

## **APPENDIX 9**

### **Overshadowing Analysis**



# RESPONSE TO THE GATEWAY DETERMINATION

## 51 HENRY STREET PENRITH

04/2019 | Project No. 15-177

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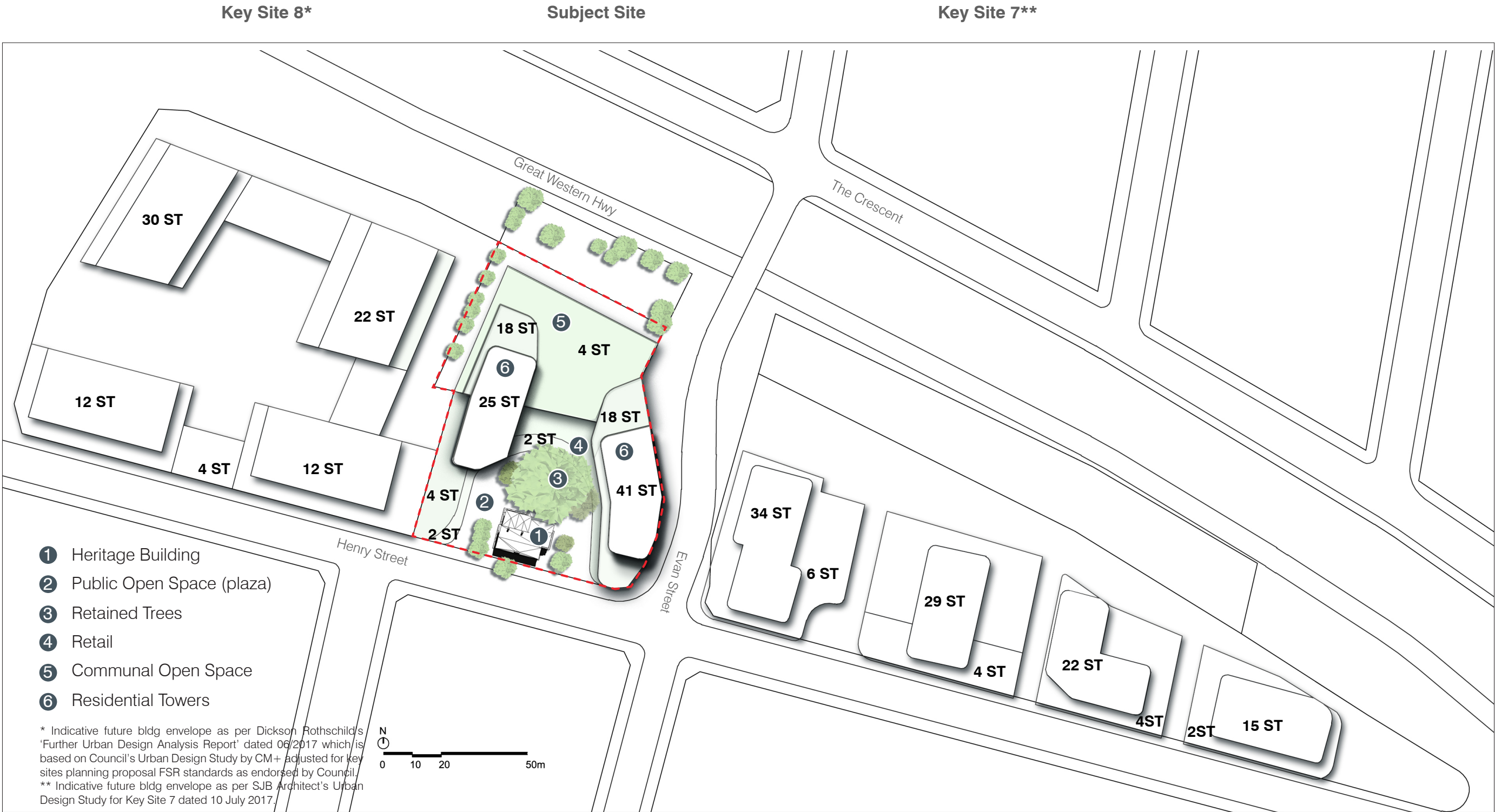
Purpose of this Report

This report is provided to respond to Council’s request for additional information following the Gateway Determination dated 26 October 2018 for 51 Henry Street, Penrith (Department Ref: PP\_2018\_PENRI\_002\_00) focusing on solar access to the central open space and heritage item of the subject site.

This report provides a comparison of the current indicative concept building envelope design which supports the planning proposal, a base-line indicative concept building envelope design which reflects the existing LEP controls and an alternative planning proposal indicative building envelope design seeking to provide solar access to the central open space and heritage item of the subject site from 12 p.m. to 2 p.m. at midwinter.

This report provides an hour-by-hour shadow analysis of each scheme and sets out the costs and benefits of seeking to require solar access to the central open space and heritage item between 12 p.m. and 2 p.m. at midwinter.

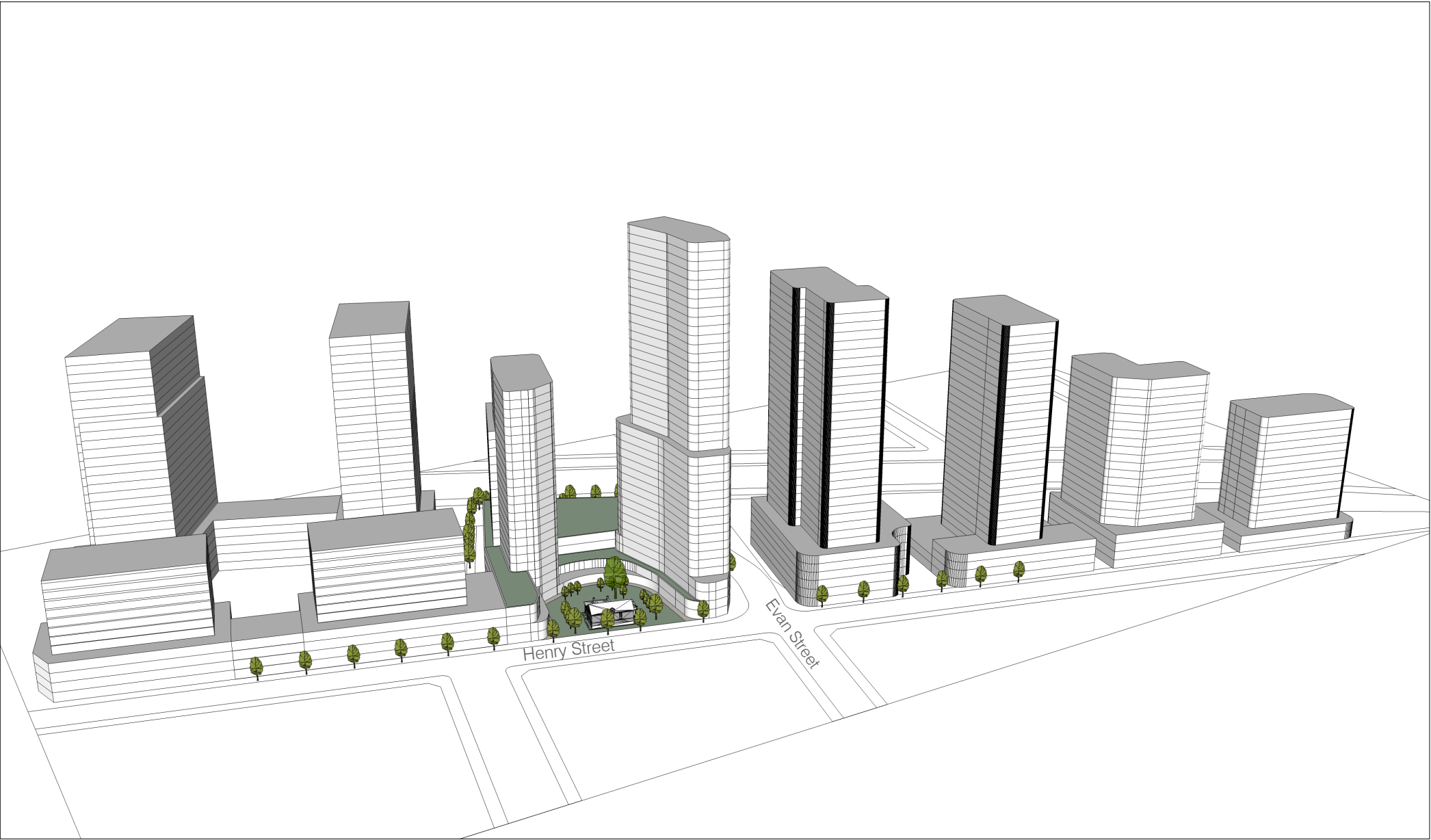




Key Site 8

Subject Site

Key Site 7



**Current Planning Proposal Indicative Concept Plan**

The Planning Proposal for the subject site which has received a Gateway Determination is supported by an indicative building envelope plan.

The indicative building envelope plan situates built form to achieve the following key urban design objectives:

- 1. provide a low backdrop to the heritage item at the centre of the site;
- 2. ensure tower lengths are not excessive;
- 3. achieve reasonable tower separations; and
- 4. allow for a landmark treatment to the prominent corner of Henry Street and Evan Street.

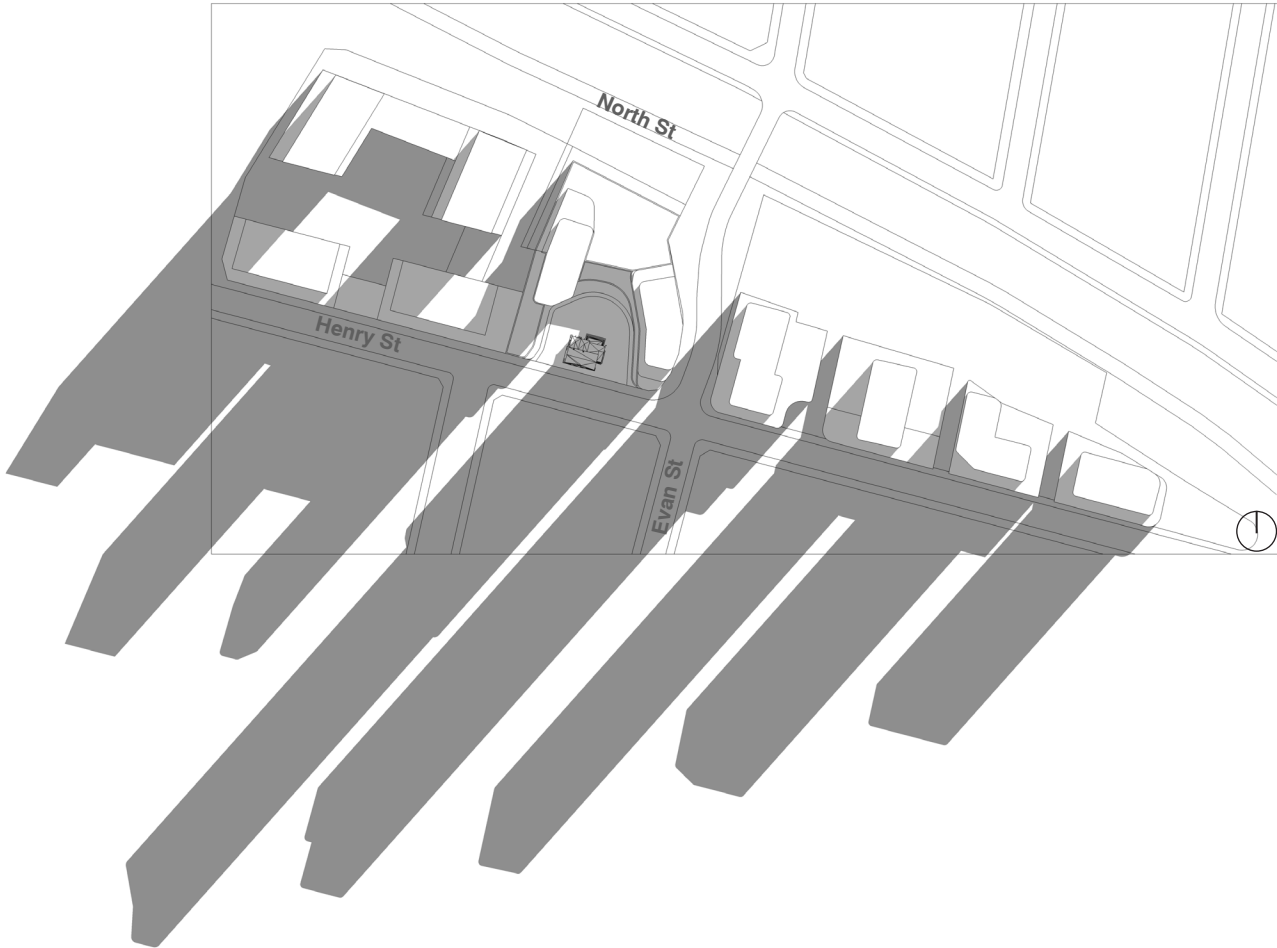
This approach has been developed in consultation with a heritage specialist and previously supported by Council.

The site plan and 3D massing includes an indicative future built form for adjacent Key Site 7 and Key Site 8 to demonstrate the proposal within its potential future context. The indicative future building envelope for Key Site 7 (east of the subject site) is as per SJB’s ‘Henry Street Penrith Urban Design Study, 39-45 Henry Street & 47-49 Henry Street’, dated 10 July 2017. The indicative future building envelope shown for Key Site 8 is as per Dickson Rothschild’s ‘Further Urban Design Analysis Report’ dated 06/2017 which is based on Council’s Urban Design Study by CM+ for adjusted for the key sites planning proposal FSR standards as endorsed by Council.

