

PPC 119-129 Onewa Road – Gold Star Corporation - SHADING ANALYSIS:

1.0 INTRODUCTION:

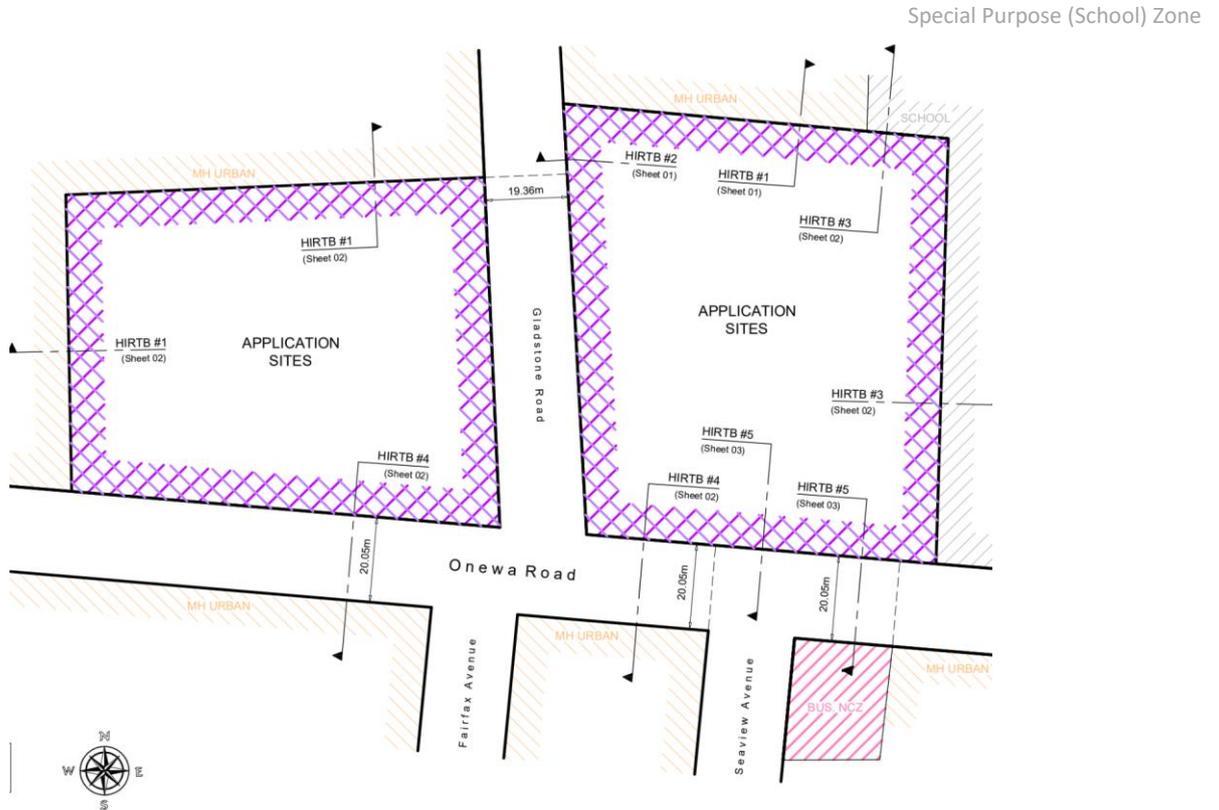
1.1 Detailed Shading Modelling has been undertaken through the commissioning by Gold Star Corporation of Jensen Chambers Young Architects (“JCY”) to compare the shading caused by the existing **Business-Light Industry zone** potential development envelope with the envelope of the Proposed **Business Mixed Use zone** being sought in the Plan Change Request. The Auckland Unitary Plan – Operative In Part version (“AUP OIP”) has key development controls which are quite similar, but subtly different. The key differences are summarised in the Table below.

Table 1: Comparison of Key Standards for Maximum Potential Development Envelope Between Existing Business – Light Industry Zone and Business-Mixed Use Zone sought in PPC

	Existing Business Light Industry Zone :	Business- Mixed Use Zone Being Sought :
Maximum Height:	20m	21m (Height Variation Control) (19m Occupiable +, 2m for roof form)
Height In Relation To Boundary (“HIRB”):	<p>a) Adjoining Residential Mixed Housing Urban Zone or Special Purpose – School Zone – 6m + a 35 degree recession plane from the shared boundary.</p> <p>b) Opposite Residential - Mixed Housing Urban Zone - 6m + 35 degrees from the site boundary on the opposite side of the road.</p> <p>(c) Opposite a Business – Neighbourhood Centre Zone - No HIRB applies.</p>	<p>(a) Adjoining Residential - Mixed Housing Urban Zone – 3m + a 45 degree recession plane from the shared boundary.</p> <p>(b) Opposite Residential - Mixed Housing Urban Zone – 3m + 45 degrees from the site boundary on the opposite side of the road.</p> <p>(c) Adjoining Special Purpose (School) Zone – 6m + 45 degrees</p> <p>(d) Opposite a Business – Neighbourhood Centre Zone - No HIRB applies.</p>
Yards:	<p>(a) Front - 2m</p> <p>(b) Side – 5m where adjoining a Residential or Special Purpose School zone</p> <p>(c) Rear – 5m where adjoining a residential or Special Purpose School zone.</p>	<p>(a) Front – Nil</p> <p>(b) Side – 3m where adjoining a Residential zone.</p> <p>(c) Rear – 3m where adjoining a Residential zone.</p>
Frontage Height & Building Setbacks:	None	Building must be set back 6m from street frontage above 18m height , where opposite a Residential zone (applies to front boundaries only).
Maximum Tower Dimension:	None	Only applies above 27m in height.

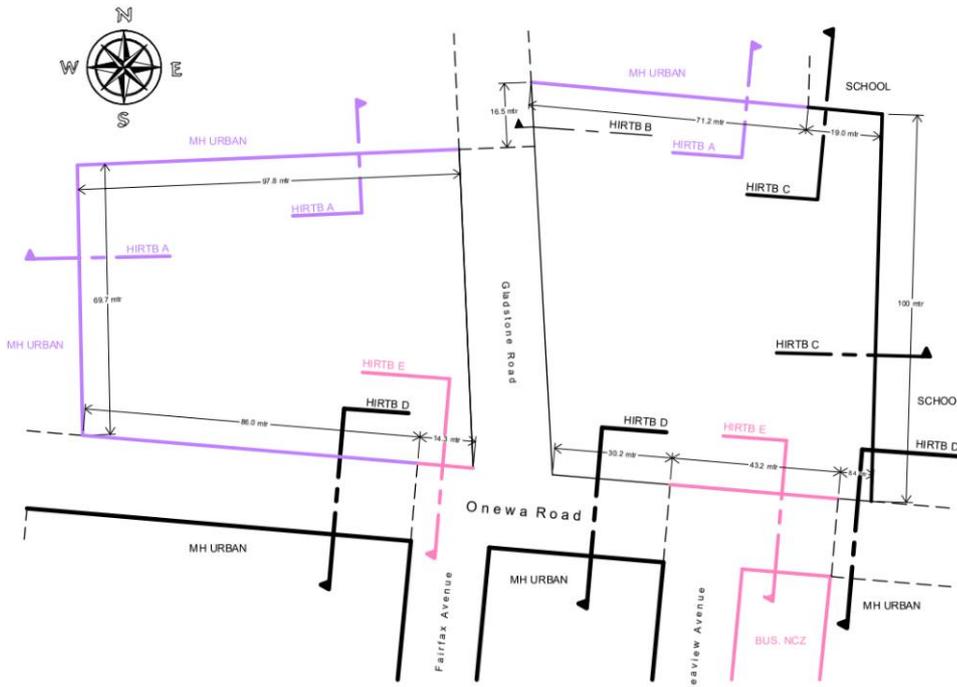
1.2 The key standards set out in Table 1 above, have been applied around the perimeter of the proposed plan Change area so as to be able to compare the maximum potential development envelopes and their effects between the two zones.

(a) ADJACENT ZONING OVERVIEW:

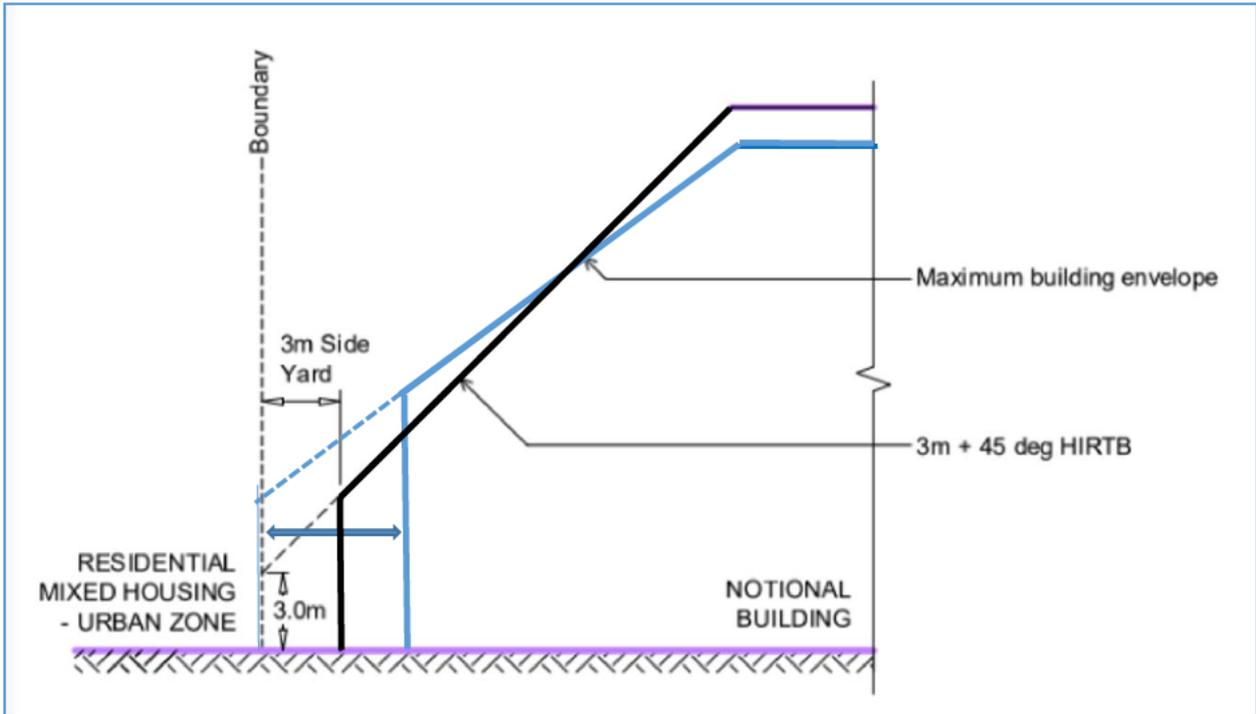


1.3 The key planning controls have been illustrated for the site with the diagrams below:

(b) KEY DIAGRAM :



HIRTB "A"



