

18th July 2019

Wellington City Council
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AEE - Shading Effects of Proposed Building at 90 Hanson Street For Southern Cross Hospitals Ltd

Scope of Assessment

1. Southern Cross Hospitals Ltd are seeking consent to construct an additional building along the frontage of the site at 90 Hanson Street, Newtown.
2. An earlier design of the proposed building included provision for a two storey building fronting the street and situated towards the northern end of the site. The design proposal has since been amended and the top storey of the proposed building has been slid southwards to lessen its effect on the surrounding neighbours.
3. The proposed development will exceed the 9m permitted activity building height limit that applies to the development site.
4. The purpose of this assessment is to establish the shading effects that the current proposal will generate with respect to the residential properties along the eastern side of Hanson Street.

District Plan

5. The development site together with the residential properties along the eastern side of Hanson St are zoned Inner Residential. Accordingly, the application is for a non-residential activity.
6. The maximum height for residential buildings and structures is 9m above ground level. Although the proposed building will not be used for residential purposes, insofar as the adjoining neighbours are concerned, there remains the possibility that development to a height of 9m could occur on the site. Residential structures to that height would result in shading to the properties across the road.
7. As a discretionary unrestricted activity it is noted that the shading effects need to be considered in their entirety. However, there is still merit in reporting the effects in two parts being those that occur above the 9m height limit and those which occur below.

Receiving Environment

8. The site at 90 Hanson Street already contains a non-residential activity so the general use of the site has already been established.
9. The existing hospital building on the site is set back from the street which provides the space where the proposed building is to be sited. The existing site configuration does not generate any noticeable shading on the adjoining residential properties.

10. For the purposes of this assessment, the nine residential properties at 115, 117, 119, 121, 123, 125, 127, 129 & 131 Hanson St have been considered being those properties along the eastern side of the street where owners have raised shading as a concern by way of a submissions on an earlier design.
11. Other residential properties in the area (such as those along the western side of Hanson St and to the south) lie outside of the zone of influence of the proposed building.

Methodology

12. There are two principal methods of assessing shading. The more commonly used method relies on drawing a series of shadow diagrams for different times of the day for selected days of the year to depict the size and shape of shadows that will occur as a result of the proposed development.
13. The second, less commonly used but more informative method, uses sun transit diagrams to show the path of the sun through the sky relative to the various obstructions such as skylines, existing buildings and proposed structures which can cause shading to a selected viewpoint.
14. Each method has its advantages and disadvantages. The main advantage of a shadow diagram is that it graphically depicts the extent of shading over a larger area, but it only applies to a specific time of the day/year. Shadow diagrams are easier for the lay person to understand. However, they are less efficient at quantifying duration of shading and multiple diagrams are typically required to show the shading effects for different times and days of the year.
15. This assessment uses the sun transit method as it has the advantage of being able to provide a complete picture of when and for how long shading may occur throughout the entire year. A limitation is that this information is only relevant for the selected viewpoint. Therefore multiple viewpoints must be assessed to understand how different areas along the street are affected.
16. A sun transit diagram is akin to a photograph taken from a specific point and onto which can be superimposed the arc of the sun across the sky on selected days of the year and the extent of any relevant structures that may produce shading to that point.
17. For any time of the day and for any day of the year, the position of the sun in the sky can be defined by angles of azimuth and altitude. Sun Transit Diagrams have been prepared for the Wellington area which shows the sun's path across the sky for each half of the solar year.
18. The "S" shaped time lines that appear on the diagrams generally at right angles to the sun's path indicate the time of day as the sun arcs across the sky. To simplify matters, and given that the sunlight study is intended to assess duration of sunlight loss, times shown are NZ Standard time with no allowance for daylight saving.
19. Separate charts are used for each half of the year because for any period of sun loss during Autumn, there is a corresponding loss in Spring. During the first half of the solar year from 23 December through to 23 June, the time lines appear as a reversed "S" whereas from 23 June through to 23 December they appear the other way around. For the purposes of this study, diagrams have only been produced for

the first half of the year.

20. Duration of sun loss is read directly off the diagrams by choosing a day of the year and following the sun's path across the sky for that day noting the times at which relevant horizon lines are crossed. The duration of loss for that particular day is the difference between the times so read. Any such loss can then be expressed as "x" minutes per day for "n" days (or weeks) of the year.
21. A survey has been undertaken to establish the position and height of the relevant subject properties along the eastern side of Hanson Street so that their relationship to the proposed development can be modelled for shading purposes.
22. A computer model of the receiving environment has been compiled using the following information:
 - The background hills and surrounding topography based on 1m contours sourced from Council's GIS records.
 - A site design model of the existing and proposed development as sourced from Warren & Mahoney.
 - The location of the houses along the eastern side of Hanson Street as surveyed by Spencer Holmes Ltd.
23. Combining these data sources provided an overall 3D model of the site and its surroundings excepting that it does not include some of the background buildings (slightly above the site to the north) or the existing Totara trees along the western side of Hanson Street. The likely result of adding these features to the model would be that the shading durations generated by the existing environment would be marginally greater thus offsetting the effects of the proposed building. Given that the shading durations have generally been rounded to the nearest 10 minutes it is not considered that the omission of the features will materially affect the results.
24. Nine viewpoints have been selected for analysis, one for each property along the eastern side of Hanson St where shading effects need to be considered. The locations of these viewpoints are described as follows:
 - VP 1 – No 115, centre of west facing window,
 - VP 2 – No 117, centre of west facing window,
 - VP 3 – No 119, centre of west facing window,
 - VP 4 – No 121, at base of timber steps by verandah.
 - VP 5 – No 123, front window
 - VP 6 – No 125, front window
 - VP 7 – No 127, front of house
 - VP 8 – No 129, front of house
 - VP 9 – No 131, front of house
25. The plan positions of these viewpoints are shown on the site diagram included herewith as Attachment 1.
26. Two sun transit diagrams have been prepared for each viewpoint. With respect to each viewpoint, the first image is a sun transit diagram for the first half of the solar year between the December and June solstices. It shows the existing

environment with the hills in the background, the existing buildings in the foreground and the extent of the proposed building as a transparent overlay. In the second sun transit diagram, the proposed building is shown in more detail. These diagrams are included at Attachment 2.

27. The corresponding diagrams for the second half of the year from June through to December would show similar results and in this instance I have decided that it is not necessary to include them.
28. The sun transit diagrams have been analysed to establish the anticipated duration of shading attributable to the proposed building split into two component parts being the shading resulting from parts of the building above and below the 9m height limit. The tables summarising the results of this analysis are included at Attachment 3.
29. All times are stated as NZ Standard Time. Add 1 hour during daylight saving to convert times to DST.

Assessment of Shading Effects

Viewpoint 1 – 115 Hanson Street,

30. The house at No 115 Hanson Street sits opposite the northern vehicle access point of the development site. The proposed building sits a little farther to the south. Viewpoint 1 is positioned at the northern street facing window.
31. Shading effects to this window will be negligible as the proposed building is all but entirely clear of the sun's path. Shading will amount to no more than about 10 minutes a day for a week or two either side of the December 23 solstice noting that this is generated by the part of the proposed building that appears below the 9m height limit when viewed from this direction.

Viewpoint 2 – 117 Hanson Street,

32. Moving southwards along the street sees more of the proposed building appearing in the sun's path. No 117 is therefore a little more affected than No 115. Viewpoint 2 models the west facing window which looks out on to the street.
33. The north-western corner of the proposed building will create a small amount of late afternoon shading ranging from 15 mins at 6:00pm in mid-February through to about 40 mins over the summer solstice. This is again generated by the part of the proposed building appearing below the 9m height limit.

Viewpoint 3 – 119 Hanson Street,

34. The northern end of the proposed building contributes to shading at this viewpoint. Shading will range from about 20 mins at 6pm in mid-February through to about 50 mins at the summer solstice.
35. There will be no change in shading effect from early March through winter to the beginning of October.
36. Approximately one third of the overall shading is attributable to that part of the building above 9m.

Viewpoint 4 – 121 Hanson Street,

37. The viewpoint location chosen for No 121 is representative of the yard and verandah area at the front of the house. The street is rising as it heads south and the additional elevation means the proposed building appears lower with respect to the horizon compared to the other viewpoints to the north.
38. The northern end of the proposed building contributes to the shading that will occur at this viewpoint. This viewpoint will experience late afternoon/evening shading over the summer from early September through to the end of March. The duration of shading will range from about 30 mins in late March up to a maximum of 1h:20m during late February and early March.
39. At least three quarters of the overall shading is attributable to that part of the building below 9m in height.
40. It is noted that the existing verandah along the front of this dwelling already naturally limits the amount of sun that can reach the front windows of this dwelling. It is expected that the late afternoon winter sun will still reach the front windows beneath the verandah because the proposed building lies clear of the sun's path during the winter months.

Viewpoint 5 – 123 Hanson Street,

41. At this point along the street the road formation starts to rise which sees the existing houses along its eastern side become elevated with respect to the roofline of the proposed building meaning that less of the building height contributes to shading effects.
42. At Viewpoint 5 the proposed building occupies all of the sun's path which results in shading effects throughout the year. However, the increase in house elevation lessens the duration of shading down to about 10 mins in summer, 30-40 mins through autumn and spring and about 50 mins through winter.
43. At least two thirds of the shading is attributable to that part of the building below 9m in height.
44. It is noted that this dwelling has only two relatively small windows facing the street and there is not therefore likely to be any significant loss of amenity despite the shading effects occurring throughout the year.

Viewpoints 6, 7, 8 & 9

45. These four viewpoints have been considered to determine the effects on properties further south along Hanson Street. The sun transit diagrams for these four properties confirm that these dwellings will all be sufficiently elevated above the roof of the proposed building so as to not be affected by shading.

General Comments

46. It is noted that the application will be assessed as a discretionary unrestricted activity meaning that all of the shading effects need to be taken into consideration.
47. The houses along the eastern side of Hanson Street are typical of the area in that they are for the most part single storey dwellings facing the street. These houses

have enjoyed a small degree of borrowed amenity on account of the existing Southern Cross Hospital buildings being set back from the street frontage with no structures of any height close to the road that would obstruct the sun to the properties opposite.

48. In general, the mitigating factors that can be considered are:
- The width of Hanson Street affords a good degree of horizontal separation between the residential dwellings and the proposed building;
 - The properties along the eastern side of Hanson St receive ample sunlight at other times of the day throughout the year;
 - The District Plan acknowledges that Wellington's topography is often steep and that full protection of sunlight is not always possible;
 - The potential loss is at the end of the day when the sun would otherwise be setting behind the background hills making it a little less noticeable;
 - The existing totara trees on the site provide a degree of shading that forms part of the existing environment;
 - Morning and mid-day shading will fall on the development site so there will be no effect on the surrounding residential properties other than at the end of the day;
 - In some cases, decreasing direct sunlight can be a relief in summer months;
 - Losses will not occur every day as not all days are sunny.
49. As outlined above, the majority of shading on 117-123 Hanson Street is attributable to that part of the proposed building under 9 metres in height. As stated above, structures up to 9m high can be built on the site as a permitted activity.
50. Shading caused by the parts of the proposed building above 9 metres in height is less than minor.
51. Based on my analysis of the selected viewpoints, and in consideration of the mitigating factors described above, the shading effects that will result from construction of the proposed building can be considered acceptable within the context of the site and the neighbouring residential properties.