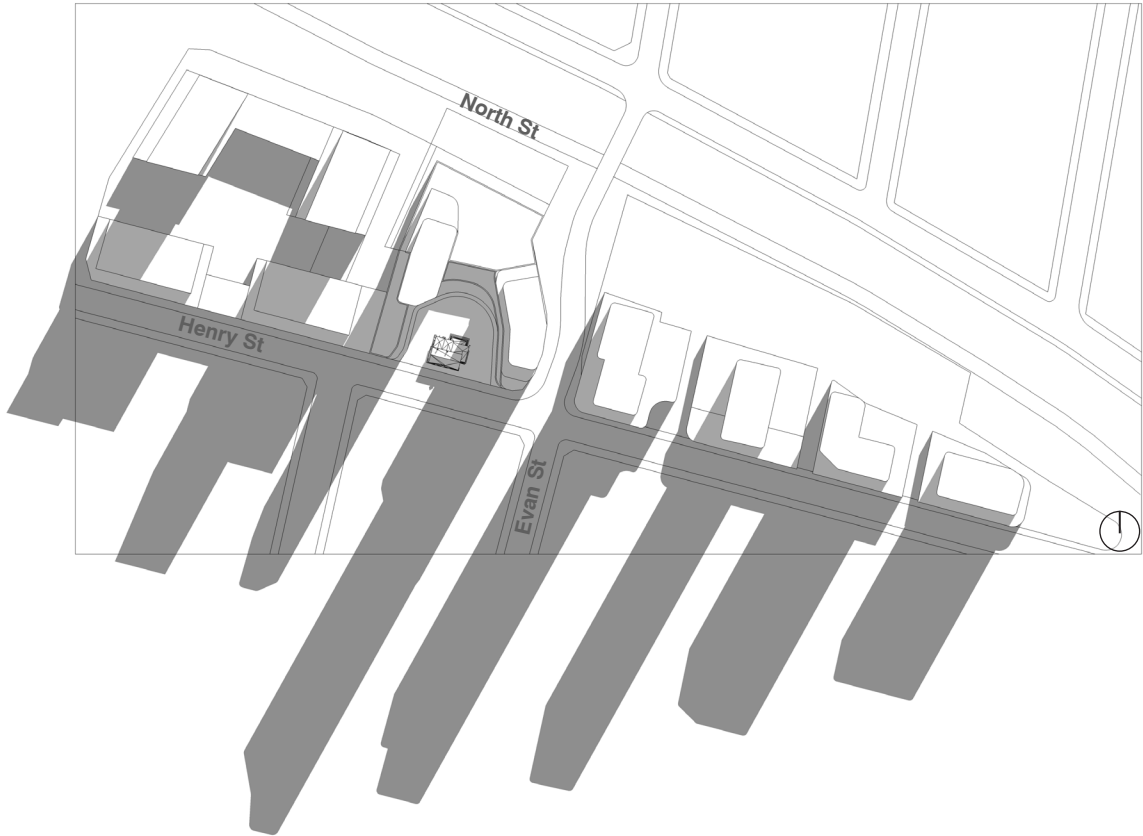
The proposed indicative envelopes indicate the compatibility of the proposal within its future context. This also allows for a shadow analysis that takes into consideration potential impacts on and from neighbouring sites.

Shadow Analysis - Planning Proposal Scheme

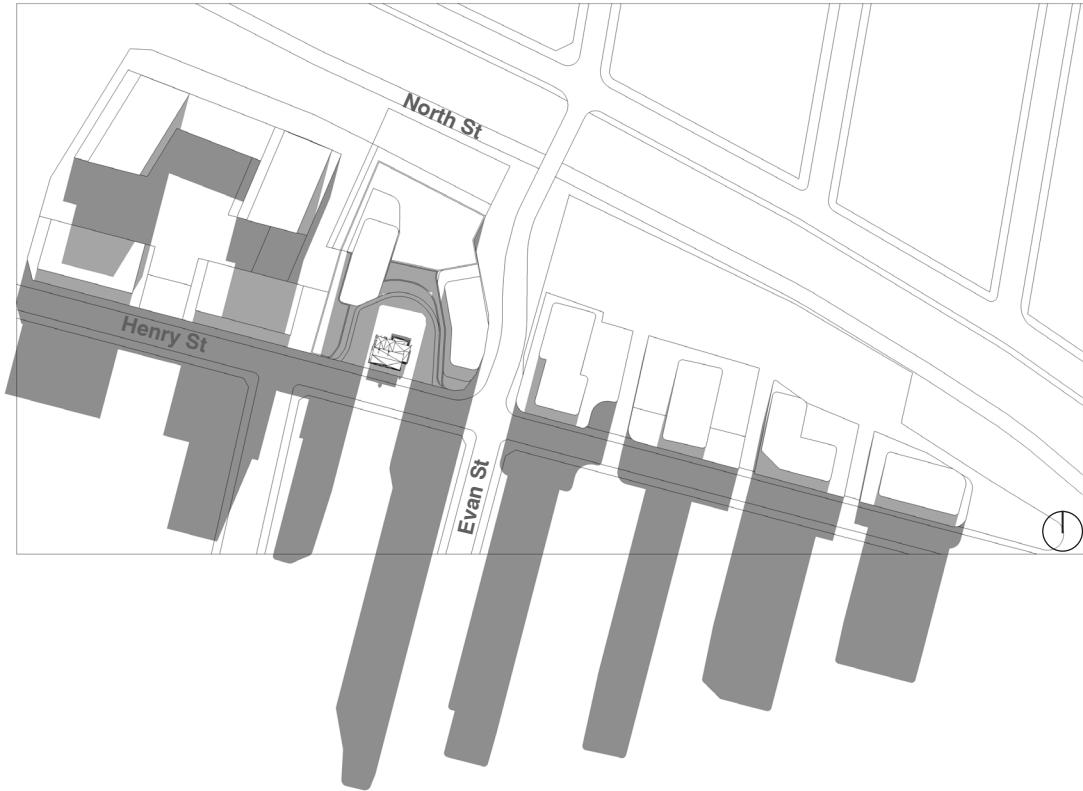
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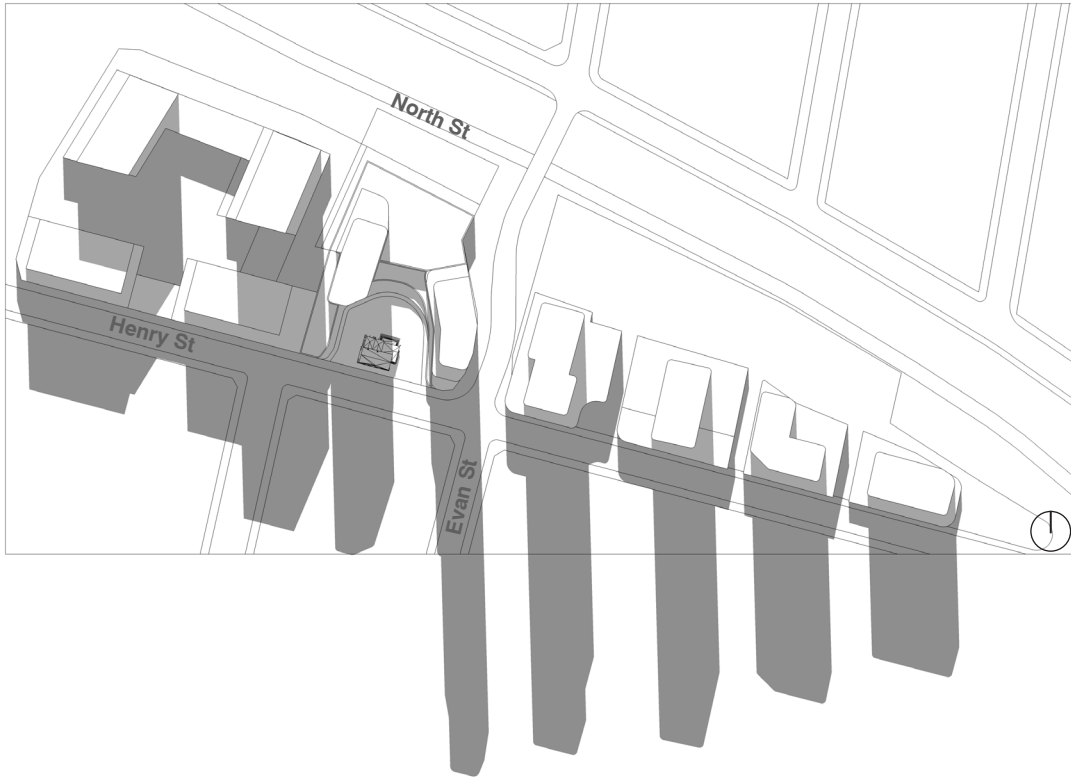
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11:00am on 21 June

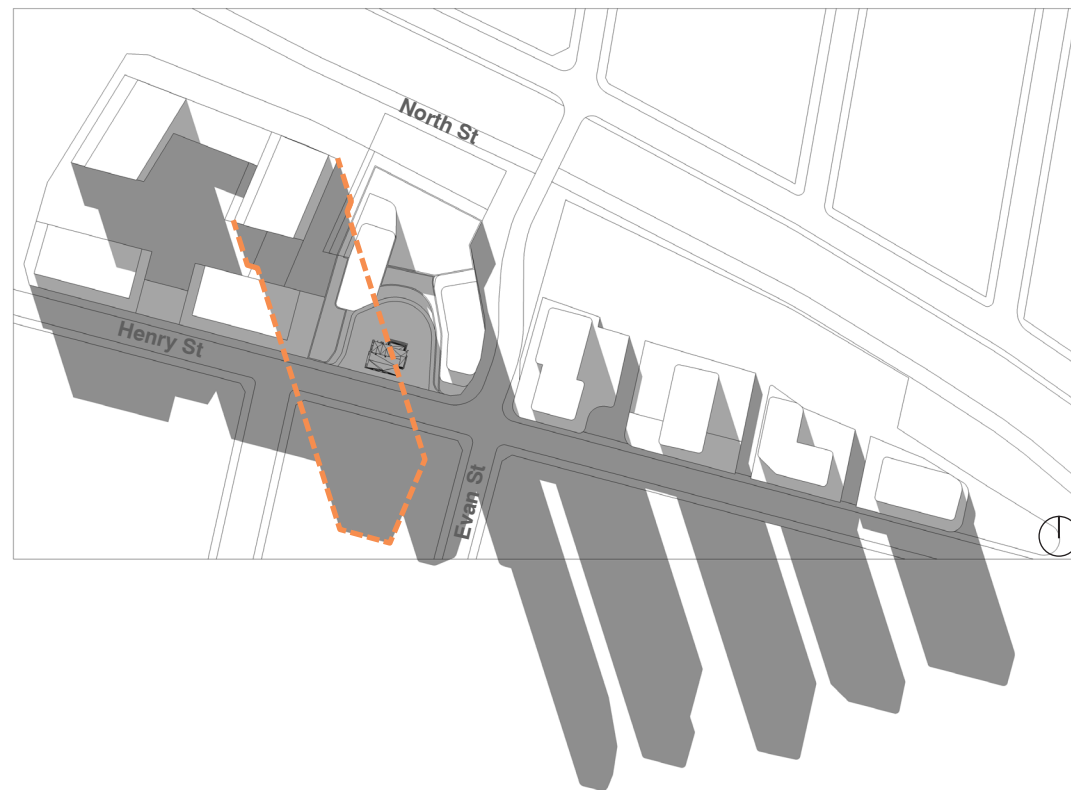


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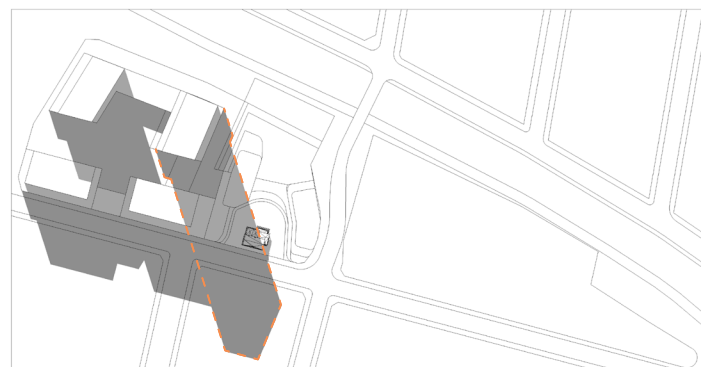