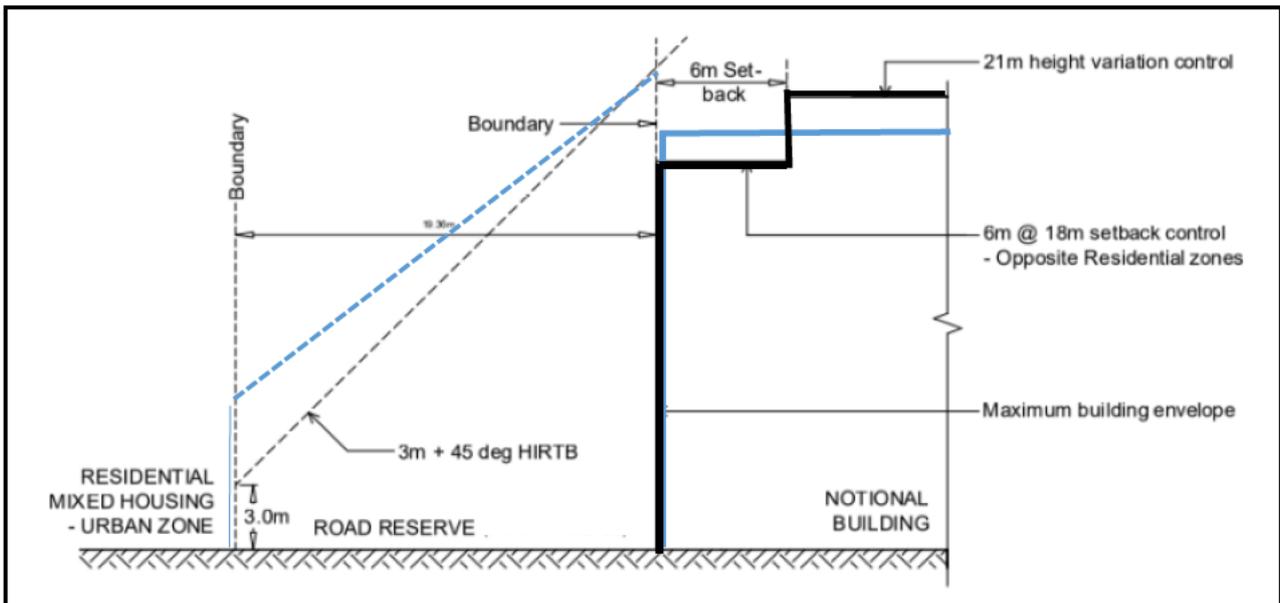
ADJOINING

MH URBAN Zone

Light Industry Zone Envelope (based around a 5 m side yard \longleftrightarrow , and 6m + 35 degree HIRB recession plane)

The bold black outline is the proposed Business-Mixed Use zone

HIRTB "B"

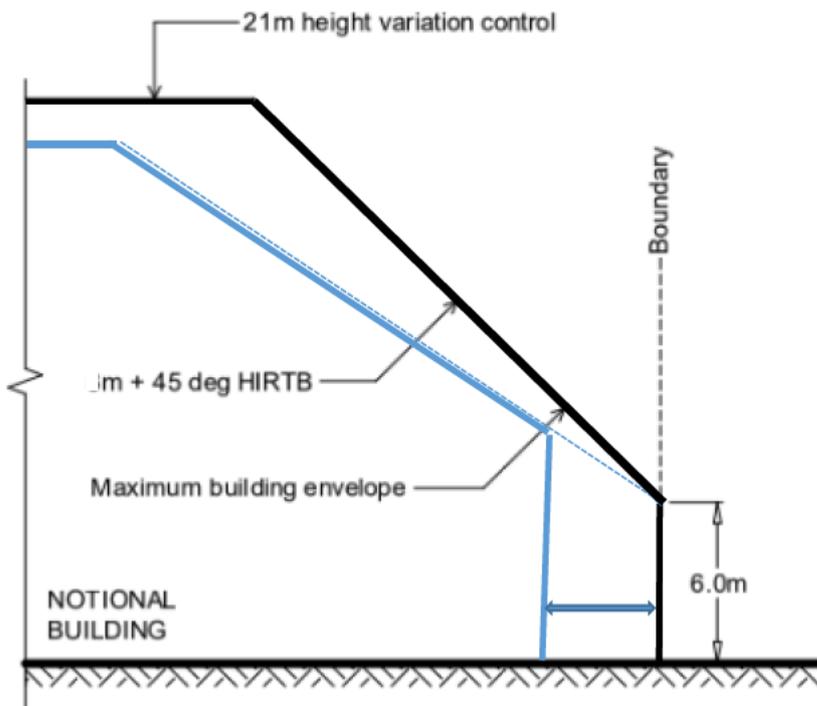


OPPOSITE

MH URBAN Zone

(where MHU zone on opposite side of the road)

HIRTB "C"



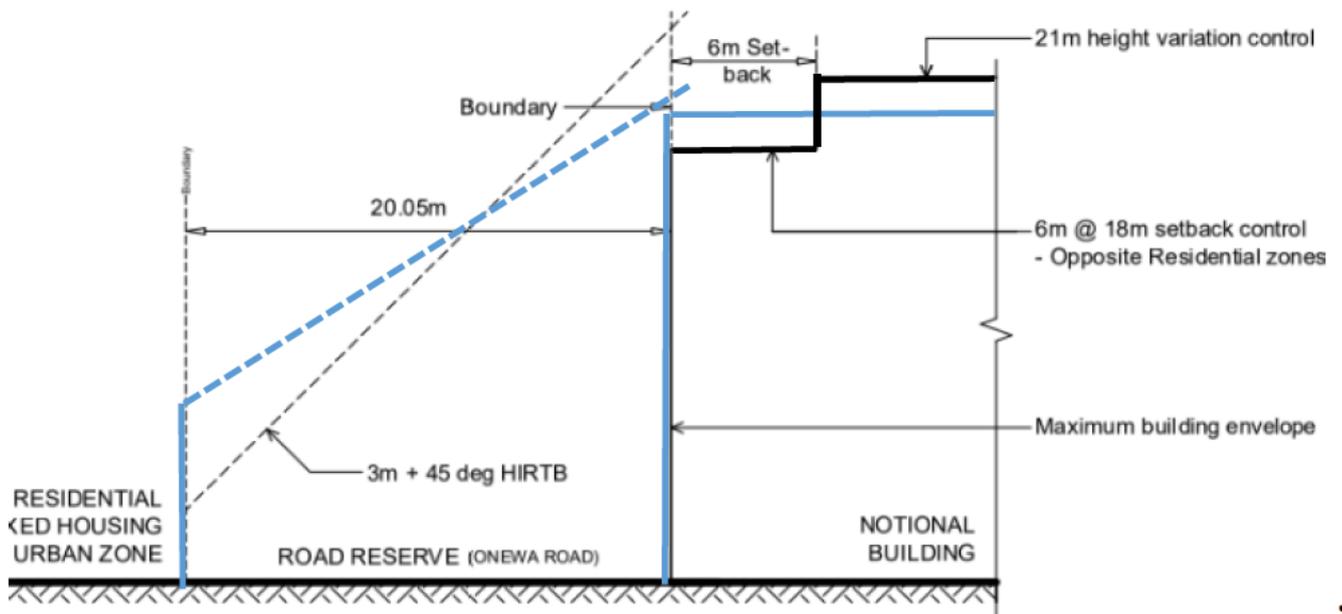
ADJOINING SPECIAL PURPOSE (SCHOOL)

ZONE

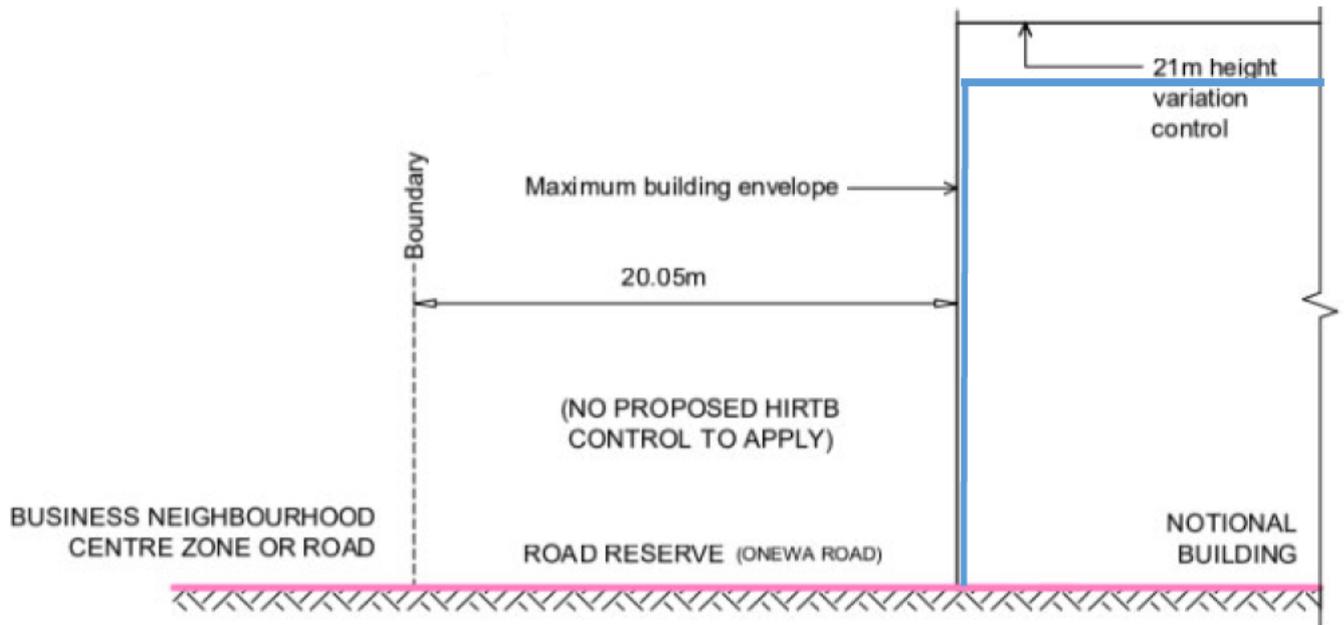
Light Industry Zone Envelope (based around a 5 m side yard, and 6m + 35 degree HIRB recession plane)

HIRTB "D"

Onewa Road
Opposite a Residential MH - Urban zone)



HIRTB "E" (Adjacent to Onewa Road & Opposite a Bus. Neighbourhood Centre zone)



The only difference in this quite limited situation for the proposed plan change area is the 20m maximum height envelope for the Business-Light Industry zoning (outlined in blue).