Amenity Value Of Sunlight

52. Our ability to mathematically model shading provides an opportunity to quantify effects much more accurately than a person can ever discern. People simply do not know down to the nearest minute what time the sun will rise or set as this is something that changes imperceptibly each and every day. They may have a general idea but they would not know exactly. Also, they will be less likely to notice a change that occurs close to the time of day when the sun would otherwise rise or set behind hills or behind other structures as this change tends to blend in with what they already expect.

Conclusion

53. The site is currently not developed to the full extent that could occur under the inner residential zoning.
54. Of the neighbouring properties along the eastern side of Hanson Street, Nos 121 & 123 are arguably affected to a greater degree than the others. However, the

degree of shading associated with construction of the proposed building will not result in a significant loss of amenity as those properties will continue to receive more than adequate direct sun at other times of the day throughout the year.

55. The shading effects are to some degree mitigated by the width of Hanson Street which provides ample horizontal separation between the residential houses on one side of the street and the proposed building on the other.
56. The properties along the eastern side of Hanson Street will continue to receive adequate amounts of sun at other times of the day/year, and the shading effects of the proposed development will be no more than minor.
57. Taking into account all of the matters described above, it is acceptable to conclude that the shading effects of the proposed building can be considered to be less than minor.

Yours faithfully
Spencer Holmes Ltd

A handwritten signature in black ink that reads "Hudson Moody". The signature is written in a cursive, flowing style.

Hudson Moody
Director – Surveying & Planning

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ATTACHMENT 1

Viewpoint Locations

Location of Viewpoints



ATTACHMENT 2

Sun Transit Diagrams

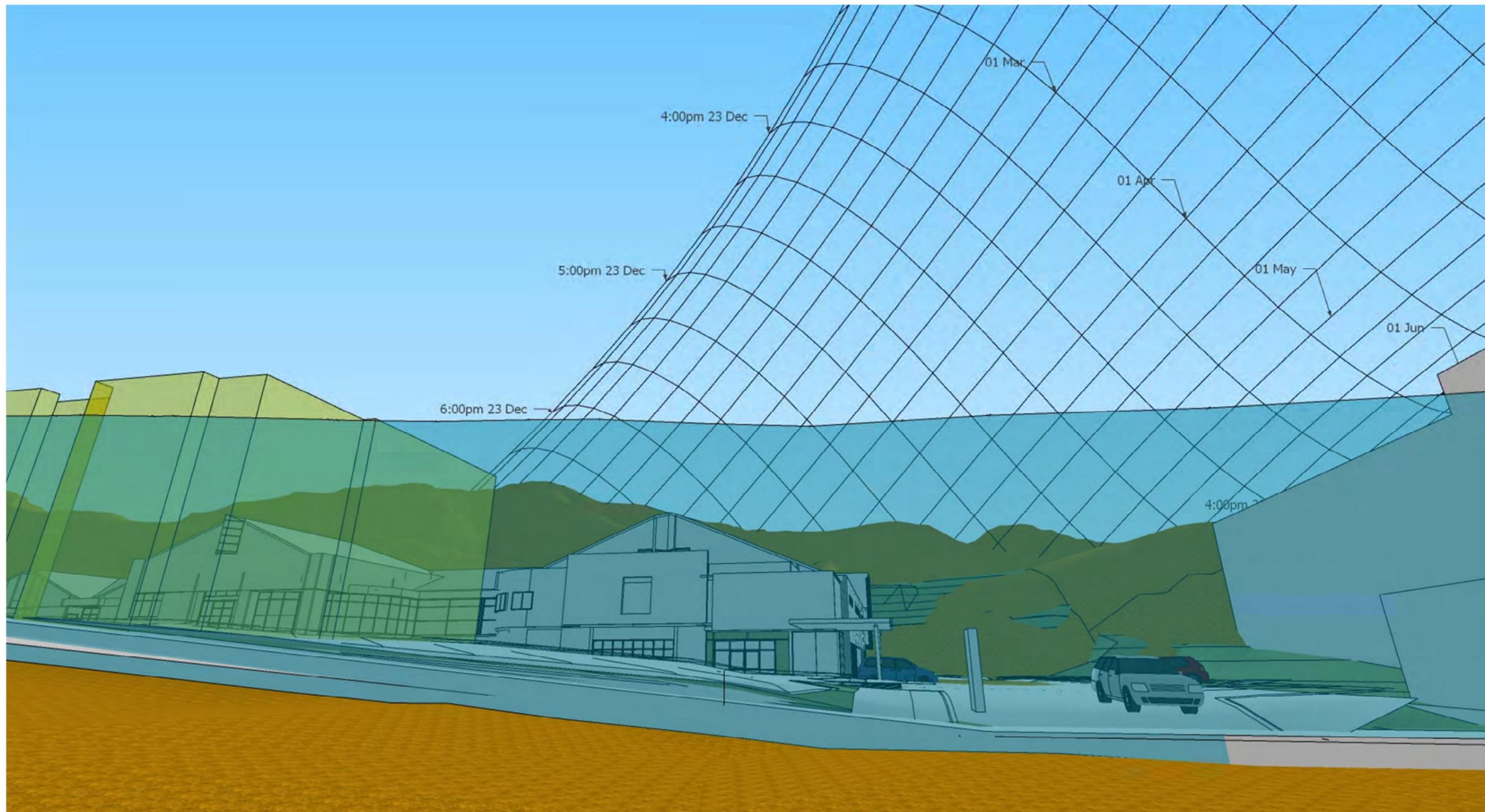
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- VP 2 – 117 Hanson St
- VP 3 – 119 Hanson St
- VP 4 – 121 Hanson St
- VP 5 – 123 Hanson St
- VP 6 _ 125 Hanson St
- VP 7 – 127 Hanson St
- VP 8 – 129 Hanson St
- VP 9 – 131 Hanson St

