7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

9.30 am, 21st June - Winter

Figure 7.21 - Shadow Diagram: 9:30 am, 21st June

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

12 pm, 21st June - Winter

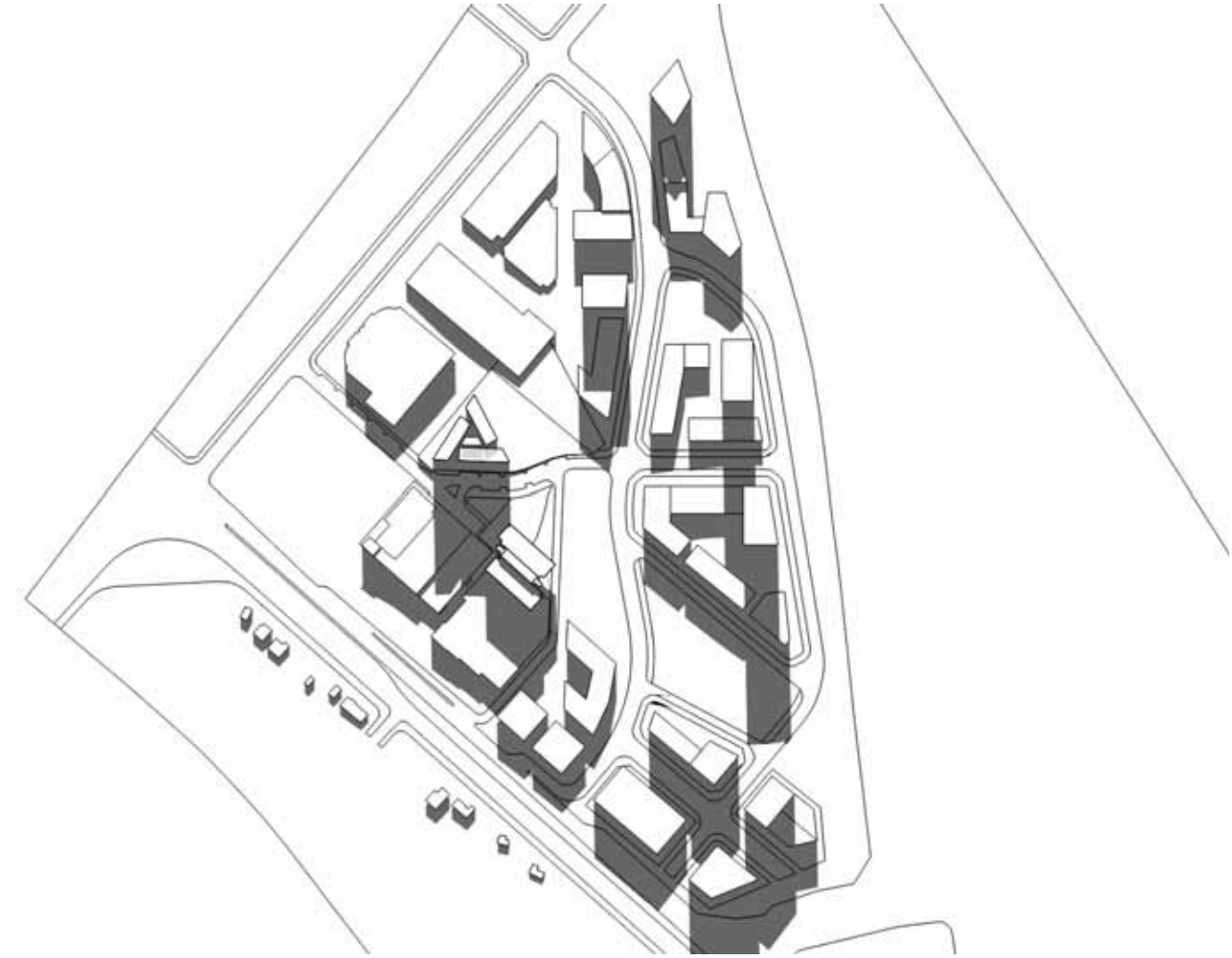


Figure 7.22 - Shadow Diagram: 12 pm, 21st June

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

3 pm, 21st June - Winter

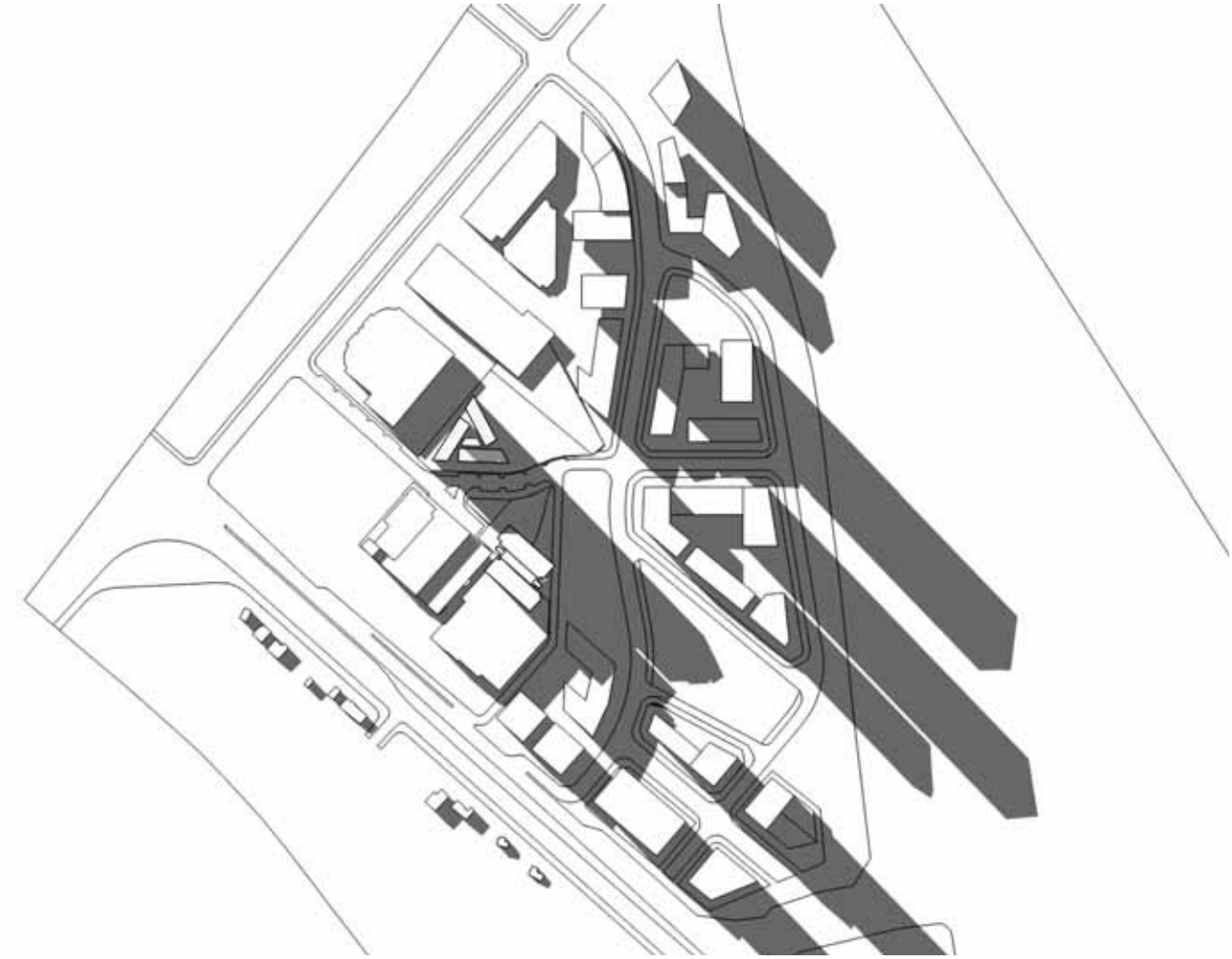


Figure 7.23 - Shadow Diagram: 3 pm, 21st June

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

9 am, 21st March/September - Equinox

Figure 7.24 - Shadow Diagram: 9:00 am, Equinox

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

12 pm, 21st March/September - Equinox

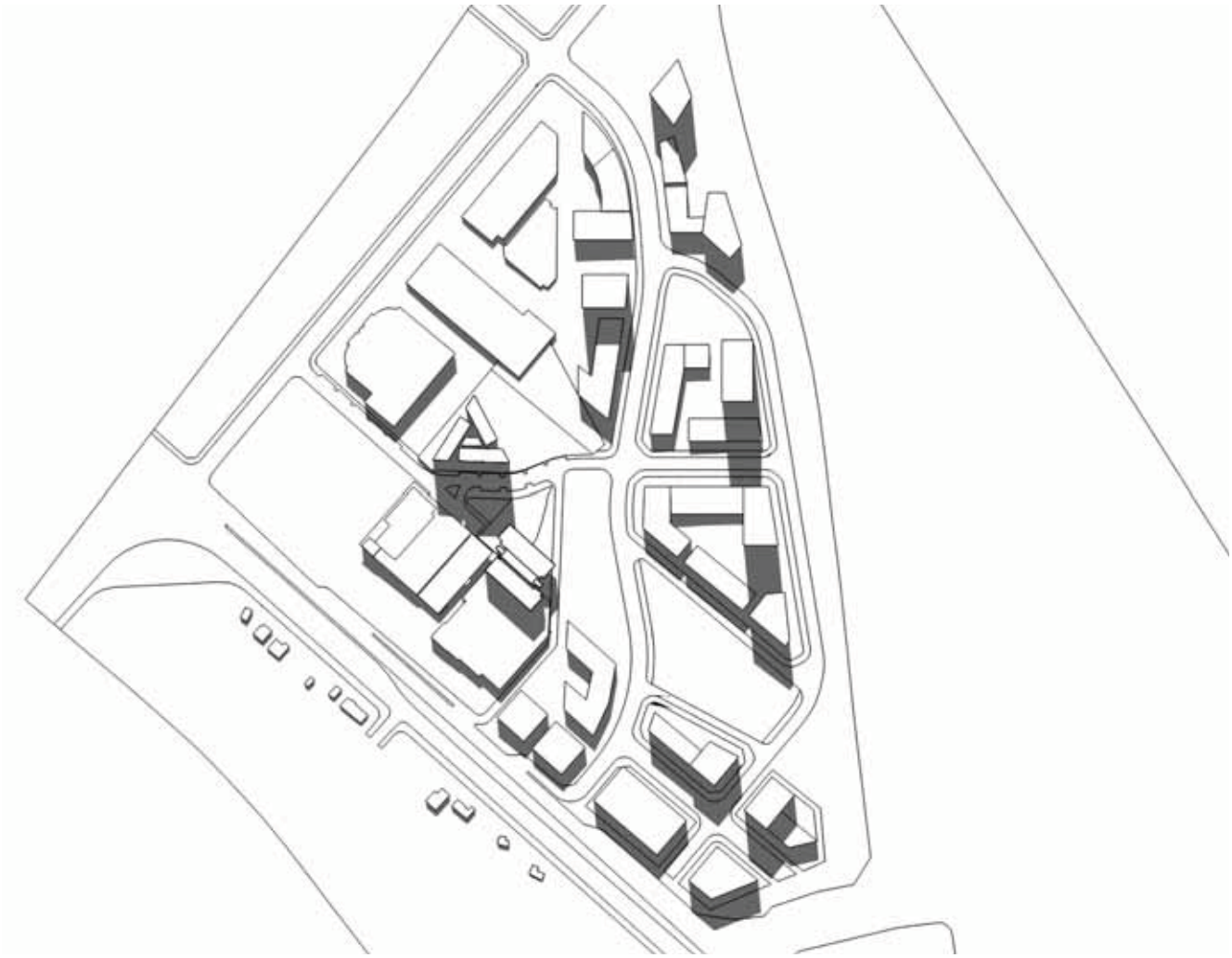


Figure 7.25 - Shadow Diagram: 12 pm, Equinox

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