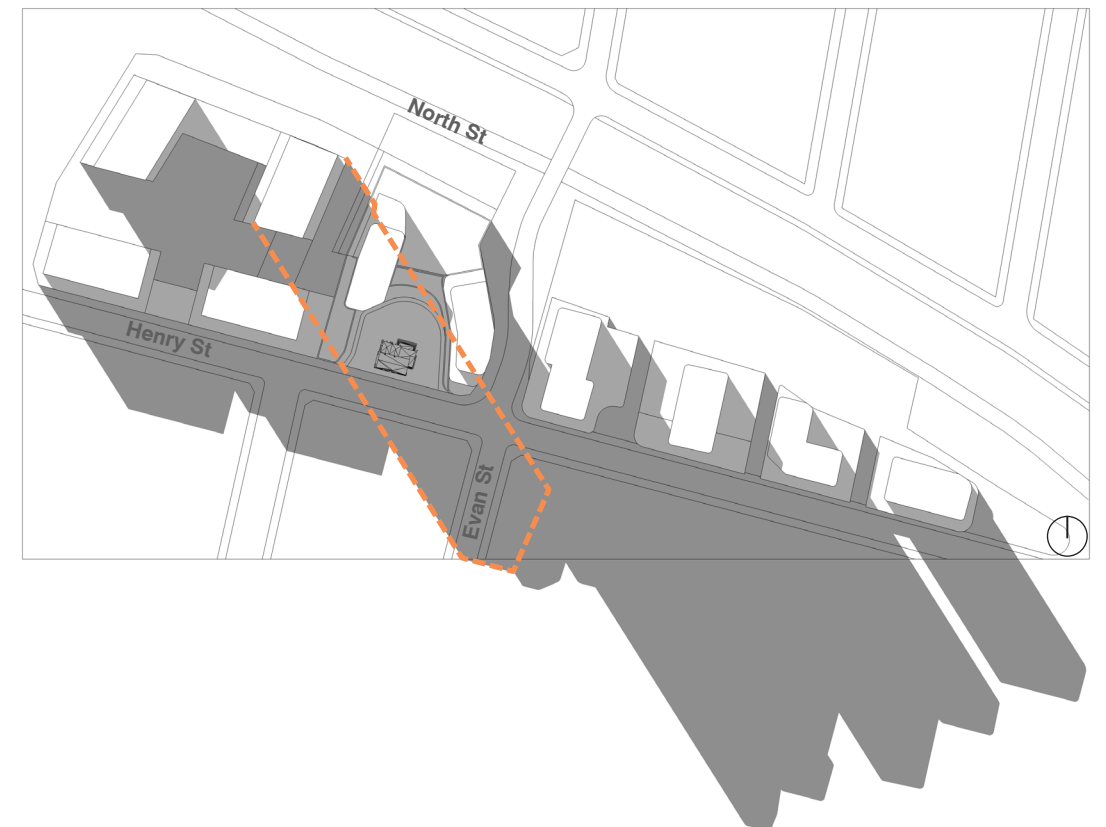
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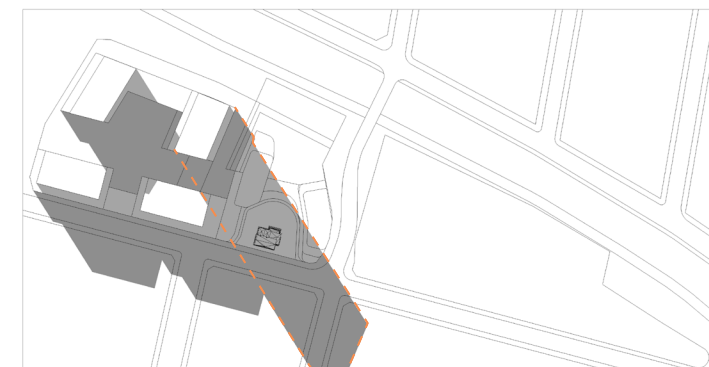
Shadow from Key Site 8



02:00pm on 21 June



Shadow from Key Site 8



03:00pm on 21 June



Shadow from Key Site 8



Summary of Shadow Analysis \_ Current Planning Proposal Scheme

The overshadowing diagrams indicate the following:

- 1. Key Site 7 has no material shadow impact on the subject site with the shadow clipping the south eastern corner of the subject site at 9 a.m. in midwinter. The shadow quickly moves away from the subject site.
- 2. The existing subdivision pattern is not oriented to true north. Therefore, the two tower arrangement with a gap at the centre of the site favours solar access to the heritage item and surrounds in the morning rather than the afternoon. The proposed westernmost tower is positioned to have an appropriate setback to Henry Street, maintain a visual distance from the heritage item and provide for a low scale backdrop to the heritage item at the centre of the site, while allowing the solar access enjoyed in the morning hours to just past 12 p.m.
- 3. The current preferred building envelope on the subject site provides good solar access to the heritage building and its surrounding open space, achieving at least some solar access to the heritage item from 9 a.m. to 12 p.m. on 21 June or 3 hours of solar access. At least 25% of the open space achieves solar access from just after 9 a.m. to between 12 p.m. and 1 p.m. or at least 3 hours of solar access.
- 4. Key Site 8 is positioned northwest of the subject site so overshadowing occurs from 12 p.m. Future built form on Key Site 8 is very likely to give rise to overshadowing to the heritage building and its surrounding open space on the subject site beginning shortly after 12 p.m. By about 1:30 p.m. there will be no sunlight to the heritage item and very negligible solar access to the open space. The heritage item and open space are completely overshadowed by 2 p.m. as is a portion of the easterly tower on the subject site.
- 5. Importantly, the current planning proposal concept does not require any restrictions on where building envelopes can be located at Key Site 8 in order to achieve good solar amenity to the heritage item and open space. The proposed western tower on the subject site effectively sits within the shadow profile of future built form on Key Site 8 in the afternoon.

## Existing LEP Indicative Concept Plan

Responding to the Gateway Determination Condition 1(d)(i), a concept scheme has been prepared based on the existing planning controls, which are a land zoning of B3, an FSR 4:1 and a Height of Buildings standard of 32 m for the northern portion of the site and 12 m for the southern portion of the site.

The DCP requires a 3.3 m ceiling height for commercial space so that the allowable number of storeys is 3 storeys fronting Henry Street and 9 storeys fronting Great Western Highway.

Above ground parking (floor area of 1,736m<sup>2</sup>) is proposed at the northwest to reduce basement levels, similar to the planning proposal indicative concept design.

The indicative building envelope of the towers responds to the commercial use with the floor plate of the western tower at 1,183m<sup>2</sup> and eastern tower at 932m<sup>2</sup>. Building separation is 18m.

The GFA calculation is based on building envelope-to-GFA ratios of 85% for commercial premises as per Part 2D of the ADG. The GFA is 22,166 m<sup>2</sup> excluding ground level parking. Given the site area is 7,358 m<sup>2</sup>, the proposed FSR is 3.0:1, which is lower than the LEP 4.0:1 ratio. This indicates that there is a mismatch between the Height and FSR controls for the site under the current LEP. This is unsurprising given the height restriction for half of the site and the appropriateness of providing a curtilage to the heritage item.

## Project Summary

Site area: 7,358 m<sup>2</sup>

Proposed FSR: 3.0:1

Available GFA: 22,166 m<sup>2</sup>

## Yield Summary

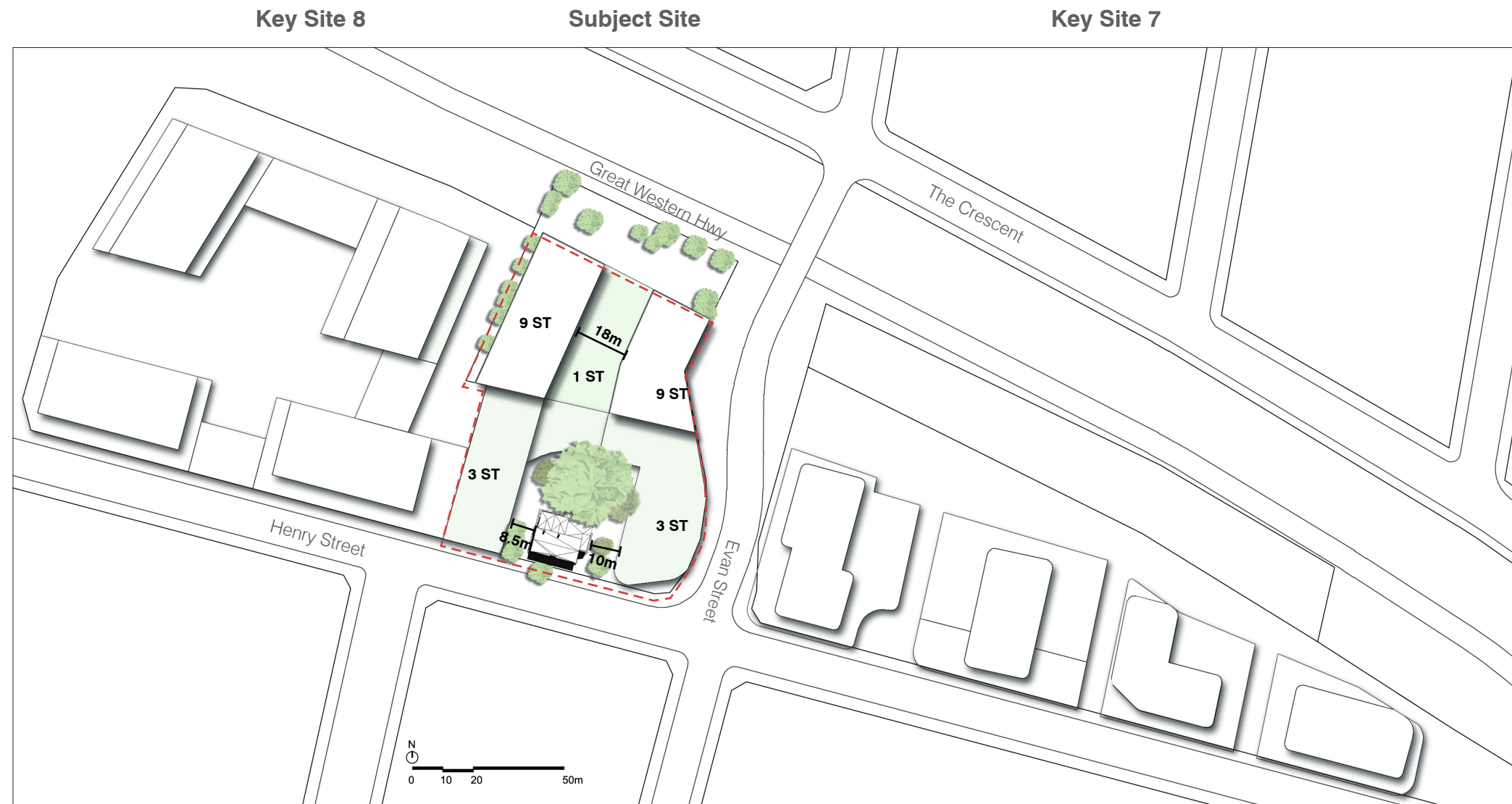
Total Non- Residential Floor Space: 22,166 m<sup>2</sup>

Total Residential Floor Space: Nil

- ① Heritage Building
- ② Public Open Space (plaza)
- ③ Retained Trees
- ④ Commercial Office
- ⑤ On Grade Parking







The indicative building envelopes are reasonable in building depth and building separation and suitable for providing a base-line for considering shadow impacts.

The indicative plan situates built form to achieve the following key urban design objectives:

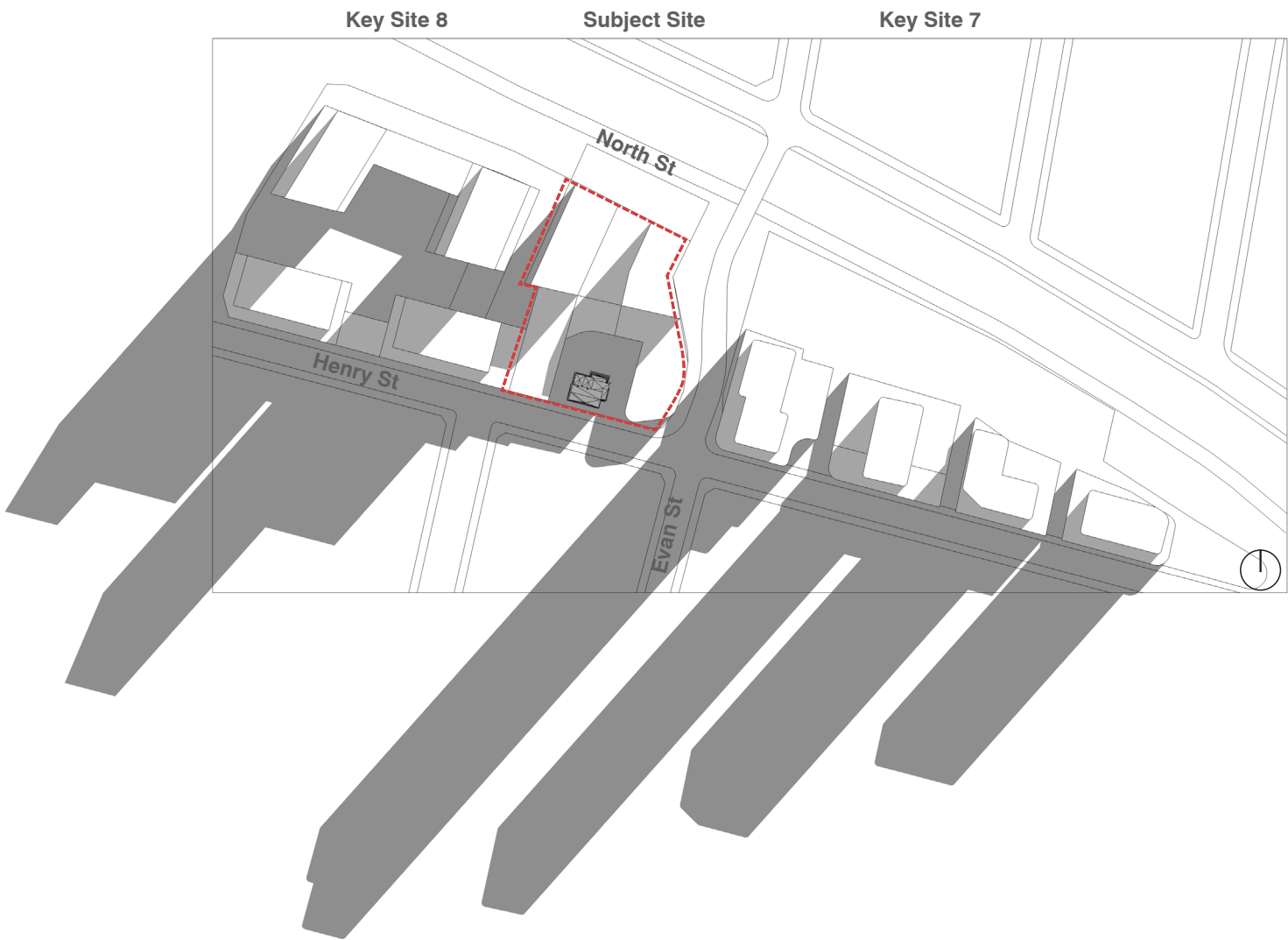
1. Reasonable separation to Heritage Item;
2. Efficient floor plate area for commercial office space;
3. Adequate building separation between two office towers to provide amenity.
4. Adequate building separation between two towers to maintain 'low scale backdrop' to heritage item at the centre of the site as per the previous comments of Council's urban designer related to heritage character for the site.
5. A plan with a curtilage to the existing heritage item similar to what is proposed within the planning proposal.