VIEWPOINT 1 – No. 115 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

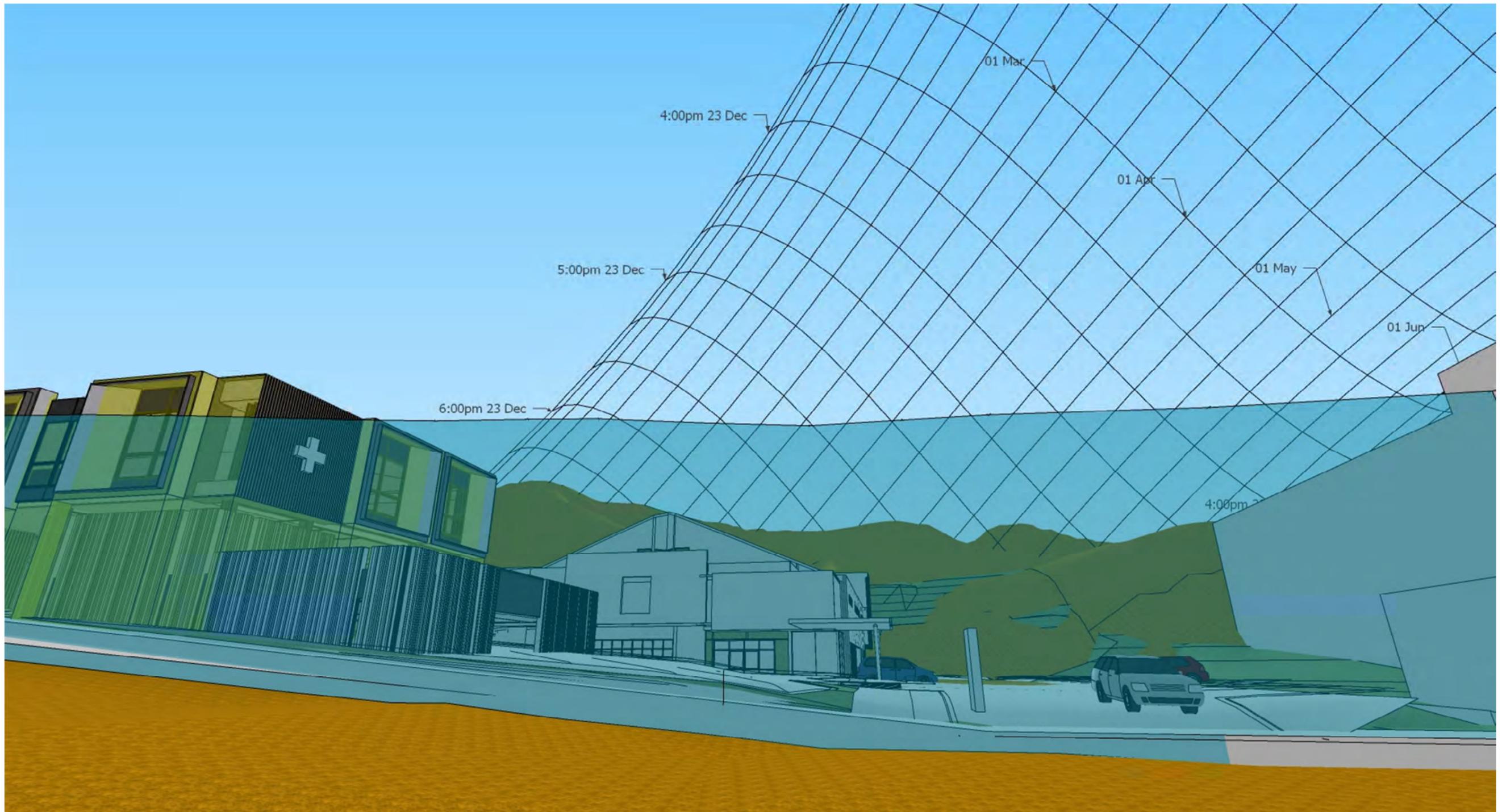
SpencerHolmes

engineers - surveyors - planners



VIEWPOINT 1 – No. 115 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

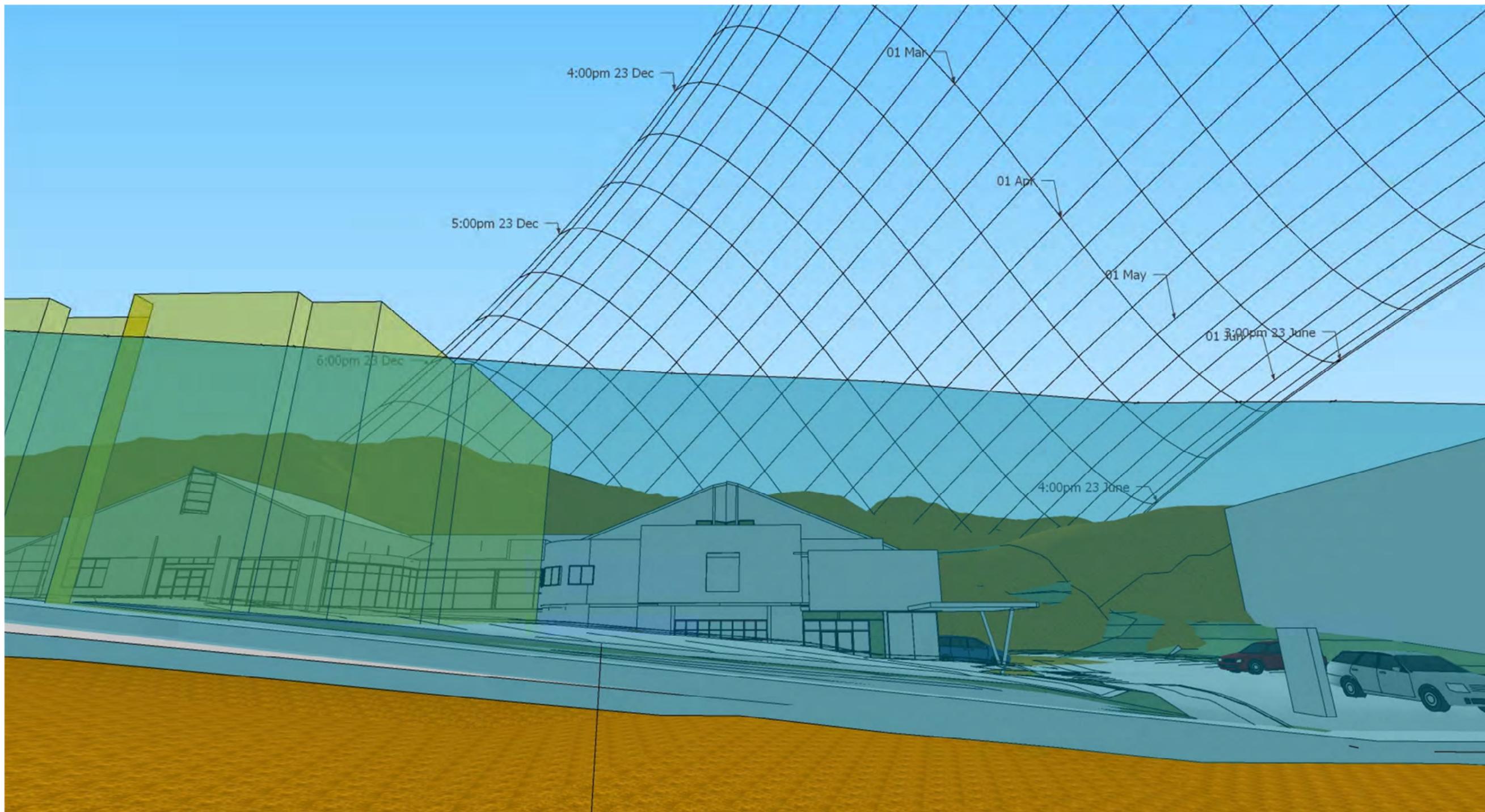


VIEWPOINT 2 – No. 117 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

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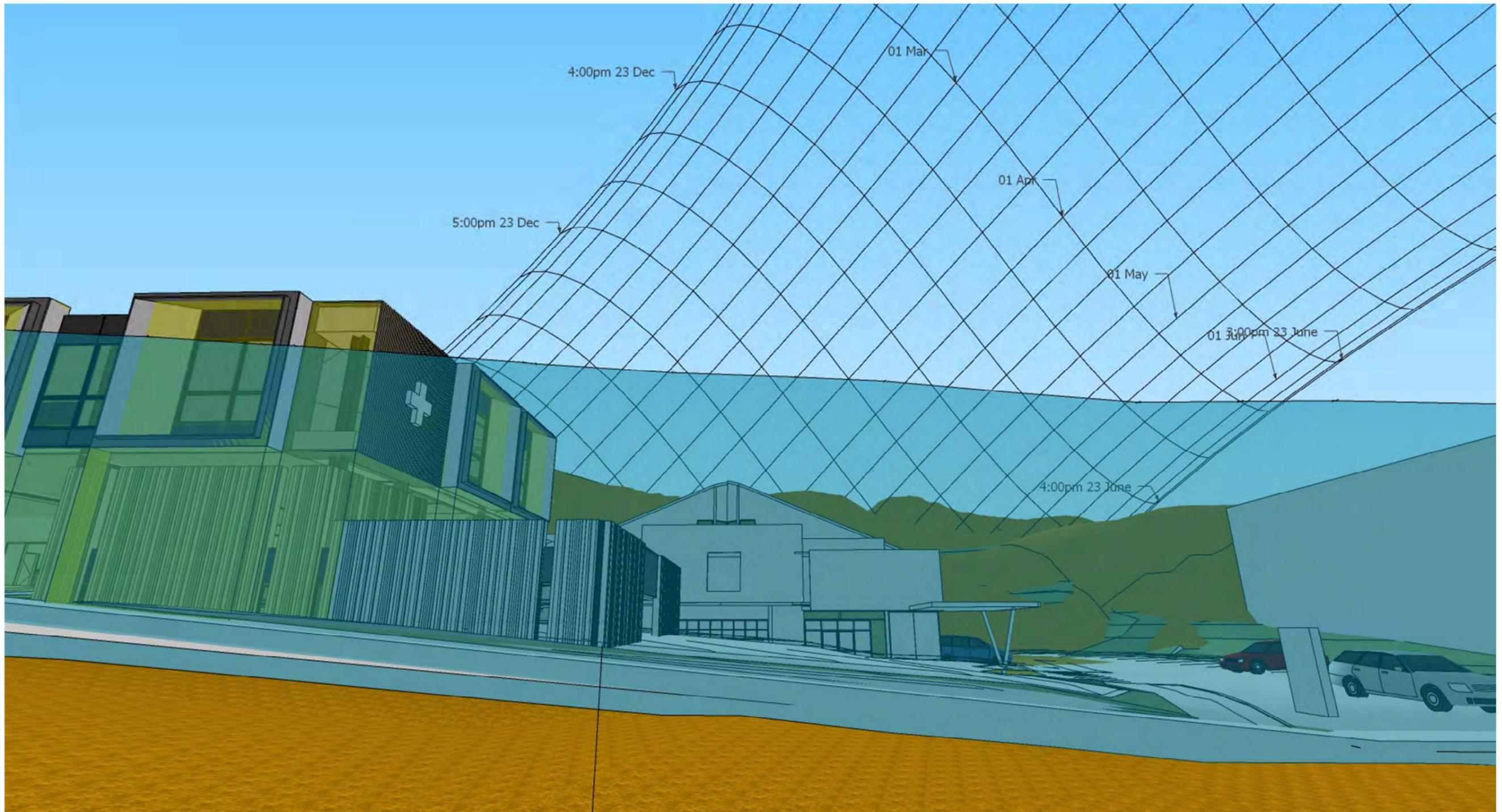