3 pm, 21st March/September - Equinox

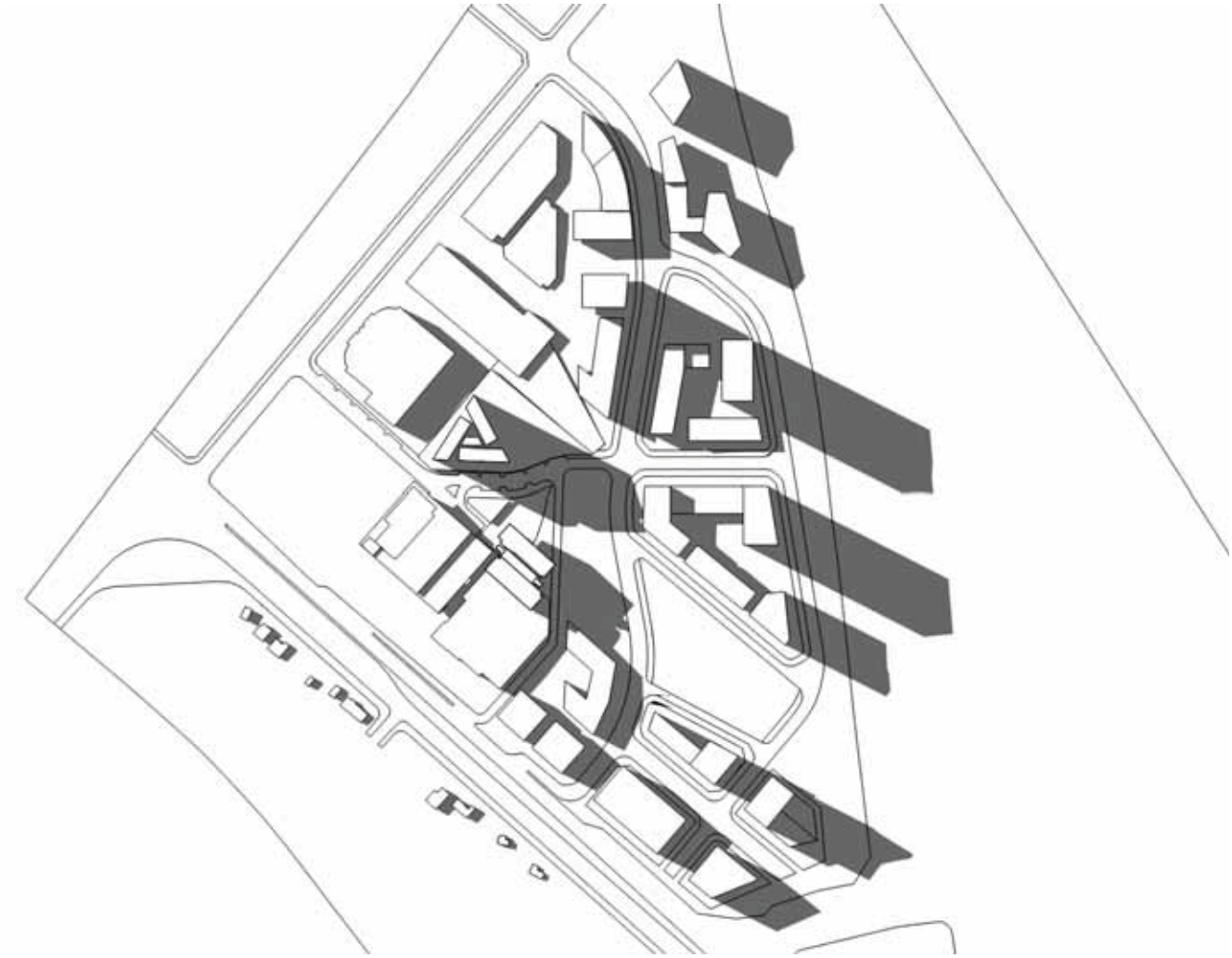


Figure 7.26 - Shadow Diagram: 3 pm, Equinox

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

9 am, 21st December - Summer

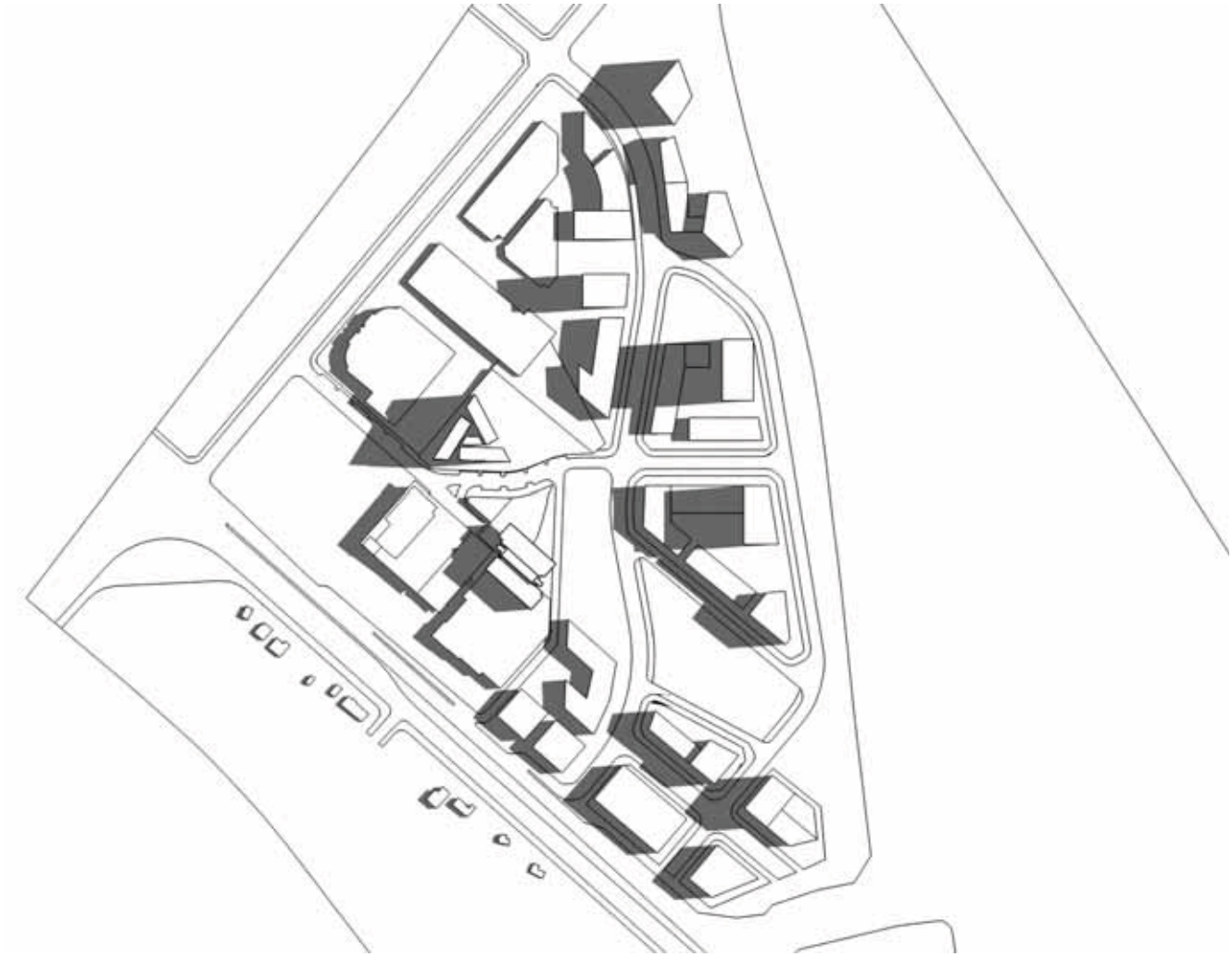


Figure 7.27 - Shadow Diagram: 9 am, 21st December

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

12 pm, 21st December - Summer

Figure 7.28 - Shadow Diagram: 12 pm, 21st December

7.2 Appendix 2: Shadow Diagrams - Concept Master Plan Scheme

3 pm, 21st December - Summer

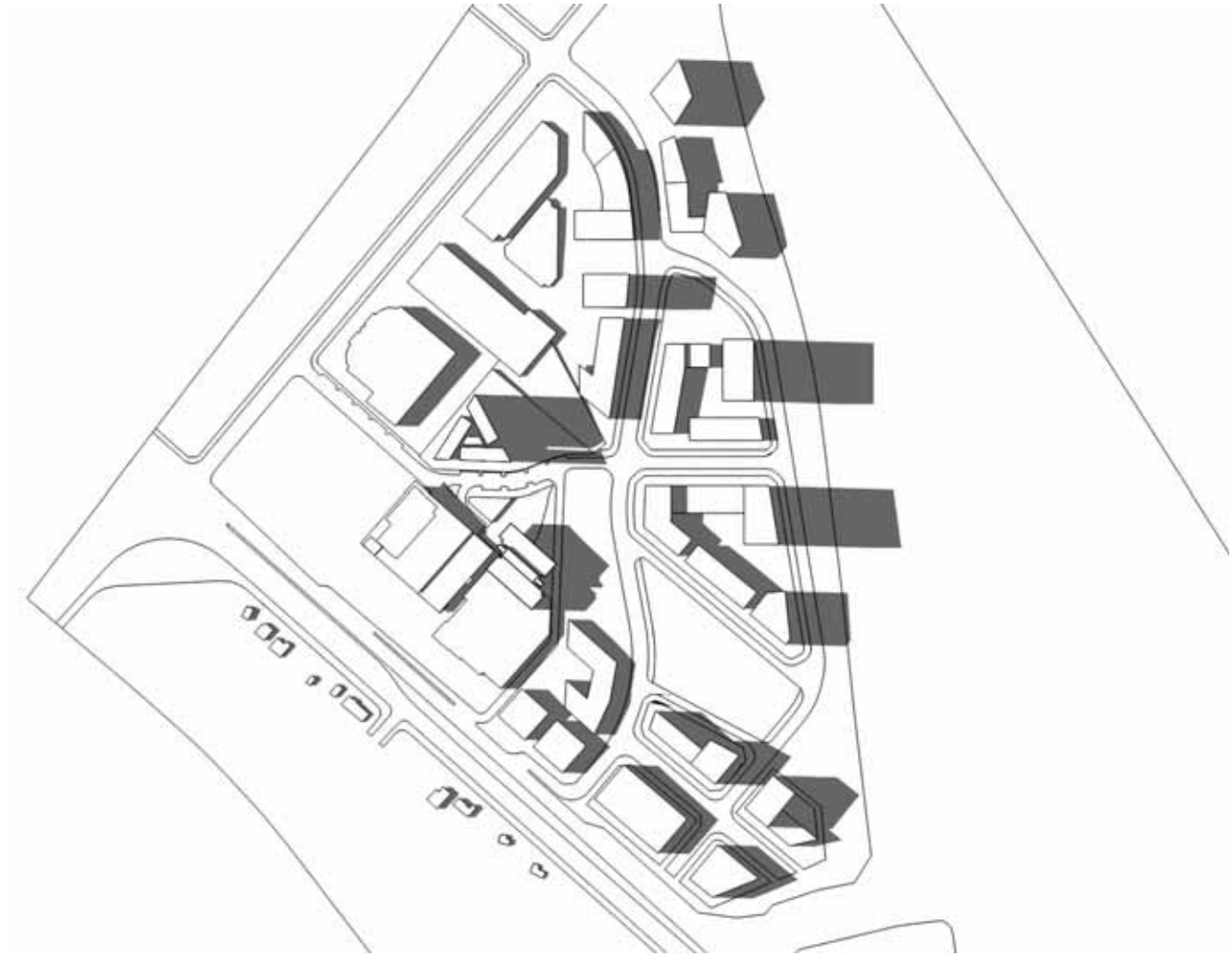


Figure 7.29 - Shadow Diagram: 3 pm, 21st December

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

9.30 am, 21st June - Winter

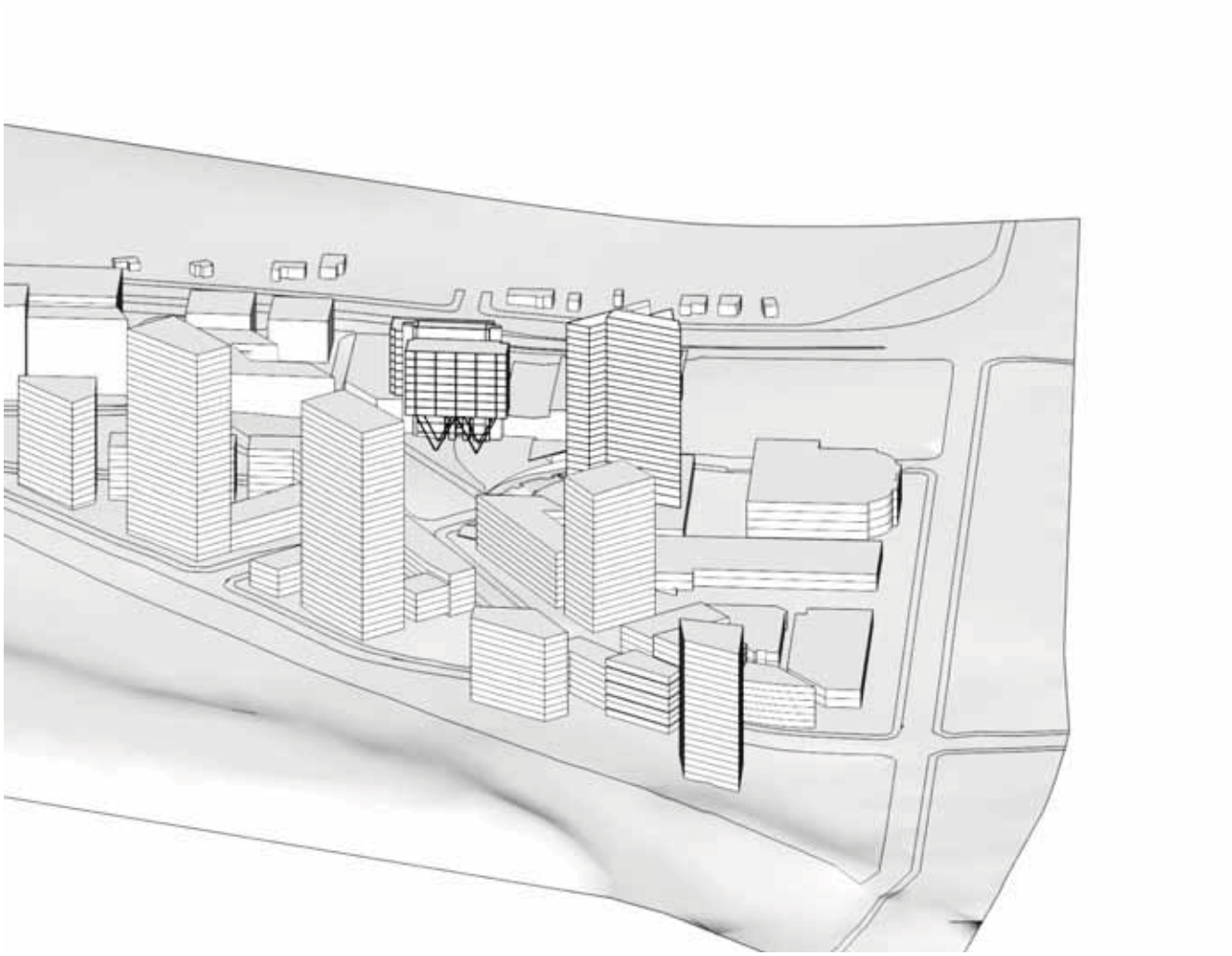


Figure 7.31 - Suneye Diagram: 9:30 am, 21st June

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