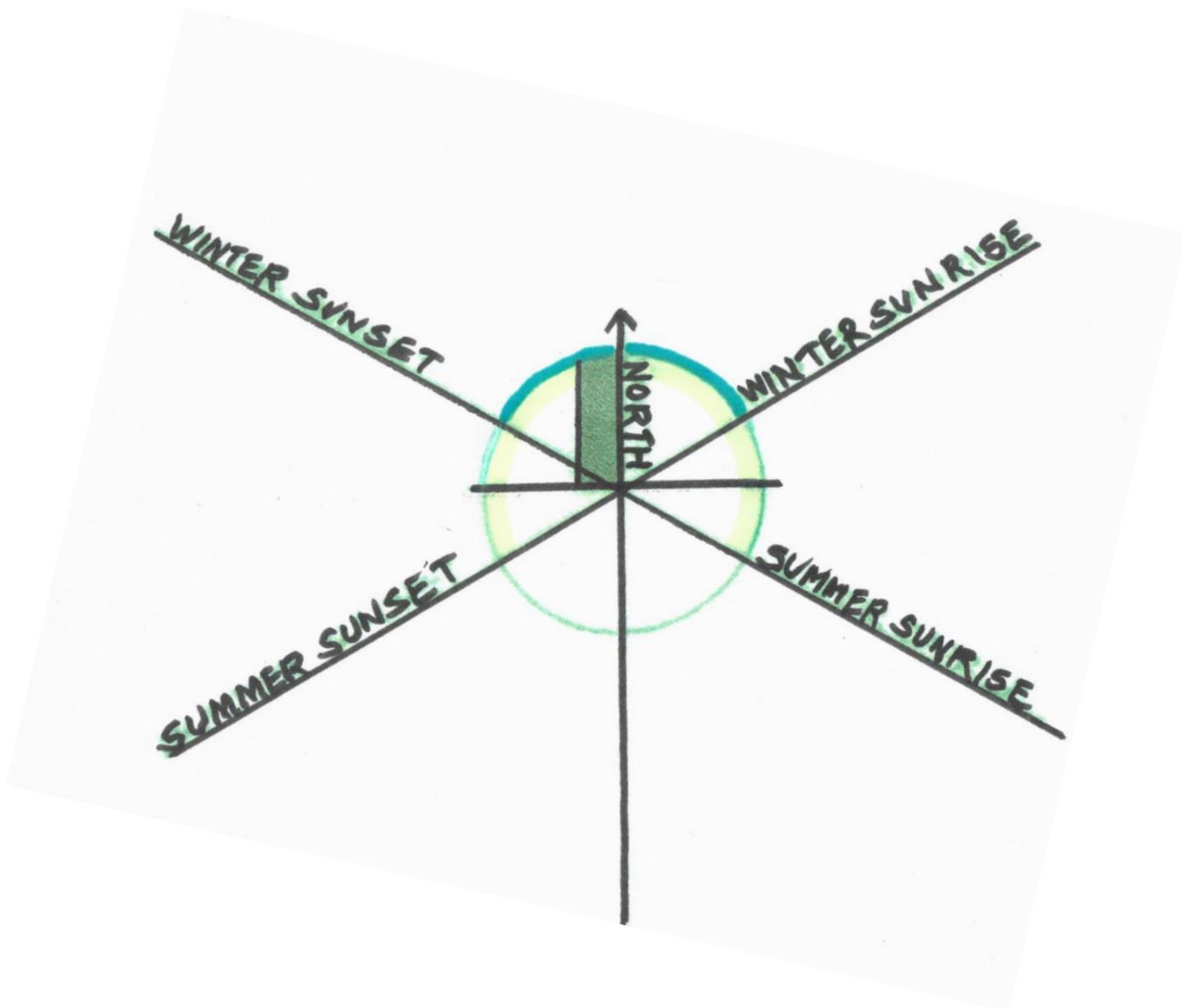
SUMMARY FROM DIAGRAMS:

- 1.4 The 1m difference in maximum height is the dominant planning control affecting additional shading.
- 1.5 Where yards apply (to sites adjoining the perimeter of the proposed plan change area), they also influence the additional shading profile (favourably, as greater yard setbacks are required for the Business-Light Industry zone).
- 1.6 These differences in yard requirements tend to be countered by the harsher 35 degree angle of the recession planes which apply to (some of) the existing Business Light Industry perimeter zone interfaces, as compared with the 45 degree recession plane which applies to (some of) the proposed Business-Mixed Use zone perimeter zone interfaces.
- 1.7 The 20m width of Onewa Road negates the difference in the starting heights where perimeter zone interfaces are opposite rather than adjoining and there is a 6m HIRB starting point, rather than the 3m HIRB starting point which will apply for the proposed Business-Mixed Use zoning.
- 1.8 It is in respect of the perimeter zone interface shared with the Special Purpose (School) zone to the west (and for a short length also, to the north) that the difference between the envelopes is more pronounced than 1m. This is illustrated on Diagram C, above, where the 6m + 45 degree HIRB recession plane for the proposed Business-Mixed Use zoning, along with only a 3m side yard requirement, creates a permitted envelope with greater than 1m in vertical and horizontal difference when compared with the 6m + 35 degree HIRB recession plane and 5m side yard which applies to the existing Light Industry zone adjoining the Special Purpose (School) zone. This adjacent Special Purpose (School) zone accordingly demands some further consideration in terms of the potential for additional shading.
- 1.9 The 6m frontage setback which applies to the Business-Mixed Use zoning, but not the Business Light Industry zoning above the 18m height, makes some potential shading from the proposed zoning less

than for the existing Business-Light Industry zoning along for residentially zoned properties across Onewa Road and to the south of the proposed plan change area.

RELEVANCE OF ORIENTATION:

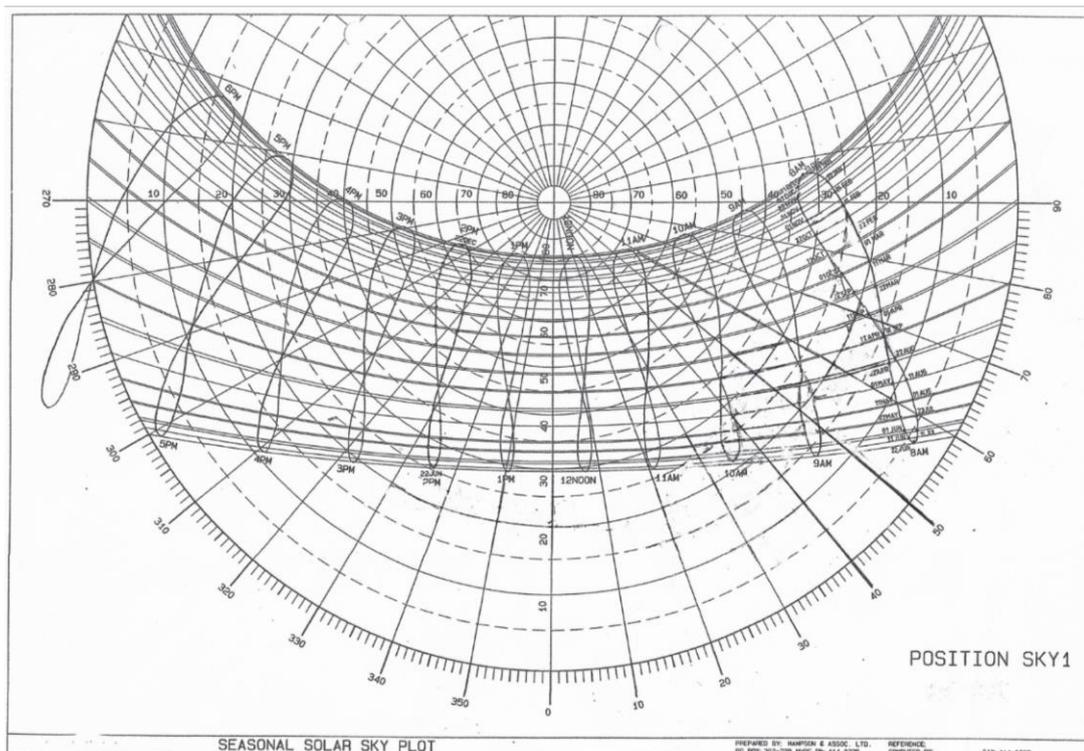
- 1.10 This site has a distinct advantage in terms of shading, in that it's orientation is to the **north** of residential properties only where the 20m width of Onewa Road is present to buffer or mitigate shading effects (and other potential effects such as dominance, privacy and noise).
- 1.11 This is especially relevant to winter sun, due to the marked difference in the narrow range of orientation of the sun between sunrise and sunset in winter, as opposed to the broader orientation range between sunrise and sunset in winter. This is illustrated diagrammatically below (and on the JCY model screenshots):



- 1.12 For the residential area adjoining to the west of the proposed Plan Change area there will be limited additional shading occurring mostly affecting summer morning sunshine and not very much winter morning sunshine. Although morning shadows will be longer due to lower sun angles, the sun and therefore shadows move more quickly in the morning (and late afternoons) when sun angles are low.

HIGH SUN ANGLES CAST SHORT SHADOWS:

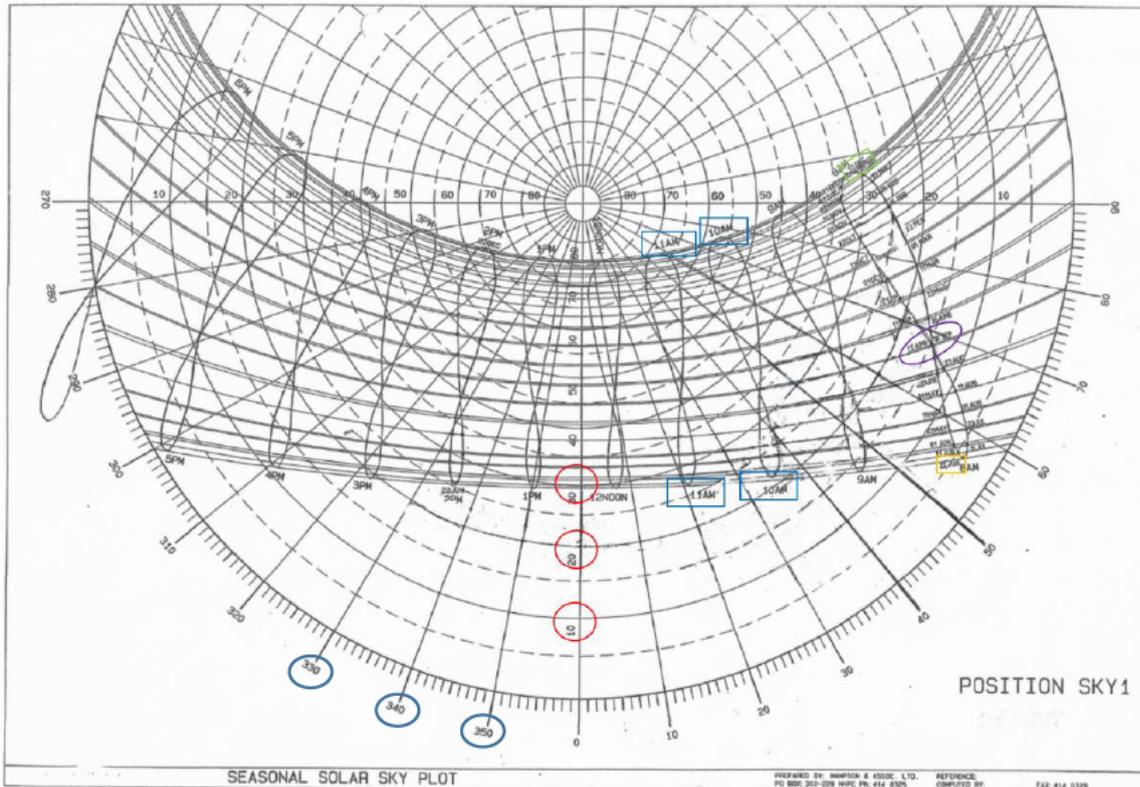
- 1.13 The amount of additional shadow cast on the ground or indeed on the side or roof of a building is determined by the sun angle.
- 1.14 For sun angles of 45 degrees or higher, the shadow length will be same or less than the difference in the envelope. For this Proposed Plan Change, the difference of 1m or less in the envelope generally applies to all but the interface adjoining the Special Purpose (School) zone to the eastern side (and a portion of the northern) boundary.
- 1.15 So where there is a combination of a small difference in potential development envelope (1m or less), and high sun angles (45 degrees or more) between the comparative zonings, then it seems clear to me that additional shading is not going to be significant.
- 1.16 To show this, I turn to use of the Seasonal Solar Skyplot chart, developed specifically for Auckland (Latitude 37 south), by Council's former Manager of Heritage and Urban Design, George Farrant.
- 1.17 The template for the Seasonal Solar Skyplot Chart as prepared by Mr Farrant and applied by Hampson & Associates Limited, Registered Surveyors, is shown below:



- 1.18 It shows the sun angles and the movement of the sun throughout each hour of the day and for each part of the year, superimposed on the hemisphere of the sky for Auckland.
- 1.19 It was a shading technique produced at the Environment Court hearing of the Skytower, when it was proposed for the site at the top of Khyber Pass Road and Symonds Street (*Bissell Electrical v Auckland City Council*). Mr Farrant produced the technique as part of his evidence for Auckland City Council on shading effects, and it was adopted by Judge Bollard as providing the best shading effects information because it allowed the days of the year affected by shading and the dwell times of shadows to be accurately presented.
- 1.20 In this instance, it is being used to illustrate the specific considerations affecting shading, so that the areas of interest in terms of shading can be identified and focussed on. It is intended to be used in conjunction with the Shading Model produced by JCY Architects.

