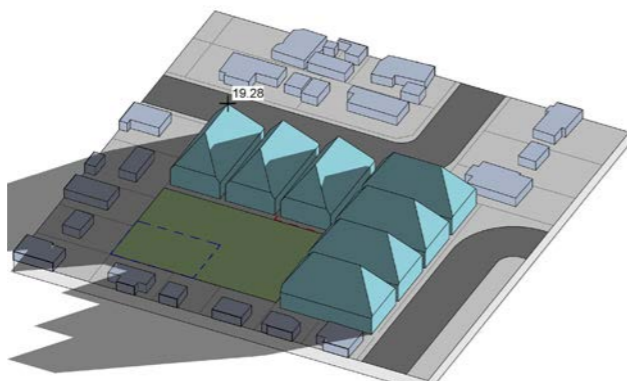
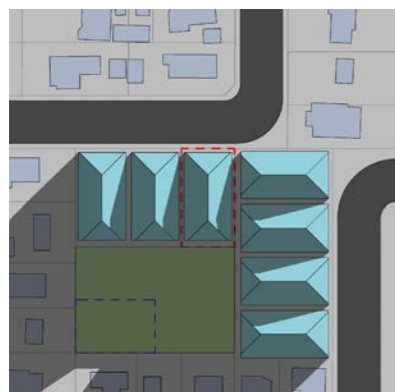
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

4m + 45°



5m + 55°



OBSERVATIONS

- The increase of height of the recession plane at the boundary (compared to the options on the previous page) has a negligible effect on the total sunlight hours received in the park during a day
- The 5m + 55° option is the only modelled option that does not receive any sunlight mid-winter at 9am. As previously stated, this is based on building envelopes and not actual built forms.
- Based on this modelling it can be concluded that medium and high density developments can not provide for unobstructed sunlight access into a 'small' park (when adjoining a park up to 40m deep) at all times of the year, but will still allow for some level of sunlight access over the course of a day, including mid-winter.
- This can be mitigated by providing some level of variety in orientations of the different parks across the city.

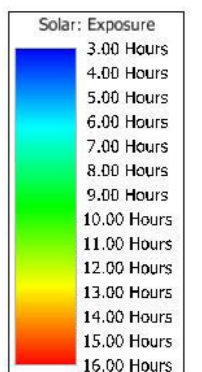
STANDARDS USED FOR
THIS EXERCISE:

TYPICAL PARCEL SIZE:
20 x 37m

TYPICAL PARCEL AREA:
740 m²

SITE COVERAGE: 80%

HEIGHT LIMIT: 35m



UPPER HUTT INTENSIFICATION EVALUATION



ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

PROPOSED GENERAL RESIDENTIAL - SINGLE SITE

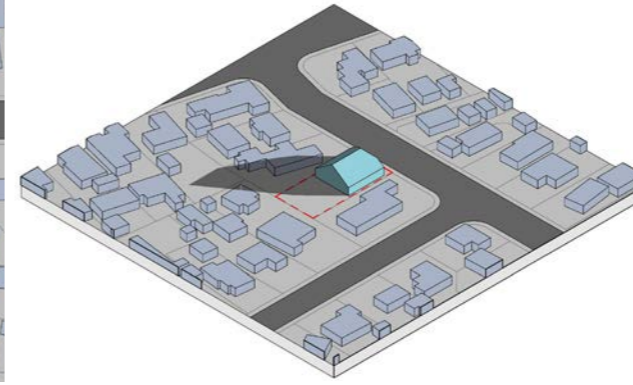
MAY 2022

TYPICAL PARCEL SIZE:
18 x 38m
TYPICAL PARCEL AREA:
684 m²

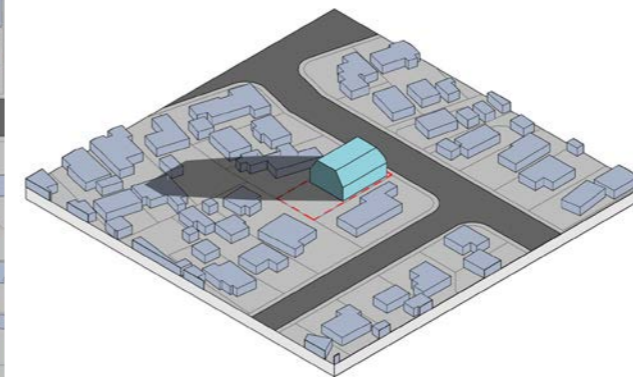
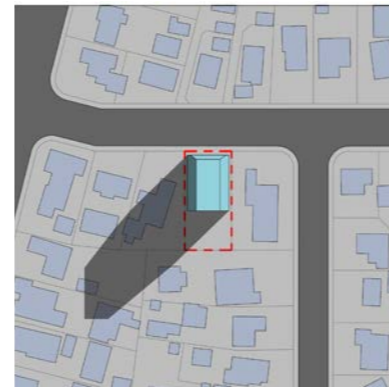
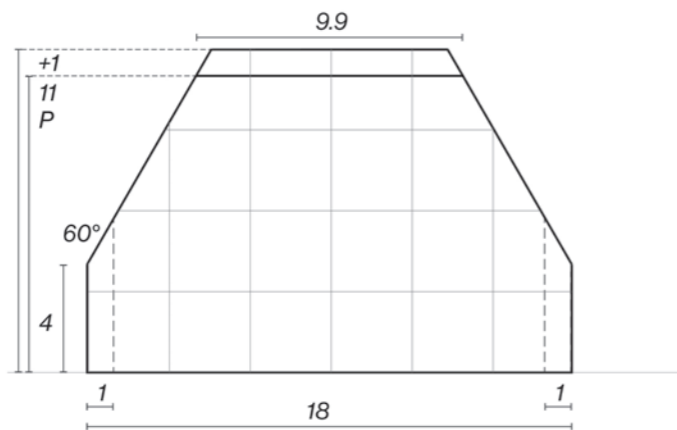
SITE COVERAGE: 50%
HEIGHT LIMIT:
Permitted: 11+1m
Modelled: 11m