This study has provided a detailed hour by hour shadow analysis at midwinter taking into account the future site context of Key Site 7 and 8.

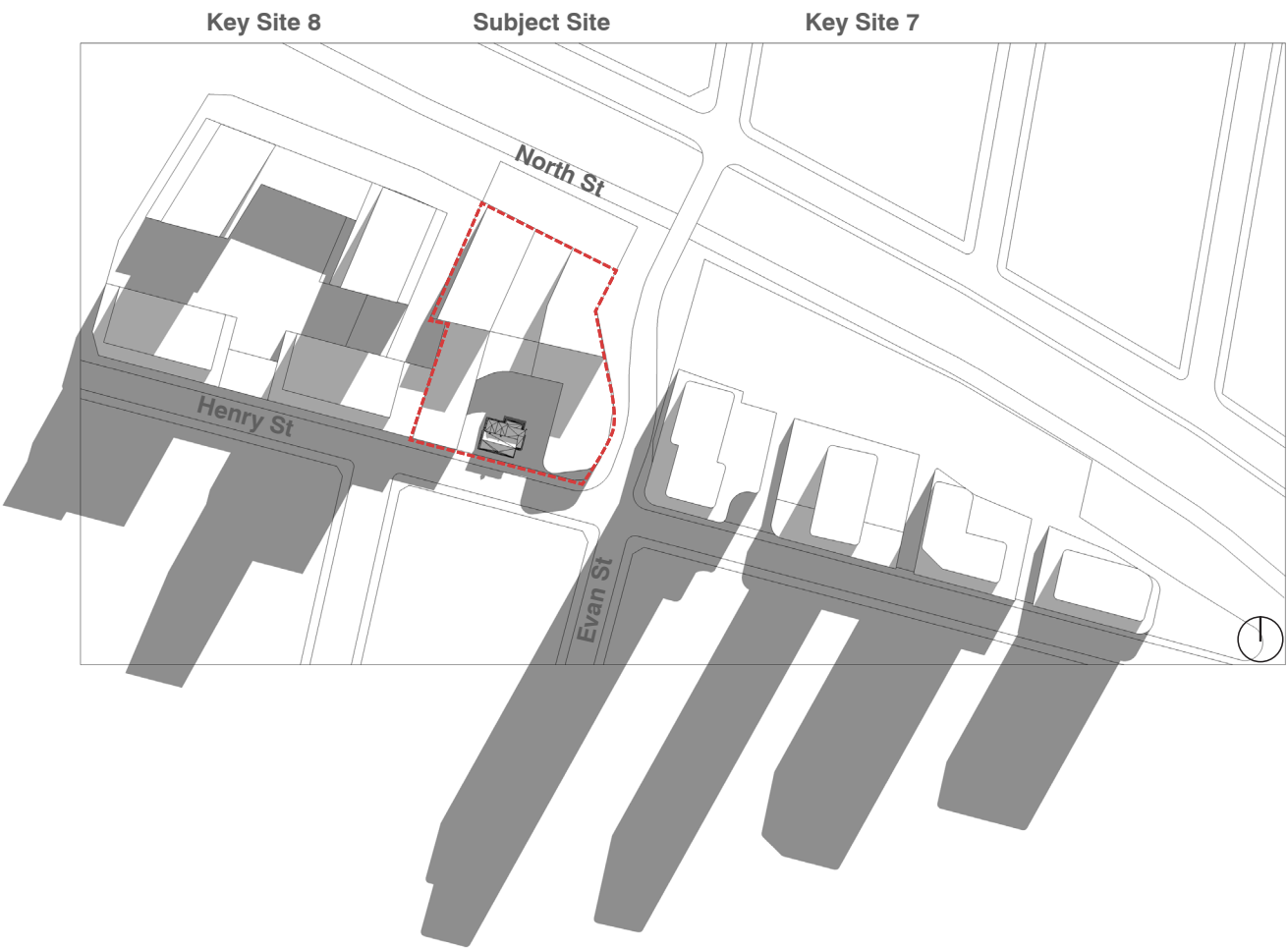


Shadow Analysis - Existing LEP Scheme

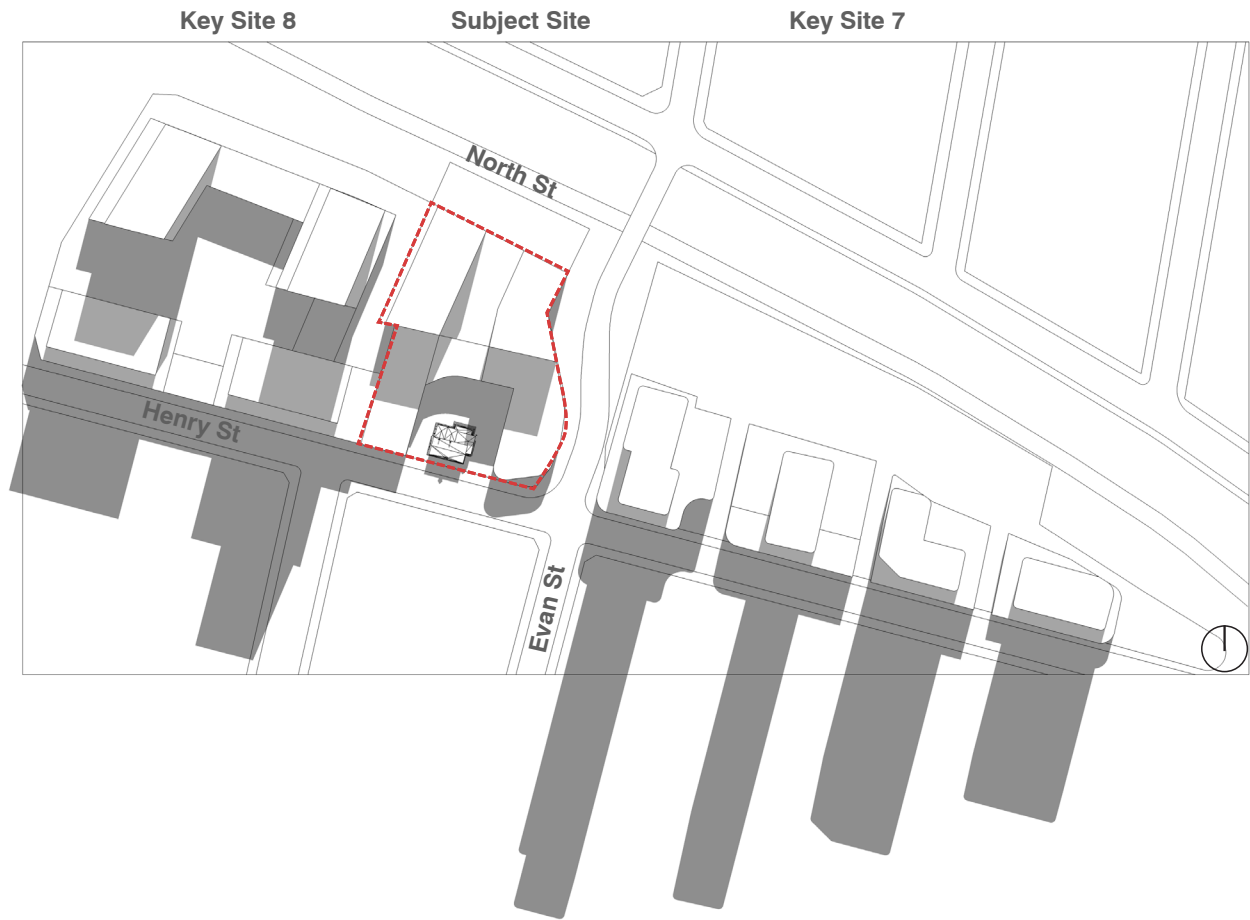
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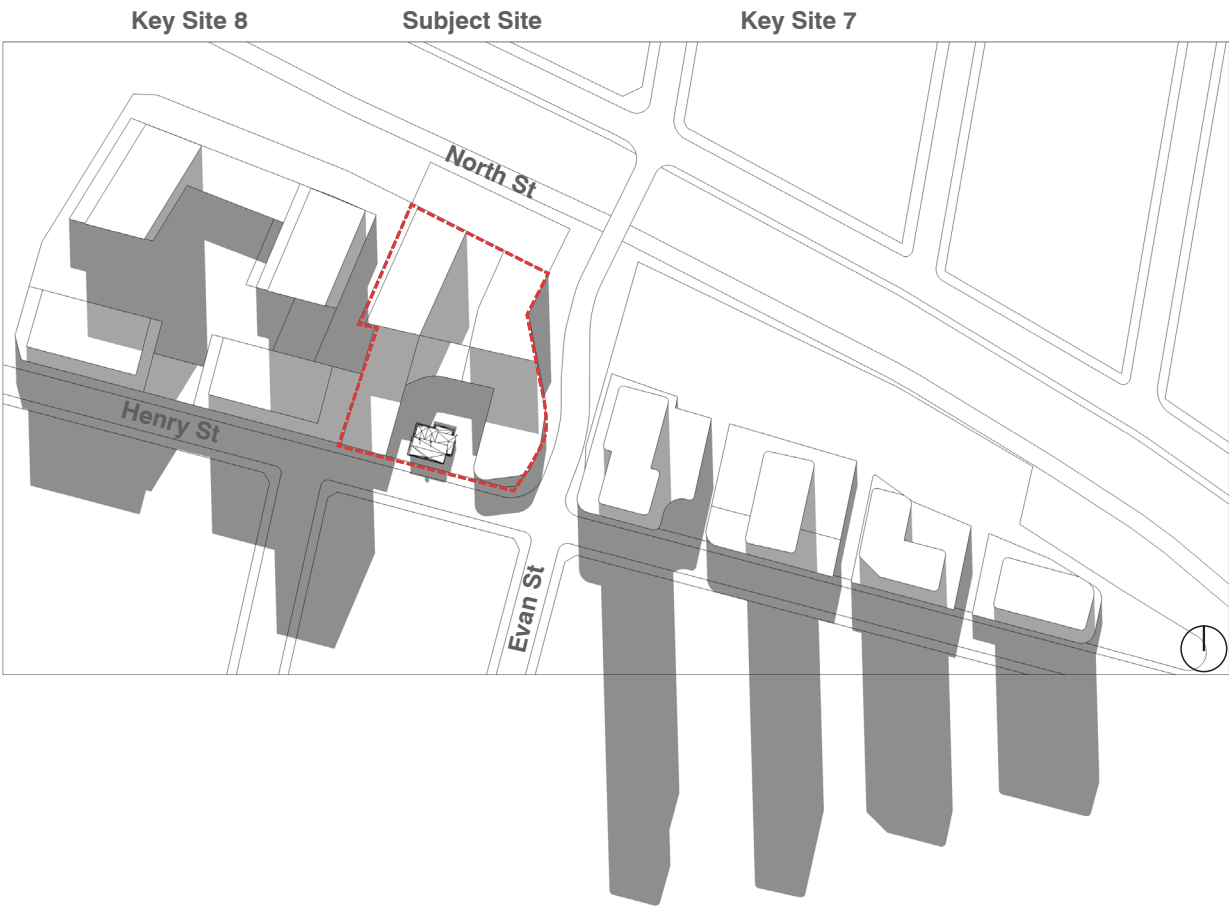
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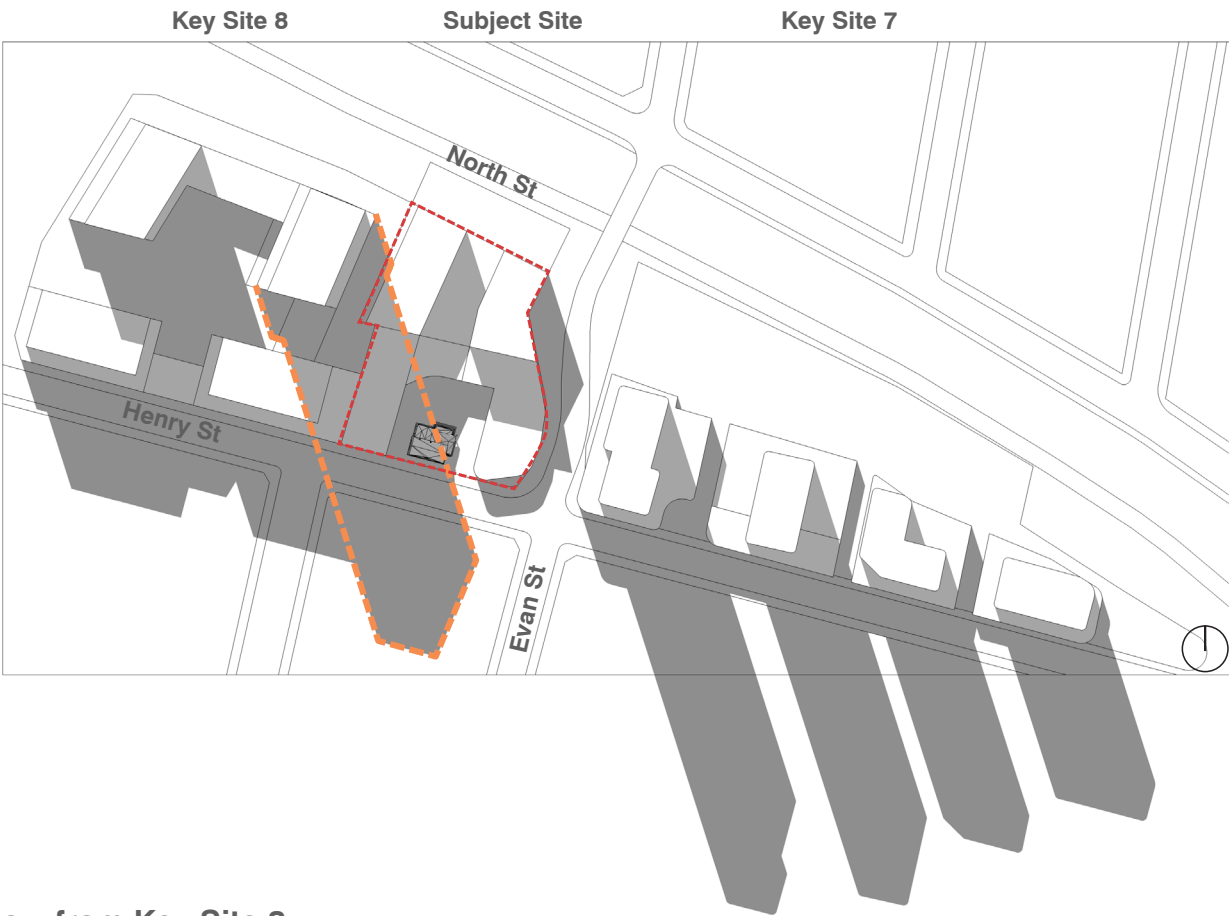
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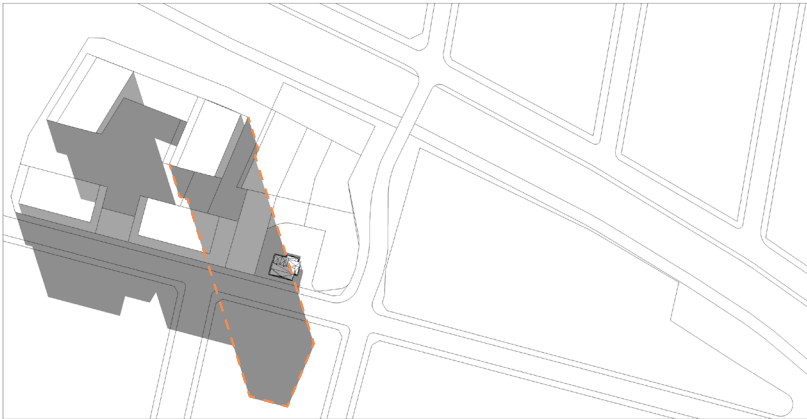
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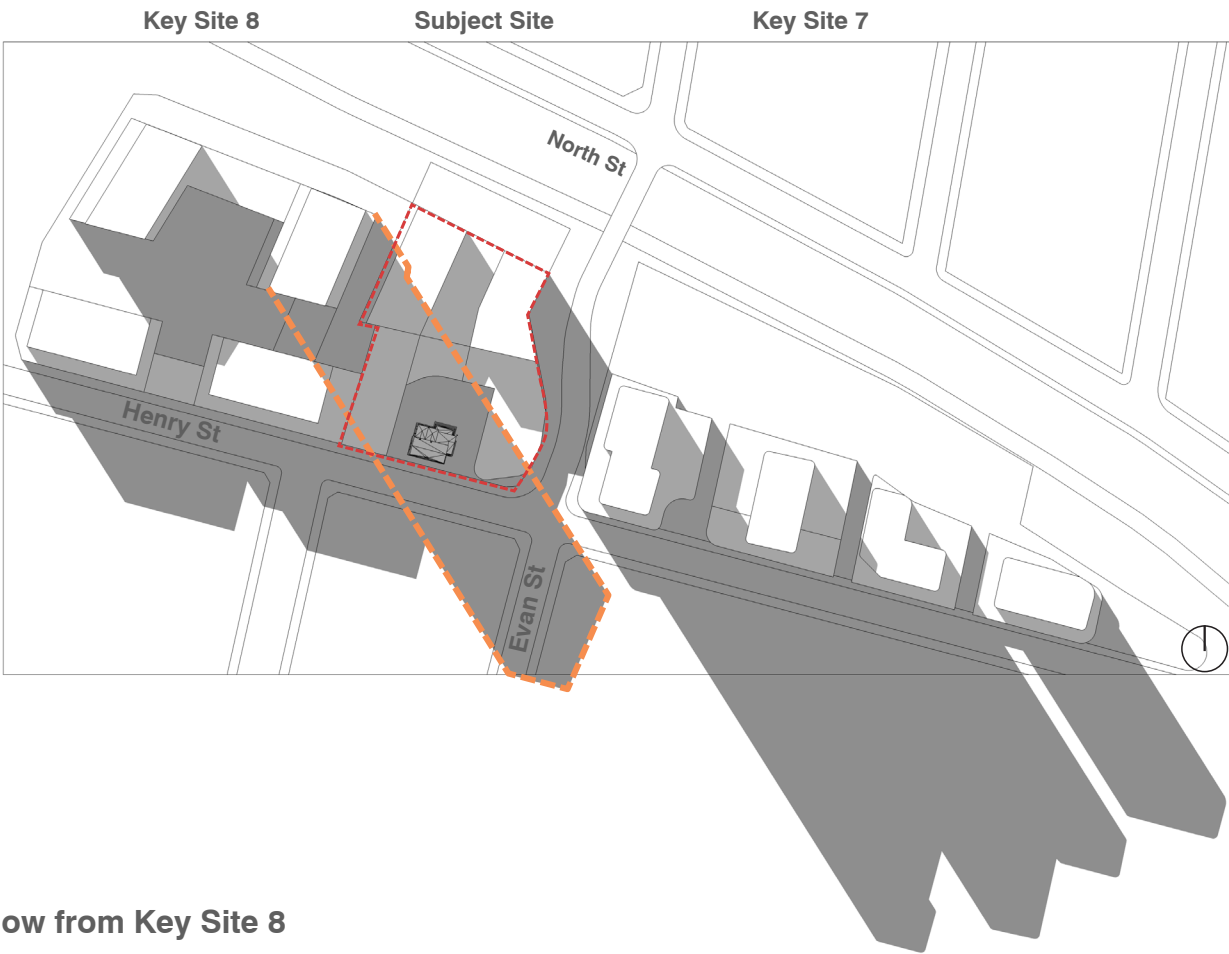
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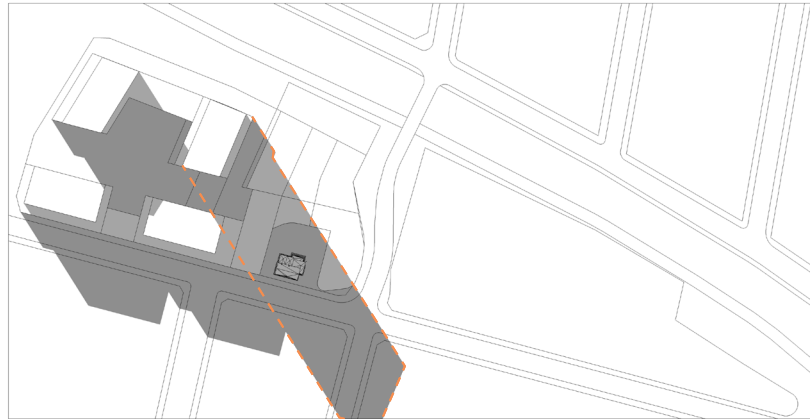
Shadow from Key Site 8