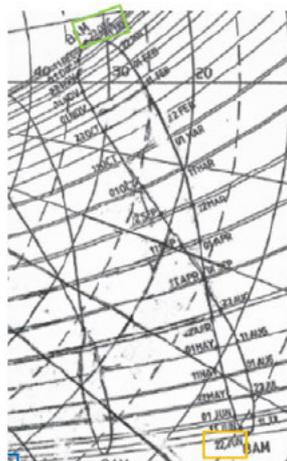
1.21 To assist in interpreting the Skyplot Chart, I have highlighted the information provided on key axis and notations of the chart.

1.22 I begin with sun angles . The sun angle is represented by solid line concentric rings on the Skyplot chart of the particular angle highlighted. For the three examples chosen, within each red outline circle I have added – namely for a 10 degree, 20 degree and 30 degree sun angle:



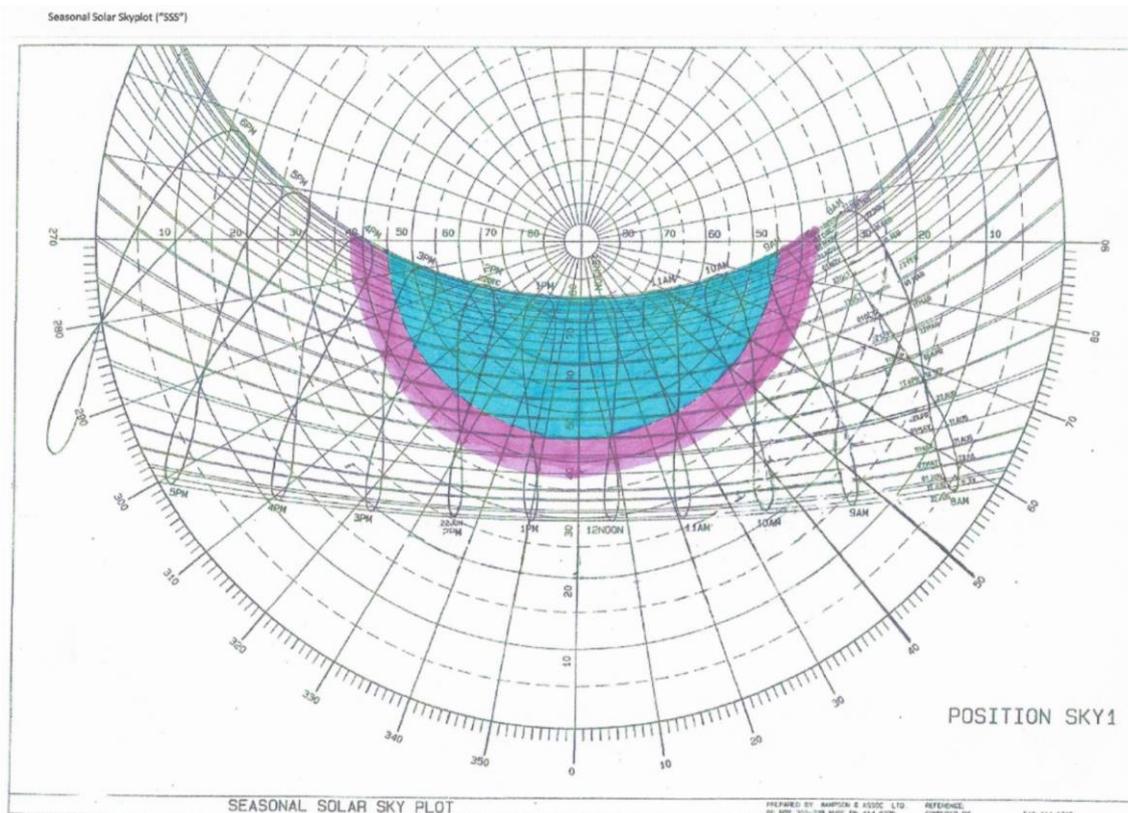
1.23 The elliptical “figure 8” type outlines across the chart represent the position of the sun for the specified hours of any given day. Two examples are highlighted in the blue boxed outlines – being in these examples for the 11 a.m. and 10 a.m. times.

Notated alongside particular points on the “figure 8” type outline at the far right of the chart (for 8 a.m.), are dates in the year. (it may be necessary to view the A-3 version of the Skyplot chart to clearly identify these notations.



1.24 The 21st/22nd June (winter solstice) is at the bottom of the page , the 22nd/23rd December (summer Solstice) is at the top of the page . The equinoxes are when the sun crosses the celestial equator – the imaginary line in the sky above the earth’s equator, when the length of day and night is approximately equal. This is near the middle of the “figure 8”.

- 1.25 The direction from which the sun comes at any particular time of the day or year is indicated by the perimeter bearing (in degrees) .
- 1.26 Using an example on the chart to illustrate, I highlight the 12 Noon "figure eight". The sun angle at winter solstice is about 29 degrees, whereas for summer solstice, the sun angle above the horizon is just over 75 degrees.
- 1.27 The particular point which I wish to make is that right across the chart, at a sun angle of 45 degrees the 1m additional height being sought by the PPC's Height Variation Control (21m), compared with the existing Light Industry Zone's Maximum Height (20m), will cast 1m of additional shadow.
- 1.28 At the sun angles higher than 45 degrees, the additional shading from the 1m in additional height being provided for will be less than 1m of additional shading. Putting that into some sort of practical context, someone standing on flat ground could take one stride move out of the additional shading into sunshine – presuming no shading from other elements is present (e.g: buildings on other sites, trees, etc.).
- 1.29 I have coloured up the Skyplot chart below, to illustrate this point:



- 1.30 The blue shaded area on the Skyplot chart above is the area within which the 45 degree or higher sun angle will mean additional shading of 1m or less, for all perimeter boundaries except those shared with the Special Purpose (School) zone, as represented in Diagram C above, where the worst case difference in the potential building envelope is 4m.
- 1.31 Accordingly, when applied to circumstances of the proposed Plan Change I consider all of the blue shaded area on the chart can be dismissed as having inconsequential additional shading, due to the high sun angles producing minimal additional shading. This applies summer sun through large parts of the middle of the day.
- 1.32 The area shaded pink on the above chart is a transitional period where sun angles between 45 degrees and 38 degrees which I consider will still produce only minor additional shading.

- 1.33 Considerations beyond sun angle need to be applied to the unshaded areas on the Skyplot chart, which involve winter sun throughout the day, including the middle of the day, but summer sun only early in the mornings and late in the afternoons. These are times when the sun is faster moving.

WHERE SHADING LANDS:

- 1.34 Another key consideration when considering additional shading effects, is whereabouts on any affected adjacent sites additional shading will land. More particularly, will additional shading affect areas where people using the sites are likely to value being in the sun. Effects on amenity are the relevant concern, especially residential amenity. So of interest will be any seating areas, grassed or paved yards or windows in living, dining kitchen or other habitable rooms. Times of the day when people are likely to enjoy such areas will also be relevant.
- 1.35 The modelling of where additional shading falls provides a guide to where amenity considerations will need to be considered.
- 1.36 JCY have produced models for both the shading caused by the maximum potential develop envelope for the existing Business - Light Industry zoning and the proposed Business-Mixed Use zone envelope. Coverage of morning sun conditions (9 a.m.), midday sun conditions (12 p.m.) and afternoon sun conditions have been modelled for summer solstice, winter solstice and the equinoxes to provide coverage of the different positioning of shading potentially caused by the different zoning development envelopes.
- 1.37 Based on this modelling of the shading caused by the two zoning envelopes, a combined set showing where additional shading occurs was also produced. This combined set indicated that in some locations on adjacent sites, there would in fact be more shading resulting from the existing Light Industry zone potential development envelope than there is from the proposed Mixed Use zone envelope.
- 1.38 The full set of drawings illustrating shading number 27 sheets.
- 1.39 Bearing in mind that the Skyplot analysis highlighted that summer sun angles will not produce much in the way of additional shading, I have focussed on the additional shading shown on JCY's combined sets outside of that period.
- 1.40 The JCY plans where showing additional shading in the form of 5m to 8m shadows guided me on the locations where further scrutiny as to where shading lands was relevant, in terms of assessing potential effects on amenity.
- 1.41 Unsurprisingly, the area with Special Purpose (School) zoning formed part of the area where further srutiny was applied.

1.42 General Context of PPC Area on Geomaps 2017 Aerial Photo



SHADOW ANALYSIS - 21st JUNE - 9am

■ LI ENVELOPE cast shadows farther than MU ENVELOPE
■ MU ENVELOPE cast shadows farther than LI ENVELOPE

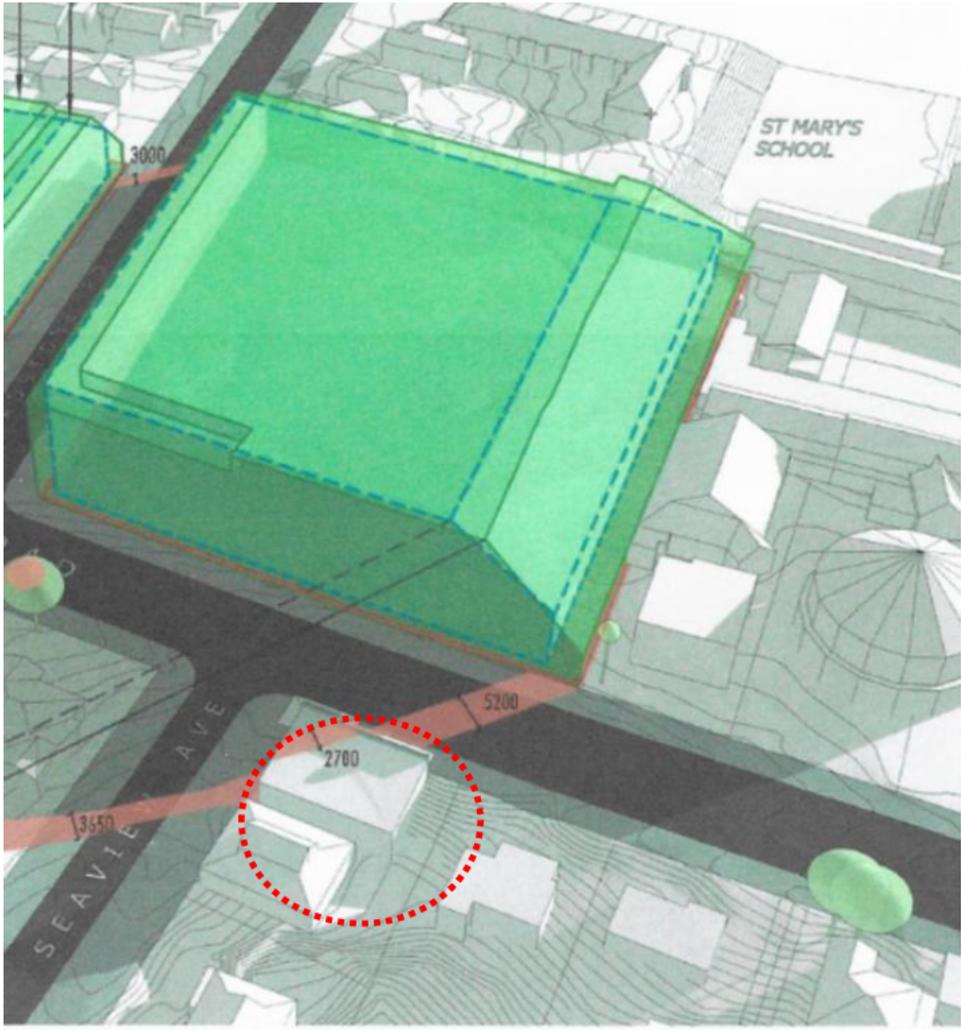
WINTER SOLSTICE

West Block :