VIEWPOINT 2 – No. 117 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

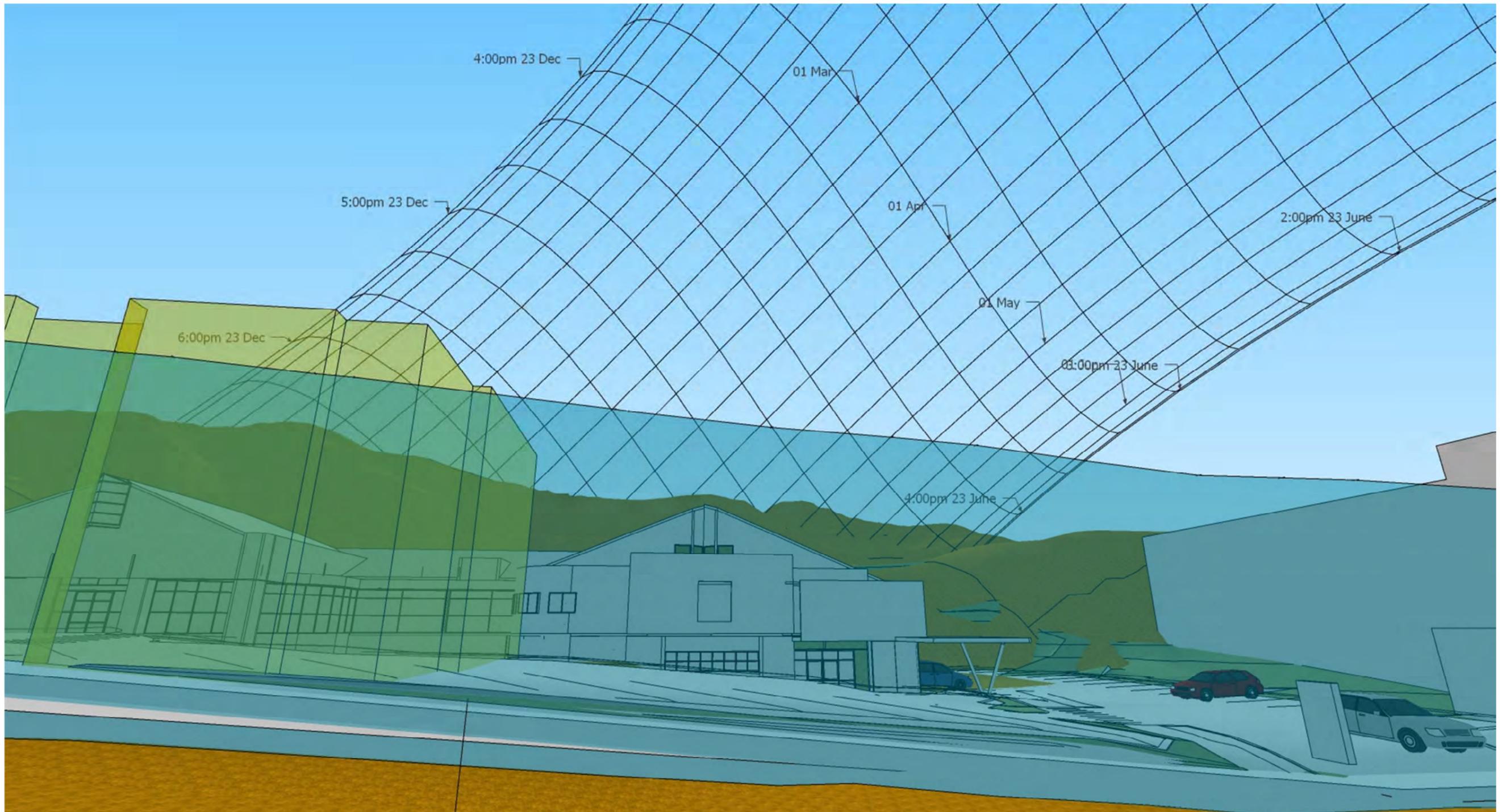
SpencerHolmes

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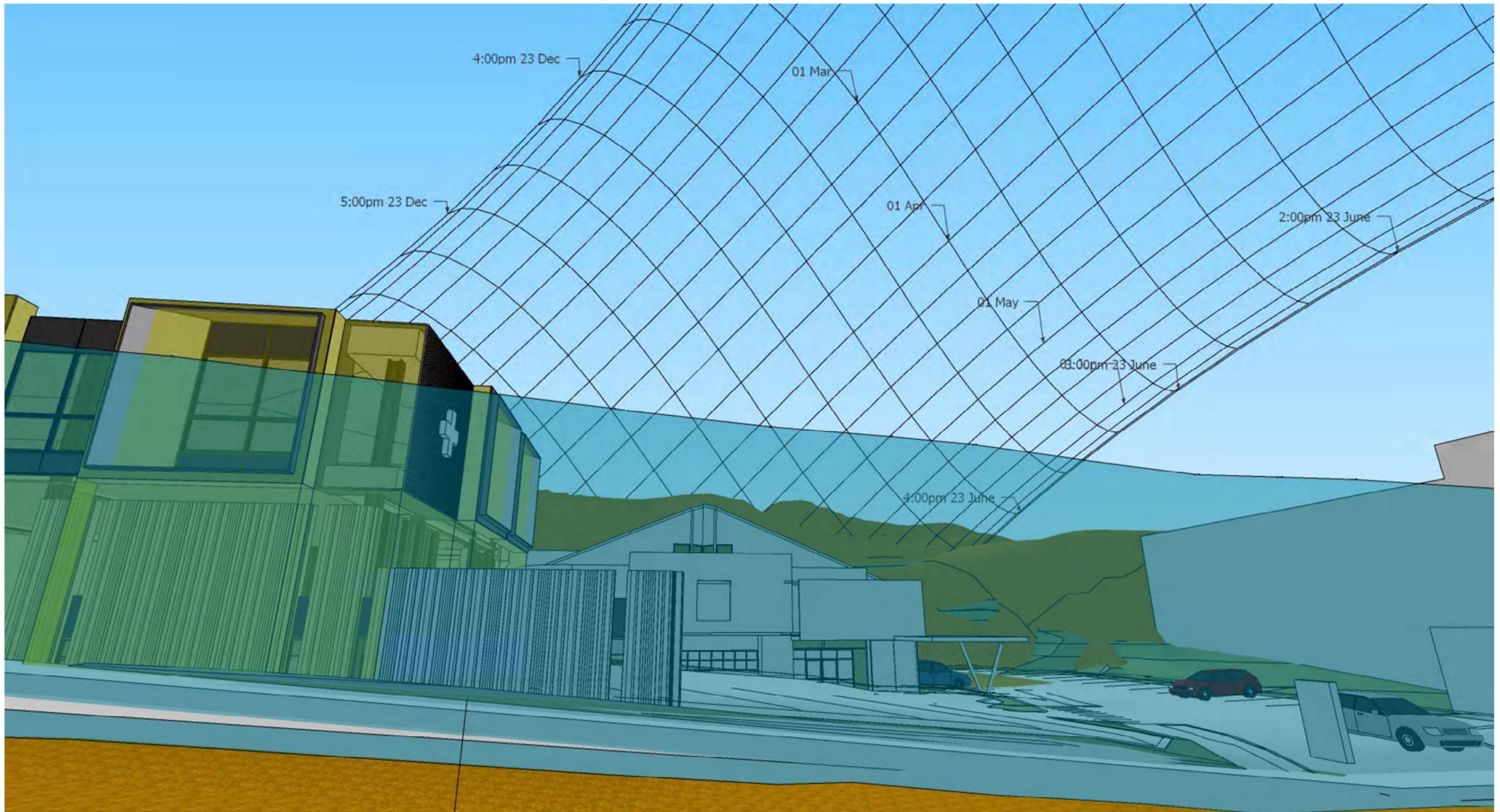
VIEWPOINT 3 – No. 119 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING



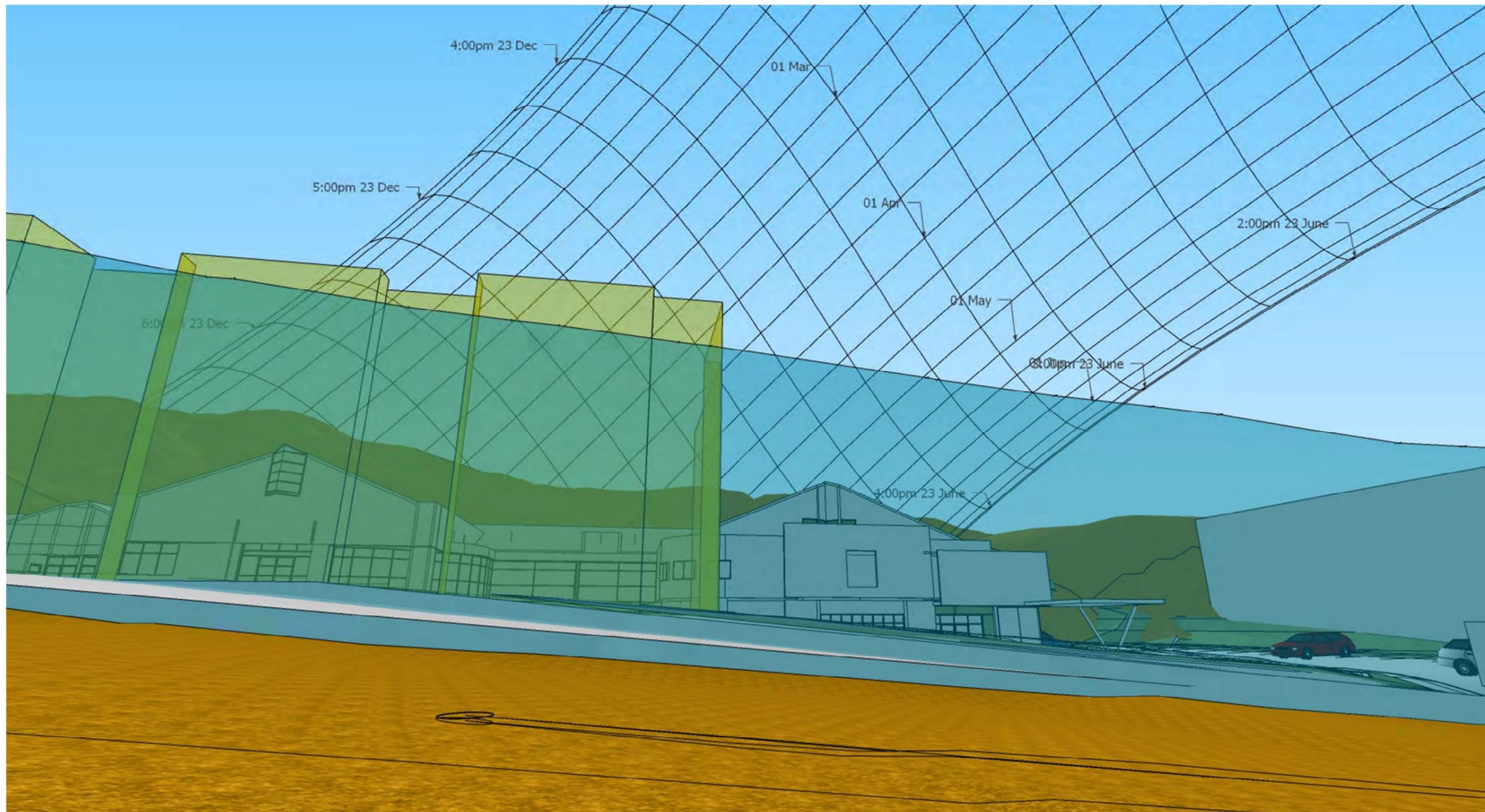
VIEWPOINT 3 – No. 119 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL



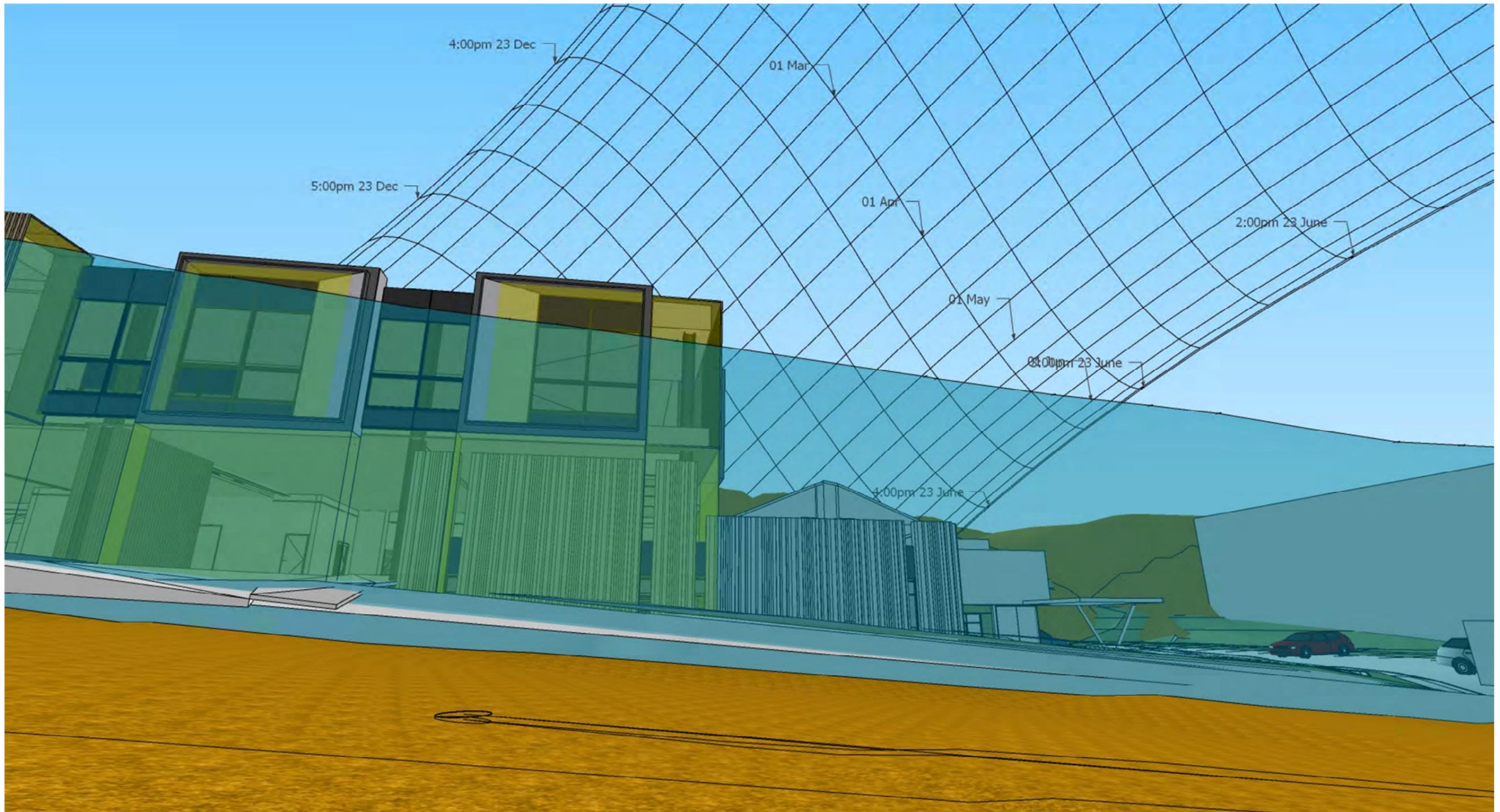
VIEWPOINT 4 – No. 121 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING



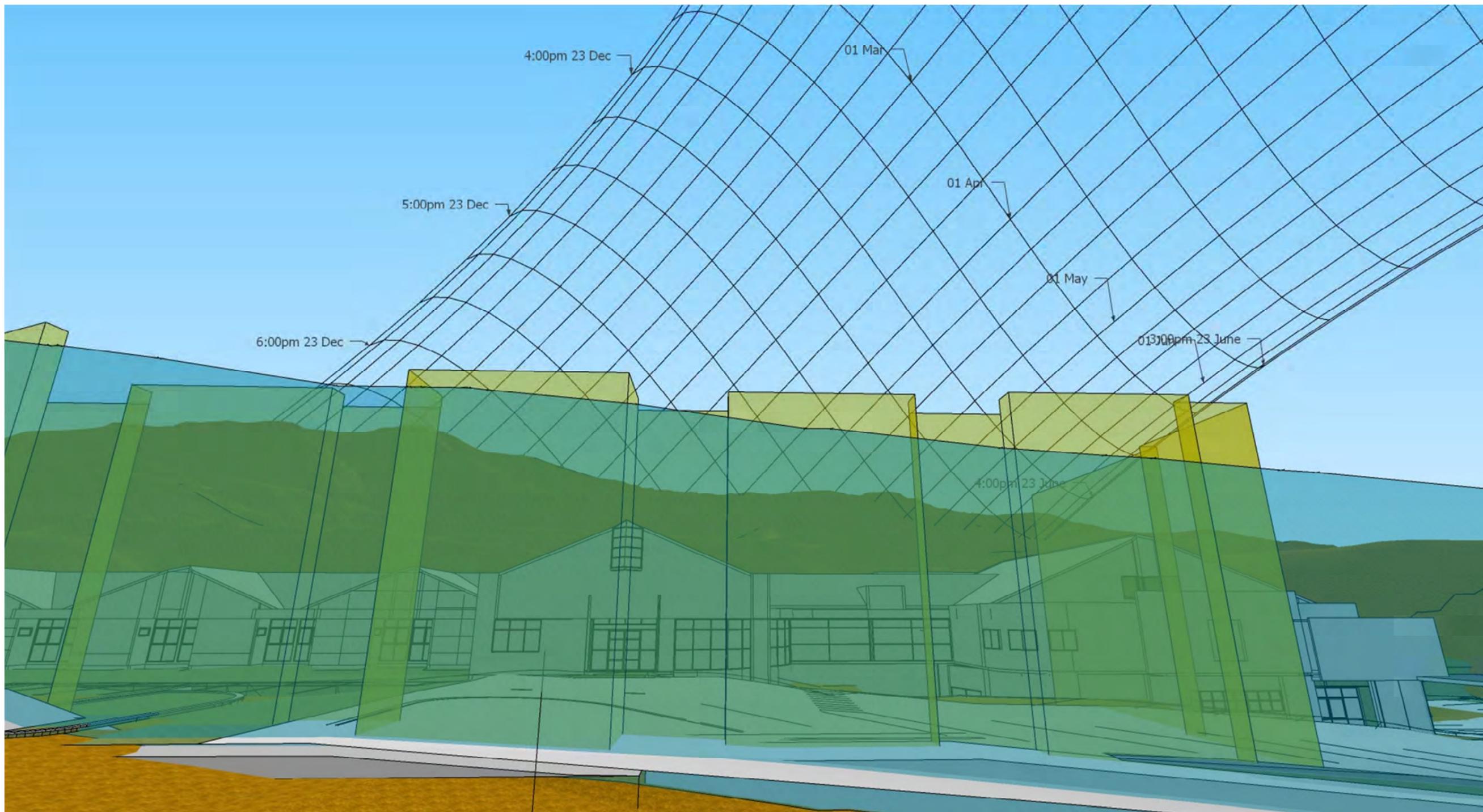
VIEWPOINT 4 – No. 121 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL



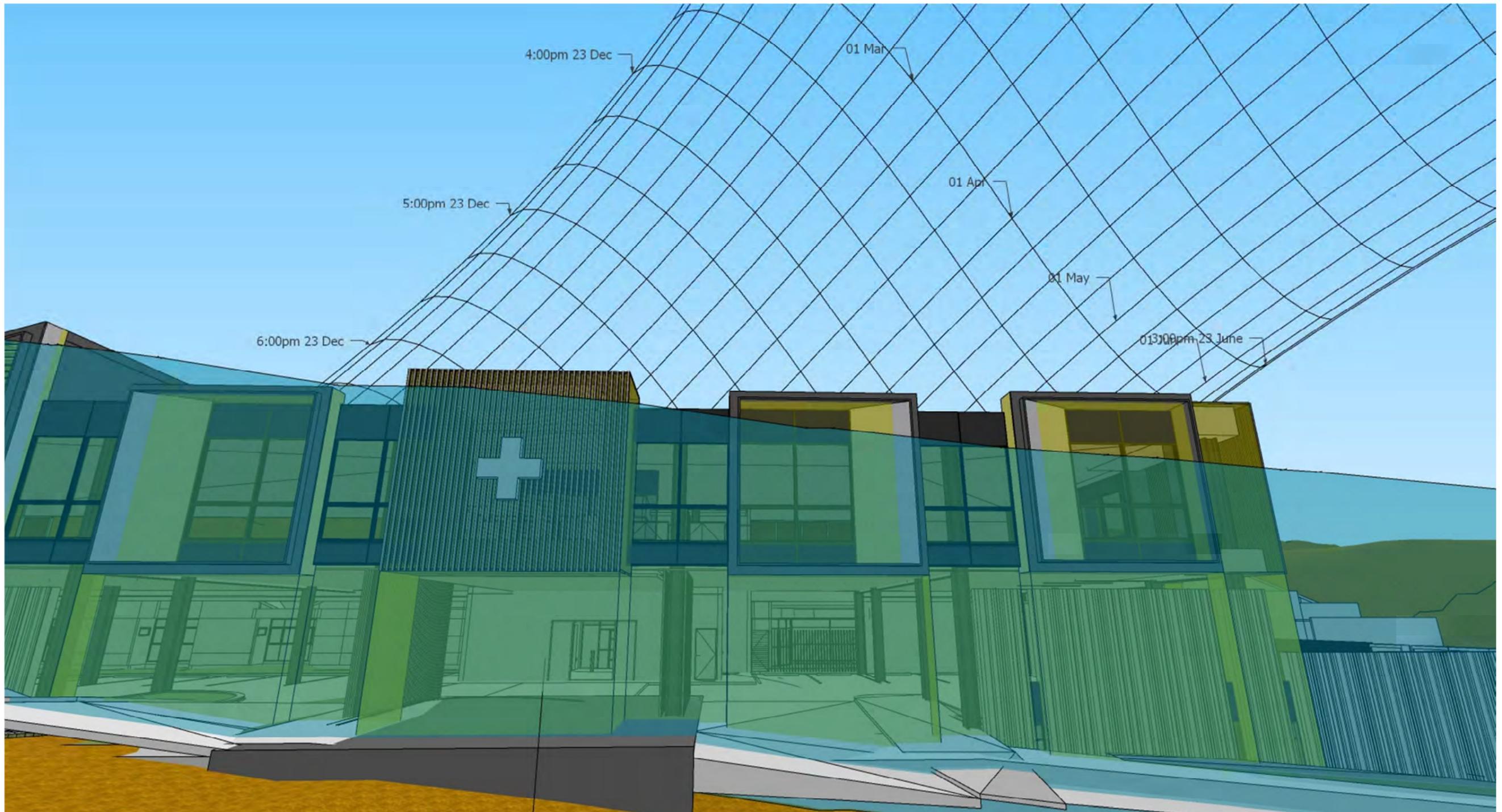
VIEWPOINT 5 – No. 123 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING



VIEWPOINT 5 – No. 123 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

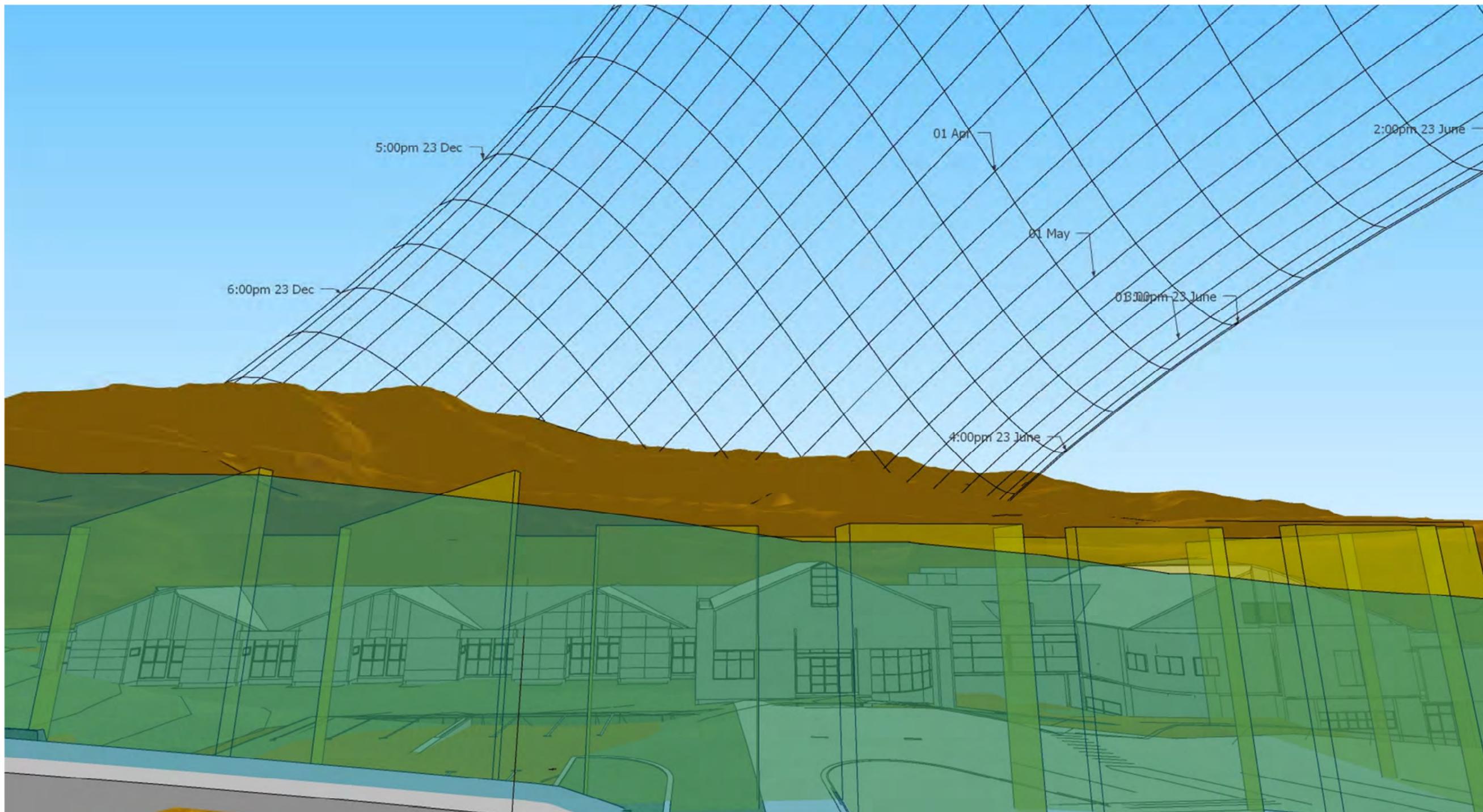


VIEWPOINT 6 – No. 125 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

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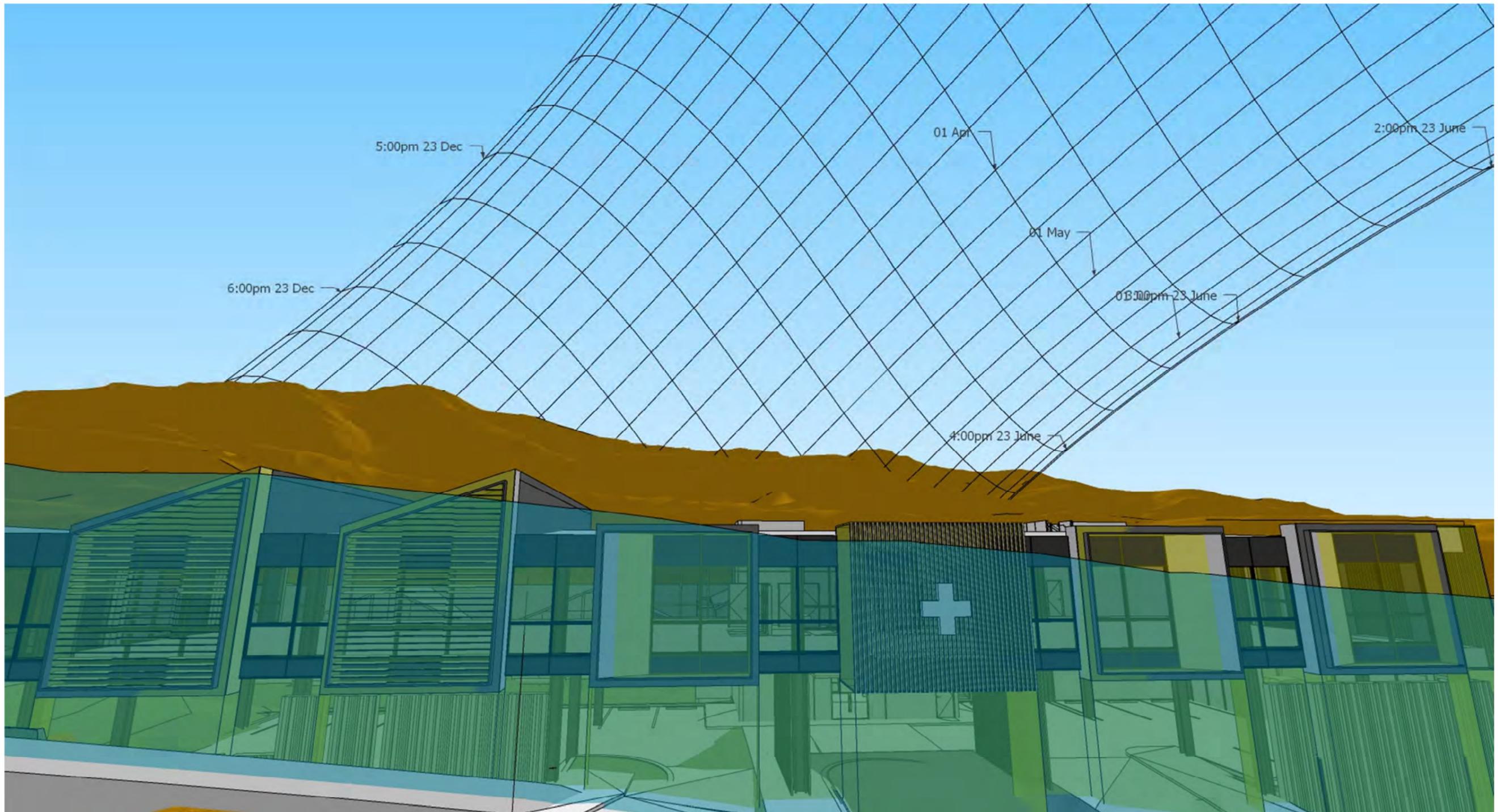
engineers - surveyors - planners



VIEWPOINT 6 – No. 125 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

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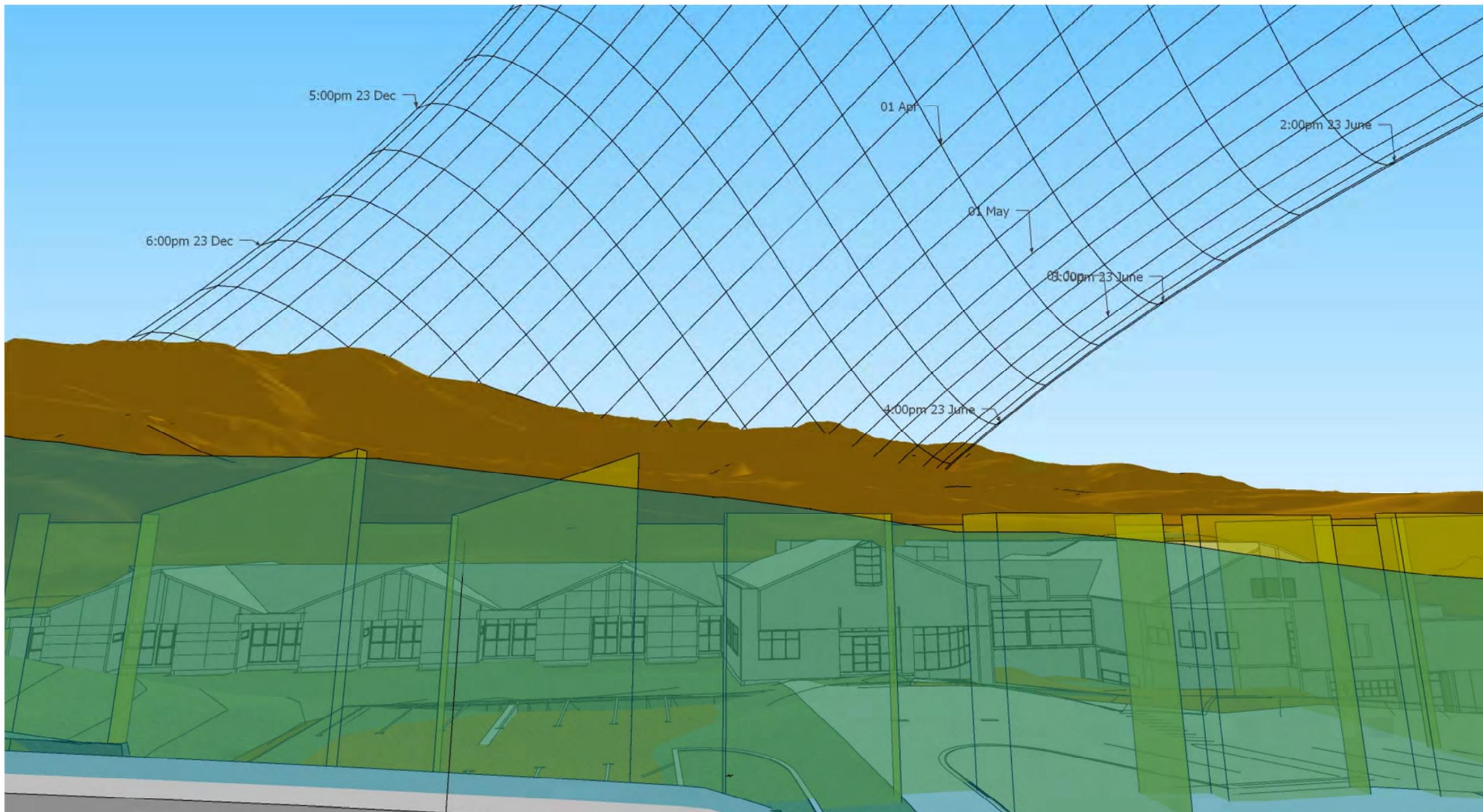


VIEWPOINT 7 – No. 127 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

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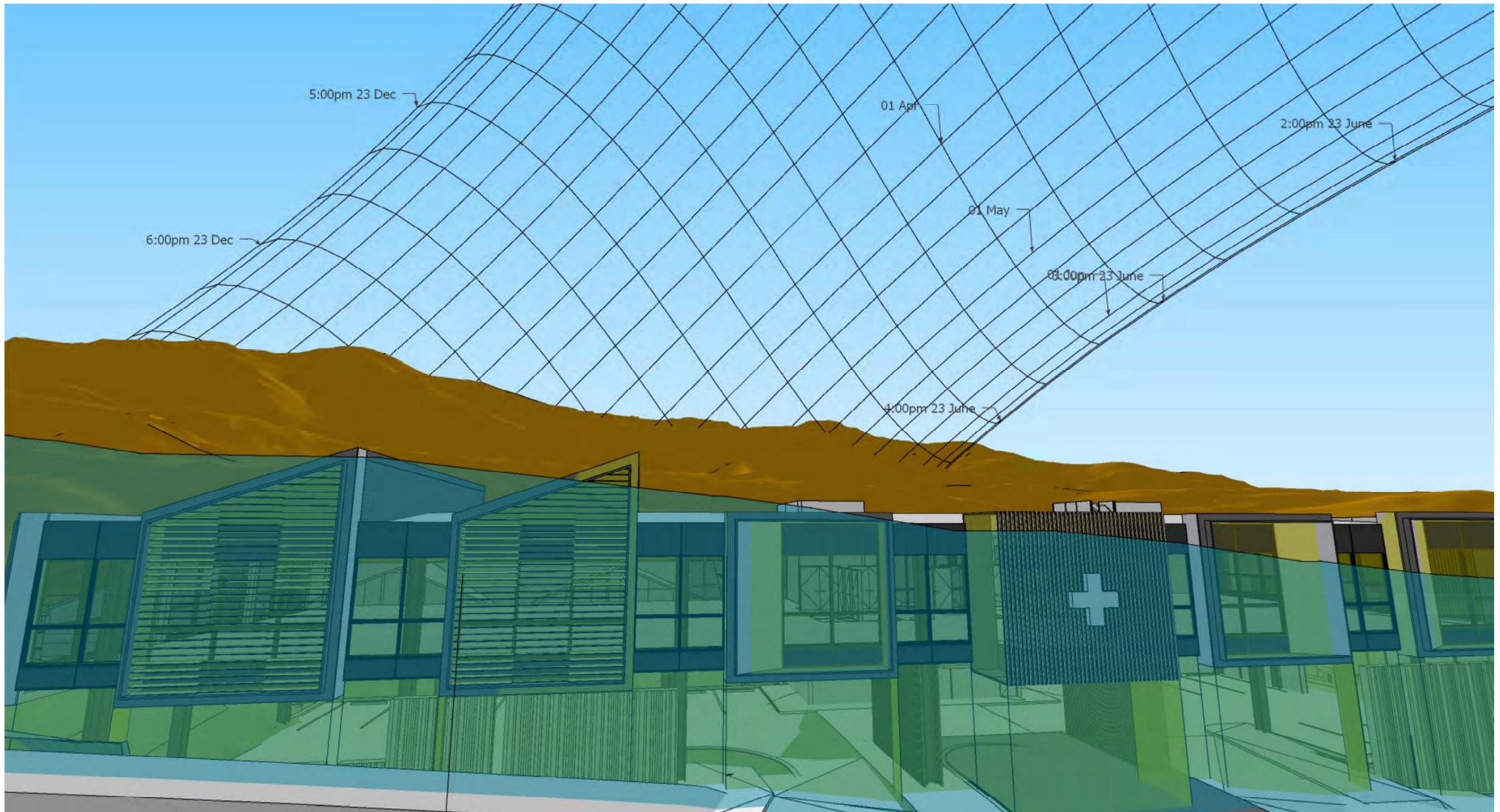