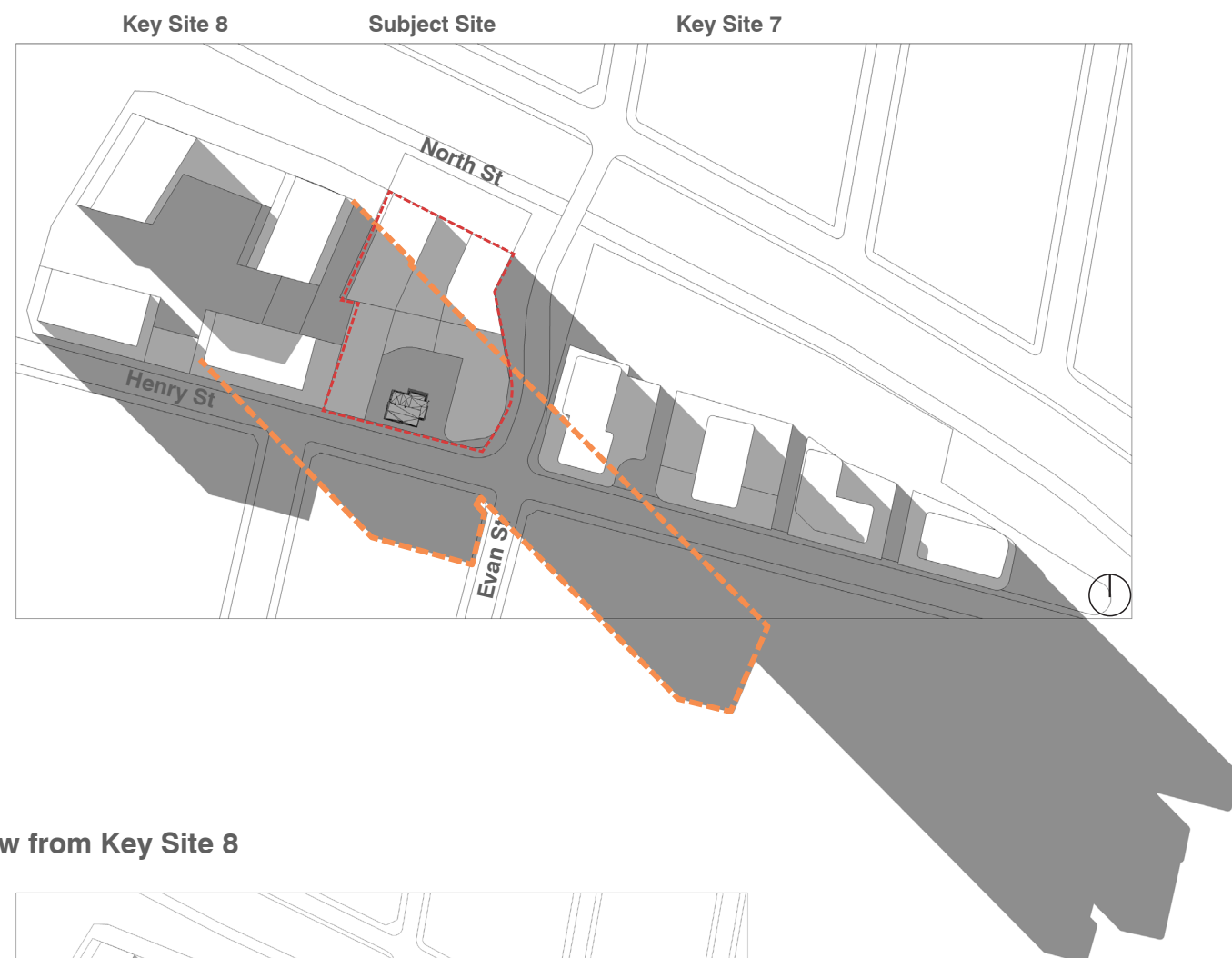
02:00pm on 21 June



Shadow from Key Site 8



03:00pm on 21 June



### Shadow from Key Site 8



### Summary of Shadow Analysis \_ Existing LEP Scheme

The analysis demonstrates the following:

1. Key Site 7 has no material shadow impact on the subject site with the shadow only clipping the south eastern corner of the subject site at 9 a.m. in midwinter. The shadow quickly moves away from the subject site
2. The current LEP controls limit solar access to the heritage item and its surrounding open space in the morning due to the HOB controls pushing the taller building elements to the north eastern and north western parts of the site.
3. By 11 a.m. about 25% of the heritage item and its surrounding open space is in sunlight.
4. By 12 p.m. just under 50% of the heritage item and its surrounding open space is in sunlight.
5. Between 12 p.m. and 1 p.m. the northwestern tower adds shadow to the open space around the heritage item.
6. By 2 p.m. the area is fully in shadow.
7. Key Site 8 is positioned northwest of the subject site so overshadowing occurs from 12 p.m. Future built form on Key Site 8 is very likely to give rise to overshadowing to the heritage building and its surrounding open space on the subject site beginning shortly after 12 p.m. By about 1:30 p.m. there will be no sunlight to the heritage item and very negligible solar access to the open space. The heritage item and open space are completely overshadowed by 2 p.m. as is a portion of the easterly tower on the subject site.
8. The LEP compliant concept therefore achieves approximately 2 hours of solar access which occurs between 11 a.m. and 1 p.m. at midwinter for the open space. Although solar access does not occur right on the hour it is clear that the heritage item will enjoy solar access between approximately 10:30 a.m. to 12:30 p.m., or 2 hours.
9. Restrictions on where towers can occur on Key Site 8 would need to be implemented to expand solar access for the heritage item and open space closer to 2 p.m.



Alternative Planning Proposal Indicative Concept Plan

This concept scheme is proposed as an alternative building envelope for the Planning Proposal seeking to address Condition 1(d)(ii) of the Gateway Determination, that is a scheme that allows sunlight to the heritage item from 12 p.m. to 2 p.m. in midwinter.

The concept retains the building podium form as proposed in existing Planning Proposal scheme. The northwestern tower massing has been shifted to the northeastern part of the site to open up solar access from 12p.m.