12 pm, 21st June - Winter

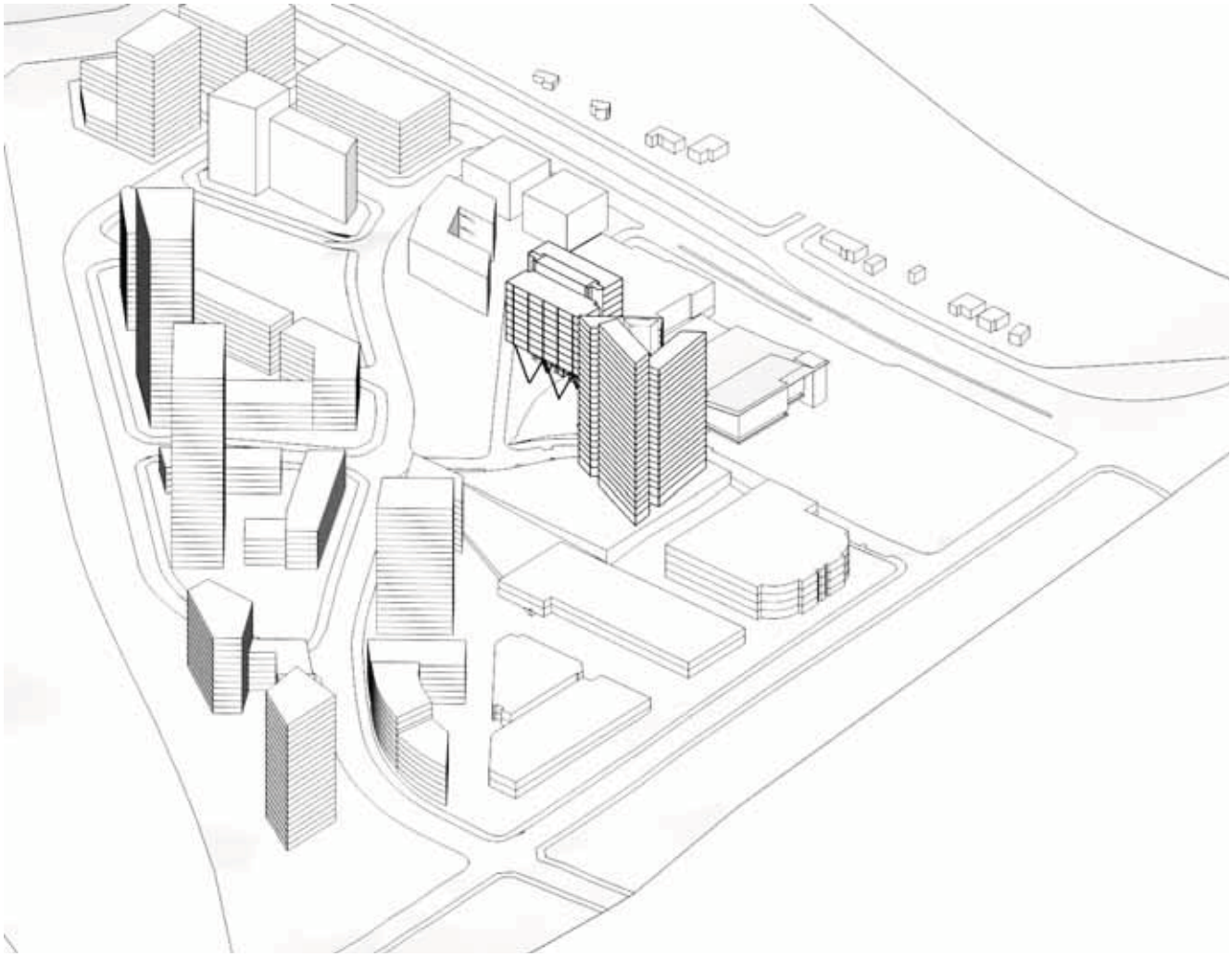


Figure 7.32 - Suneye Diagram: 12 pm, 21st June

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

3 pm, 21st June - Winter

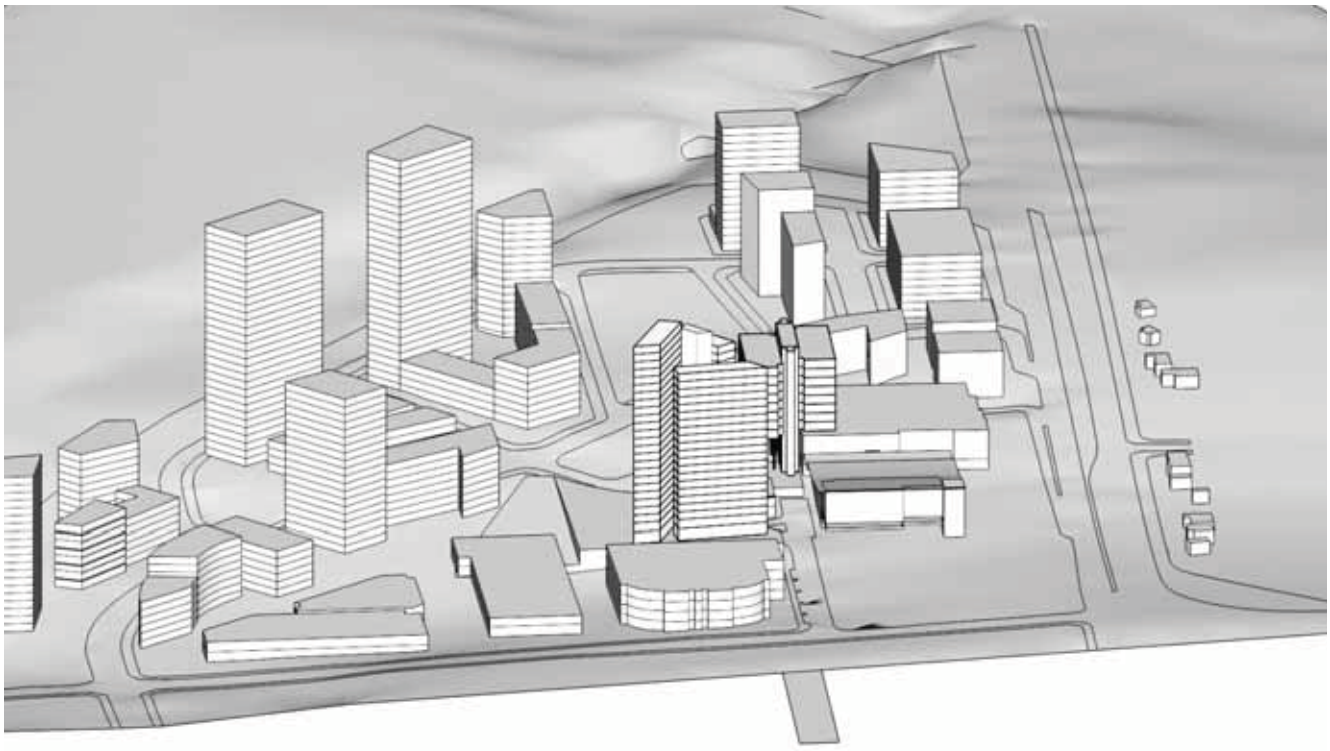


Figure 7.33 - Suneye Diagram: 3 pm, 21st June

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

9 am, 21st March/September - Equinox

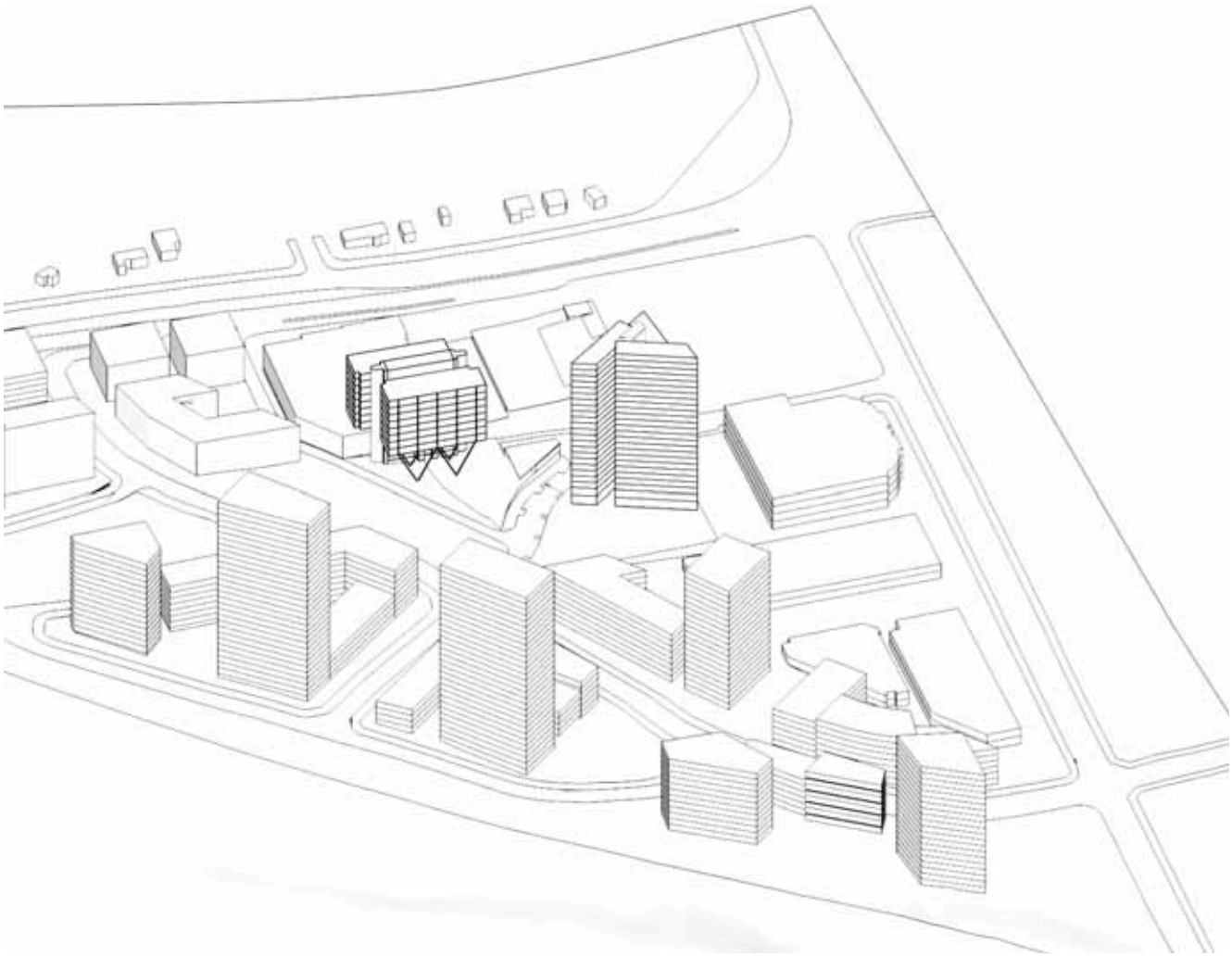


Figure 7.34 - Suneye Diagram: 9 am, Equinox

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

12 pm, 21st March/September - Equinox

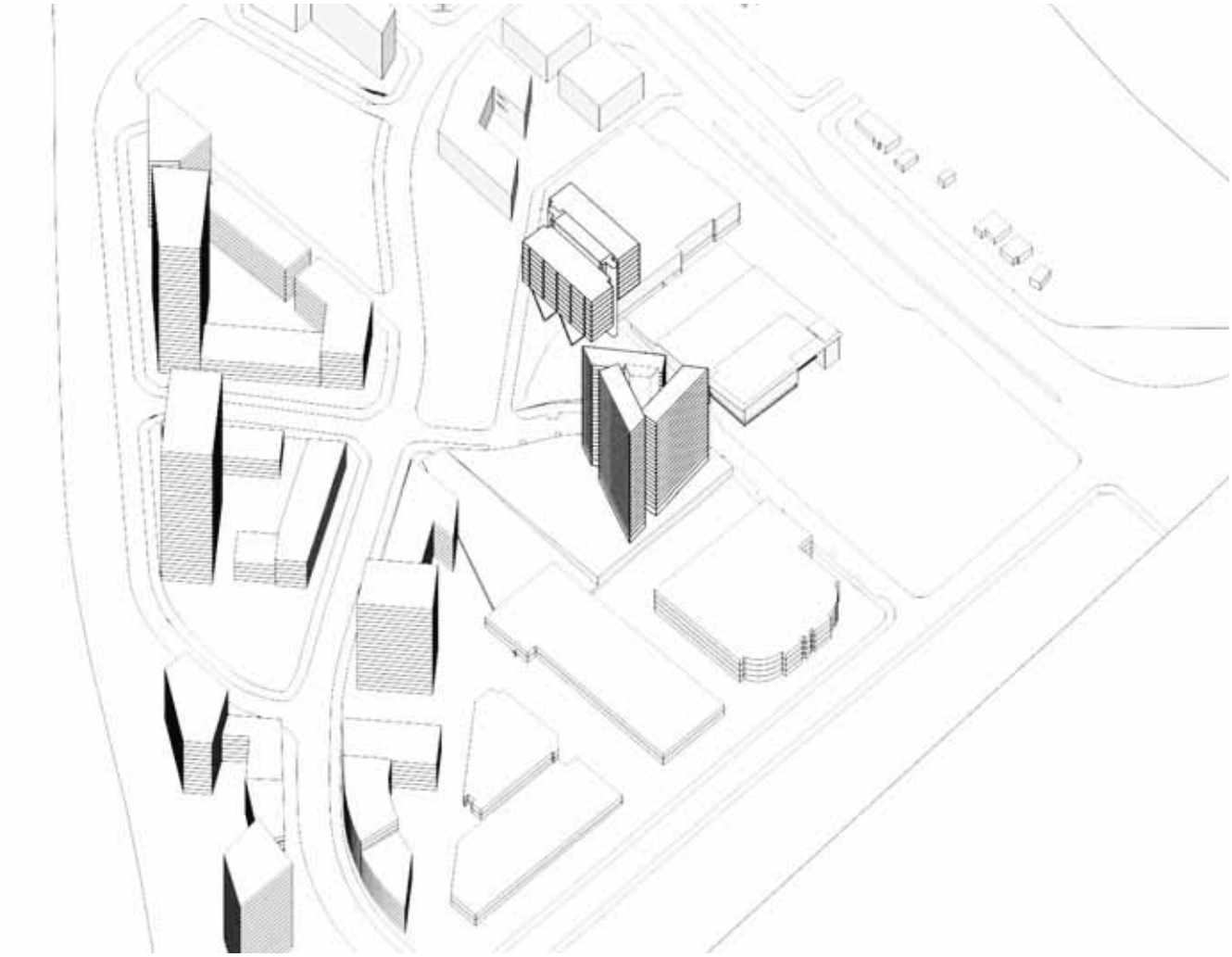


Figure 7.35 - Suneye Diagram: 12 pm, Equinox

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

3 pm, 21st March/September - Equinox

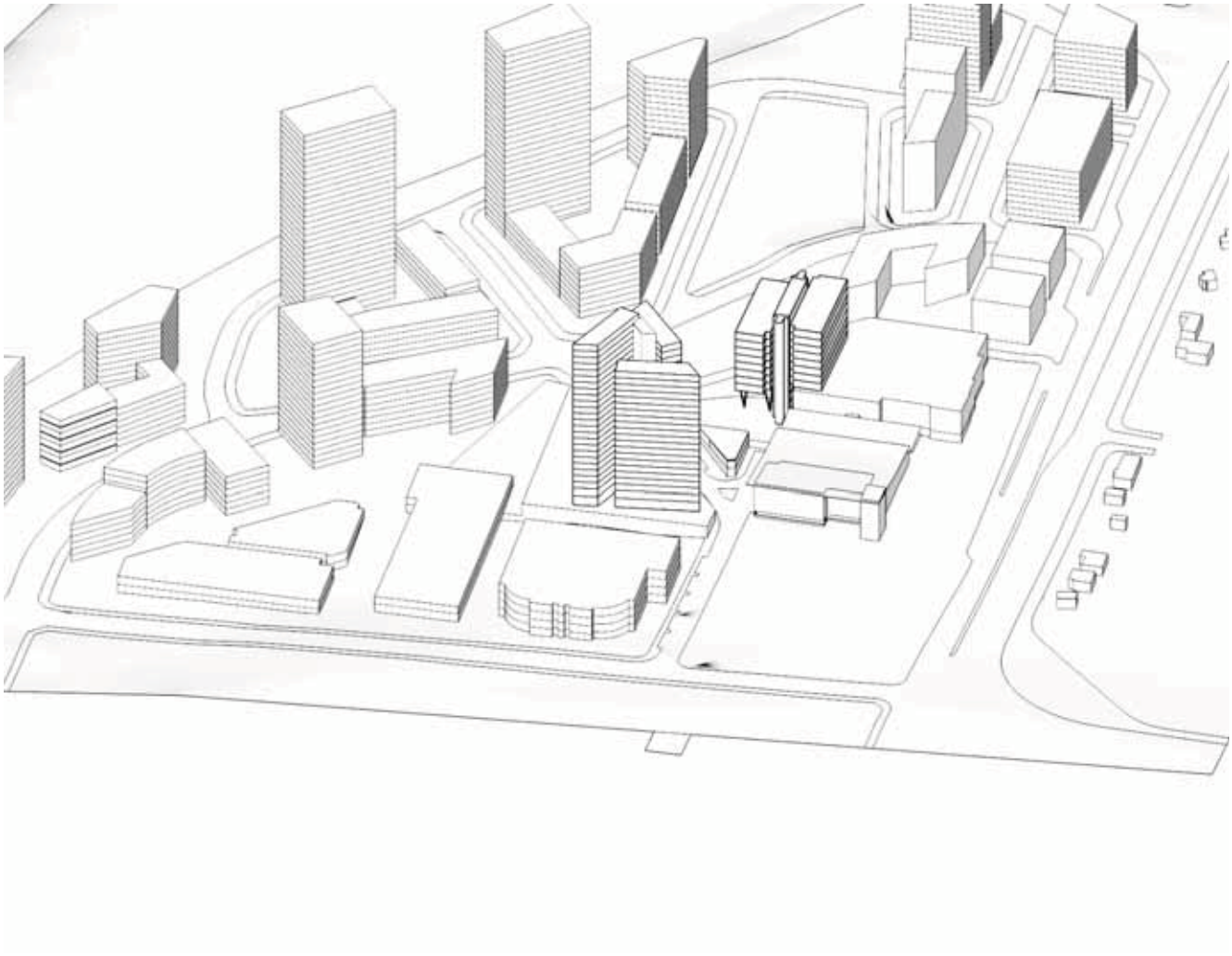


Figure 7.36 - Suneye Diagram: 3 pm, Equinox