VIEWPOINT 7 – No. 127 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

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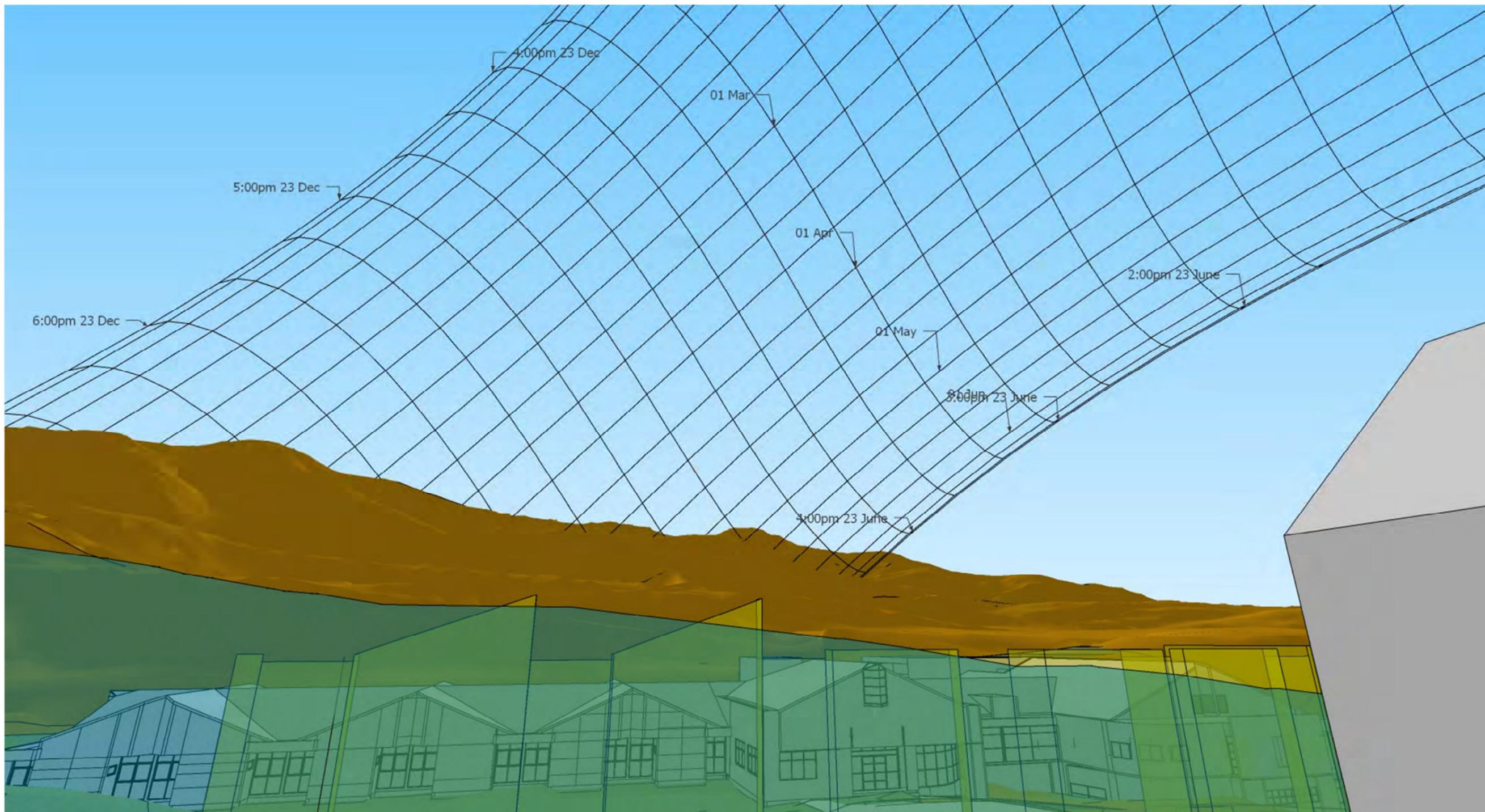


VIEWPOINT 8 – No. 129 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

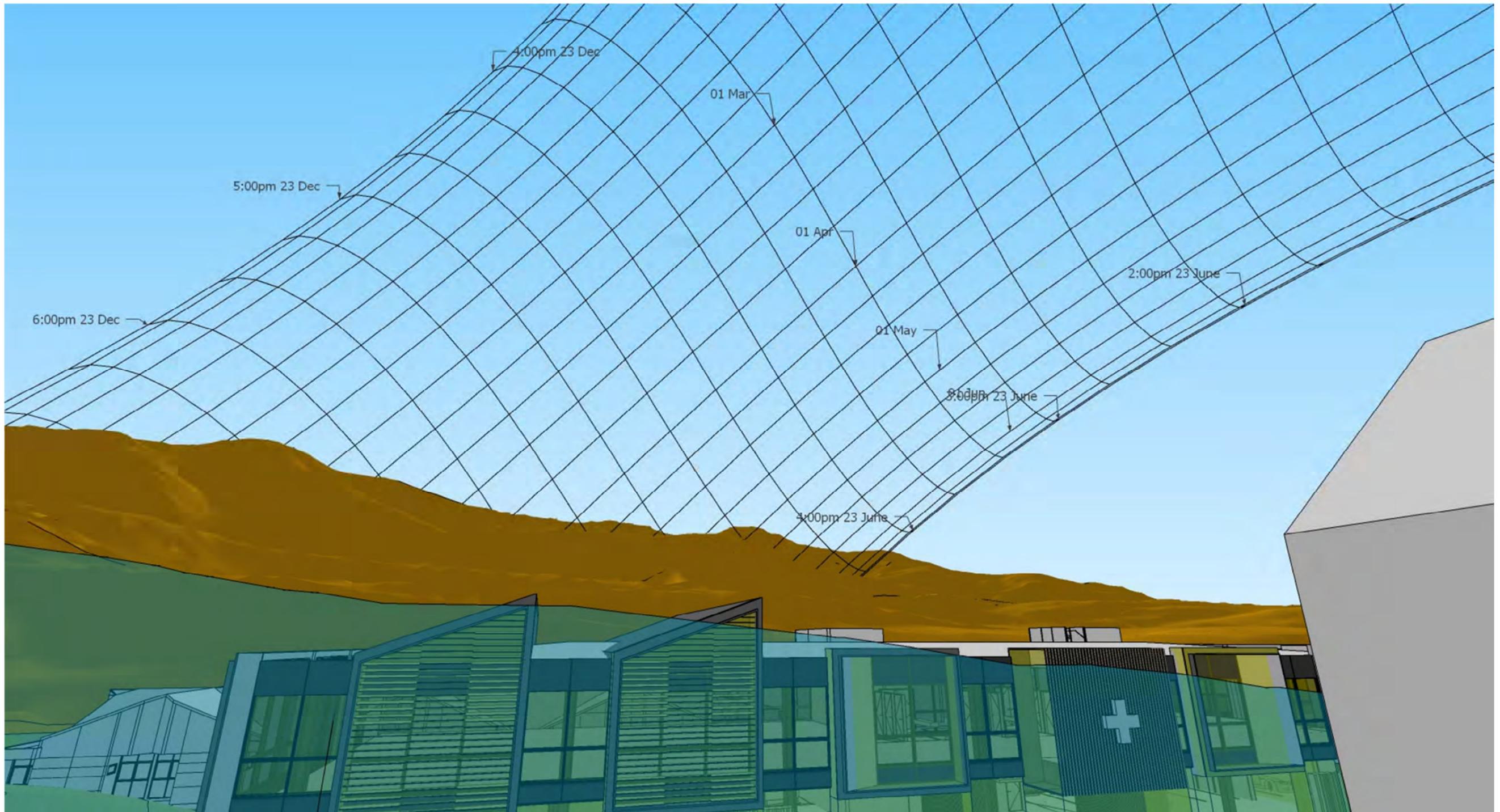
SpencerHolmes

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VIEWPOINT 8 – No. 129 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL

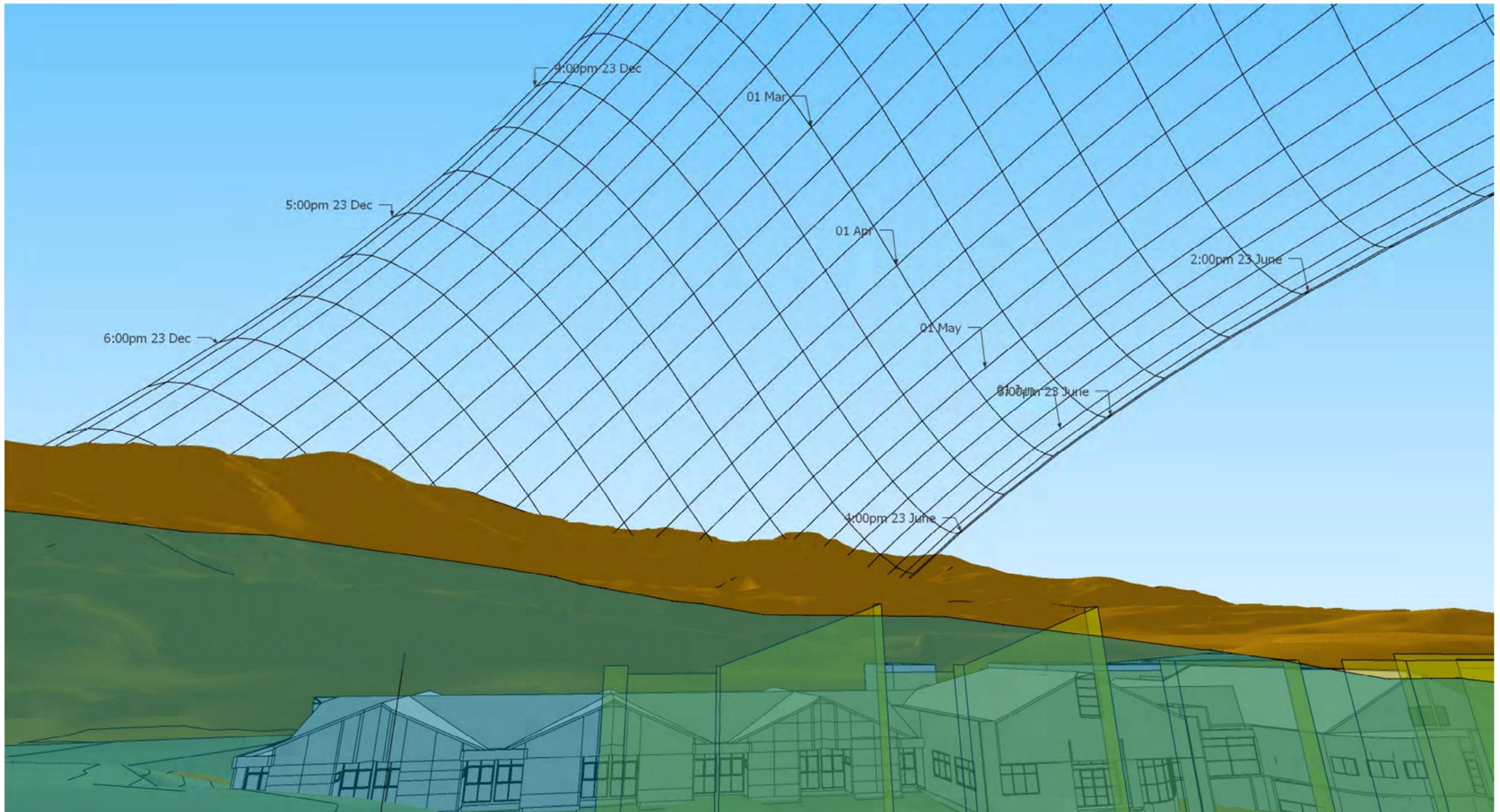


VIEWPOINT 9 – No. 131 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & OUTLINE OF PROPOSED BUILDING

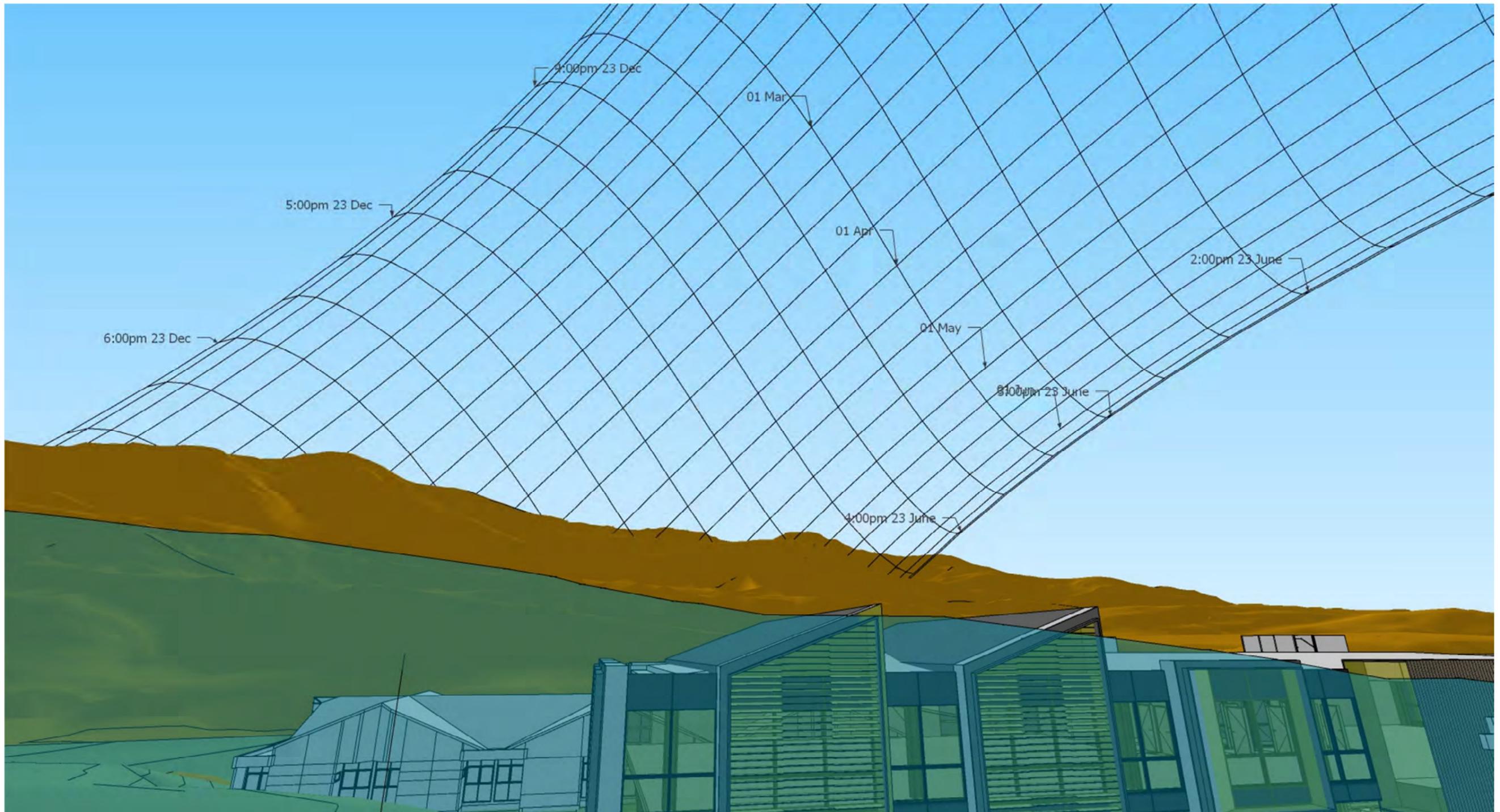
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VIEWPOINT 9 – No. 131 Hanson Street

EXISTING BUILT ENVIRONMENT, BACKGROUND HILLS & PROPOSED BUILDING WITH ARCHITECTURAL DETAIL



ATTACHMENT 3

- Sun Loss Duration Tables

DURATION OF SUN LOSS

Viewpoint 1 – No 115 Hanson St				
(Expressed as h:mm)	Building mass above 9m		Building mass below 9m	
Date	Time of day	Duration	Time of day	Duration
23 Dec	-	-	18:30-18:40	0:10
01 Jan	-	-	18:30-18:40	0:10
15 Jan	-	-	-	-
01 Feb	-	-	-	-
15 Feb	-	-	-	-
01 March	-	-	-	-
15 March	-	-	-	-
01 April	-	-	-	-
15 April	-	-	-	-
01 May	-	-	-	-
15 May	-	-	-	-
01 June	-	-	-	-
23 June	-	-	-	-

Viewpoint 2 – No 117 Hanson St				
(Expressed as h:mm)	Building mass above 9m		Building mass below 9m	
Date	Time of day	Duration	Time of day	Duration
23 Dec	-	-	18:00-18:40	0:40
01 Jan	-	-	18:00-18:40	0:40
15 Jan	-	-	18:00-18:30	0:30
01 Feb	-	-	18:05-18:25	0:20
15 Feb	-	-	18:05-18:20	0:15
01 March	-	-	-	-
15 March	-	-	-	-
01 April	-	-	-	-
15 April	-	-	-	-
01 May	-	-	-	-
15 May	-	-	-	-
01 June	-	-	-	-
23 June	-	-	-	-

Viewpoint 3 – No 119 Hanson St				
(Expressed as h:mm)	Building mass above 9m		Building mass below 9m	
Date	Time of day	Duration	Time of day	Duration
23 Dec	17:50-18:10	0:20	18:10-18:40	0:30
01 Jan	17:50-18:10	0:20	18:10-18:40	0:30
15 Jan	17:50-18:10	0:20	18:10-18:30	0:20
01 Feb	17:40-18:00	0:20	18:00-18:20	0:20
15 Feb	-	-	17:50-18:20	0:30
01 March	-	-	17:50-18:10	0:20
15 March	-	-	-	-
01 April	-	-	-	-
15 April	-	-	-	-
01 May	-	-	-	-
15 May	-	-	-	-
01 June	-	-	-	-
23 June	-	-	-	-

Viewpoint 4 – No 121 Hanson St				
(Expressed as h:mm)	Building mass above 9m		Building mass below 9m	
Date	Time of day	Duration	Time of day	Duration
23 Dec	17:30-17:50	0:20	17:50-18:40	0:50
01 Jan	17:30-17:50	0:20	17:50-18:40	0:50
15 Jan	17:30-17:40	0:10	17:40-18:30	0:50
01 Feb	17:30-17:35	0:05	17:35-18:20	0:45
15 Feb	17:00-17:20	0:20	17:20-18:20	1:00
01 March	16:40-17:00	0:20	17:00-18:00	1:00
15 March	16:30-16:40	0:10	16:40-17:40	1:00
01 April	-	-	16:50-17:20	0:30
15 April	-	-	-	-
01 May	-	-	-	-
15 May	-	-	-	-
01 June	-	-	-	-
23 June	-	-	-	-

Viewpoint 5 – No 123 Hanson St				
(Expressed as h:mm)	Building mass above 9m		Building mass below 9m	
Date	Time of day	Duration	Time of day	Duration
23 Dec	-	-	18:20-18:30	0:10
01 Jan	-	-	18:20-18:30	0:10
15 Jan	-	-	18:25-18:35	0:10
01 Feb	18:00-18:05	0:05	18:05-18:20	0:15
15 Feb	17:40-17:50	0:10	17:50-18:20	0:30
01 March	17:30-17:35	0:05	17:35-18:00	0:25
15 March	-	-	17:10-17:40	0:40
01 April	16:35-16:50	0:15	16:50-17:20	0:30
15 April	16:20-16:30	0:10	16:30-16:50	0:20
01 May	15:40-16:00	0:20	16:00-16:30	0:30
15 May	15:30-15:50	0:20	15:50-16:20	0:30
01 June	15:20-15:40	0:20	15:40-16:10	0:30
23 June	15:20-15:40	0:20	15:40-16:10	0:30

Viewpoints 6, 7, 8 & 9

These viewpoints are elevated such that the sun sets behind the western hills and the proposed building does not impact the sun's path.