The GFA calculations are based on building envelope-to-GFA ratios which are 85% for commercial premises, and 75% for residential use as per Section 2D of the ADG. The total GFA is 47,830.6 m<sup>2</sup> excluding above ground parking. Given the site area is 7,358 m<sup>2</sup>, the proposed FSR is 6.5:1.

Project Summary

Site area: 7,358 m<sup>2</sup>  
Proposed FSR: 6.5:1  
Available GFA: 47,830.6 m<sup>2</sup>

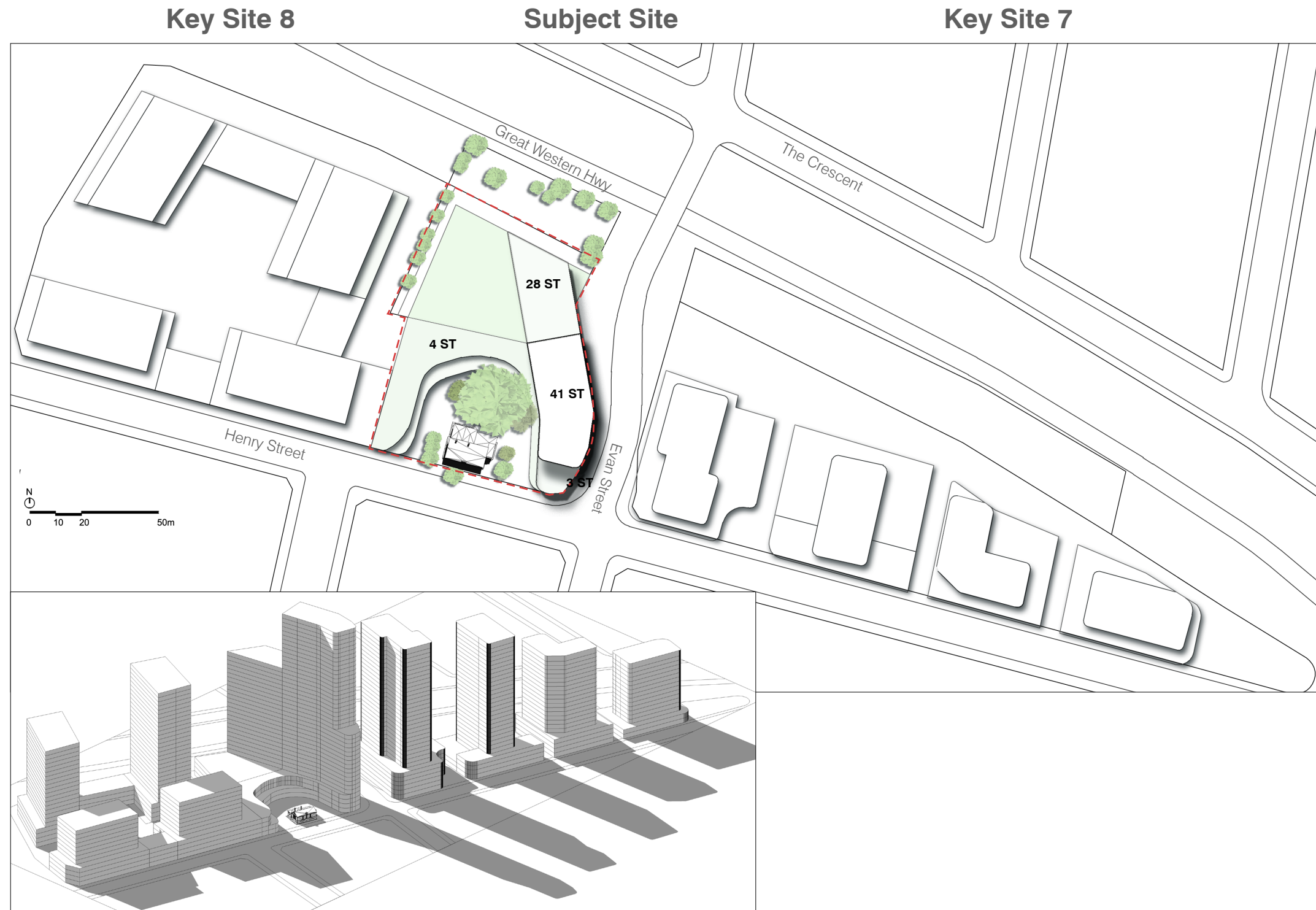
Yield Summary

Total Non- Residential Floor Space: 5,572.6 m<sup>2</sup>  
Total Residential Floor Space: 42,285 m<sup>2</sup>  
Total Residential Units at 80% efficiency: 451 units (75m<sup>2</sup>/ unit)

- 1 Heritage Building
- 2 Public Open Space (plaza)
- 3 Retained Trees
- 4 Commercial Office
- 5 On Grade Parking
- 6 Residential Towers



SHADOW ANALYSIS \_ 51 HENRY STREET, PENRITH



The shadow analysis is undertaken with future built form at Key Site 7 and Key Site 8 to demonstrate overshadowing in the future context.

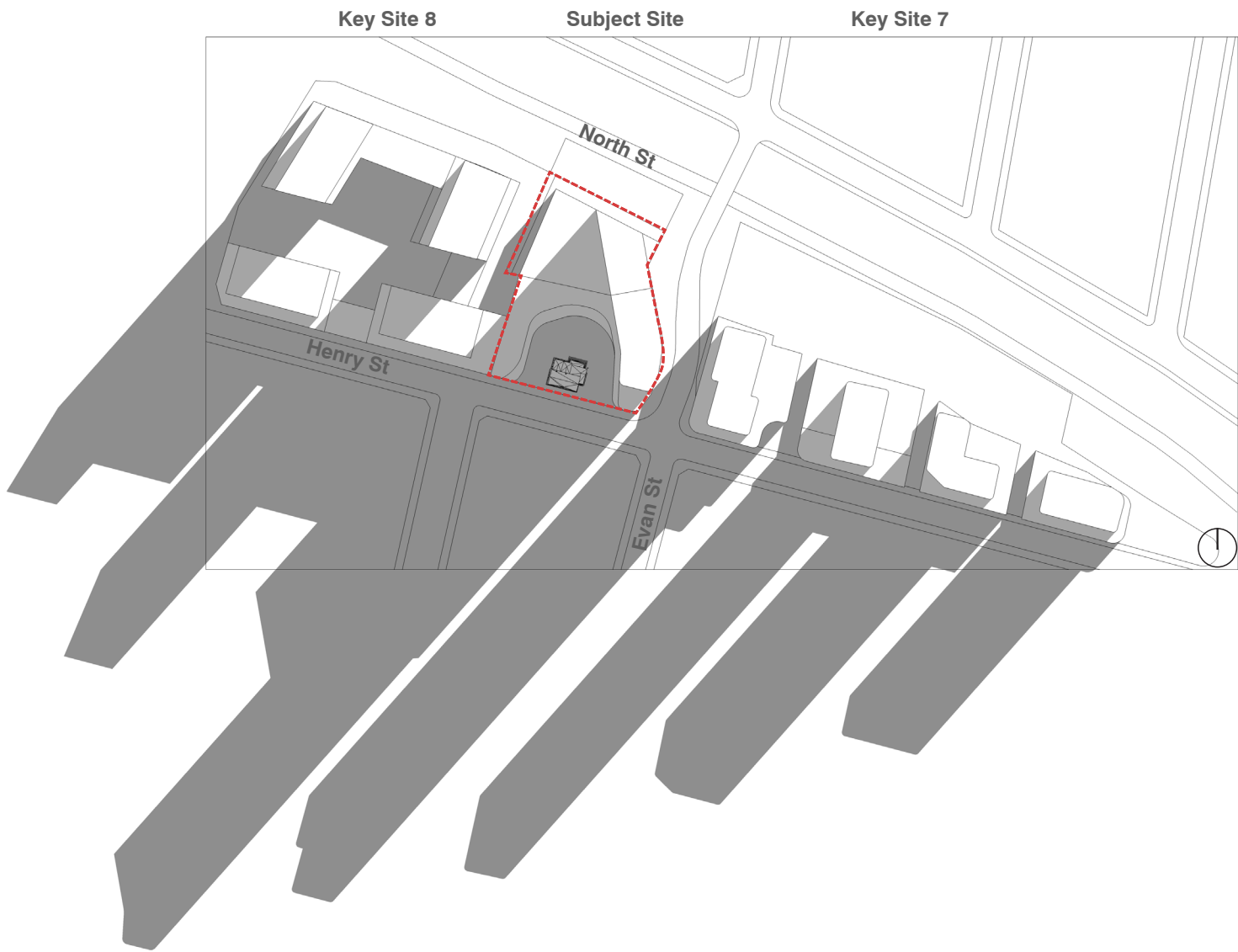
The indicative plan situates built form to achieve the following key urban design objectives:

1. Maintain an orientation to the tower forms to achieve at least 2 hours solar access to apartments in midwinter.
2. Allow solar access beginning at 12 p.m.
3. Maintain podium form near heritage item.
4. Maintain building separation consistent with ADG visual privacy criteria.

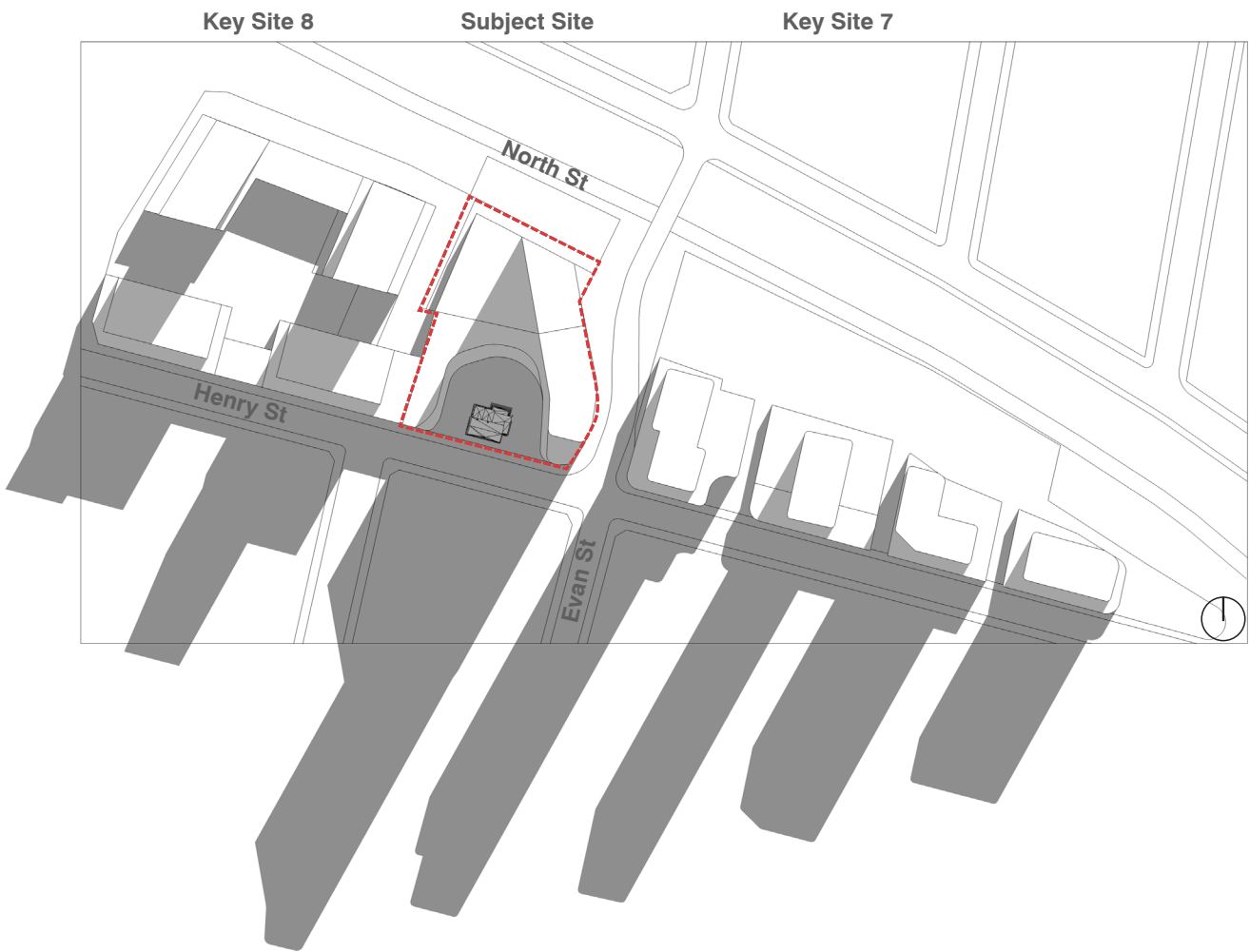
The width of the site and position of the heritage item limits potential tower locations. To open up solar access to the north and northwestern part of the site while maintaining a low podium form near the heritage item, building mass is concentrated in a continuous stepping tower along the eastern boundary of the site. The low scale backdrop to the heritage item is interrupted to some extent by shifting built form towards the east but the interruption occurs a good distance from the heritage item.