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

9 am, 21st December - Summer

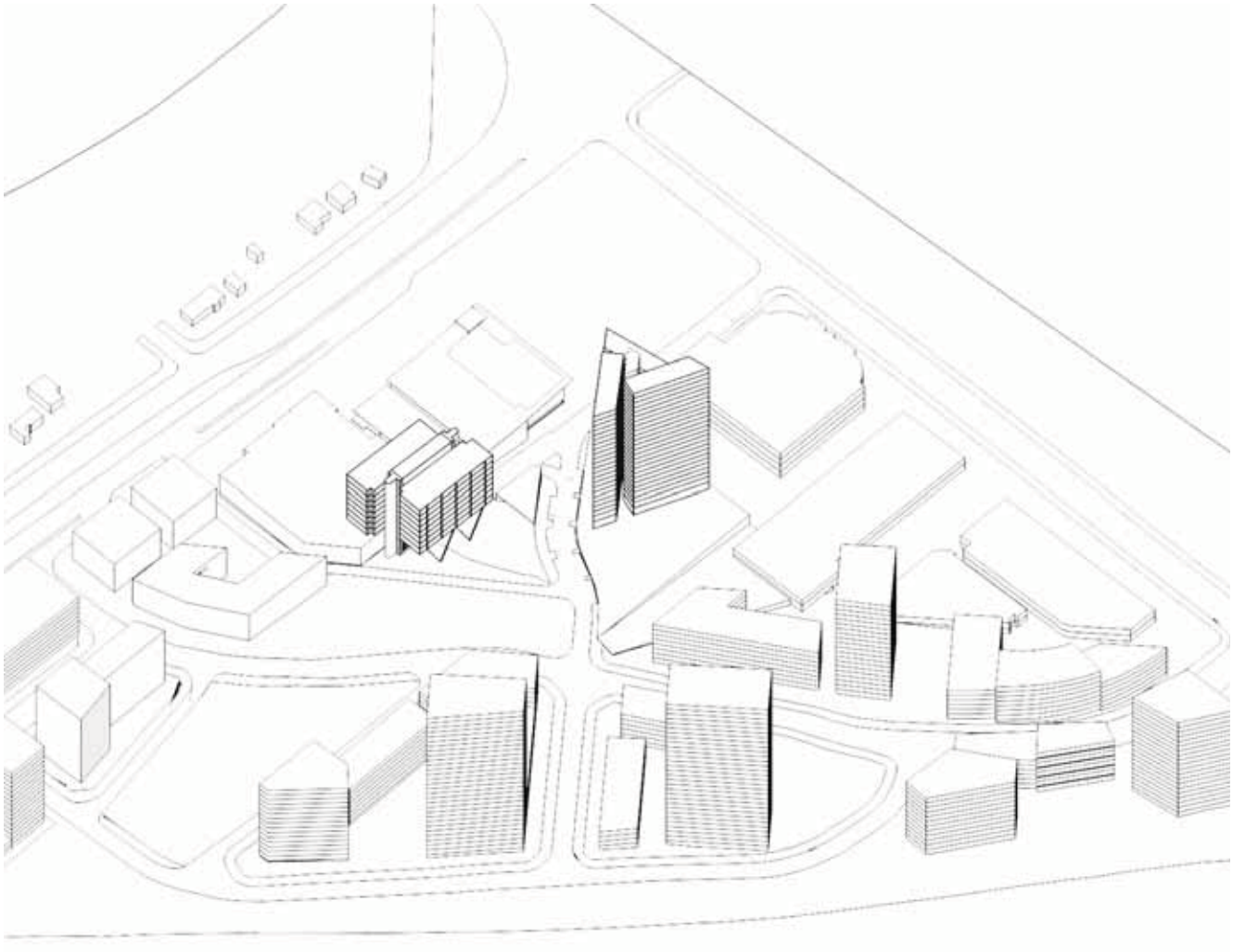


Figure 7.37 - Suneye Diagram: 9 am, 21st December

7.3 Appendix 3: Shadow and Suneye Diagrams - Concept Master Plan Scheme

12 pm, 21st December - Summer

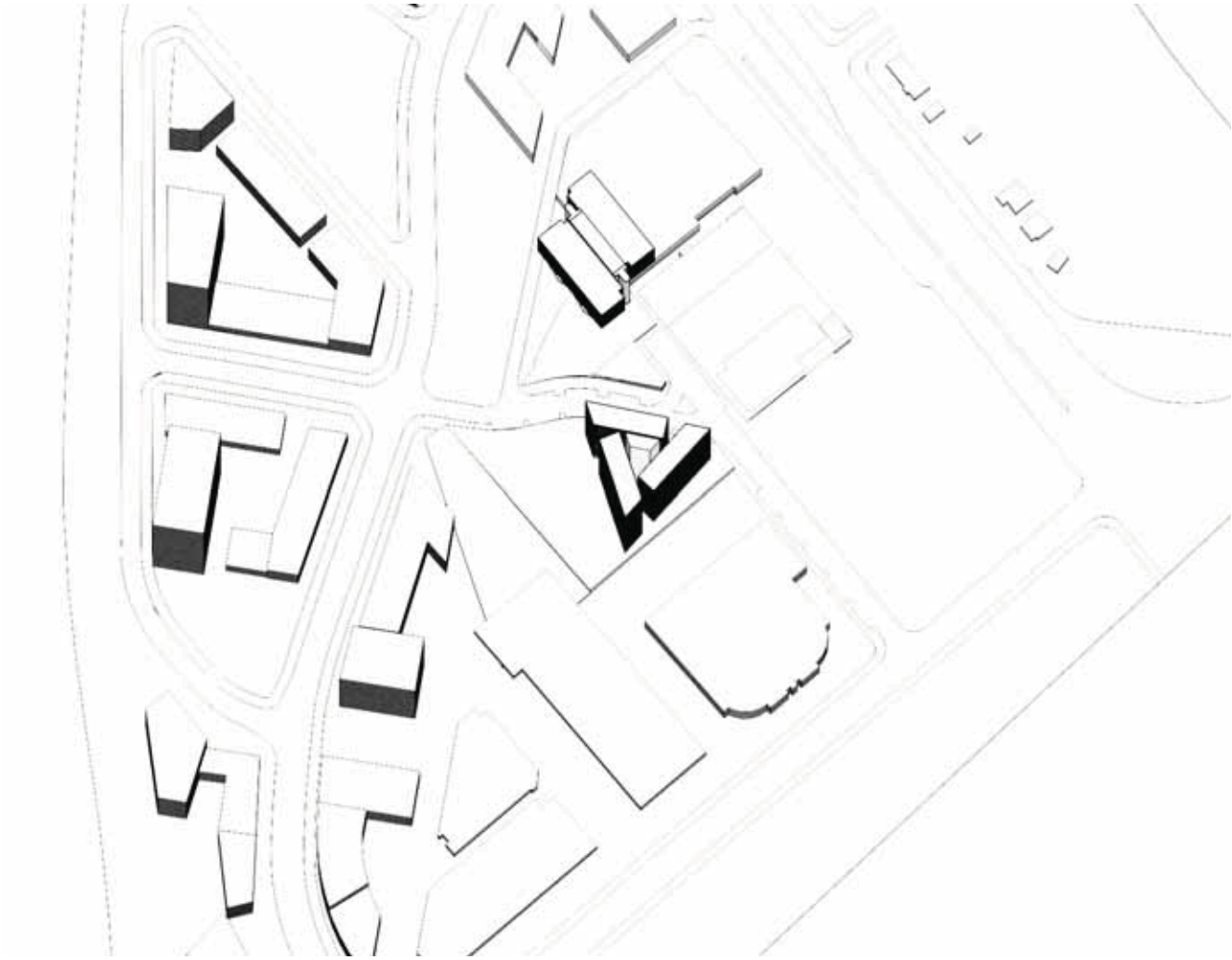


Figure 7.38 - Suneye Diagram: 12 pm, 21st December

7.3 Appendix 3: Suneye Diagrams - Concept Master Plan Scheme

3 pm, 21st December - Summer

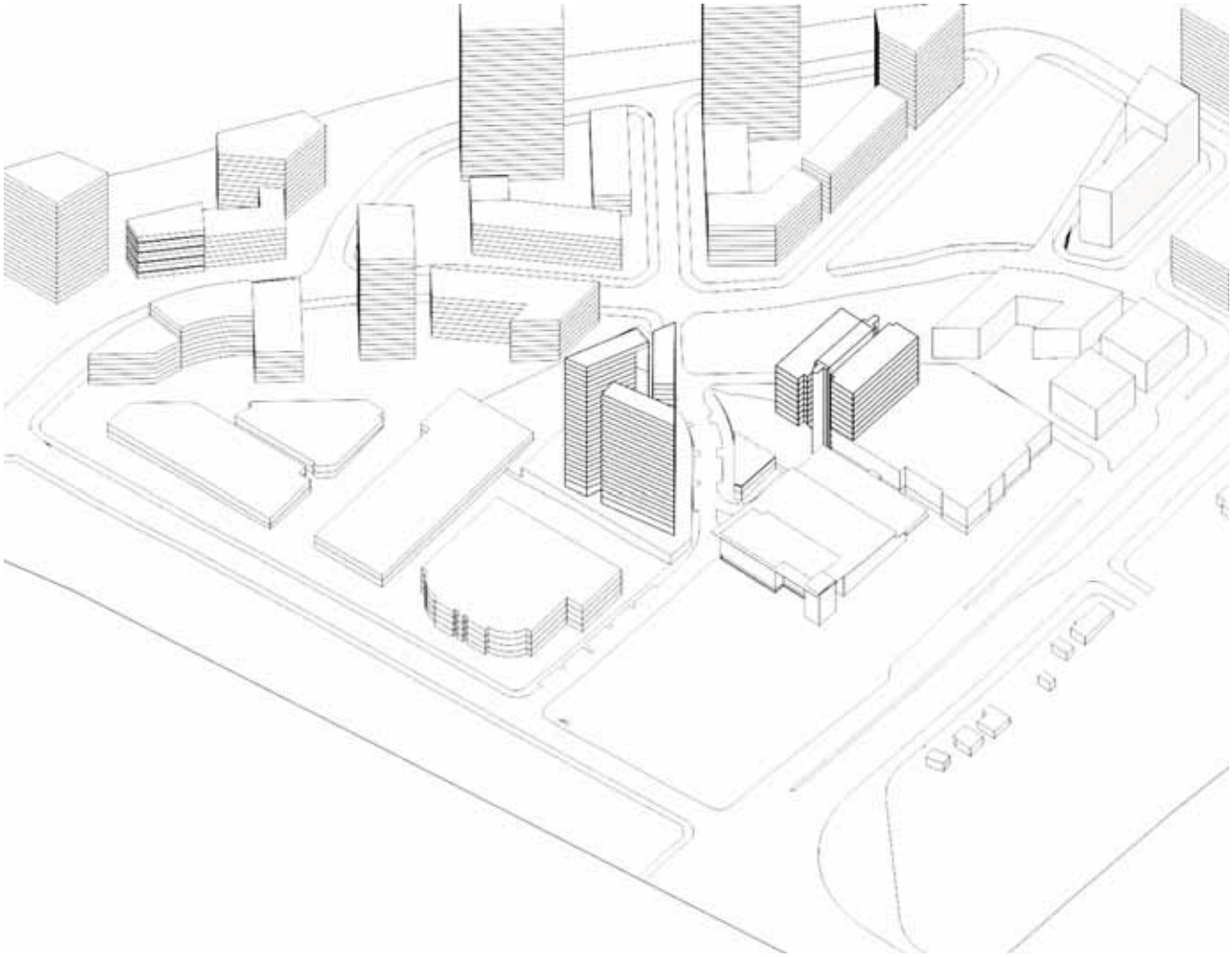


Figure 7.39 - Suneye Diagram: 3 pm, 21st December

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

9.30 am, 21st June - Winter

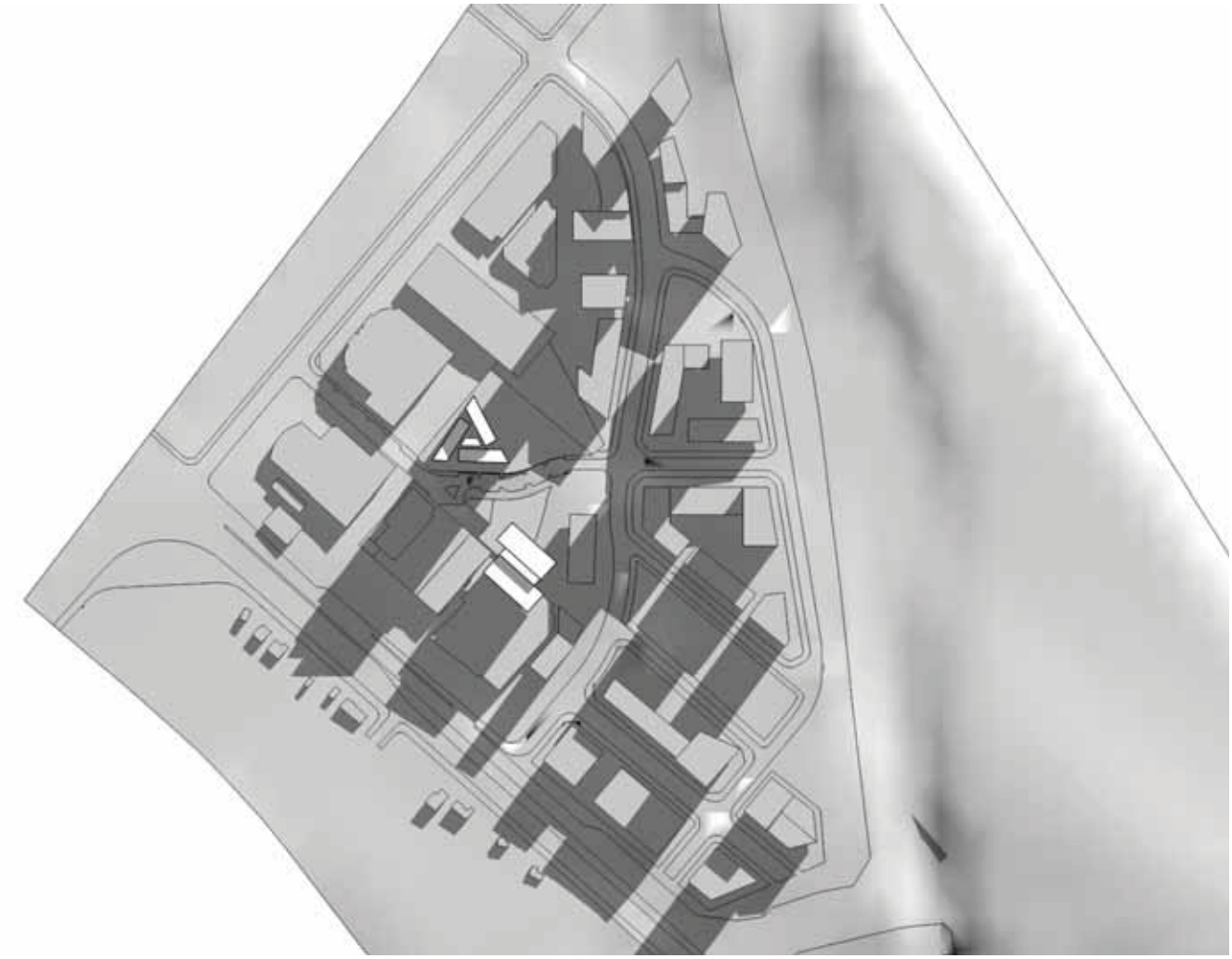


Figure 7.41 - Shadow Diagram: 9:30 am, 21st June

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Preferred Concept Master Plan Scheme