West and East Block :





shadows farther than MU ENVELOPE
 shadows farther than LI ENVELOPE

WINTER S

Morning (9 am), Mid-winter (June 21, 2020) shading :

- 1.43 Focussing first on the additional shading shown on the Neighbourhood Shops (incl. Wabi Sabi). 5m of additional shading at 9am would affect the front window of Wasi Sabi. However, the salon doesn't open until 10 am, except on Saturdays. This photo, and those that follow, were taken on 9 June, so give a good indication of mid-winter sun and existing shading conditions.



Photo 1.

Photo 1: Neighbourhood shops Incl Wabi Sabi, at 108 Onewa Road, opposite "Z" Service Station.



Photo 2: Seaview Ave looking SW from Onewa Rd



1.44 It is photo 3, overleaf, which shows where the additional shading margin at 9am falls on the backyard of 118 Onewa Road.

Photo 3: Rear yard of 118 Onewa Road is an area affected by 3.6 -5.2m of additional shading at 9am, on a midwinter morning.



1.45 The additional shading is not falling in an area likely to be in use for amenity purposes at 9am on a midwinter morning.

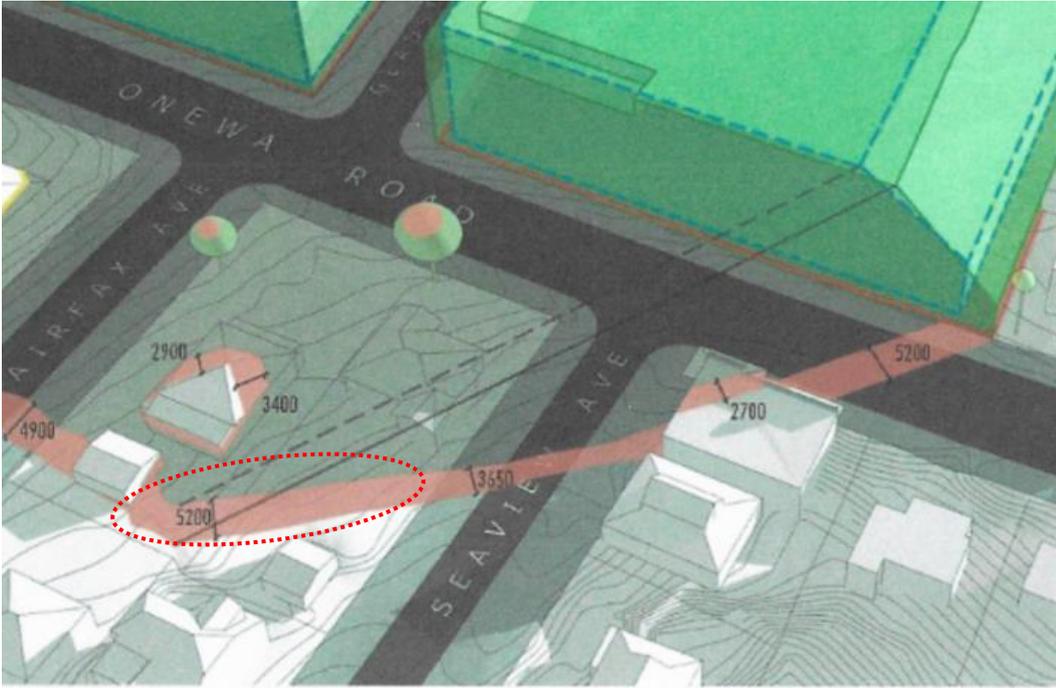
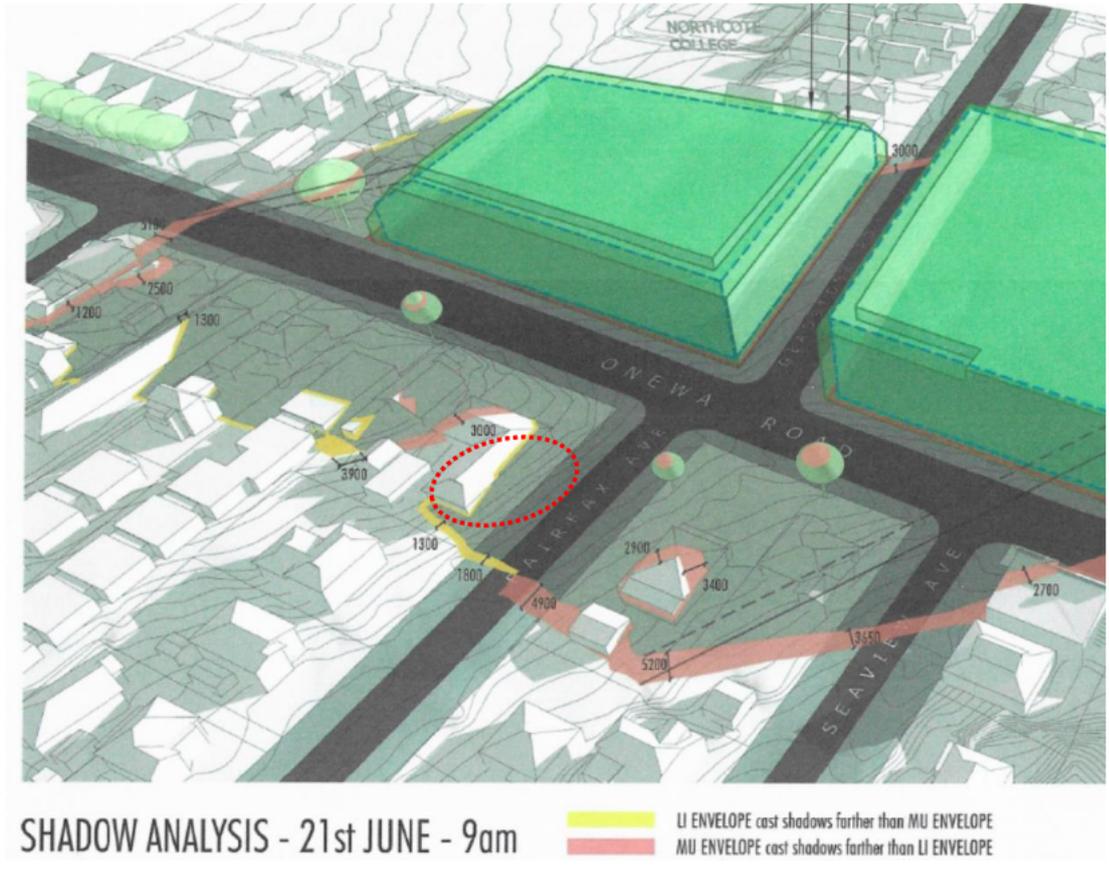


Photo 4: Approximately 4.9m of additional shading will fall on the garage at the rear of 2 Fairfax Avenue





1.46 Beyond the 2 Fairfax Avenue property in a westerly direction the JCY modelling shows additional shading diminishes in width and for a large part the margin is yellow shaded, meaning that the existing Light Industry zone planning development envelope causes more shading than the proposed Mixed Use zone envelope.



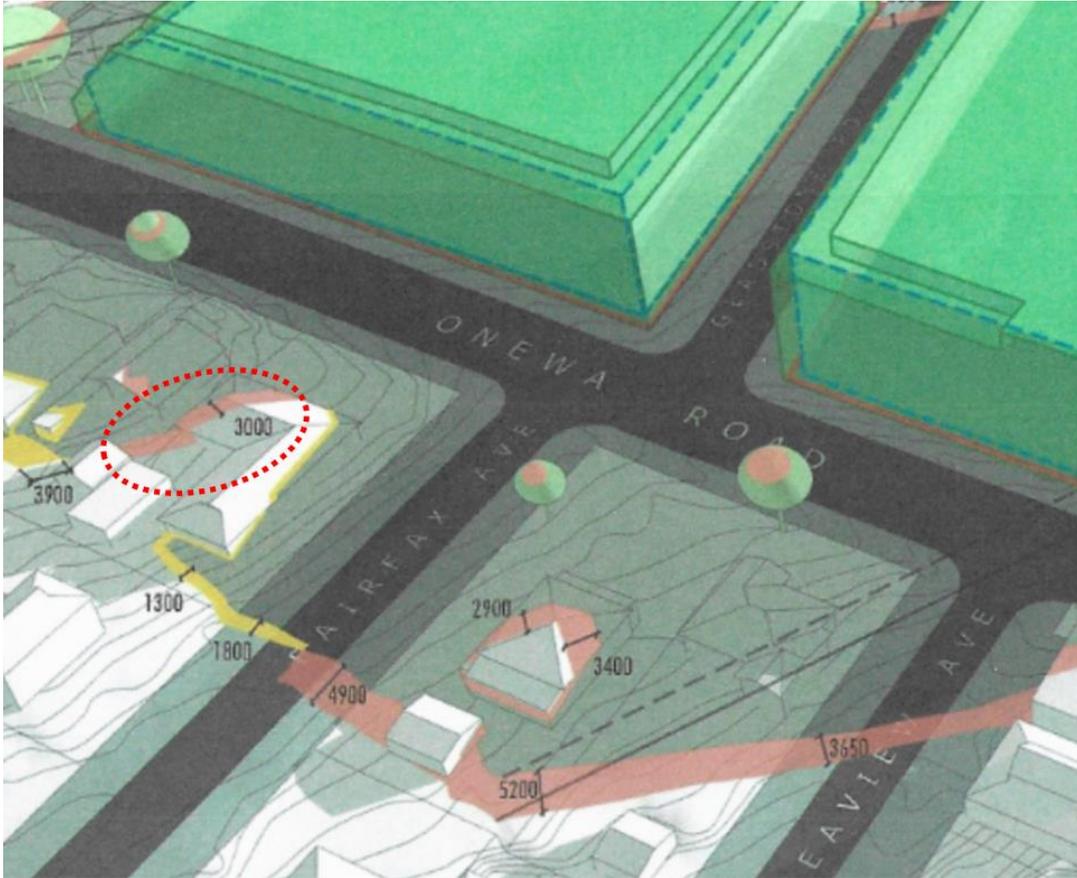
1.47 A 3m width additional shadow does affect part of the corner house and site at 124 Onewa Road and the adjoining driveway and garage for 126 Onewa Road:



Photo 5: Corner House at 124 Onewa Road which will have the window of a habitable room affected by a 3m band of additional shading at 9am midwinter.