Shadow Analysis - Alternative Planning Proposal Scheme

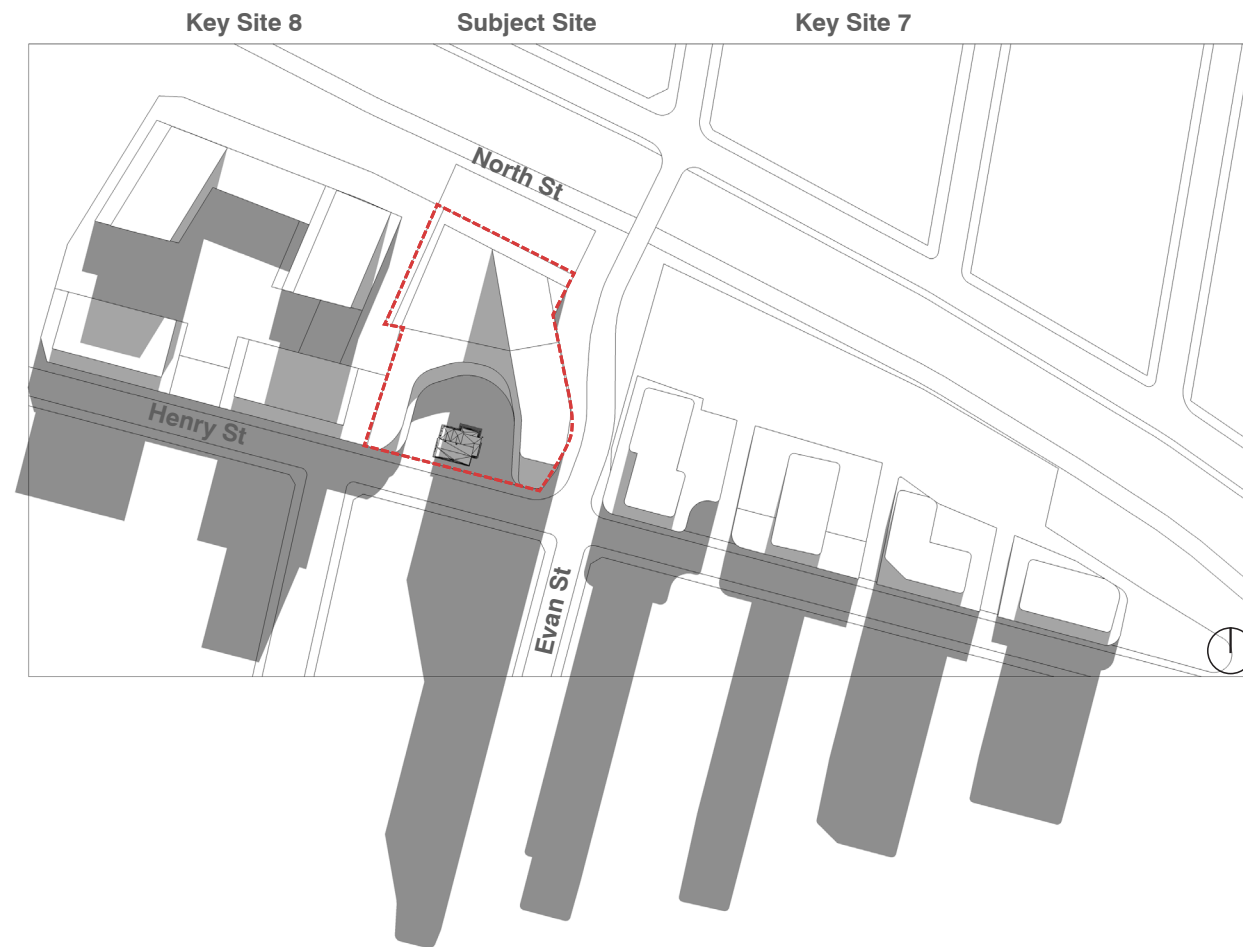
9:00am on 21 June



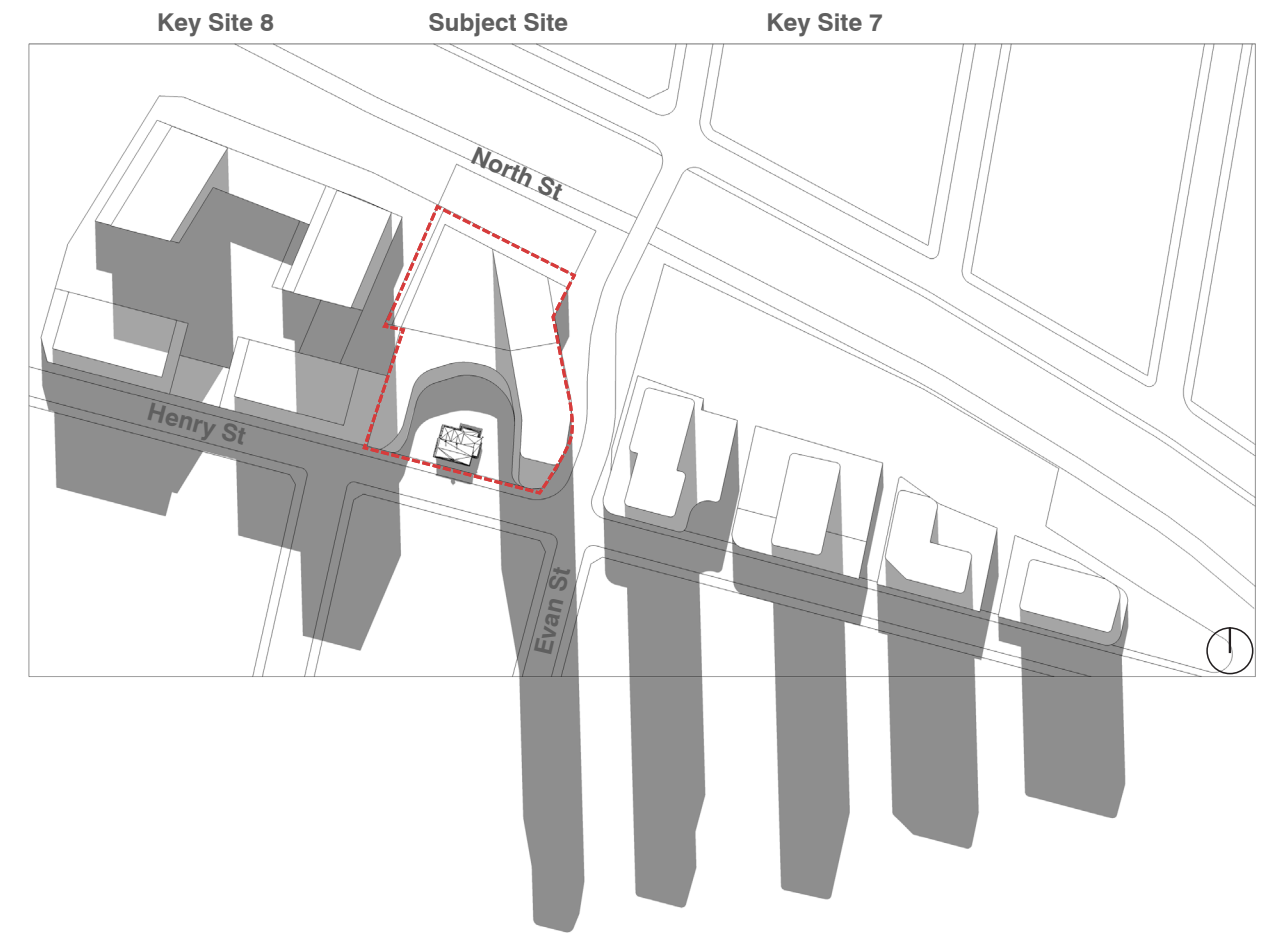
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11:00am on 21 June