SETBACK FROM
BOUNDARY WITH A
ROAD: 1.5m
SETBACK FROM OTHER
BOUNDARIES: 1m
REAR SETBACK: 1m

EXISTING SITUATION
2.7m + 35° + 45° to road boundary



MDRS
4m + 60°



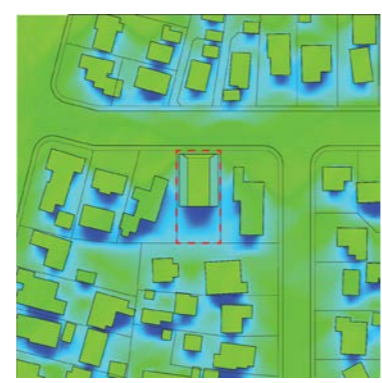
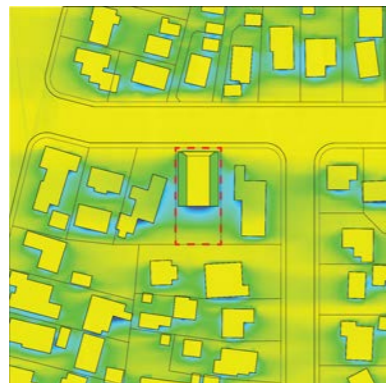
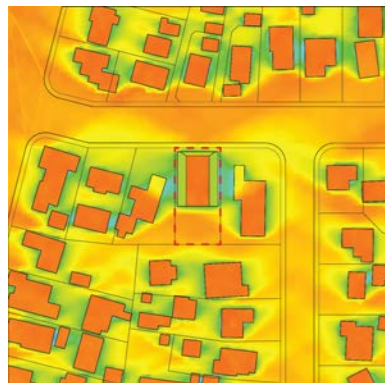
NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

MDRS
4m + 60°

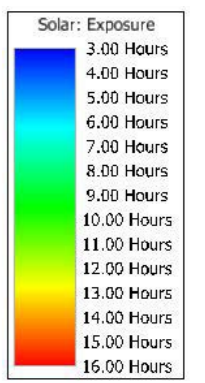
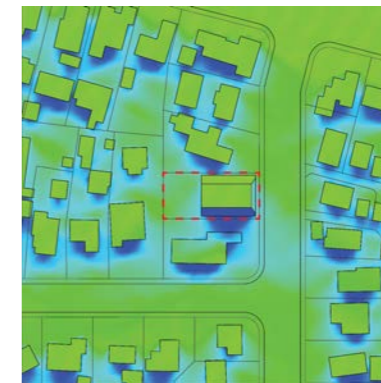
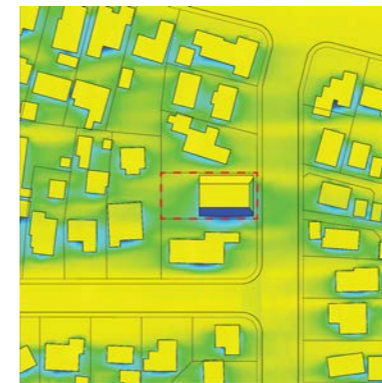
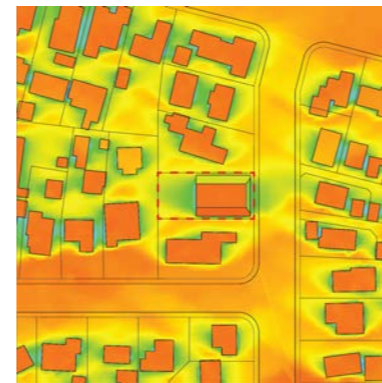


EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

PROPOSED GENERAL RESIDENTIAL - MULTI-SITE

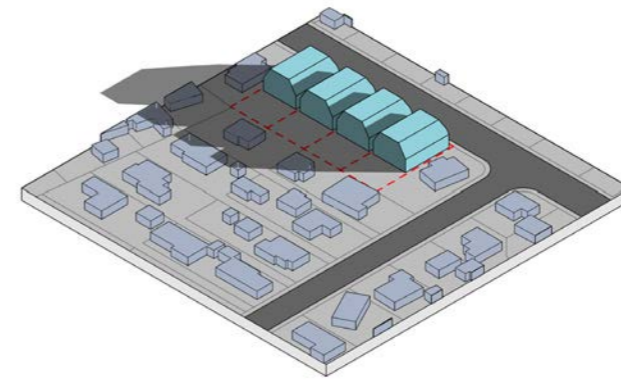
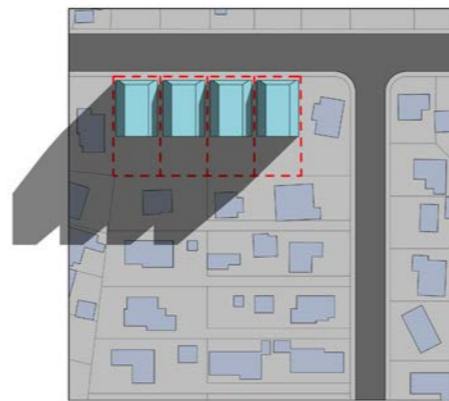
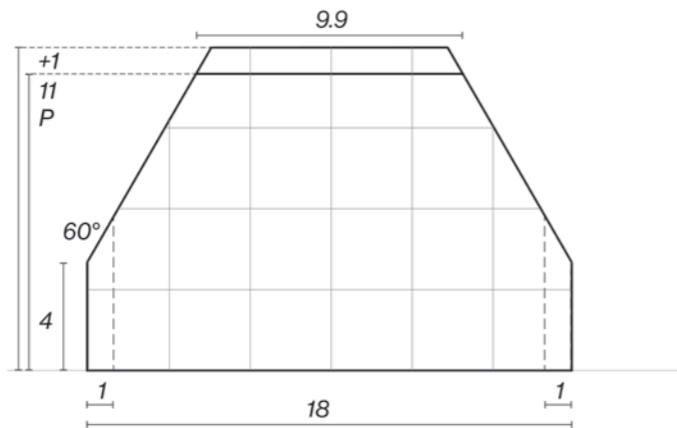
MAY 2022