Photo 6: The Driveway and garage to 126 Onewa Road also shows a 3m width margin of additional shading. A driveway is clearly not an amenity area for enjoying the sunshine.





1.48 I note that the side of the white house at 126 Onewa Road would already be potentially shaded by the existing Light Industry zoning planning development envelope at 9 a.m. in mid-winter.

Conclusion for 9am mid-winter additional shading

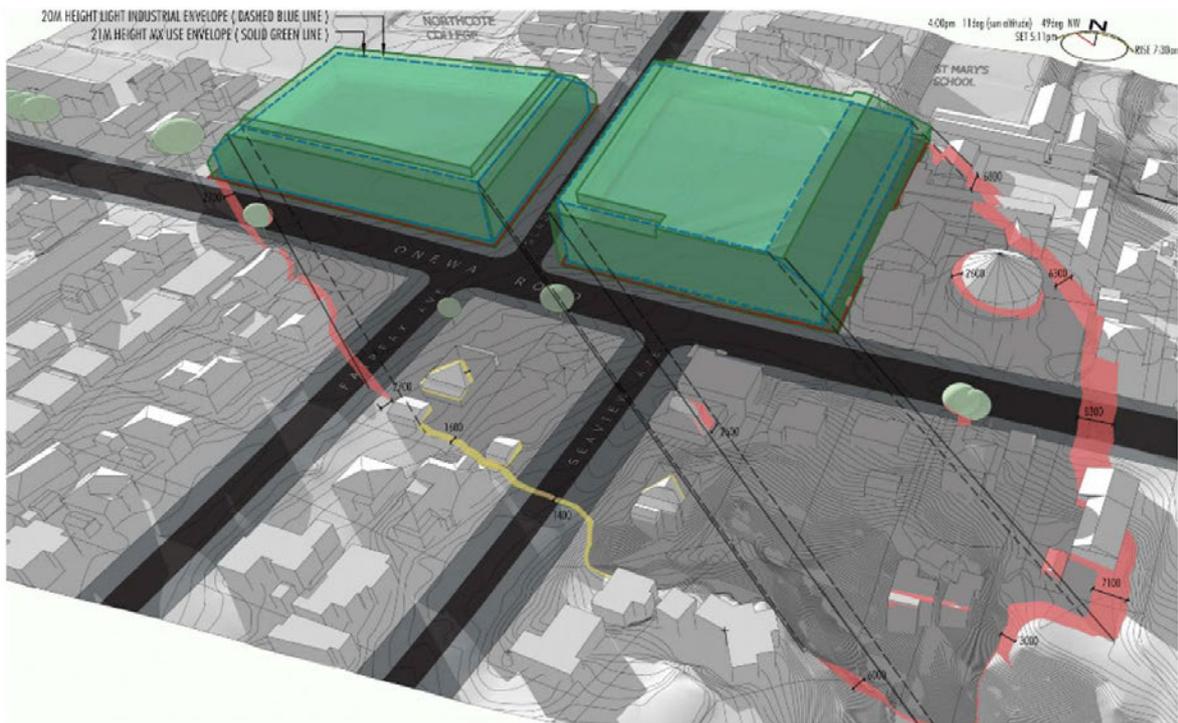
1.49 In the context of the full year, there will be no significant additional shading in the locations of additional shading for mid-winter between the equinoxes, all through summer. 9 a.m. is not a time when sunlight is widely valued in association with outdoor amenity purposes. In those few instances where additional shading falls on windows in residential buildings, the Skyplots confirm the indication from the JCY plans that the additional shading involved will have a maximum dwell time of less than 30 minutes (worst case). Overall this constitutes a shading effect which is no more than minor on residential amenity. For the amenity of businesses, opening hours and limited dwell times combine to suggest shading effects on amenity will also be no more than minor.

1.50 I turn now to consider two other of the JCY plans, deserving of further scrutiny as to where the shading occurs, because of the widths of additional shading arising.

1.51 These can be dealt with together, because the affected properties essentially overlap.

1.52 The areas of particular interest are to the west and south west of the proposed Plan Change Area.

200612 LI & MU COMBINE SHADOW ANALYSIS 03.pdf



SHADOW ANALYSIS - 21st JUNE - 4pm

LI ENVELOPE cast shadows further than MU ENVELOPE
 MU ENVELOPE cast shadows further than LI ENVELOPE

WINTER SOLSTICE

200612 LI & MU COMBINE SHADOW ANALYSIS 03.pdf



SHADOW ANALYSIS - 23rd SEPT - 5pm

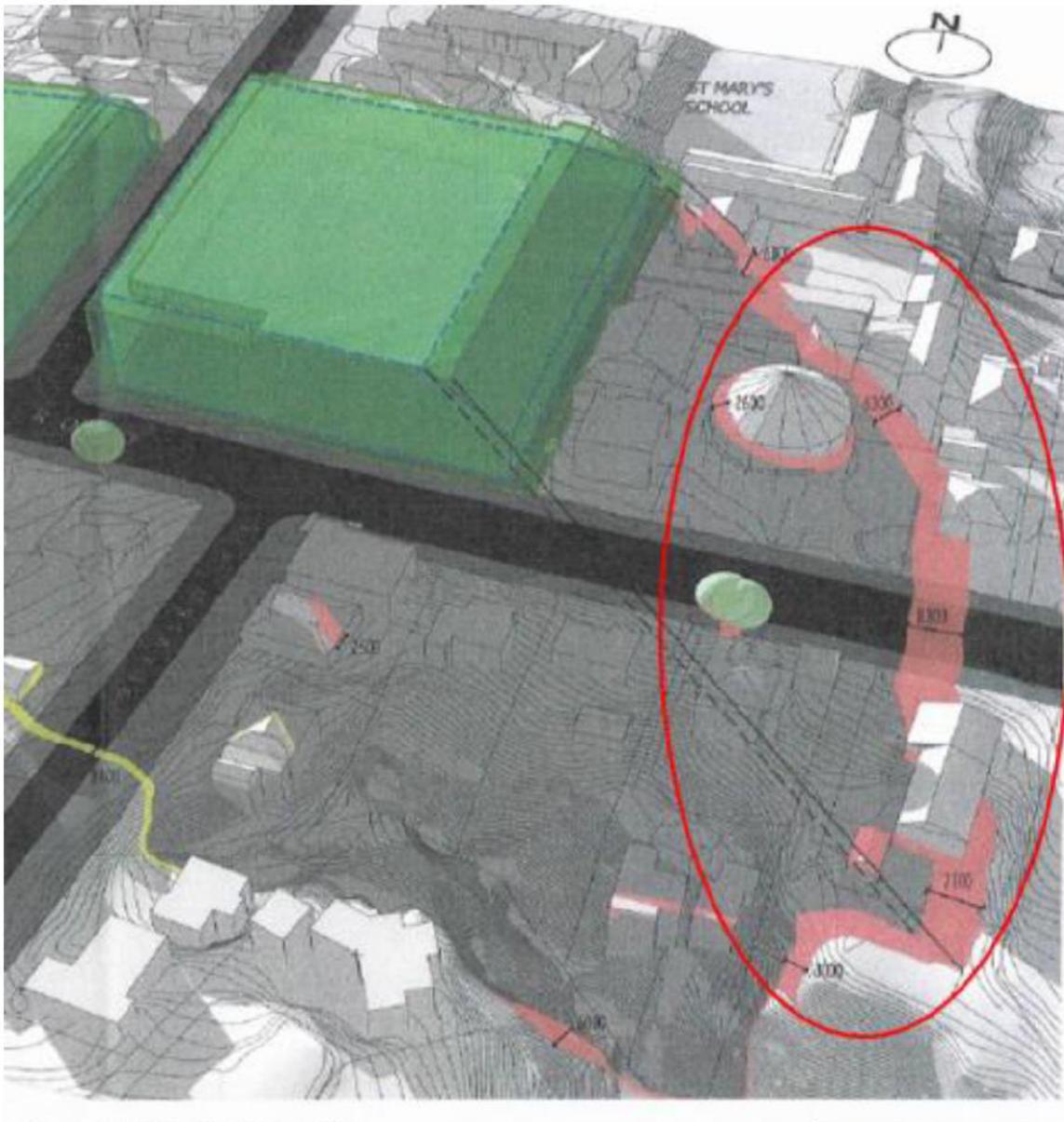
LI ENVELOPE cast shadows further than MU ENVELOPE
 MU ENVELOPE cast shadows further than LI ENVELOPE

MID SPRING EQUINOX

111 Onewa Road. The additional shading is at 4pm on 21st June (Winter Solstice). Not especially relevant for the amenities for a hair salon (Refer Photo 1., below).



1.



2.



2.



4.

117A Onewa Road. The additional shading of particular interest is at 6pm on 23st December (Summer Solstice). Not especially relevant for the amenities for an office use (Refer Photo 5., below) with hours indicated on the sign as finishing at 4.30pm.



5.



6.

7.