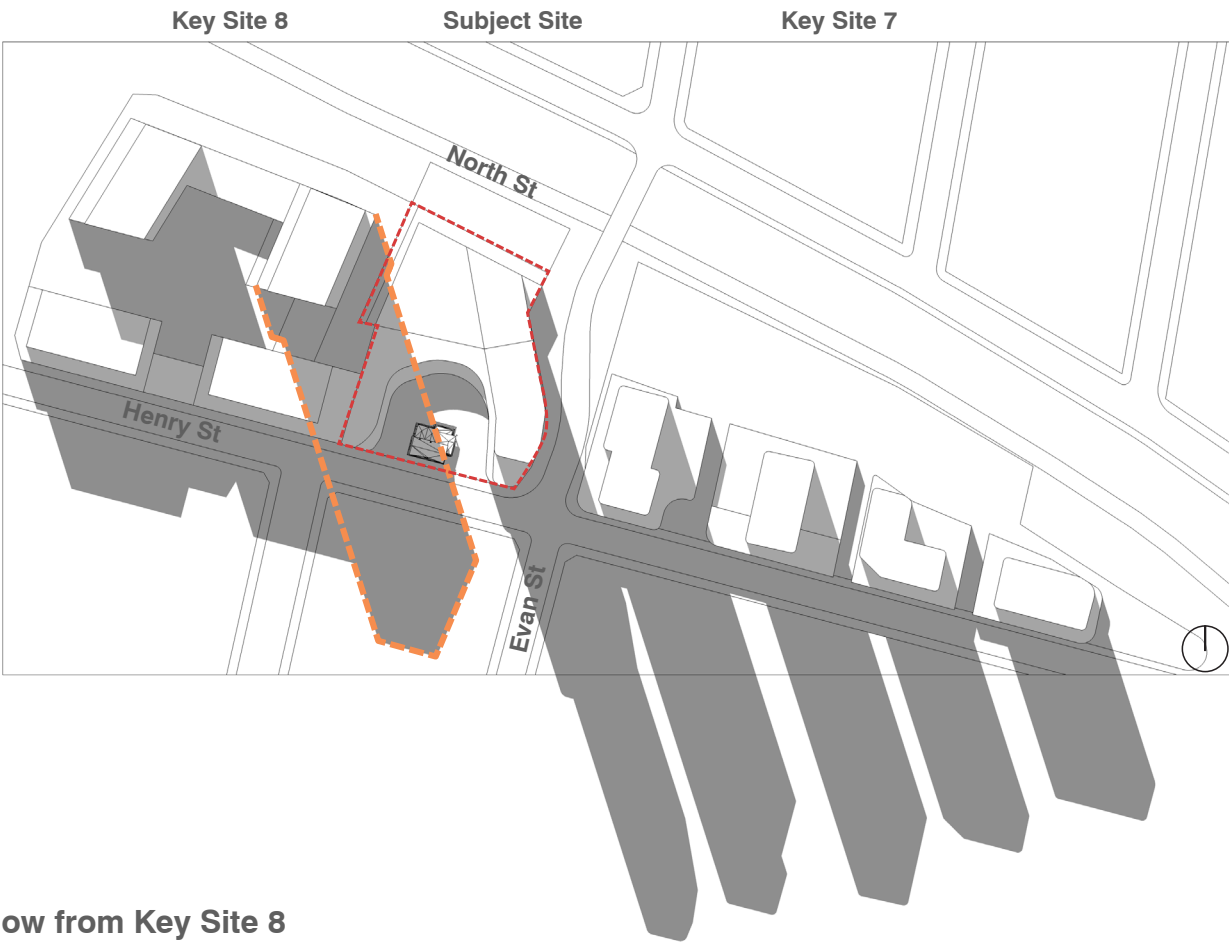


12:00pm on 21 June

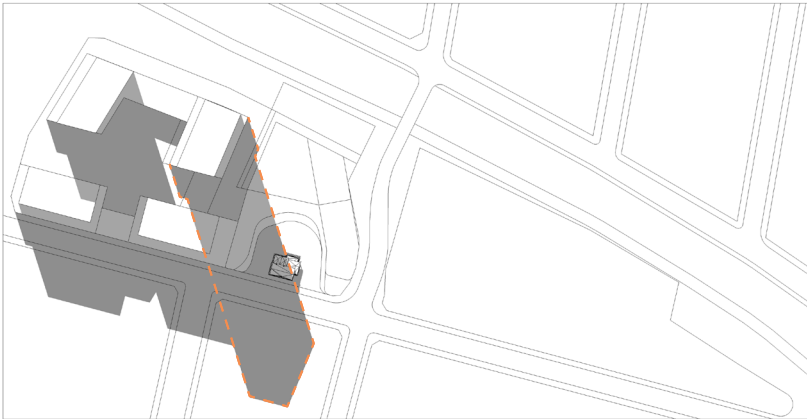




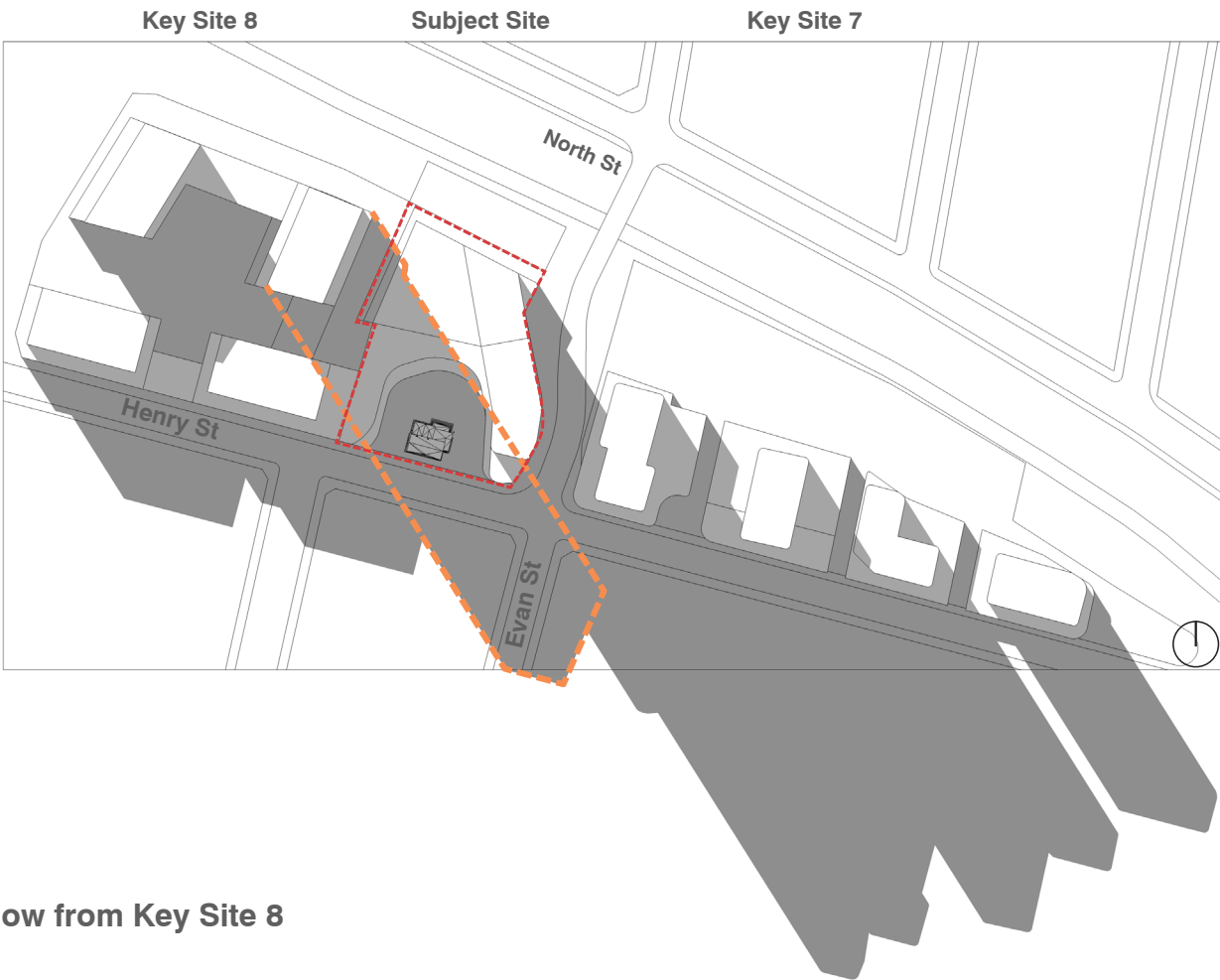
01:00pm on 21 June



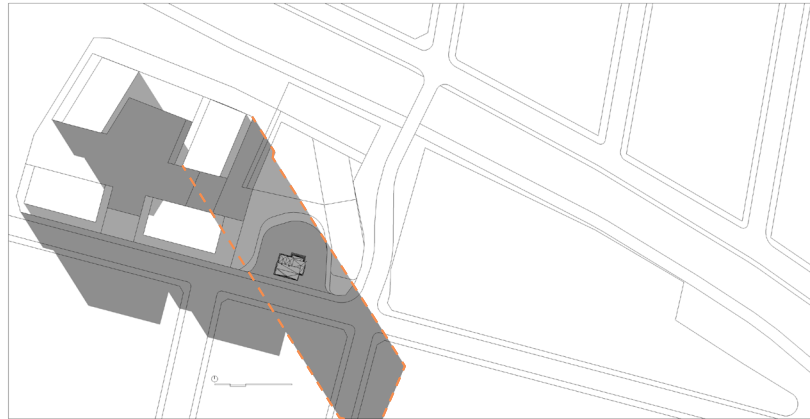
Shadow from Key Site 8



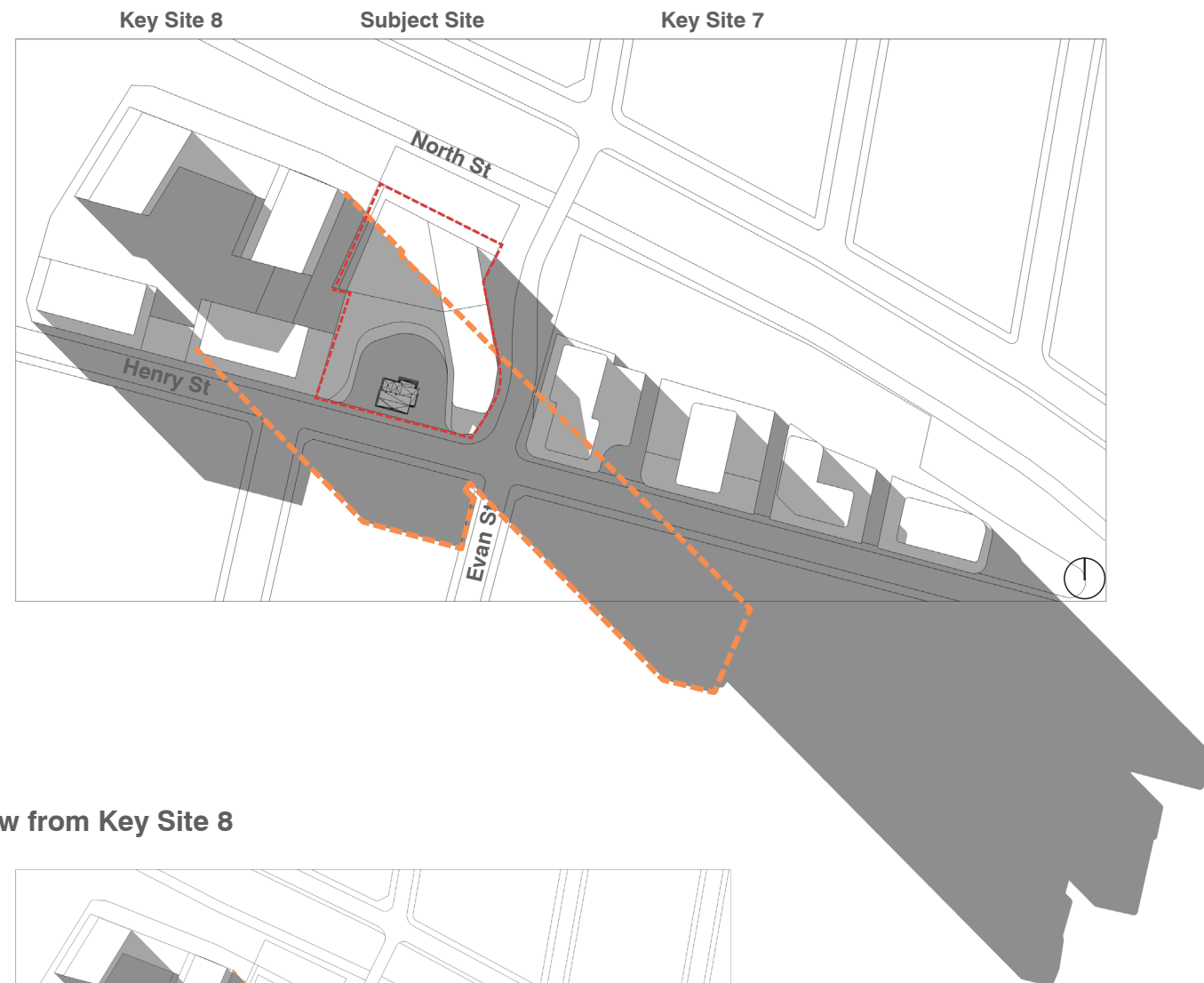
02:00pm on 21 June



Shadow from Key Site 8



03:00pm on 21 June



**Shadow from Key Site 8**



## Summary of Shadow Analysis \_Alternative Planning Proposal Scheme

The results indicate the following:

1. Key Site 7 has no material shadow impact on the subject site with the shadow clipping the south eastern corner of the subject site at 9 a.m. in midwinter. The shadow quickly moves away from the subject site.
2. Placing built form to the eastern part of the site eliminates morning sun to the heritage item.
3. At least some solar access to the heritage item between 11 a.m. and 1 p.m. on 21 June or 2 hours of solar access is achieved.
4. Good solar access is achieved to the heritage item at 12 p.m. in midwinter.
5. Overshadowing of the heritage item begins to arise from Key Site 7 around 1:00 p.m. At least 25% of the open space remains in sunlight at 1:00 p.m. with this reducing to less than 25% shortly after 1:00 p.m.
6. By 2 p.m. the heritage item and surrounding open space is completely overshadowed.
7. Key Site 8 is positioned northwest of the subject site. Future built form on Key Site 8 is very likely to give rise to overshadowing to the heritage building and its surrounding open space on the subject site beginning shortly after 12 noon and is likely to completely overshadow the heritage item and its surrounding open space by 2 p.m. This is by virtue of the position of Key Site 8 relative to the subject site.
8. The alternative planning proposal concept therefore achieves approximately 2 hours of solar access to the heritage item which occurs between 11 a.m. and 1 p.m. at midwinter.
9. Restrictions on where towers can occur on Key Site 8 would need to be implemented to expand solar access for the heritage item and open space closer to 2 p.m.

Findings

Although the building density and heights are lower under the existing LEP controls comparable to the planning proposal schemes, the existing planning controls give rise to a very similar solar access outcome for the heritage item and surrounding open space compared to the planning proposal schemes.

The current planning proposal scheme provides the greatest number of hours of sunlight to the heritage item and the surrounding open space although in the morning hours. It achieves 3 hours of solar access without having to rely on restrictions to where towers can be placed on neighbouring Key Site 8.

The alternative planning proposal concept achieves sunlight to the heritage item from 12 p.m. to 1 p.m. but the overall number of hours of solar access is reduced in comparison to the current planning proposal scheme from 3 hours to 2 hours.

The length of the tower is significantly longer for the alternative planning proposal scheme and does not achieve the desirable central low backdrop to the heritage item as successfully as the current planning proposal concept. Careful architectural resolution of the single tower massing would be needed to ensure a high quality built form outcome.

Restrictions on where built form can occur on neighbouring Key Site 8 would need to be implemented to facilitate solar access to the heritage item and surrounding open space from 1 p.m. to 2 p.m. for any scheme on the subject site due to the existing subdivision orientation in relation to true north.

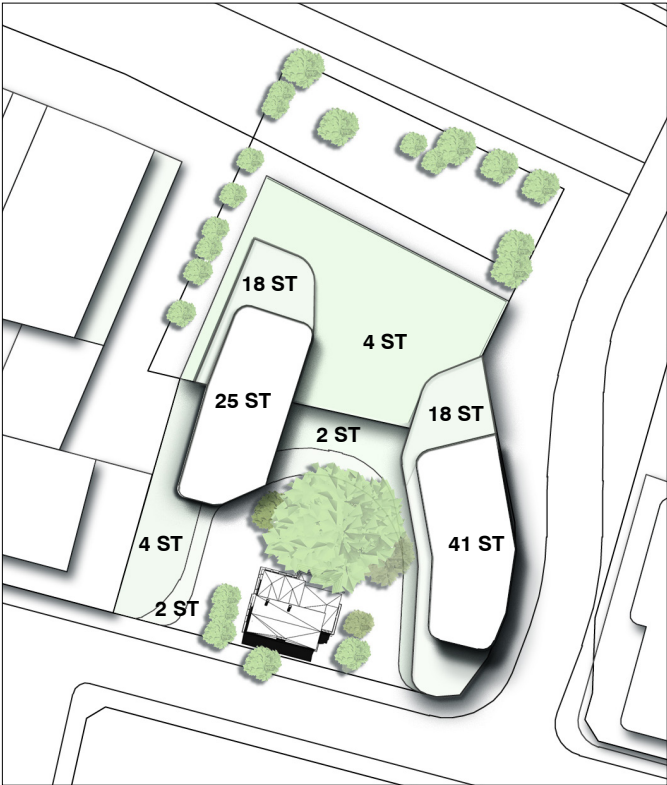
The benefit of the current planning proposal scheme is that ample solar access is achieved without restrictions to built form on Key Site 8.

ComparisonTable:  
Solar Access \_ 9 a.m. to 3 p.m.  
Midwinter

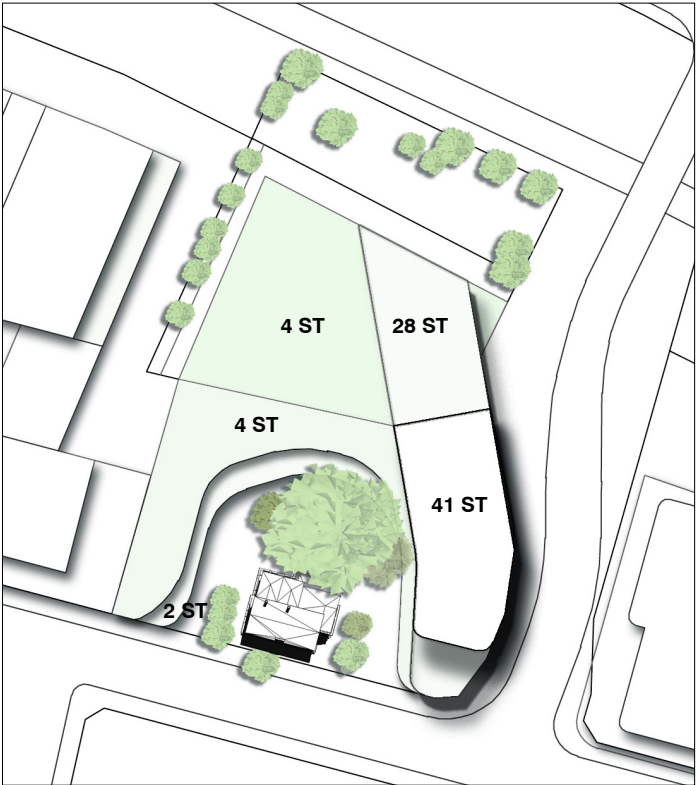
	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM
Existing LEP							
heritage bldg							
open space (at least 25%)							
Current PP							
heritage bldg							
open space (at least 25%)							
Alternative PP							
heritage bldg							
open space (at least 25%)							



Existing LEP Concept



Current Planning Proposal Concept



Alternative Planning Proposal Concept

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Nominated Architects:  
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Fergus William Cumming Reg. No. 7233