TYPICAL PARCEL SIZE:
18 x 38m
TYPICAL PARCEL AREA:
684 m²

SITE COVERAGE: 50%
HEIGHT LIMIT:
Permitted: 11+1m
Modelled: 11m

SETBACK FROM
BOUNDARY WITH A
ROAD: 1.5m
SETBACK FROM OTHER
BOUNDARIES: 1m
REAR SETBACK: 1m

MDRS
4m + 60°



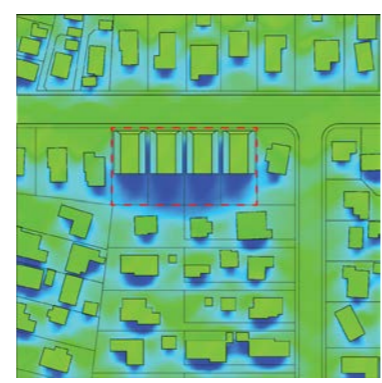
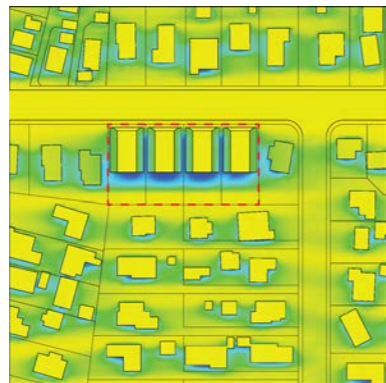
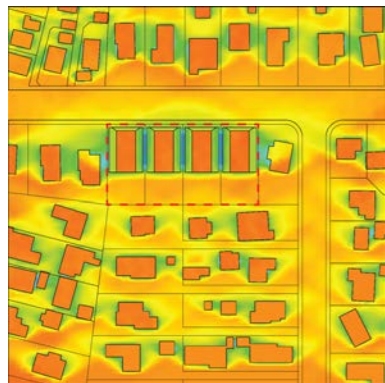
NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

MDRS
4m + 60°

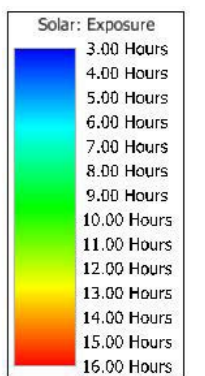
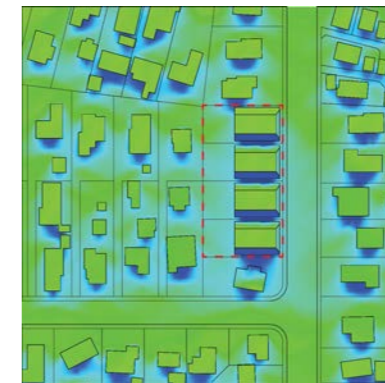
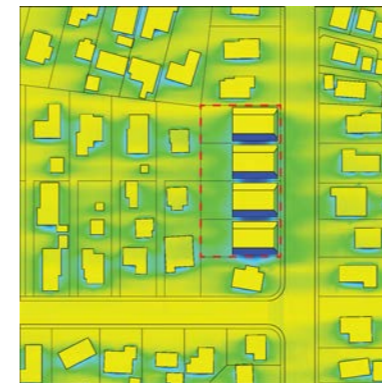
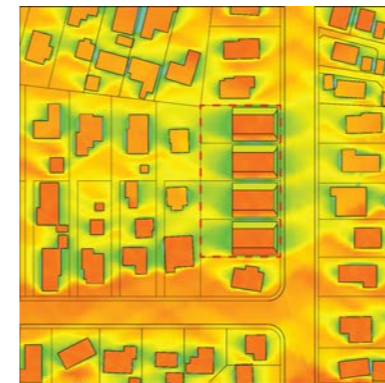


EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

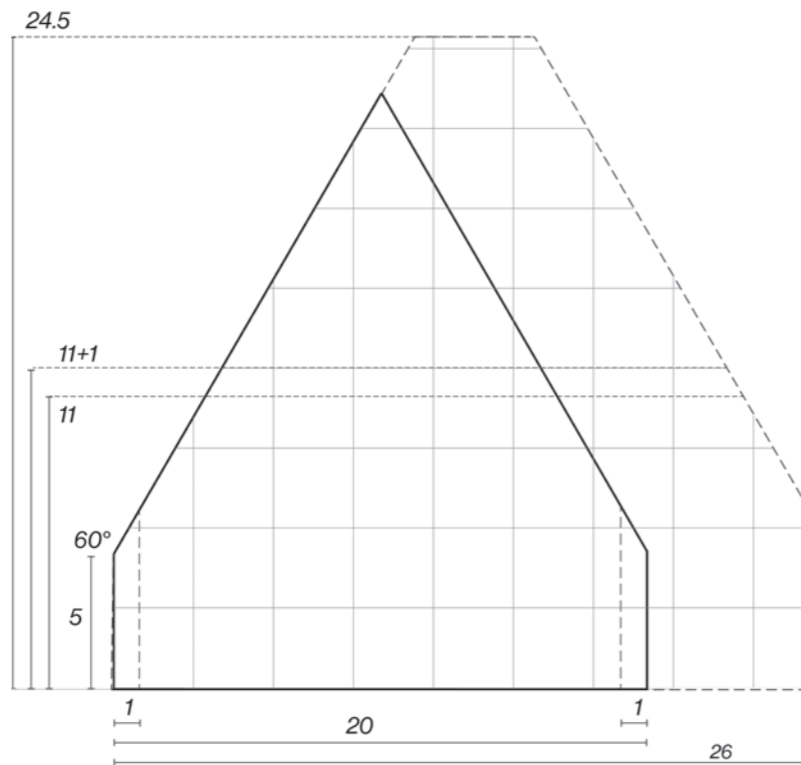
WINTER SOLSTICE
21 JUNE



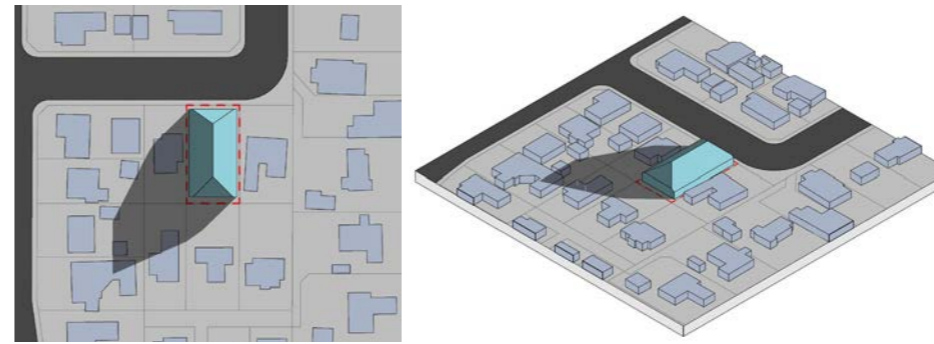
PROPOSED HIGH DENSITY RESIDENTIAL - SINGLE SITE

MAY 2022

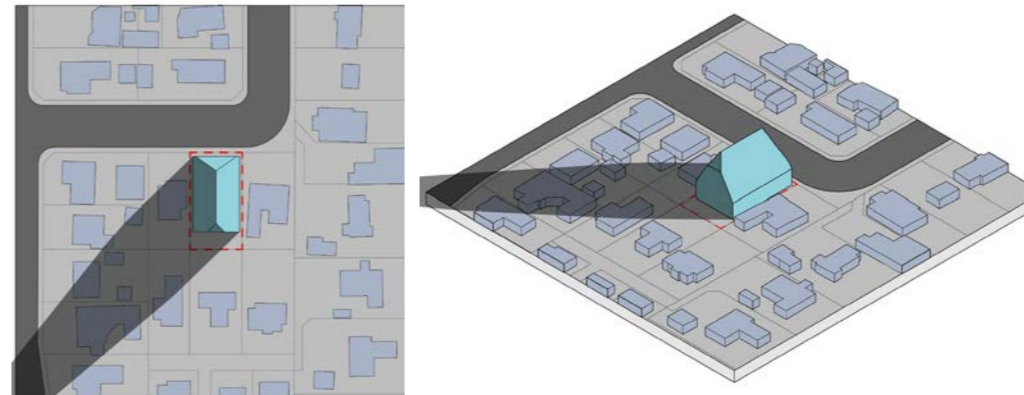
TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
703 m²
SITE COVERAGE: 70%
P: 11+1m
RD: 24.5m
SETBACK FROM BOUNDARY WITH A ROAD: 1.5m
SETBACK FROM OTHER BOUNDARIES: 1m
REAR SETBACK: 1m



EXISTING SITUATION
2.7m + 35° + 45° to road boundary



PROPOSED
5m + 60°



- The building envelope, in a typical high density zone site of 20m wide, will reach a height of approximately 21m. The modelled site is 20m wide and such has a max height of 21m.
- To reach a height of 24.5m as a restricted discretionary activity, while having the ability to fit a usable storey at that height, a site will need a minimum width of approx 27m.

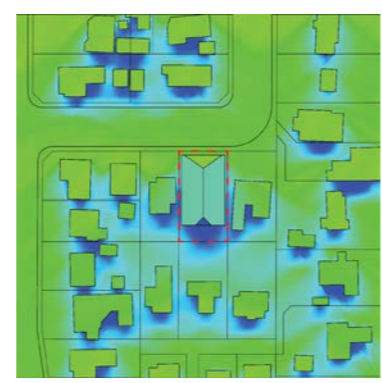
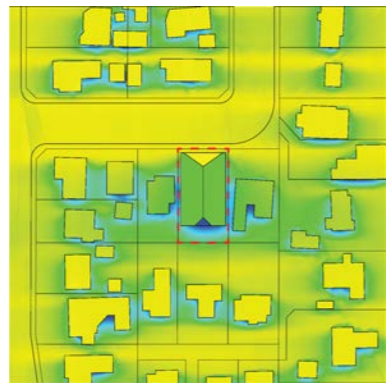
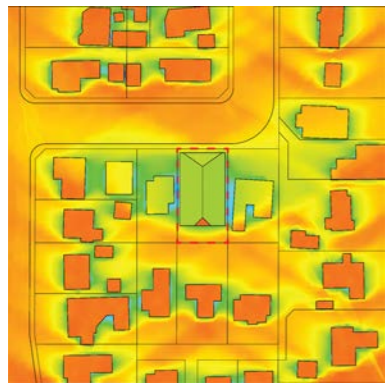
NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