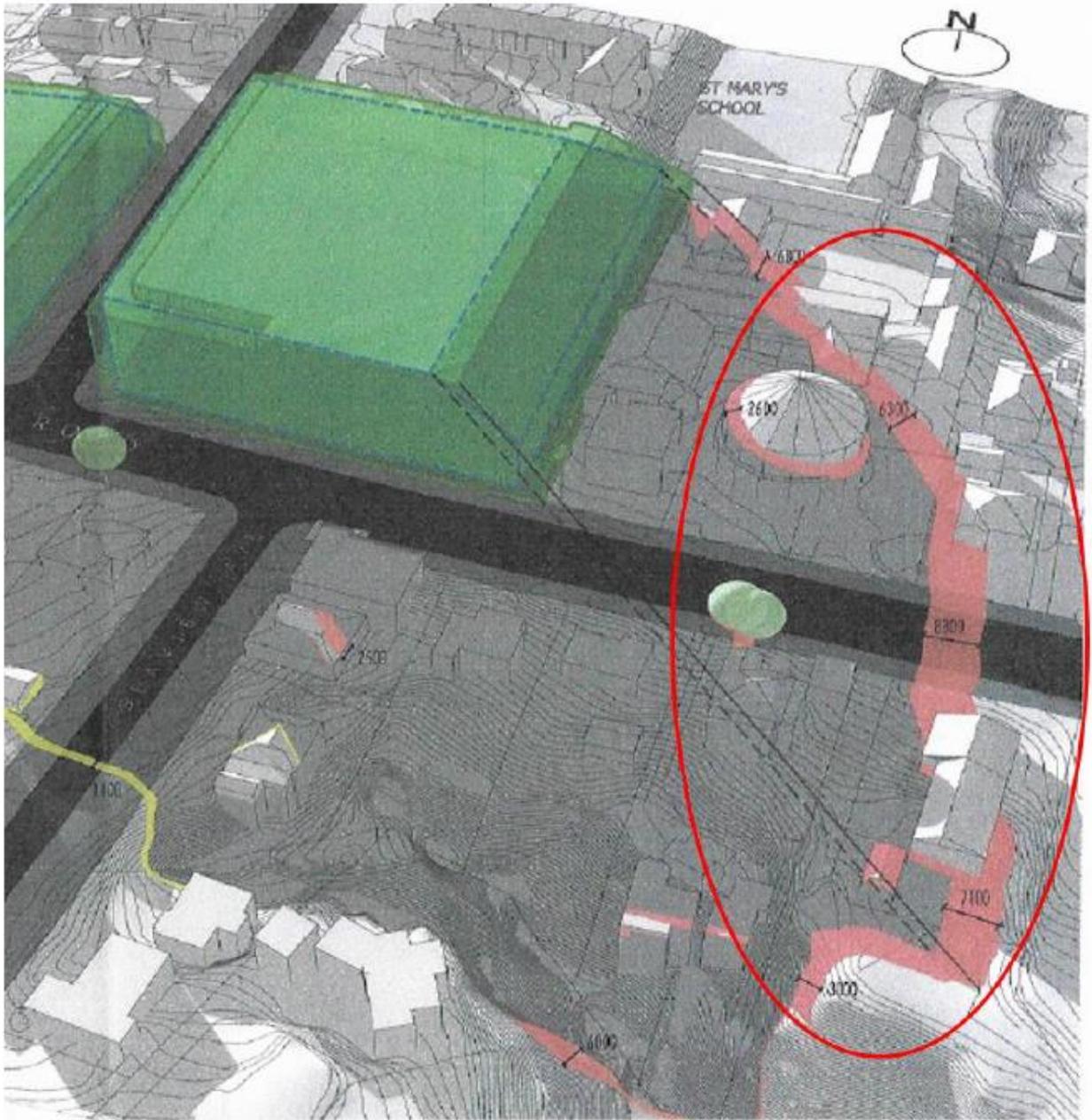


1.53 The remainder of the site is in church and carpark use (refer photos 7 & 8.):



8.

1.54 On the other side of Onewa Road, **92 Onewa Road** appeared to be subject to up to 8.3m of additional shadow :



ENVELOPE casted shadow farther than MU ENVELOPE
U ENVELOPE casted shadow farther than LI ENVELOPE

WINTER SOLSTICE

9.



© 2020 Google

10.

1.55 A site visit revealed that the residential looking building most affected by the additional winter shading is in office & administration use (Refer Photos 11 & 12).

11.



11.



12.



13.

- 1.56 Behind the curtains, the corner room of the office and administration building contains a meeting room, which spills out onto a “breakout” seating area on the deck. Given that the additional shading subject to this further scrutiny occurs at 4pm, mid-winter, the additional shadow is not occurring at a time of the day or of the year when it is likely to be at all often highly valued for use as an office amenity.

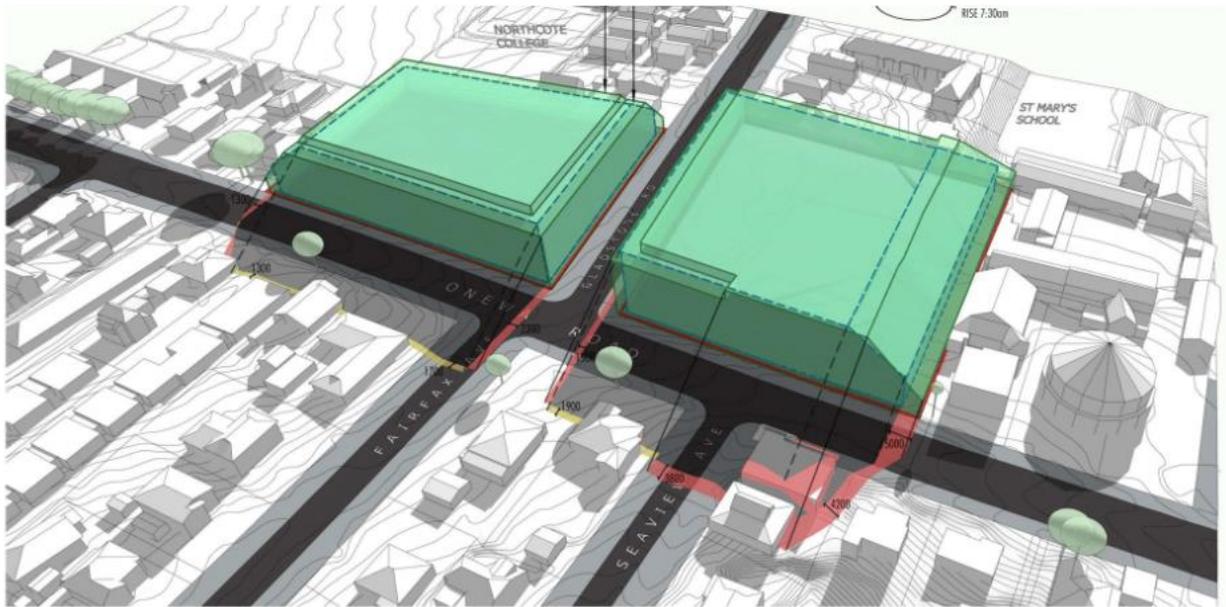


14.

Behind the administration building, additional shading will also fall onto an area of carparking associated with administrative/office use, which is unlikely to be greatly valued late on mid-winter afternoons for amenity purposes.

- 1.57 For completeness, I include the remaining shading plans from the JCY "Combined Set" which indicate margins of additional shading

200612 LI & MU COMBINE SHADOW ANALYSIS 03.pdf



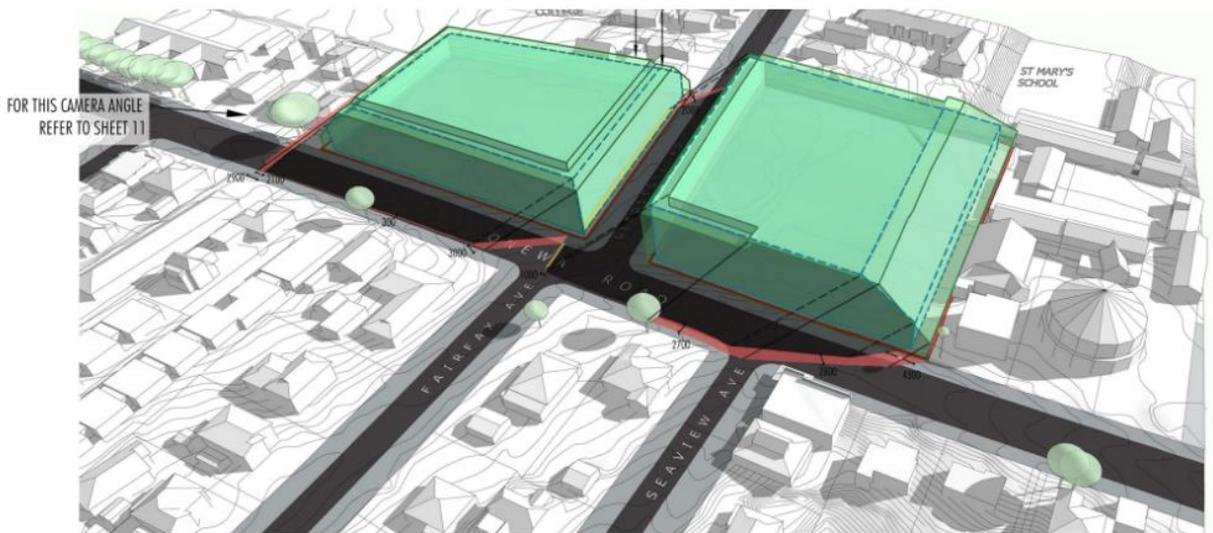
SHADOW ANALYSIS - 21st JUNE - 12pm

LI ENVELOPE cast shadows further than MU ENVELOPE
 MU ENVELOPE cast shadows further than LI ENVELOPE

WINTER SOLSTICE

15.

- 1.58 **Comment:** Only small margins of additional shading (less than 3m) or additional shading which falls in locations with limited amenity value (e.g: Onewa Road).



SHADOW ANALYSIS - 23rd SEPT - 9am
 NOTE: READ SHADOW ANALYSIS WITH SHEET 11

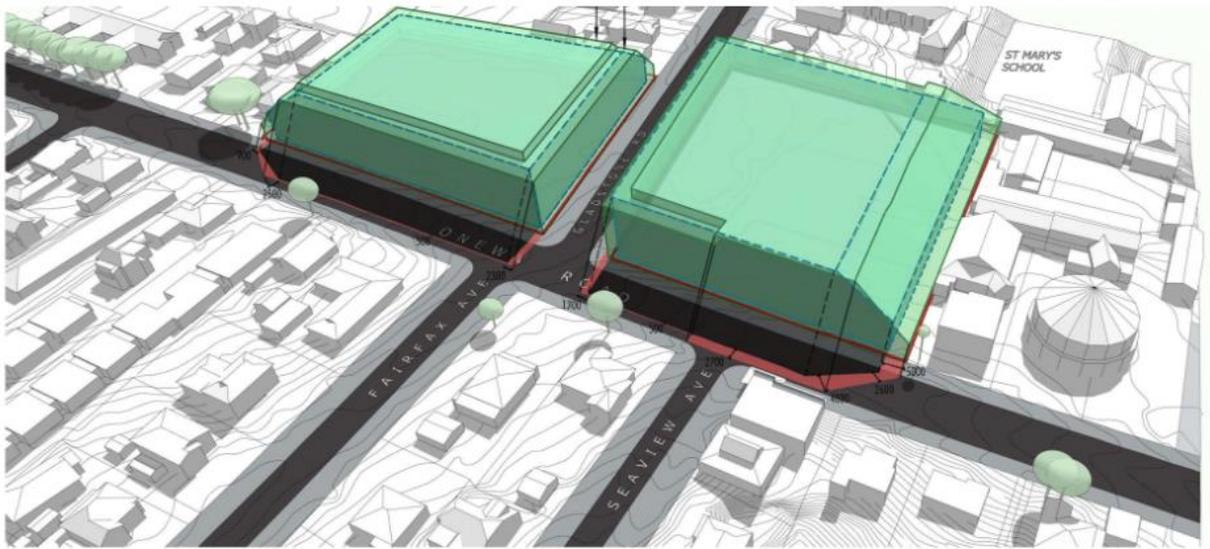
LI ENVELOPE cast shadows further than MU ENVELOPE
 MU ENVELOPE cast shadows further than LI ENVELOPE

MID SPRING EQUINOX

16.

(Note that, the mid spring equinox of 23rd September equates to the mid autumn equinox of around 22 March.)

- 1.59 **Comment:** Only small margins of additional shading occur (less than 3m), apart from where additional shadows fall on the road corridors.