12 pm, 21st June - Winter

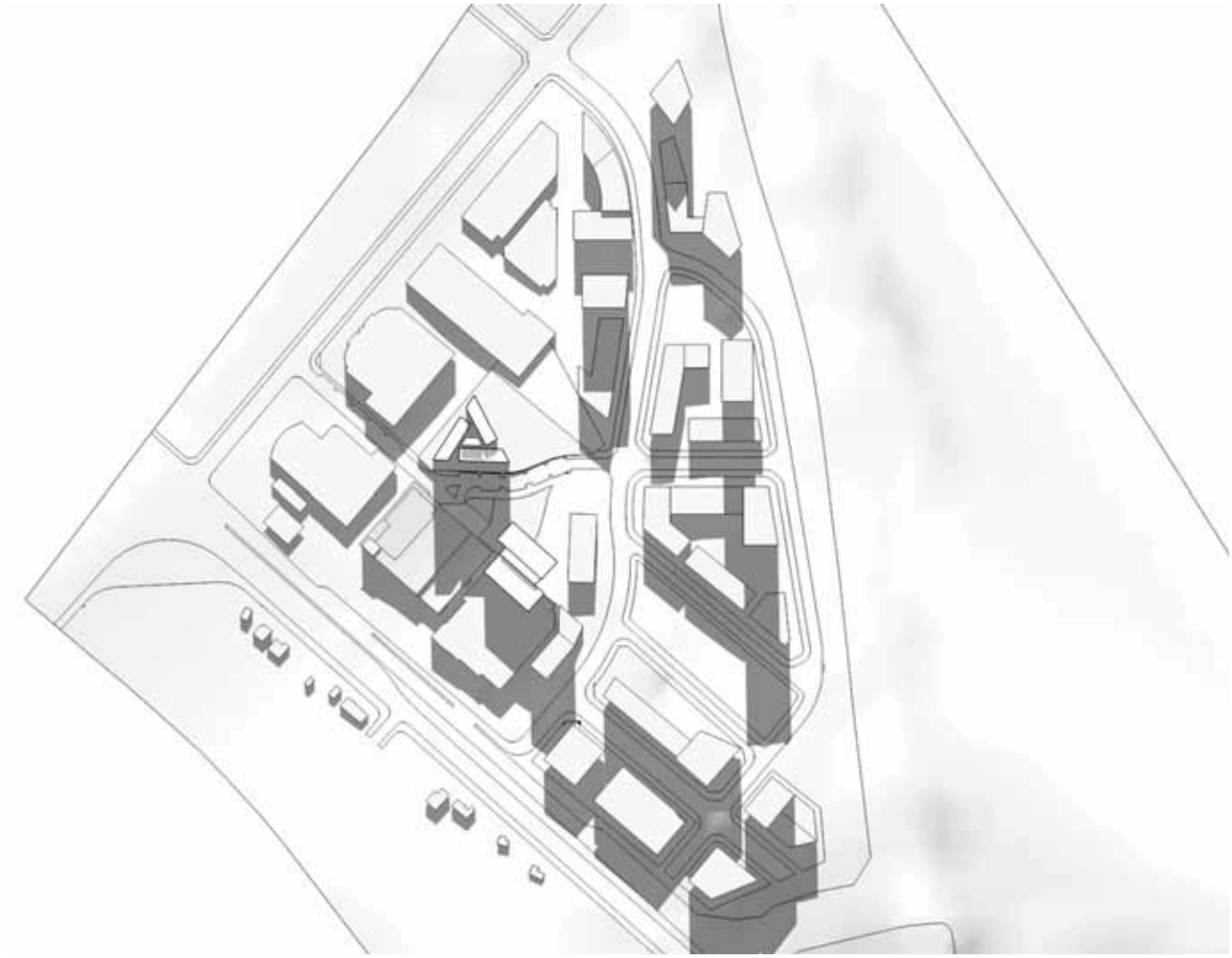


Figure 7.42 - Shadow Diagram: 12 pm, 21st June

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

3 pm, 21st June - Winter

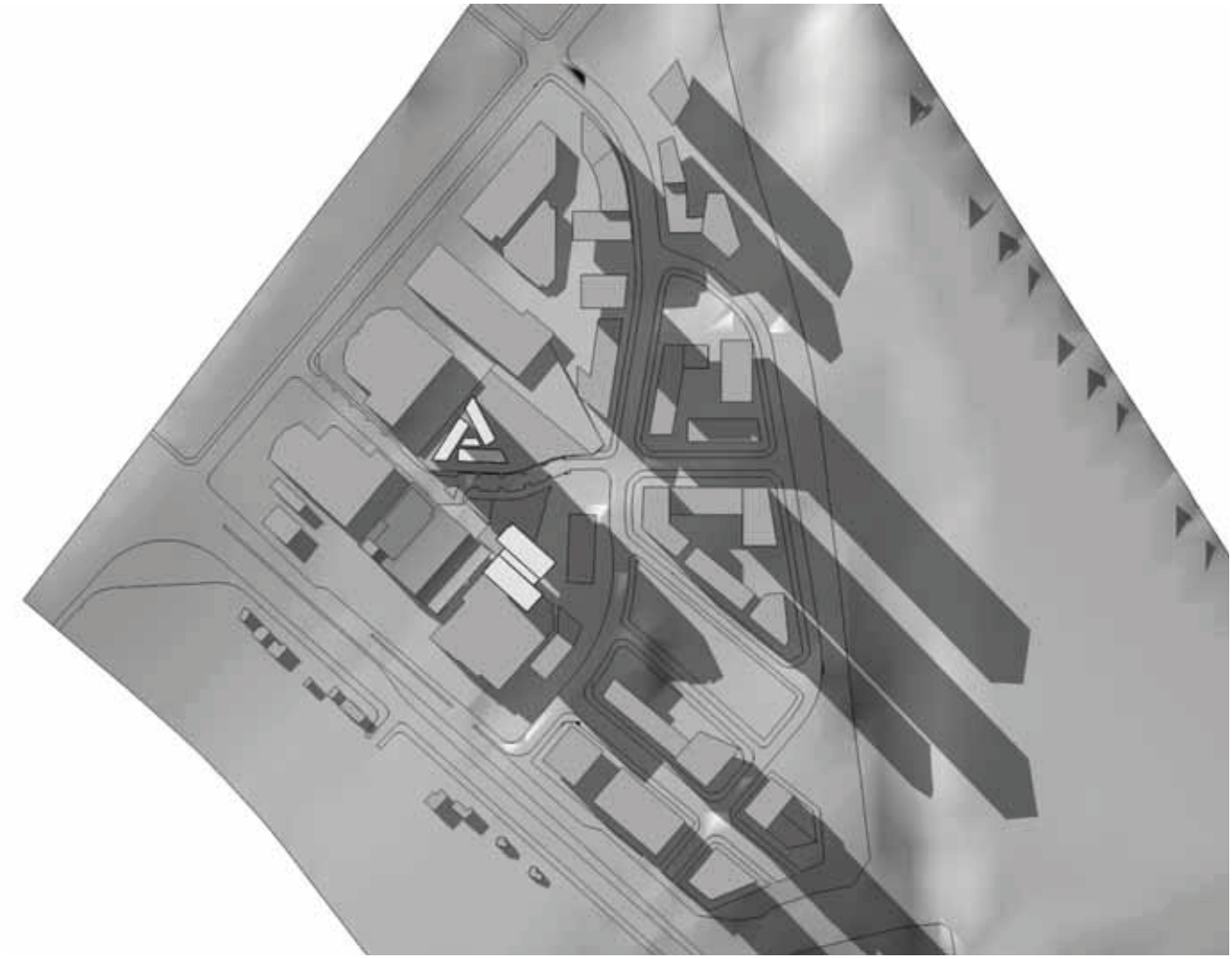


Figure 7.43 - Shadow Diagram: 3 pm, 21st June

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

9 am, 21st March/September - Equinox

Figure 7.44 - Shadow Diagram: 9:00 am, Equinox

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

12 pm, 21st March/September - Equinox

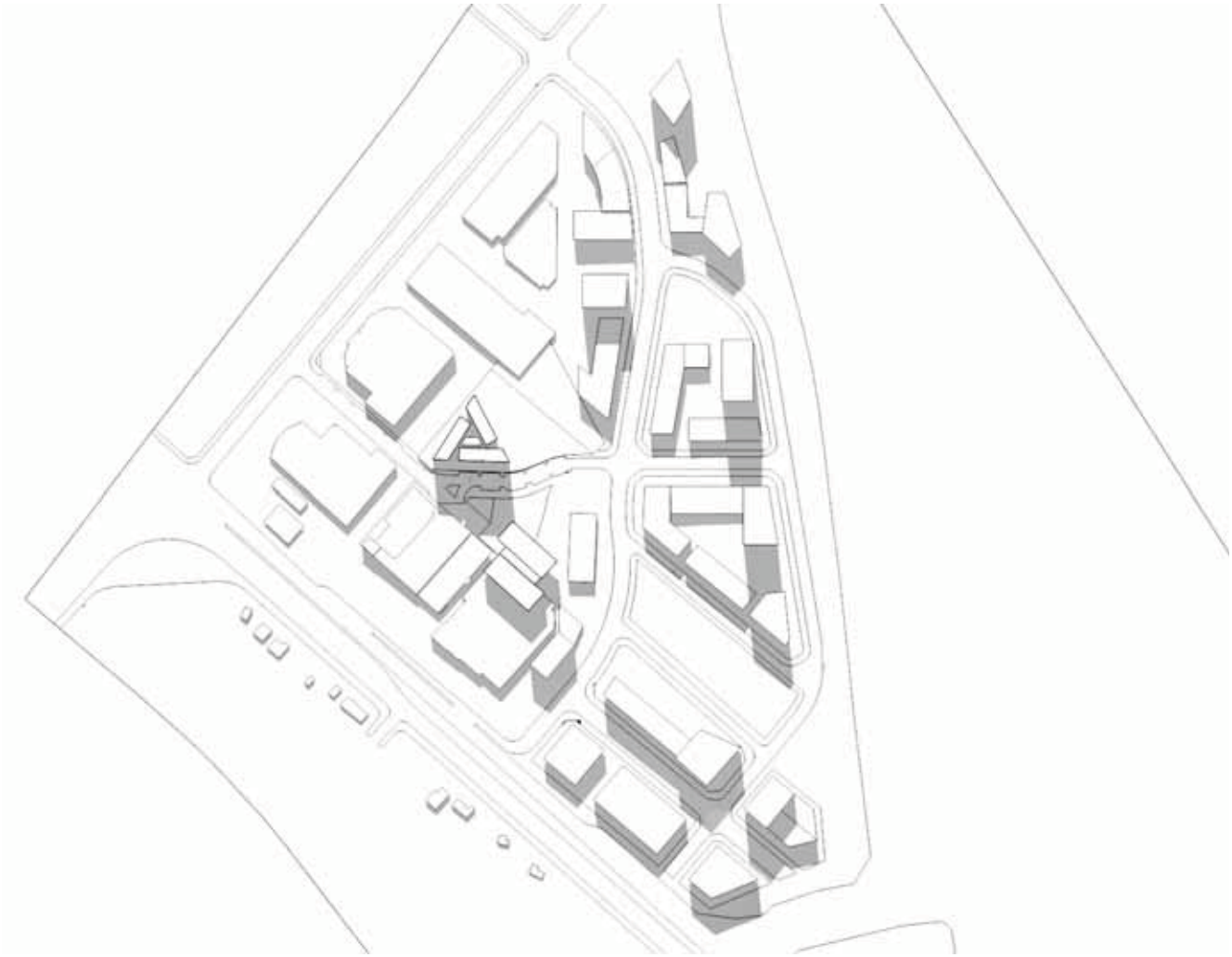


Figure 7.45 - Shadow Diagram: 12 pm, Equinox

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

3 pm, 21st March/September - Equinox

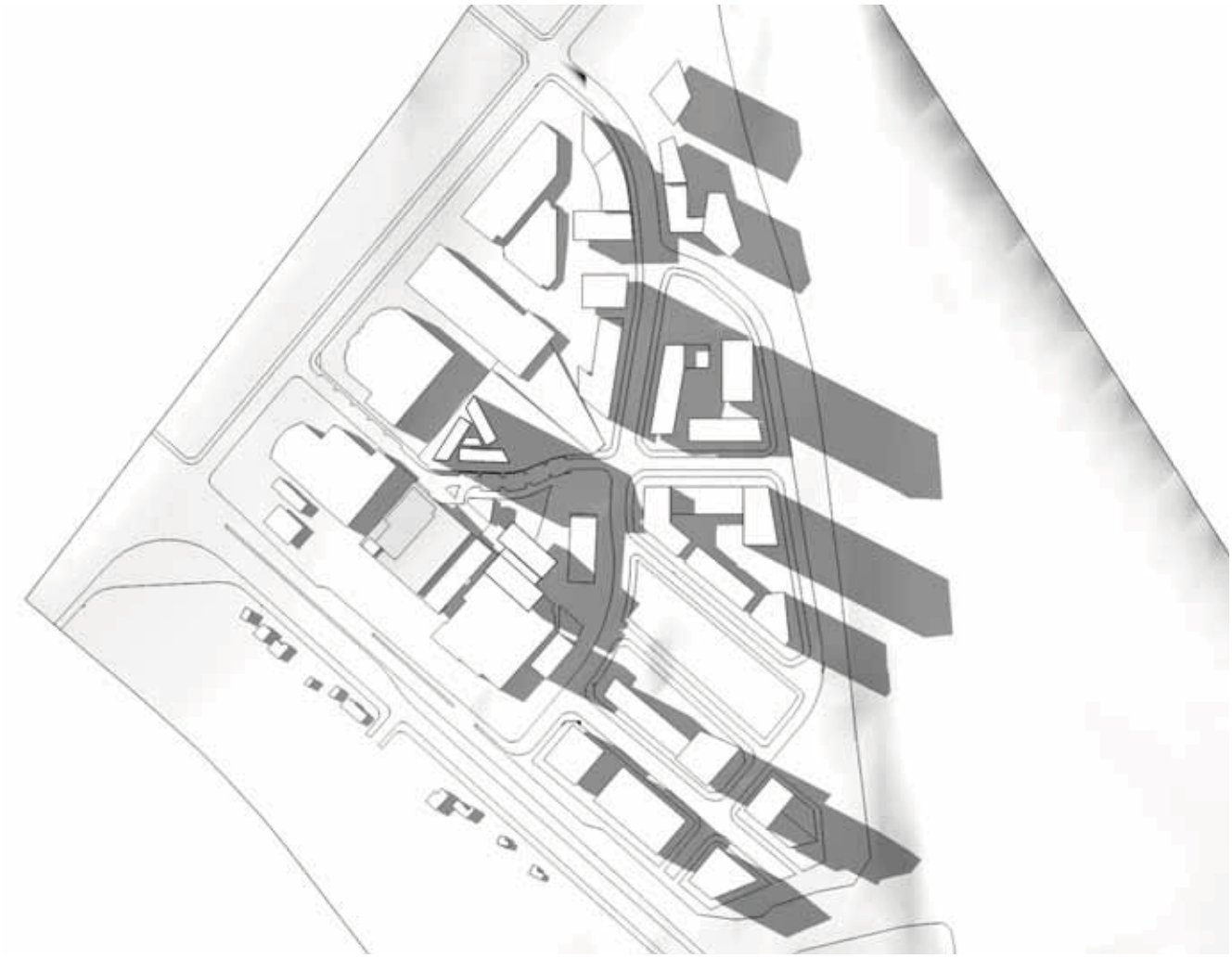


Figure 7.46 - Shadow Diagram: 3 pm, Equinox

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

9 am, 21st December - Summer

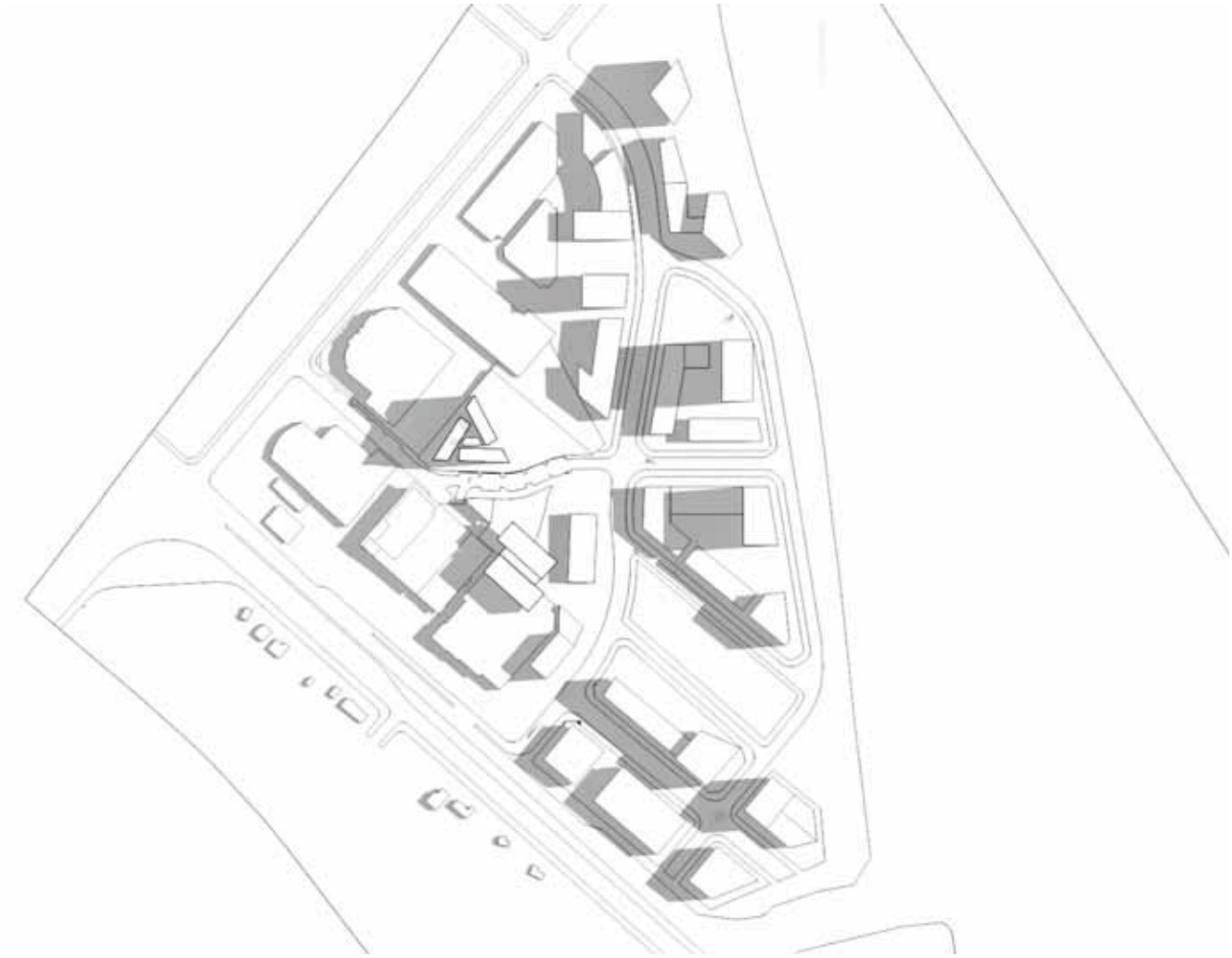


Figure 7.47 - Shadow Diagram: 9 am, 21st December

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

12 pm, 21st December - Summer

Figure 7.48 - Shadow Diagram: 12 pm, 21st December

7.4 Appendix 4: Shadow Diagrams - Preferred Alternate Concept Master Plan Scheme

3 pm, 21st December - Summer

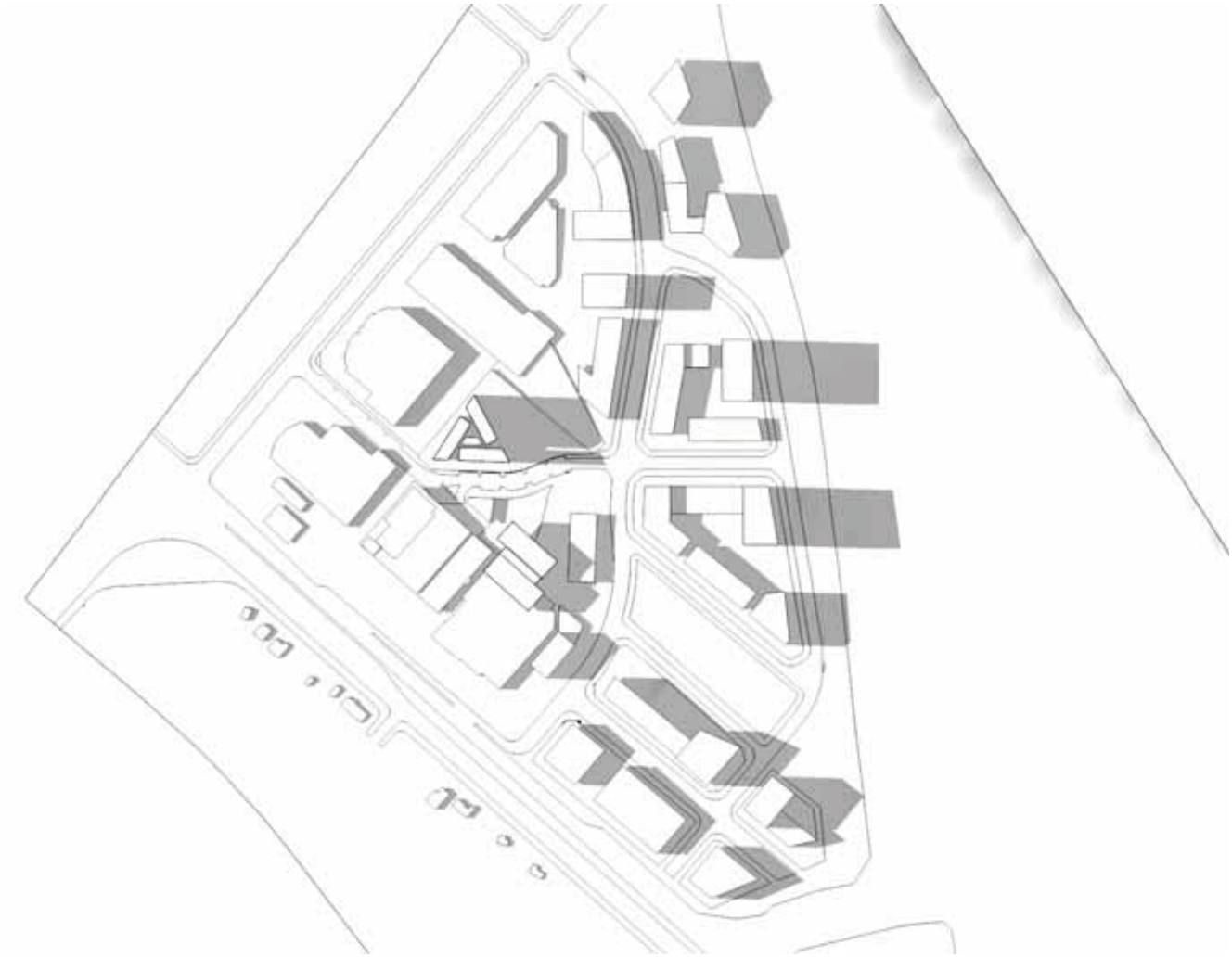


Figure 7.49 - Shadow Diagram: 3 pm, 21st December

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

9.30 am, 21st June - Winter

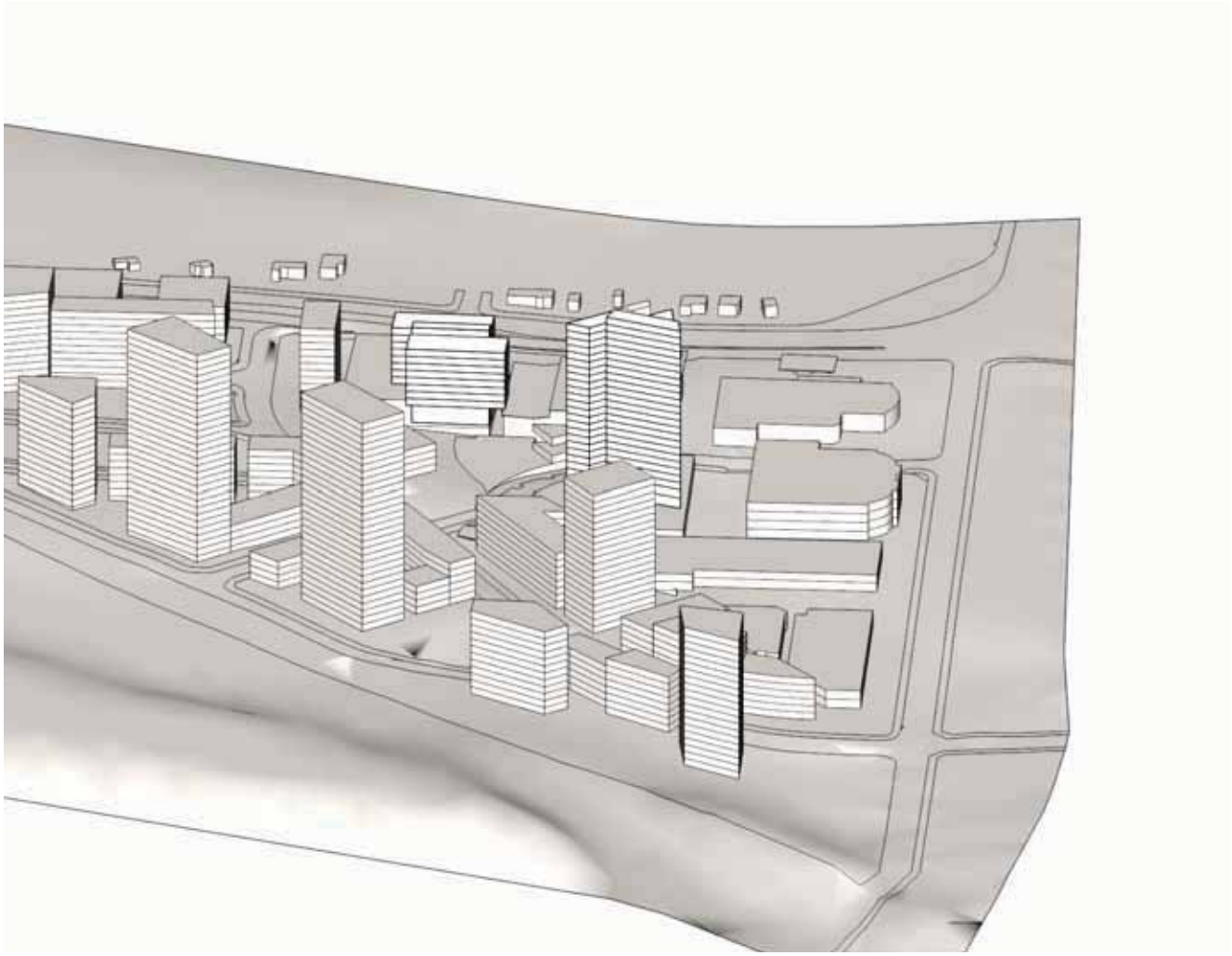


Figure 7.51 - Suneye Diagram: 9:30 am, 21st June

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

12 pm, 21st June - Winter

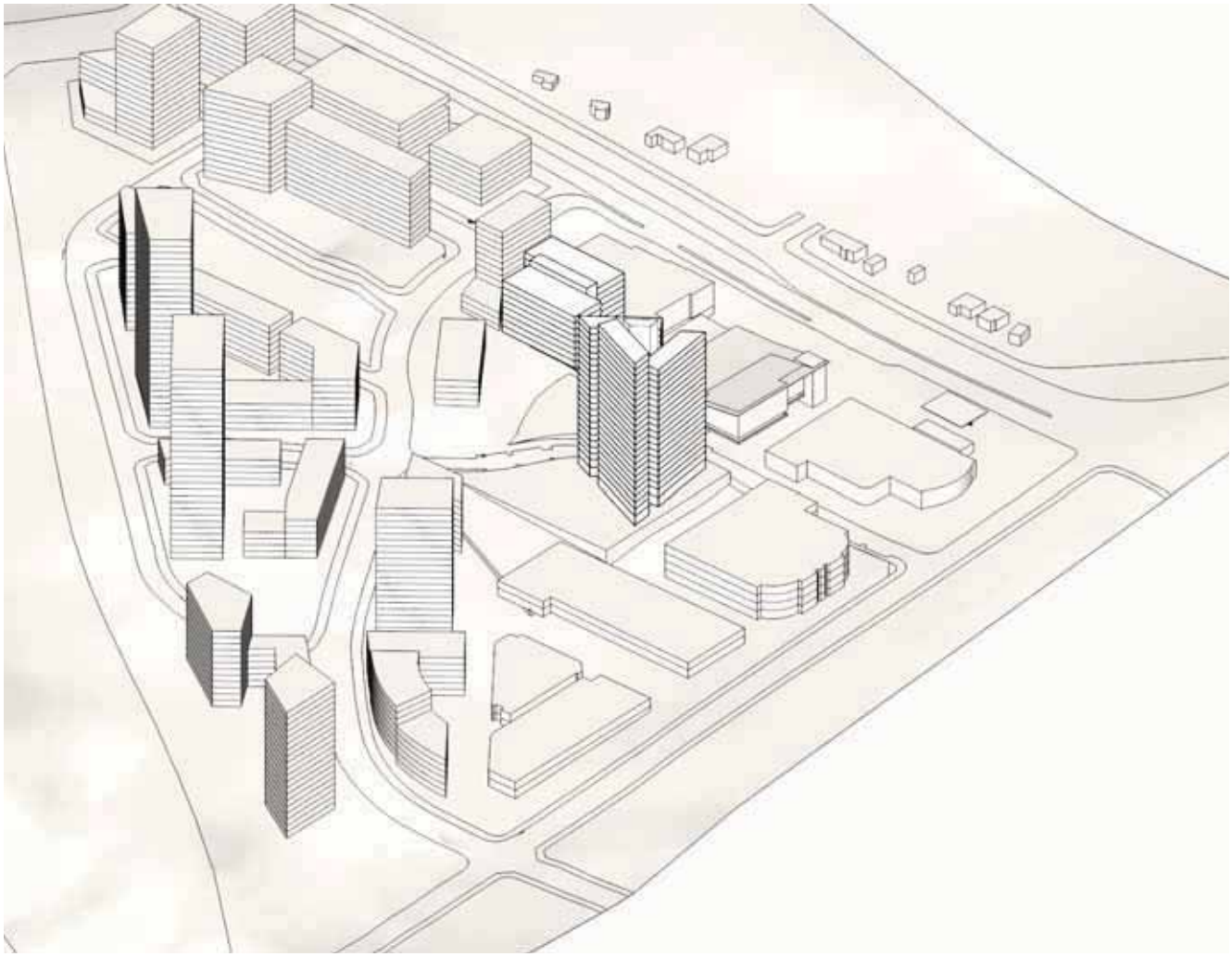


Figure 7.52 - Suneye Diagram: 12 pm, 21st June

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme5

3 pm, 21st June - Winter

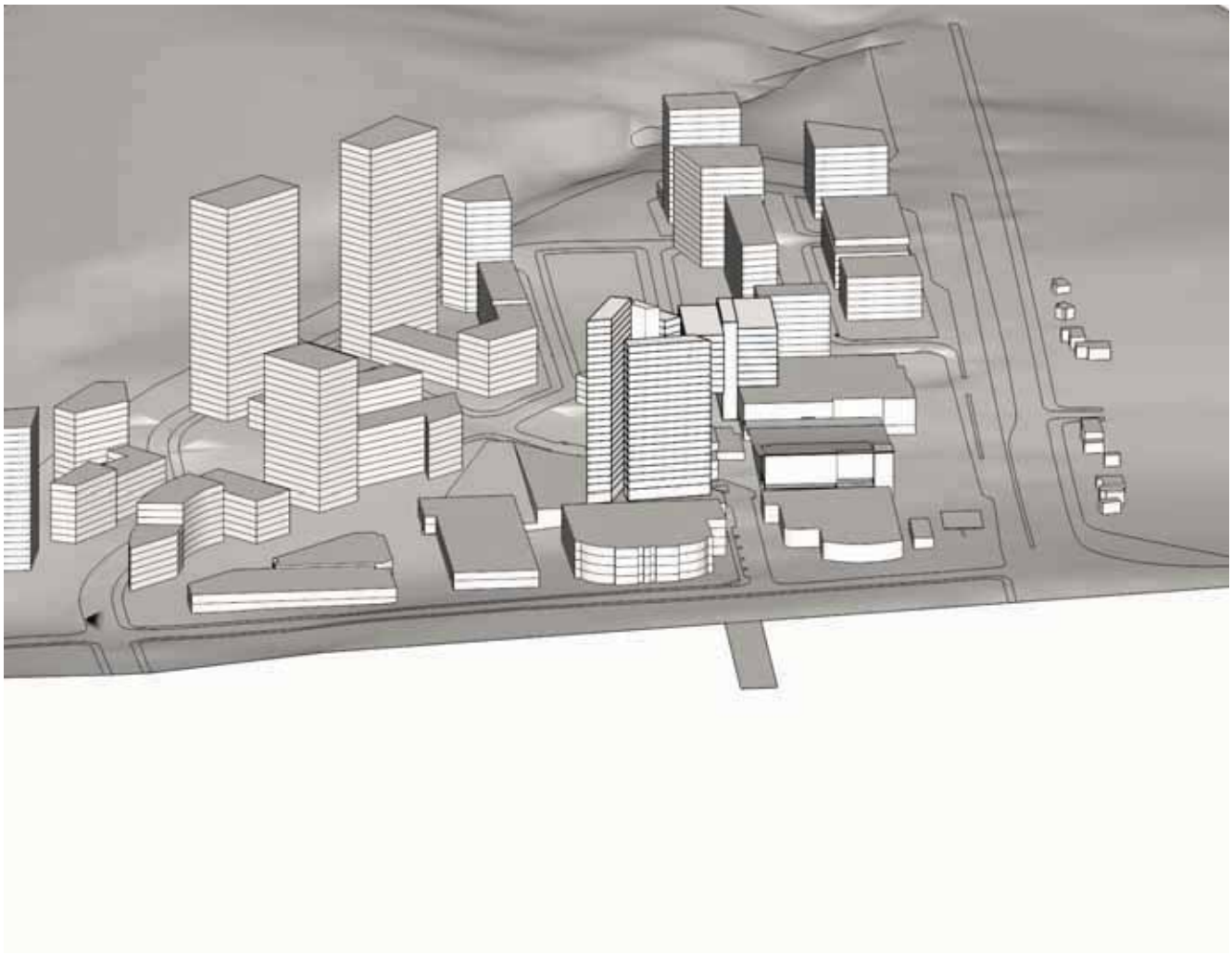


Figure 7.53 - Suneye Diagram: 3 pm, 21st June

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

9 am, 21st March/September - Equinox

Figure 7.54 - Suneye Diagram: 9 am, Equinox

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

12 pm, 21st March/September - Equinox

Figure 7.55 - Suneye Diagram: 12 pm, Equinox

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

3 pm, 21st March/September - Equinox

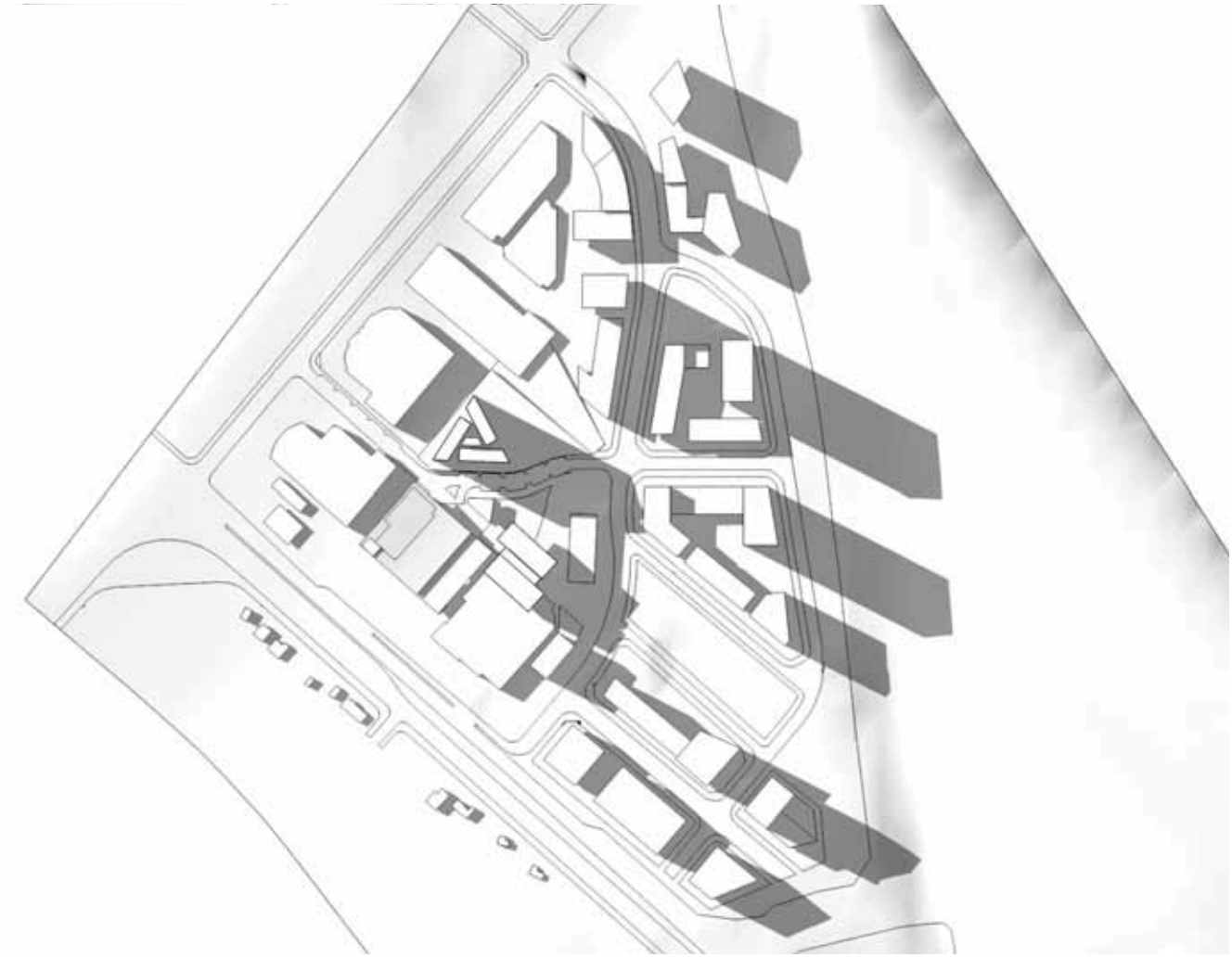


Figure 7.56 - Suneye Diagram: 3 pm, Equinox

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

9 am, 21st December - Summer

Figure 7.57 - Suneye Diagram: 9 am, 21st December

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

12 pm, 21st December - Summer

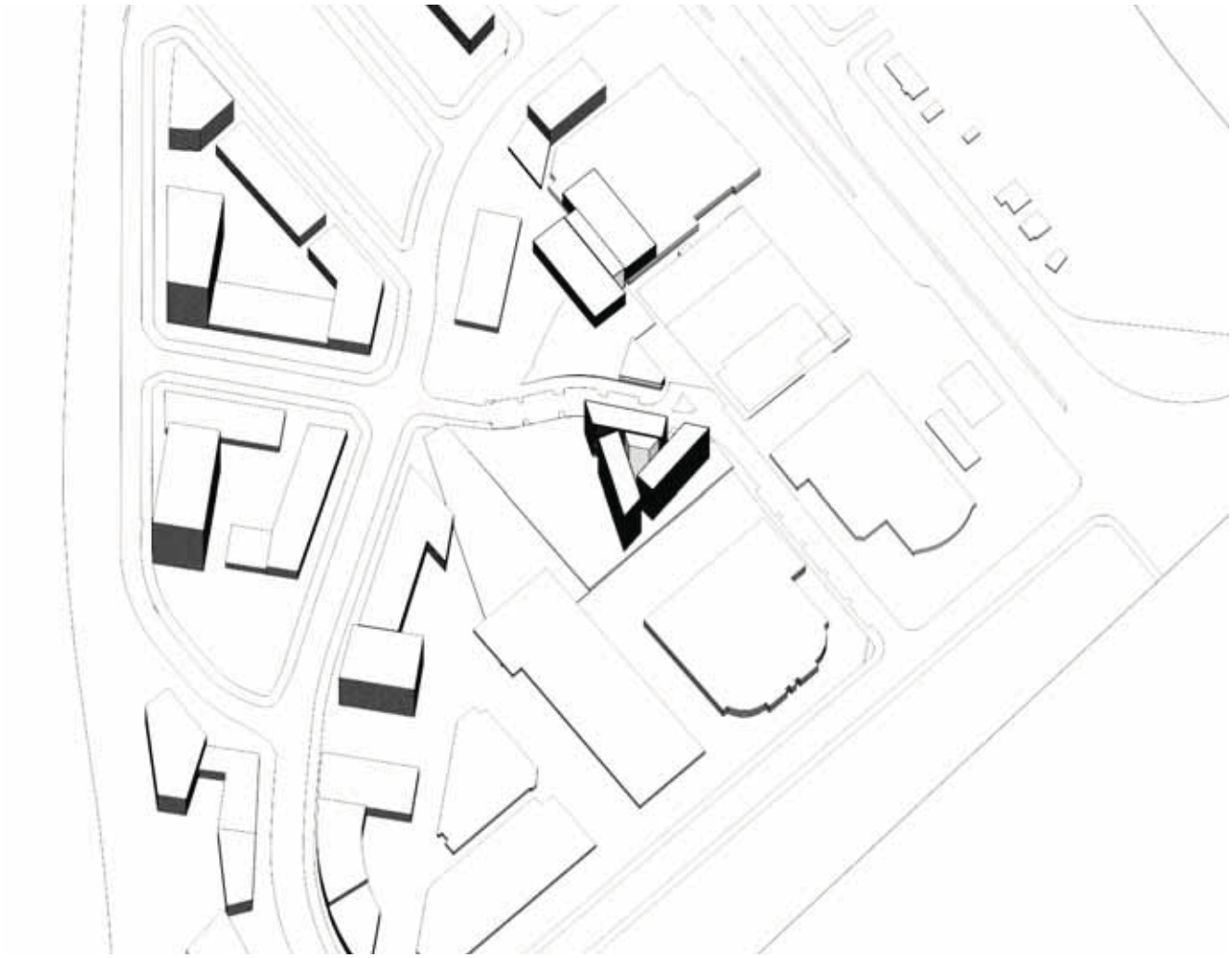


Figure 7.58 - Suneye Diagram: 12 pm, 21st December

7.5 Appendix 5: Suneye Diagrams - Preferred Alternate Concept Master Plan Scheme

3 pm, 21st December - Summer

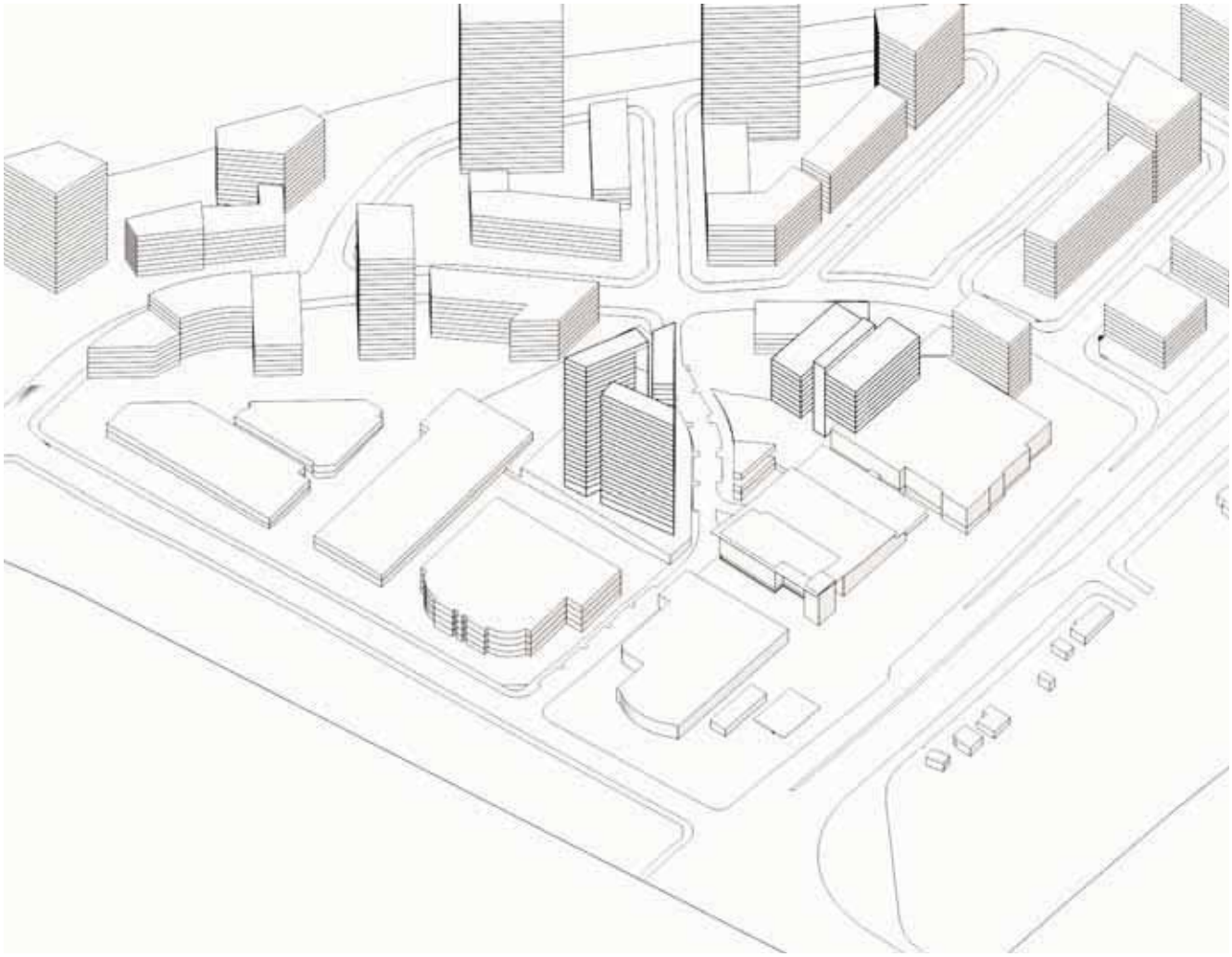


Figure 7.59 - Suneye Diagram: 3 pm, 21st December

7.6 Appendix 6: 3D Rendered Views

Aerial perspective

Macquarie Park Planning Proposal - Aerial Perspective

Harvey Norman Group

12_019 Rev_G May 2013

Legend

Site Boundary

AJ+C Allen Jack+Cottier

Perspective of Urban Square

Macquarie Park Planning Proposal - Perspective of Urban Plaza

Harvey Norman Group

12_019 Rev_G May 2013

AJ+C
Allen Jack+Cottier

Reference: 12.175

traffix
traffic & transport planners

suite 3.08
level 3 46a macleay street
potts point nsw 2011
po box 1061
potts point nsw 1335
t: +61 2 8324 8700
f: +61 2 9380 4481
w: www.traffix.com.au
director graham pindar
acn: 065132961
abn: 66065132961

30th April 2013

Urbis
Tower 2, Level 23
Darling Park
201 Sussex Street
Sydney NSW 2000

Attention: Stephen White

Re: Planning Proposal for Harvey Norman Group Macquarie Park Planning Proposal

Dear Stephen,

We refer to the subject site and in particular the Planning Proposal related to the change in zoning permissibility to allow for the future construction of a mixed use residential and commercial development on the subject site. In this regard, we have reviewed all relevant documentation provided to us and undertaken site inspections and now advise as follows:

Existing Site

The site is located on the northern side of Epping Road to the east of its intersection with Wicks Road and is partly occupied by the existing Domayne store. The site also extends to the north (rear) of the site, to encompass a large parcel of land that is located at the rear of the existing Officeworks development. The site is shown in **Figure 1** and **Figure 2** and presently enjoys access to Epping Road (in and out) via the service road that traverses the site frontage; as well as a rear access directly onto Wicks Road.

Figure 1: Site Extents

Figure 2: Site and Building Forms

Planning Context

The site lies within the Macquarie Park Corridor and the relevant local government provisions are the Ryde Council DCP 2010 and Ryde LEP 2010. These documents are currently under review, and there will be significant uplift throughout the Corridor under Council's Draft Amendment LEP No.1, principally to take advantage of the substantial investment in State Government infrastructure in the locality, notably the North Ryde and Macquarie University railway stations.

The site is also located to the immediate west of the State Government's Transit Oriented Development for the North Ryde Station Urban Activation Precinct Project (NRSUAP), which is a State Significant Development that is being progressed as an Urban Activation Precinct. This can be seen in Figure 2 and is the land generally situated between the subject site and the M2 Motorway.

Having regard for the above, there is significant uncertainty at the present time in relation to the ultimate planning controls that will be applied to the site, as well as the level of road infrastructure that will be required to deliver a traffic solution to deal with the cumulative impacts not just of the subject site and the NRSUAP, but also the uplift within the Macquarie Park Corridor more generally.

Description of Surrounding Roads

The surrounding road network is shown generally in **Figure 3**, which is extracted from Ryde Council's DCP 2010 Structure Plan. This is an expression of Council's intended road network and is not firm. In relation to the principal roads of interest to this study, the following are of particular relevance:

- M2 Motorway: an RTA State Road (MR 6002) that generally runs in an east-west direction between Lane Cove in the east and Baulkham Hills in the west. The M2 Motorway is one of Sydney's major transport corridors to the north-western suburbs. It carries in the order of 95,000vpd.
- Epping Road: an RTA State Road (MR 373) that generally runs in an east-west direction between the M2 Motorway (at Lane Cove) in the east and Blaxland Road (Epping) in the west. Epping Road forms the southern site boundary and carries approximately 50,000vpd.
- Lane Cove Road: an RTA State Road (MR 162) that runs in north-south direction to the west of the site. It forms a continuation of Homebush Bay Drive in the south and continues into Mona Vale Road in the north. It carries approximately 75,000 vpd in the vicinity of the site.
- Wicks Road an RTA Regional Road (RR 2058) that generally runs in a north-south direction parallel to Lane Cove Road, to the east of the site. It runs between Twin Road in the South and crosses Epping Road in the north, forming a junction with Waterloo Road. It carries in the order of 17,000 vpd in the vicinity of the site.
- Waterloo Road a local road that connect Wicks Road (North) with Lane Cove Road and is the principal site access to/from the north and north-west, as well as the portion of Macquarie Park that lies to the west of Lane Cove Road.

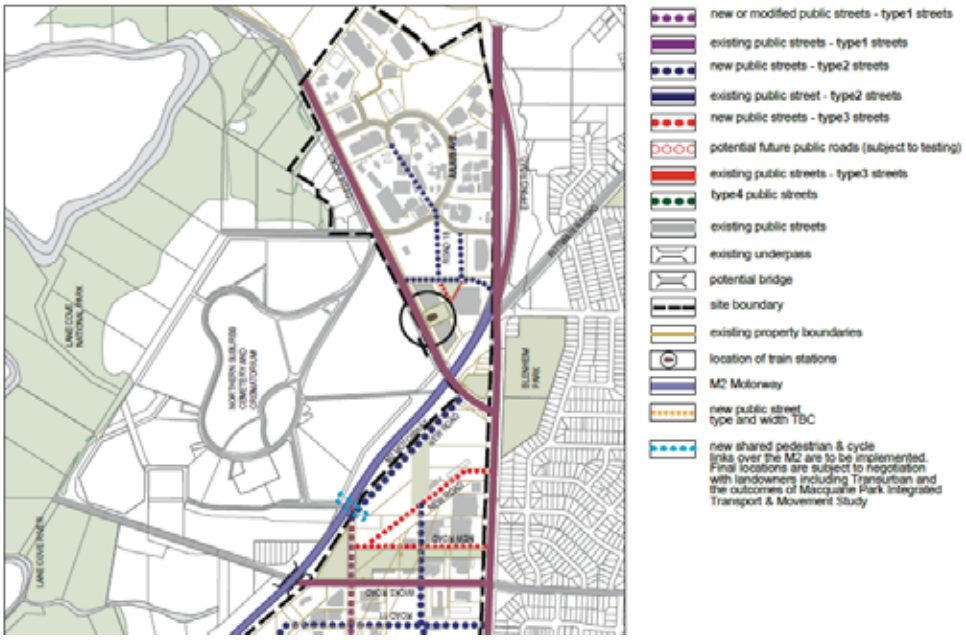


Figure 3: Structure Plan Road Network

In a more local context, the roads envisaged under the Structure Plan (as amended by the revisions proposed in the recent Architectus review) are as shown in **Figure 4**.

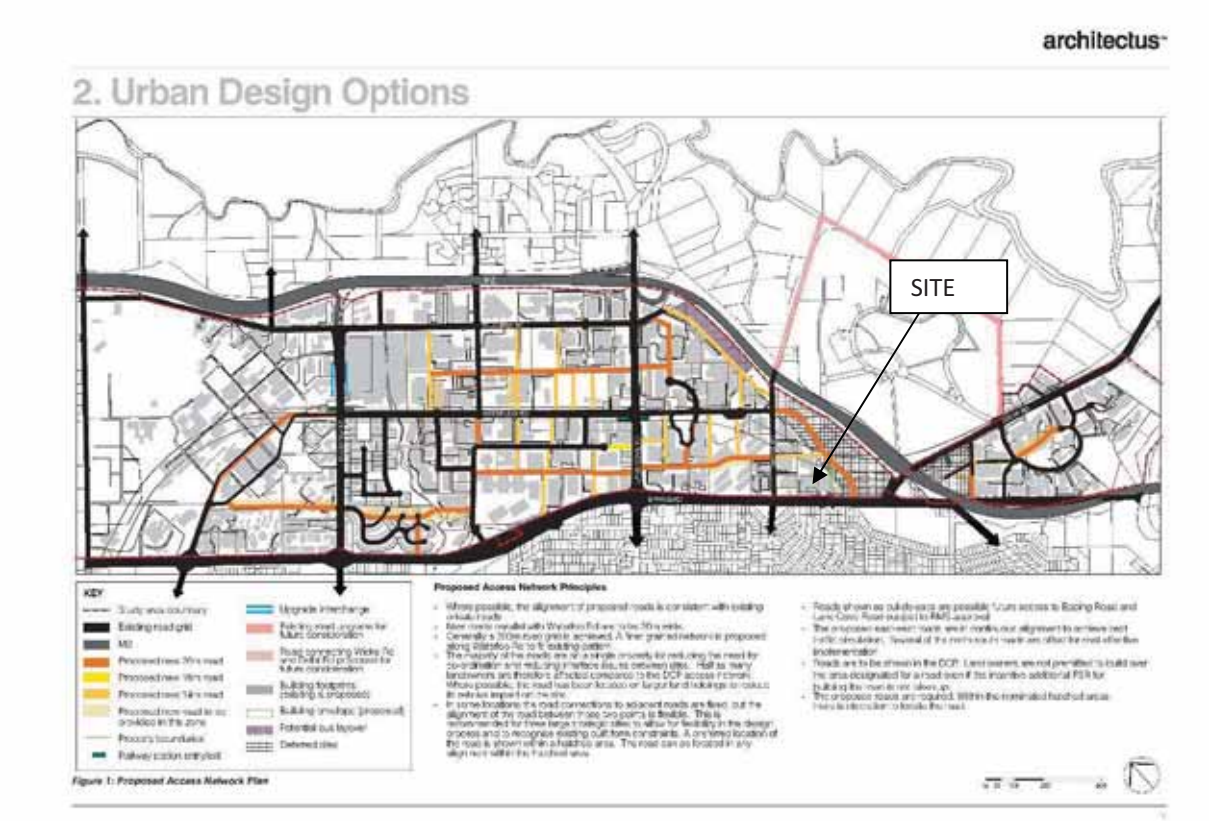


Figure 4: Structure Plan Local Road Network