MDRS
4m + 60°

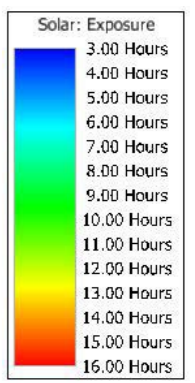
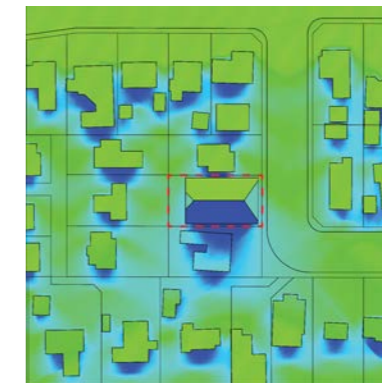
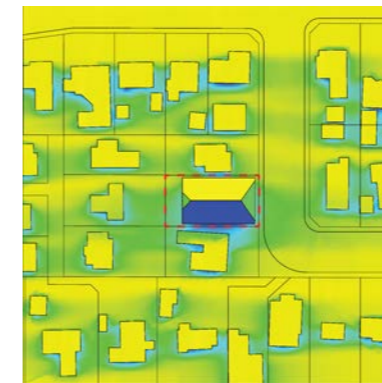
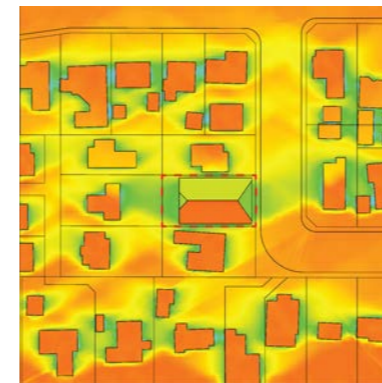


EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION

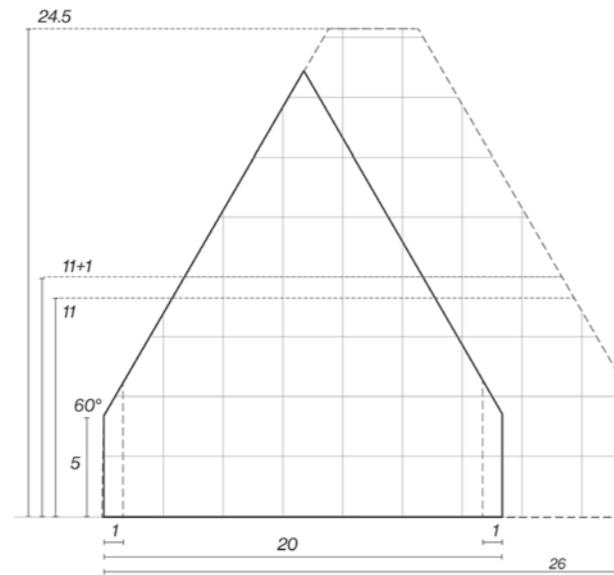


ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

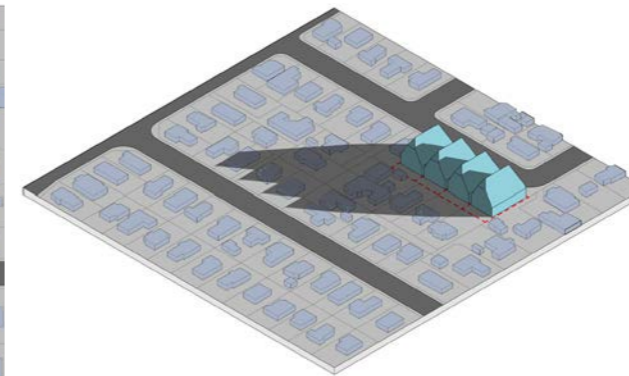
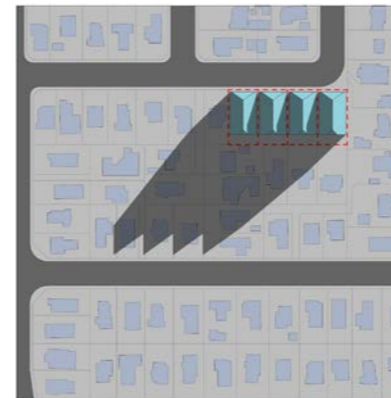
PROPOSED HIGH DENSITY RESIDENTIAL - MULTI-SITE

MAY 2022

TYPICAL PARCEL SIZE:
20 x 37m
TYPICAL PARCEL AREA:
703 m²
SITE COVERAGE: 70%
P: 11+1m
RD: 24.5m
SETBACK FROM
BOUNDARY WITH A
ROAD: 1.5m
SETBACK FROM OTHER
BOUNDARIES: 1m
REAR SETBACK: 1m