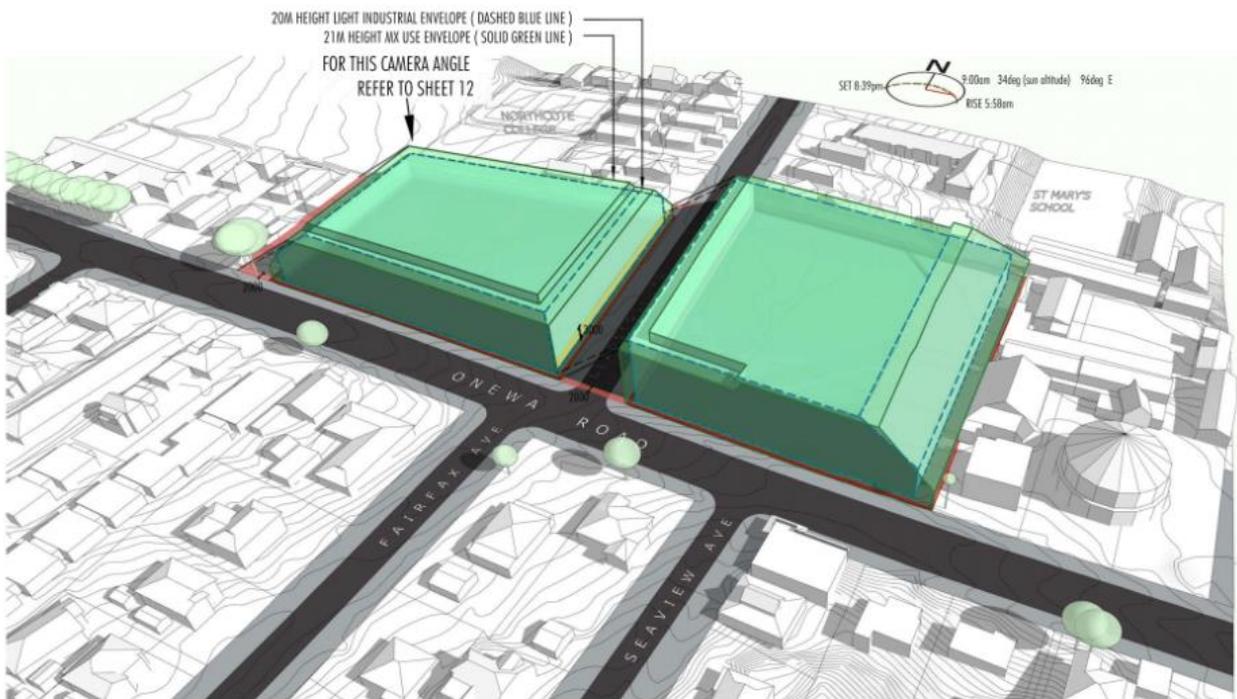
SHADOW ANALYSIS - 23rd SEPT - 12pm

■ LI ENVELOPE cast shadows further than MU ENVELOPE
■ MU ENVELOPE cast shadows further than LI ENVELOPE

MID SPRING EQUINOX

17.

Comment: Only small margins of additional shading (less than 3m) occur, apart from where additional shading falls within the road corridors.



SHADOW ANALYSIS - 21st DEC - 9am

■ LI ENVELOPE cast shadows further than MU ENVELOPE
■ MU ENVELOPE cast shadows further than LI ENVELOPE

NOTE: READ SHADOW ANALYSIS WITH SHEET 12

SUMMER SOLSTICE

18.

Comment: Only small margins of additional shading (less than 2m) for the areas shown in this view. Note also however, the alternative view provided for this date and time.



SHADOW ANALYSIS - 21st DEC - 9am
NOTE: READ SHADOW ANALYSIS WITH SHEET 07

U ENVELOPE cast shadows further than AU ENVELOPE
AU ENVELOPE cast shadows further than U ENVELOPE

SUMMER SOLSTICE

19.



20.

Comment: Partly considered in 18. Above, this second plan view generally 3m or less of additional shading, apart from the front of the residential property at 8 Gladstone Road, which will potentially have a 4m additional shading margin at 9 am. This additional shading will fall on one front bedroom of the house as well as the front yard and a right of way (see photo 20 above). The low sun angle (34 degrees) and faster moving shadows at this time of day, will mean only limited dwell times will apply for this shading.



SHADOW ANALYSIS - 21st DEC - 12pm

■ LI ENVELOPE cast shadows farther than MU ENVELOPE
■ MU ENVELOPE cast shadows farther than LI ENVELOPE

SUMMER SOLSTICE

21.

Comment: Only small margins of additional shading (less than 3m)



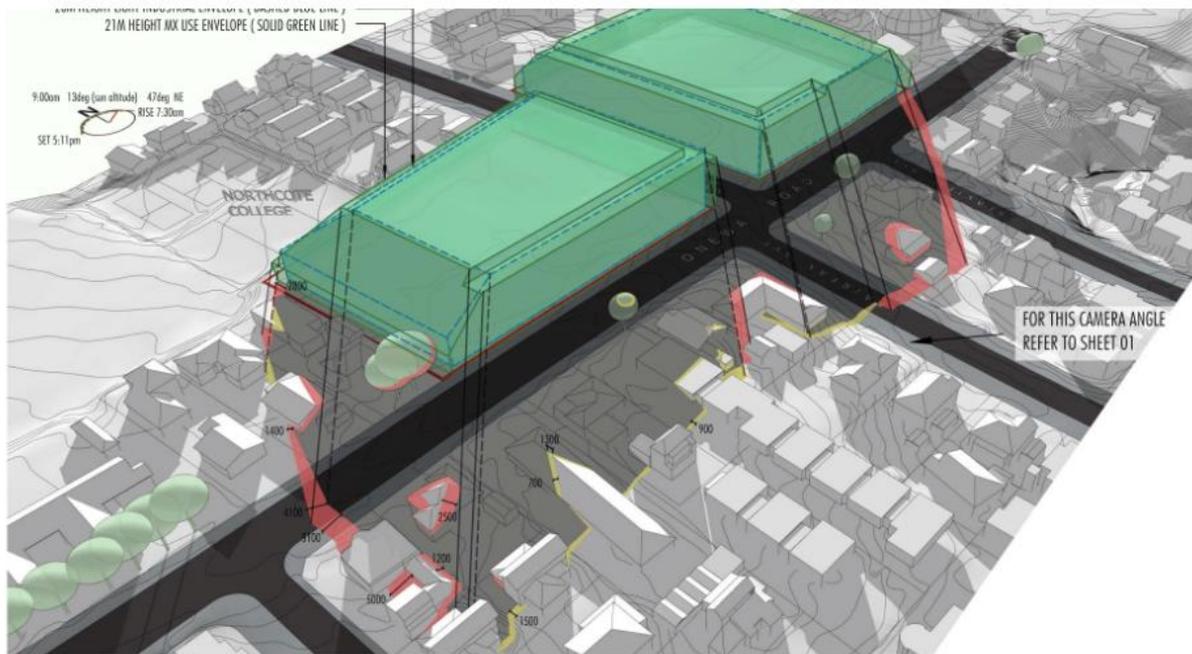
SHADOW ANALYSIS - 21st DEC - 6pm

■ LI ENVELOPE cast shadows farther than MU ENVELOPE
■ MU ENVELOPE cast shadows farther than LI ENVELOPE

SUMMER SOLSTICE

20.

Comment: Additional shading falls on non-residential areas of little or no amenity concern.



SHADOW ANALYSIS - 21st JUNE - 9am
NOTE: READ SHADOW ANALYSIS WITH SHEET 01

LI ENVELOPE cast shadows further than MU ENVELOPE
MU ENVELOPE cast shadows further than LI ENVELOPE

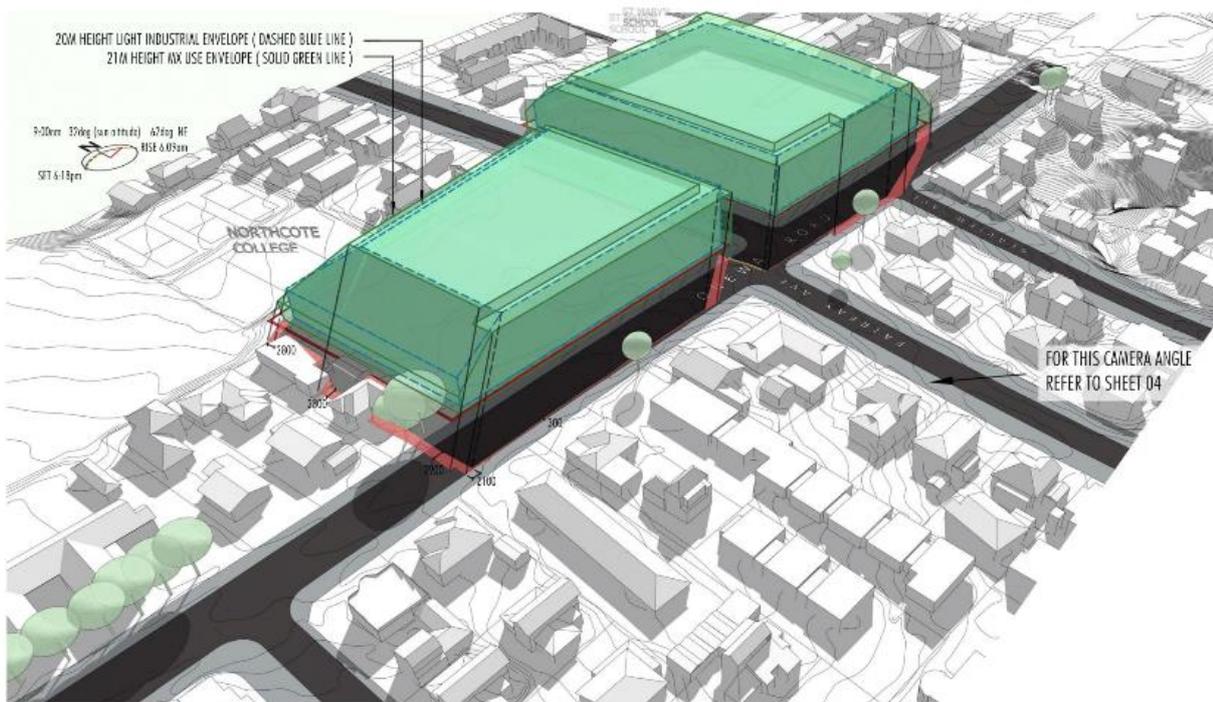
WINTER SOLSTICE

21.

Comment: As partly scrutinized in more depth above, using a different view, in terms of the around 5m margins of additional shading highlighted with this view, I note that at the south western end of the proposed Plan Change area, the affected site and building on the south eastern corner of Onewa Road and Valley Road, although zoned Residential, is occupied by a Chiropractors operation, where affected windows on the frontage are practising rooms which are curtained off from the sun (and prying eyes). (Refer Photo 22, below).



22.



SHADOW ANALYSIS - 23rd SEPT - 9am
 NOTE: READ SHADOW ANALYSIS WITH SHEET 04

LI ENVELOPE cast shadows further than INU ENVELOPE
 NU ENVELOPE cast shadows further than LI ENVELOPE

MID SPRING EQUINOX

23.

Comment: Less than 3m of additional shading.

Overall Conclusion on Additional Shading:

The proposed Plan Change and Plan Change area combine to create a helpful combination of circumstances which avoid, remove or mitigate the extent of additional shading effects. Key amongst these is that only 1m of additional height is being sought, compared to the maximum height allowed by the existing zoning. Other standards do not generally exacerbate the extent of additional shading, except where the site adjoins the Special Purpose (School) zone, mostly along the eastern boundary of the proposed Plan Change area. However, the additional shading caused in this area does not cause any significant adverse amenity effects, falling as it does on non-residential areas of little or no amenity significance. Where the proposed Plan Change area is generally to the north of residentially zoned land to the south, the intervening buffer of Onewa Road provides some convenient mitigation, in combination with high sun angles. In other locations, the east west and north of the plan change area the margins of additional shading can be between 2m and 8m, but as they are occurring in the mornings and afternoons, the swifter movement of the sun across the sky means dwell times of additional shading will not be significant (all less than 30 minutes) and the days affected by any additional shading will be only a small proportion of the year.

John Lovett
 29 June, 2020.