The subject site is located between the two north-south "New Roads" with a frontage also to Epping Road, with an access handle through to Wicks Road, as shown in Figure 1. The above figure however demonstrates the need to adopt a flexible approach to the formulation of a suitable road hierarchy, as both of these "Type 3" Roads are not expected to be deliverable in the form shown. For example, the easternmost "New Road" is shown to form a public road intersection with Epping Road to the east of the subject site and this road was originally intended to be heavily relied upon by the State Significant NRSUAP. This intersection is however not supported by the RMS on safety grounds. On the basis of these matters, the opportunity has been taken under this Planning Proposal to formulate a deliverable road hierarchy that meets the needs of the locality, including providing a public entry road from Epping Road that serves the subject site as well as the NRSUAP site adjacent. This is discussed further below.

Existing Site Traffic

The existing site is occupied by Domayne which fronts onto Epping Road, where a parallel (but not separated) service lane permits both entry and exit movements into the Domayne retail store (as well as the Officeworks development to the immediate west). This arrangement is shown below in **Figure 5**.

Figure 5: Epping Road Site Frontage

This service lane serves the Officeworks and Domayne sites only, including the Domayne service dock access shown in the foreground. Surveys undertaken on a typical Thursday show that the Domayne site, which has 160 parking spaces, generates moderate traffic impacts during the on-street peak periods, which is to be expected as bulky goods uses typically occur on weekends. Specifically, the site generated 12 veh/hr in the AM Peak and 28 veh/hr during the PM peak period.

The site also includes an existing warehouse to the rear, which is presently accessed via a private driveway onto Wicks Road. Notwithstanding that the access arrangements onto Epping Road will be improved under this Planning Proposal (with a high standard public road entry that will serve the locality generally), the area will also benefit from increased reliance on this Wicks Road access. The existing access is shown in **Figure 6**.

Figure 6: Wicks Road Site Access

This access presently carries moderate traffic volumes. It is however sufficiently wide to allow construction to a public road standard, with either left-in/left-out access but also with the possibility of a signal-controlled exit movement, although with no possibility of a right turn entry. In this regard, a right turn entry turn is not required as alternate access is available via the improved Epping Road entry for the majority of traffic.

Indicative Development Adopted for Assessment

The Planning Proposal seeks to amend the current LEP and in particular the zoning and development controls associated with the subject site. While development yields are yet to be finalised, for the purpose of this preliminary report the likely future development (under the Primary Scheme) is conceptual but is expected to include:

- Redevelopment and/or demolition of existing structures as appropriate;
- Delivery of improved access arrangements onto both road frontages;
- Delivery of an internal road hierarchy that will serve the needs of the locality, including the NRSUAP site, while achieving the objectives of Council's DCP for improved permeability;
- Construction of a mixed use development precinct with 47,242m^2 GFA comprising the following uses:
    - 162 residential apartments;
    - 200 hotel suites;
    - 13,945m^2 of commercial floor area (Building B2, to serve as an international HQ for Harvey Norman and Building C1);
    - 8,663m^2 of bulky goods retail uses (which already exists); and
    - Provision of a total of 715 parking spaces, comprising 174 for the residential use and 541 for the non-residential uses.