PROPOSED
5m + 60°



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

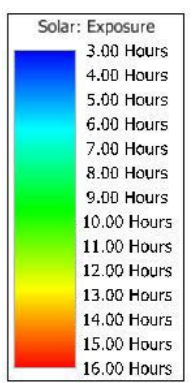
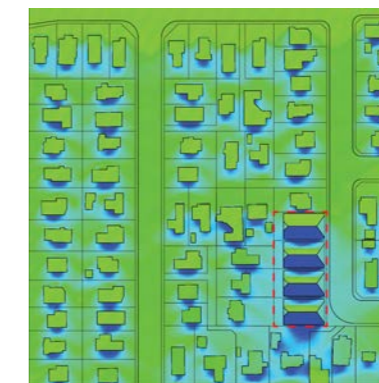
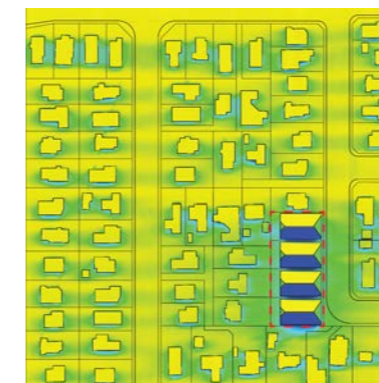
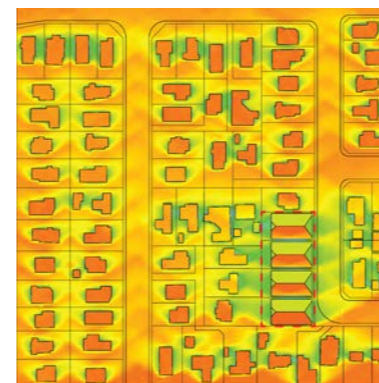
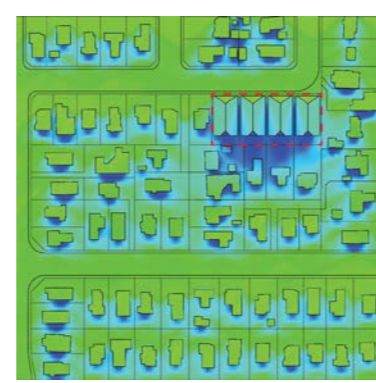
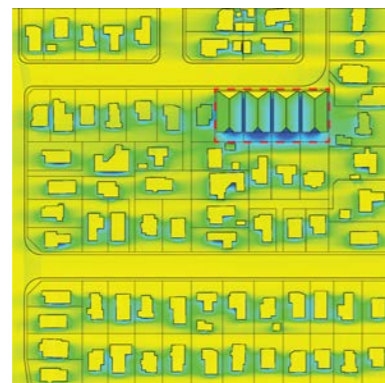
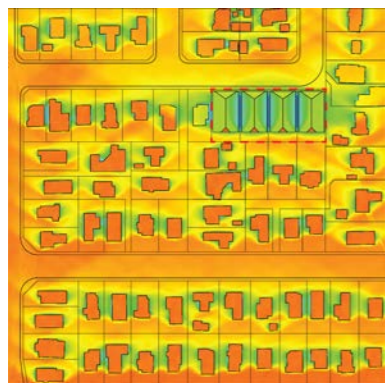
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



UPPER HUTT INTENSIFICATION EVALUATION



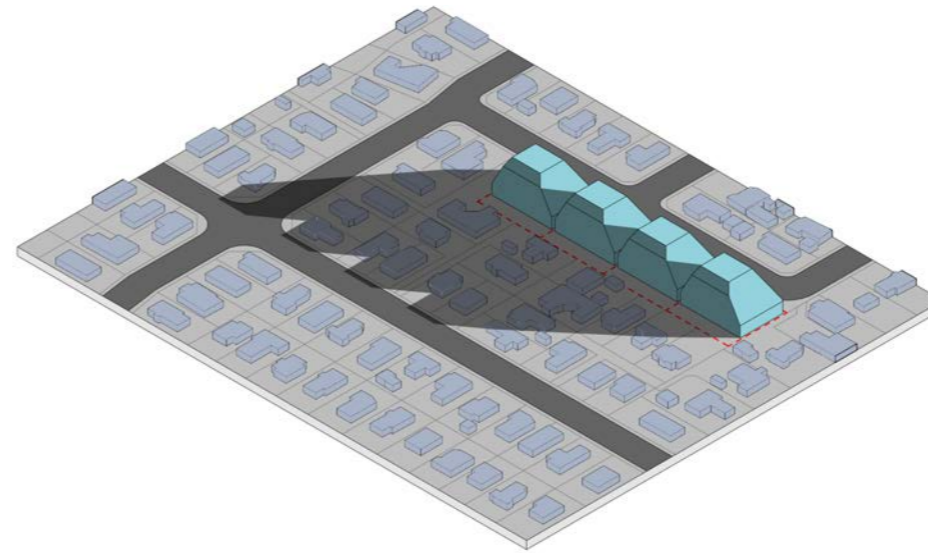
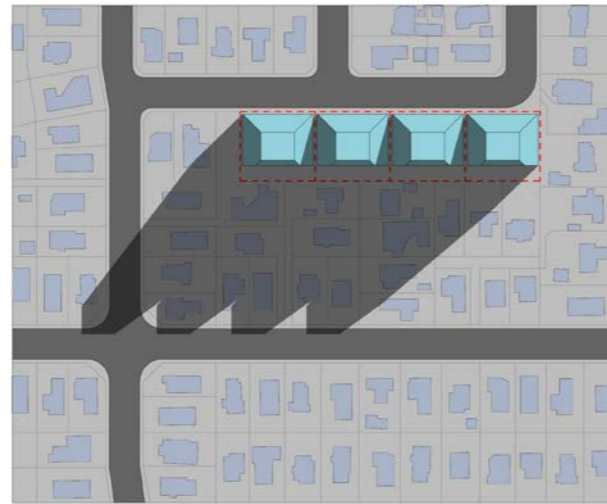
ALL TESTS ARE DONE DURING THE
MID-WINTER SOLSTICE: 21 JUNE, 0900
ALL SITES ARE ORIENTATED TO NORTH

PROPOSED HIGH DENSITY RESIDENTIAL - AMALGAMATED

MAY 2022

TYPICAL PARCEL SIZE:
40 x 37m
TYPICAL PARCEL AREA:
703 m²
SITE COVERAGE: 70%
P: 11+1m
RD: 24.5m
SETBACK FROM
BOUNDARY WITH A
ROAD: 1.5m
SETBACK FROM OTHER
BOUNDARIES: 1m
REAR SETBACK: 1m

PROPOSED
5m + 60°, 40m wide site, 70% coverage



NORTH/ SOUTH ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

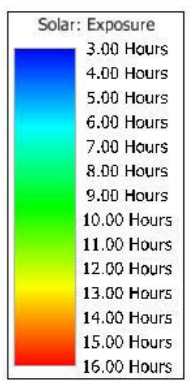
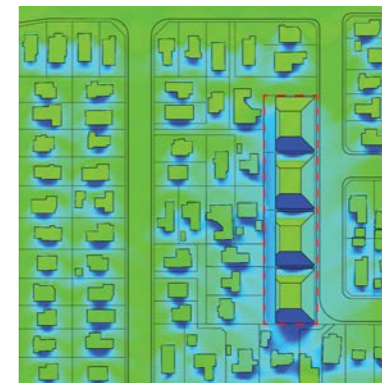
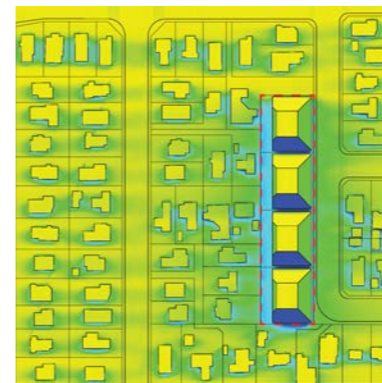
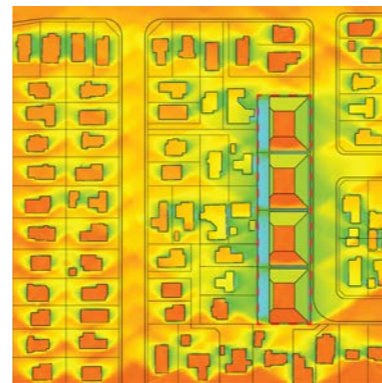
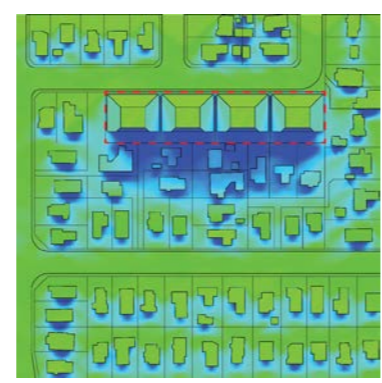
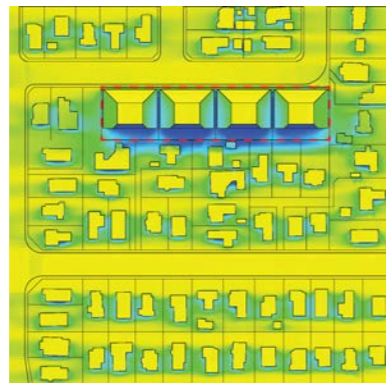
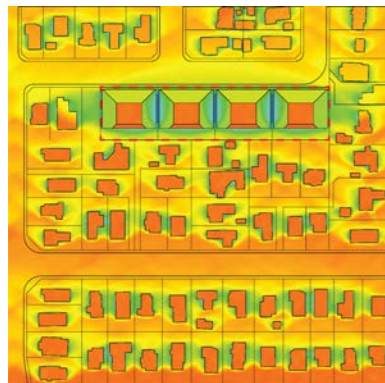
WINTER SOLSTICE
21 JUNE

EAST / WEST ORIENTATION

SUMMER SOLSTICE
21 DECEMBER

EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE



PROPOSED RESIDENTIAL STANDARDS NEXT TO A TYPICAL SMALL PARK (40M DEEP)

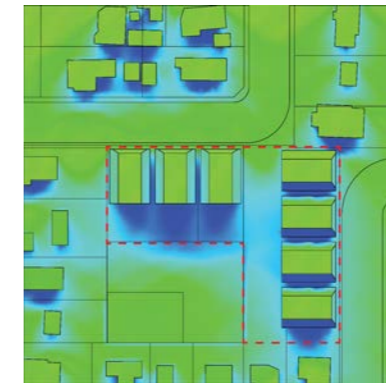
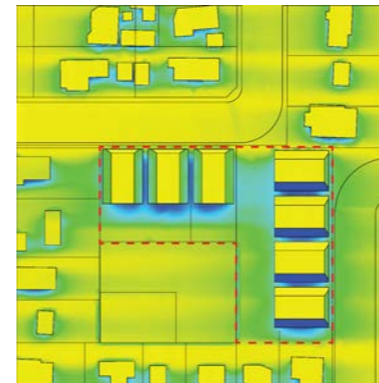
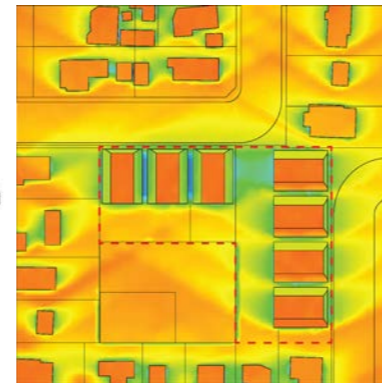
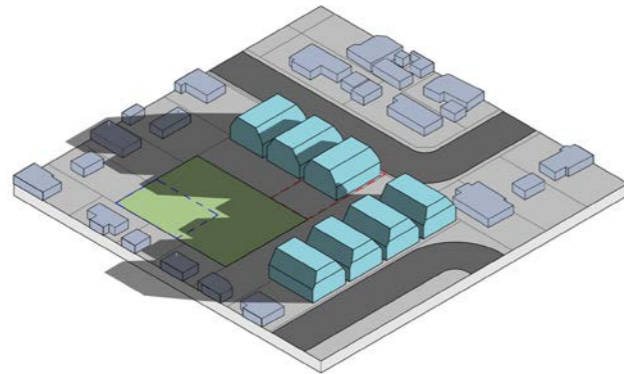
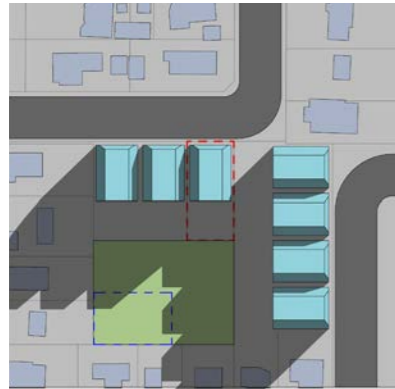
MAY 2022

SUMMER SOLSTICE
21 DECEMBER

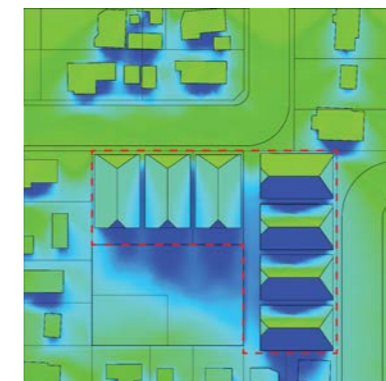
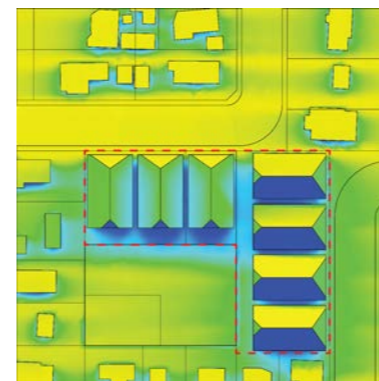
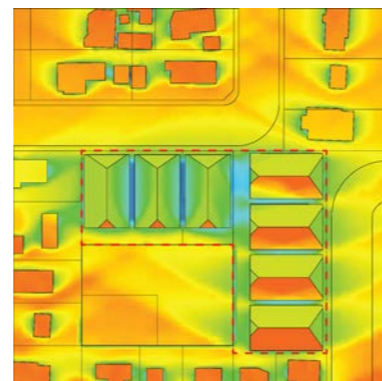
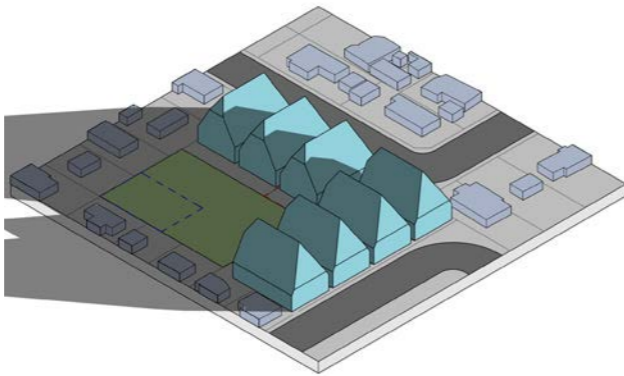
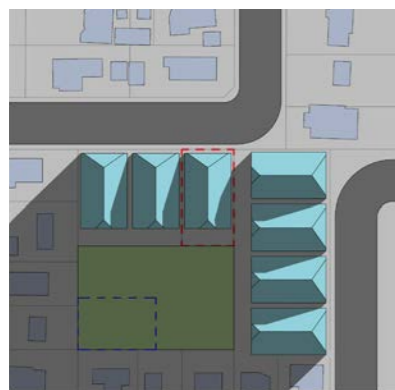
EQUINOX
21 SEPTEMBER

WINTER SOLSTICE
21 JUNE

PROPOSED GENERAL RESIDENTIAL: 4m + 60° - SITE COVERAGE: 50% HEIGHT LIMIT: 11m



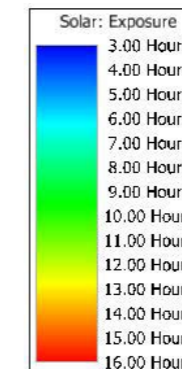
PROPOSED HIGH DENSITY: 5m + 60° - SITE COVERAGE: 70% HEIGHT LIMIT: 24.5m (RD)



SITE DIMENSIONS

PARCEL SIZE: 20 x 37m

PARCEL AREA: 740 m²



OBSERVATIONS

- The proposed configurations have been modelled to test the shading effect on a 'small' park of approximately 40m deep
- The modelled configuration is based on the provided high density metrics ('worst case') with varying recession plane options
- As the shadow length study on the previous page indicates, mid-winter 9am casts the longest shadow, in southwestern direction. Therefore the hypothetical building configuration tests the sunlight access into the southwestern corner of the park
- The general residential model shows that the park might be shaded up to approx three quarters of the area mid-winter. However, the park will always receive some level of sunlight over the course of an average day.
- The high density model shows that the park might be fully shaded mid-winter at 9am, however these will get respectively between 5 and 10 hours of sunlight in the southwestern corner over the course of the day. Note that this is based on a 20m wide site. With a 21m maximum building envelope height, this property does not fully reached the 24.5m restricted discretionary height limit.

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

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