A copy of the indicative development concept prepared by Allen Jack + Cottier is provided separately in the Planning Proposal documentation.

The traffic and transport issues arising from this Planning Proposal are discussed further below. It is emphasised in this regard that for the purposes of the Planning Proposal and having regard for the matters discussed further below, a high-level approach has been taken and is appropriate, in the knowledge that extensive further detailed assessment will be required at a later time (development application stage/s), which may also need to take into account the cumulative impacts of all known development proposals as well as potential infrastructure improvements which are needed to support the proposed uplift in the Macquarie Park Corridor more generally, irrespective of whether the subject site is redeveloped.

Notwithstanding this overall complex planning context, the assessment outlined below deals with the impacts that are expected to arise from this Planning Proposal as an isolated proposal, with recommendations made as to the transport planning initiatives that will need to be taken to achieve a satisfactory outcome.

The proposed layout of the road network and building forms based on the above indicative yields are shown in **Figure 7**.

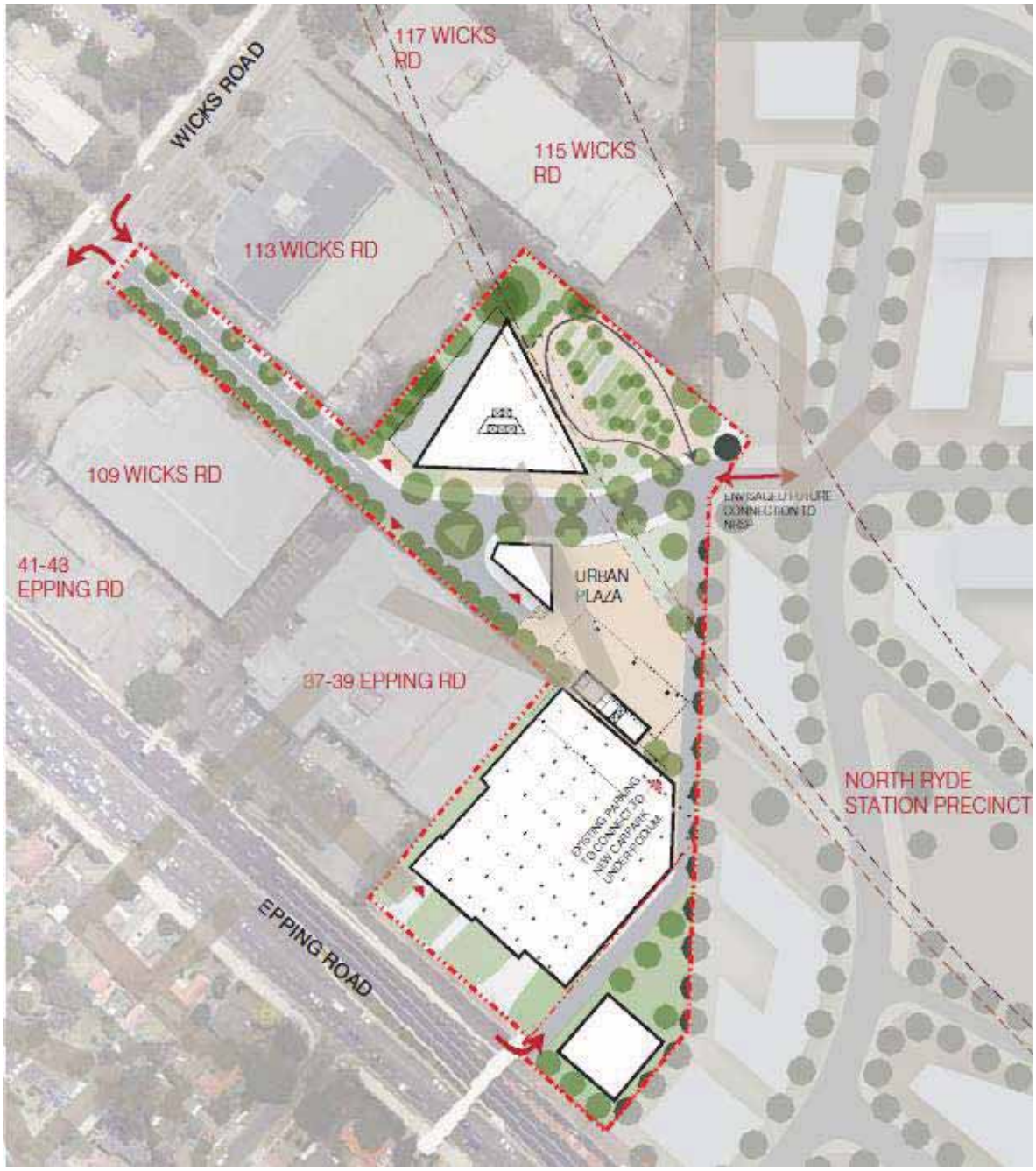


Figure 7: Site Road Network - Primary Scheme

Access Requirements

The Planning Proposal envisages a new road layout as shown in Figure 7. This access option is referred to as the Primary Scheme and incorporates a high standard driveway entry from Epping Road, which is located at the termination of the existing service lane shown in Figure 5. This will provide access to the 'rear' of the site behind the existing retail building. In addition to this, it is expected that the existing access driveway serving the Domayne site via Epping Road will be

retained as an entry-exit driveway, but with the use of this existing driveway limited to the revitalised retail/commercial use as now proposed. It may also be necessary to prohibit any further significant intensification in use of this driveway, notwithstanding that it provides access only to part of the site. This acknowledges the capacity constraints that presently exist along the Epping Road frontage during peak periods. It is noted in this regard that the retention of the retail use does not raise any concerns as this traffic already occurs and as discussed above, is very moderate during commuter peak periods. The main issue will be the amount of commercial activity that will be able to be connected to Epping Road. This would not be a concern in the AM peak period, as the entry movement (predominant in the AM peak occurs via a left turn from the service lane under relatively free-flow conditions. The more significant issue is, rather, during the PM peak period, where exits from the commercial use may need to be restricted through internal management measures.

A secondary site access is proposed via the construction of a public road standard access onto Wicks Road (north). This is an important connection in view of the constraints on the use of Epping Road as discussed above, most notably during the PM peak. It also takes advantage of the fact that Wicks Road will become a Type 1 Road (see Figure 4), with an important collector road function. This is presently proposed as a left-in/left-out access following preliminary discussions with RMS. This would be satisfactory in the event that the main spine road within the NRSUAP site that connects directly into Waterloo Road at Wicks Road (forming a four way junction) is constructed, providing egress to the north. In the event that use of the main spine road is not achievable for any reason, then it is possible that traffic signal control would provide the optimal access arrangement at the Wicks Road access, permitting exits to the north along Wicks Road and Waterloo Road, thence to Lane Cove Road. Under this scenario, right turns into the site would not be possible from Wicks Road due to capacity constraints as well as the potential for queuing effects towards Epping Road.

It is proposed that consultation with the RMS and Council will be undertaken as part of any subsequent development application process to ensure that the future access arrangements achieve the optimal arrangement not just for the site, but the precinct more generally.

Transport Planning Context

The site lies within 600 metres walking distance of North Ryde Railway Station and this is within the normal 800 metres walking distance that is usually adopted for commuter trips. In addition, there are extensive bus services in the immediate locality, with routes traversing Lane Cove Road and Epping Road, which are both proximate and very convenient.

The DCP parking controls within the Macquarie Park Corridor have been structured with regard for the need to limit parking to maximise public transport and other alternate travel modes and this is discussed further below. Also of relevance is the proposed mixed use nature of the development. Specifically, the uses have a synergy with one another and the effect of this will be to 'internalise' trips so that they occur as local trips, rather than as regional trips. For example, many of the residents within the site would be expected to work or study in the immediate locality and these people would be able to walk or use a bicycle should they desire, particularly given the pedestrian and bicycle linkages that are proposed. Similarly, many of the people who reside in the hotel will be attending businesses in the locality and they will also walk in many cases. This includes people associated with the Harvey Normal head office complex, which it is noted organises regular visits of franchisees in large numbers on a frequent basis.

In general terms, while the strong focus of Macquarie Park as an employment zone is fully appreciated, the proposed residential and hotel uses within the precinct have a clear capacity to reduce commuter travel and maximise local workplace trips, many of which are expected to involve walking. This is also the basis of the NRSUAP site, which is being proffered as a transit-oriented development, by virtue of its proximity to public transport, but which also recognises the planning benefits of incorporating residential development into the land use mix.

Transport Strategy

The transport strategy that underpins this Planning Proposal acknowledges the traffic capacity constraints that apply within the locality generally, noting that at the present time the road network is characterised by slow travel speeds and significant delays along Lane Cove Road and Epping Road in particular, during commuter peak periods. Nevertheless, uplift within the Macquarie Park Corridor is inevitable and arguably essential, given the substantial recent public investment in the provision of substantial rail infrastructure, including North Ryde and Macquarie Park railway stations. Indeed, this infrastructure was provided in advance of new development, rather than being reactive to an existing demand. This is evident from an examination of railway passenger count data, which shows very moderate daily passenger levels that will need to increase dramatically over time to maximise the available capacity. That is, this infrastructure is in fact predicated on uplift and ongoing development within the Macquarie Park Corridor and the Planning Proposal is responsive to this situation.

However, in view of the road capacity constraints that exist in the locality and even though substantial road infrastructure improvements are planned in the long term, it is critical to the success of the Planning Proposal that it adopts a sustainable approach to the transport task. This is achieved through the following initiatives:

- The mixed use nature of the development will 'internalise' trips as discussed above, which will increase walking and contribute to a more vital urban experience;
- Parking provision is to be generally in line with Council's DCP, which seeks to find an appropriate balance between the need to promote alternate travel modes, while protecting and preserving the amenity of local residential communities;
- Future development applications will need to formulate a Workplace Travel Plan, which seeks to maximise alternate travel modes through the adoption of proactive initiatives including provision of cyclist end-user facilities, car share schemes and car pooling, as well as management measures including the preparation of Travel Access Guides to ensure that residents and workers are aware of all available transport options; and
- Incorporation of bicycle and pedestrian linkages that provide safe and attractive environments for these user groups.

It is expected that the above initiatives will, over time, enable higher public transport targets (or more appropriately non-car travel targets) to be achieved for the site.

Context for Traffic Assessment

There are many uncertainties with regard to development pressures in the locality and the establishment of an appropriate road network and these make any consideration of the subject site as an isolated development site largely irrelevant. Rather, the Planning Proposal needs to be viewed in the context of the cumulative effects of various factors, which need to be taken into account and which will provide the strategic planning context not just for the subject application but any proposal that might be considered. These are as follows:

- The NRSUAP development will, if approved, impose a local road network onto this precinct that poses both opportunities and constraints. In response to this, the Planning Proposal has made every attempt to acknowledge and integrate this road network to achieve an acceptable outcome for the precinct. Importantly, the development envisaged under the Planning Proposal is considered to be supportable in its own right and has an access solution that can be implemented independently;

- The Macquarie Park Growth Model is the model that is required to be used by Ryde Council in the assessment of any development application (but not this Planning proposal) within the Macquarie Park Corridor. While this model could potentially be used to assess the subject Planning Proposal, there is significant uncertainty surrounding the utility of this model in relation to the following areas (based on our current knowledge):
    - The RMS does not consider the model as being 'fit for purpose';
    - The model does not include the State Significant NRSUAP development, nor the road network contemplated under that proposal;
    - The model does not include the benefits associated with the newly constructed M2 ramps at Herring Road (west to south and east to south); and
    - The model does not include the benefits of the proposed (though not approved) new on-ramp from Lane Cove Road to the M2 (eastbound) which will reduce traffic along Lane Cove Road (southbound) and Epping Road (eastbound).

Having regard for these matters, the model is not considered to be a suitable base model for assessment of the subject Planning Proposal. It is noted however that this may not necessarily be the case when development applications are ultimately submitted after any rezoning, at which time more detailed assessment would be required, in accordance with Council's adopted DA assessment protocols as they apply at that time. This should also be seen in the context where under any rezoning, there would be no right to assume full development to its maximum extent even for a compliant scheme and a merit-based assessment will still be required.

Finally, it is considered that the cumulative impacts of all the above factors as well as the uplift that is generally expected to occur within the Macquarie Park Corridor is a matter that may well be outside the control of Ryde Council, as they raise significant strategic planning issues. They are also outside the control of any individual development site. Nevertheless, the site that is the subject of this Planning Proposal is able to be assessed at a local level and this will provide input to the ongoing planning process. This is discussed further below.

Traffic Generation

For the purpose of this Planning Proposal, the indicative traffic generation has been assessed on the basis of RMS trip rates where appropriate; and trip rates adopted in the NRSUAP TMAP study, to provide a consistent approach across the region. The rates account for the following factors:

- The mixed use nature of the development and the associated synergy whereby trips will be 'internalised' with a high proportion of walking trips;
- The influence of travel demand measures as discussed above which are intended to achieve an improvement in public transport patronage and other non-car travel modes over time; and
- The implementation of a restricted parking policy.

The resulting trip rates and net increase in traffic generation (i.e. over and above the existing retail site generation) is shown in **Figures 8 and 9** for the AM and PM peaks respectively on a typical Thursday. This relates to the Primary Scheme which adopts a 2.39 to 1 FSR.

Primary 2.39 to 1 FSR
Thursday AM Peak

Land Use	Area/No.	RTA Generation Rate (trips/m2 or Unit)	Land Use Generation	Vehicles In	Vehicles Out
Apartments	**162**				
1 bed	65	0.23	15	3	12
2 bed	89	0.23	20	4	16
3 bed	8	0.23	2	0	1
Total			**37**	**7**	**30**
Commercial					
Commercial	13945	0.0081	113	90	23
Total			**113**	**90**	**23**
Bulk Retail					
Bulk Retail	8663	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.01	2	1	1
Retail	500	0.01	5	3	3
Total	**650**		**7**	**3**	**3**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**167**	**118**	**50**
TOTAL			**205**	**125**	**80**

Hotel 24 trips per 100 rooms -used for 88 Talavera Rd
Other rates based on NRSPP TMAP for consistency

Figure 8: AM Trip Generation Increase – 2.39:1 FSR

Thursday PM Peak

Land Use	Area/No.	RTA Generation Rate (trips/m2 or Unit)	Land Use Generation	Vehicles In	Vehicles Out
Apartments	**162**				
1 bed	65	0.23	15	12	3
2 bed	89	0.23	20	16	4
3 bed	8	0.23	2	1	0
Total			**37**	**30**	**7**
Commercial					
Commercial	13945	0.0081	113	23	90
Total			**113**	**23**	**90**
Bulk Retail					
Bulk Retail	8663	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.043	6	3	3
Retail	500	0.043	22	11	11
Total	**650**		**28**	**14**	**14**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**189**	**61**	**129**
TOTAL			**226**	**91**	**136**

Hotel 24 trips per 100 rooms -used for 88 Talavera Rd
Other rates based on NRSPP TMAP for consistency

Figure 9: PM Trip Generation Increase – 2.39:1 FSR

It can be seen that the indicative development yield as adopted results in 205 veh/hr in the AM peak and 226 veh/hr during the PM peak. These trips will be split onto all available accesses although as mentioned above, no significant increased reliance on Epping Road is anticipated in relation to exit movements. That is, entry movements are provided with a relatively high standard of accessibility, with entry movements available via Epping Road and Wicks Road. Accordingly, the main issues to be addressed in any subsequent development application would be the need to accommodate 48-133 veh/hr exiting the site during the AM and PM peaks respectively, particularly the latter. While some traffic would be able to exit onto Epping Road, the majority of this traffic is expected to use the Wicks Road exit driveway and this would be assisted by traffic signal control as discussed above. This situation would be alleviated however, in the event that exiting traffic is able to use the main NRSUAP spine road to exit directly into Waterloo Road at Wicks Road and this will require further investigation as part of a strategic traffic study that examines the cumulative traffic impacts of the subject site, the NRSUAP site and any other uplift that may occur.

Notwithstanding, there is no evident impediment to the support of the rezoning and there are options available that will provide the requisite capacity. It is also noteworthy that the trip rates shown in Figures 8 and 9 are consistent with Ryde Council's Reference Document No. 2 for the Growth Model which permits trip rates to be reduced to 40% of RMS rates where a Work Travel Plan is adopted. It is also noted that the subject site will be developed in stages, so that interim development scenarios would be more readily achievable.

Traffic Generation Sensitivity Analysis

The above analysis is based on a proposed FSR of 2.39 to 1, which assumes uplift across the site. This may be compared with assessment against a scheme with a 2.0 to 1 FSR based on Council's incentive scheme for Macquarie Park in Draft Ryde LEP Amendment No. 1. Based on a this scheme, the traffic generation would be as shown in **Figures 10 and 11** for the AM and PM peaks respectively. The analysis is based on advice from AJ+C concerning the land use mix and yields as indicated in these figures.

It is noteworthy that Council's attention is expected to be focussed upon the relative change in traffic generation arising from the additional FSR, rather than the absolute increase in generation as indicated in Figures 8 and 9 above. That is, the base case for assessment should be a scheme in accordance with the incentive scheme in circumstances where redevelopment is proposed in any event.

Primary 2.00 to 1 FSR
Thursday AM Peak

Land Use	Area/No.	RTA Generation Rate (trips/m2 or Unit)	Land Use Generation	Vehicles In	Vehicles Out
Apartments	**117**				
1 bed	47	0.23	11	2	9
2 bed	64	0.23	15	3	12
3 bed	6	0.23	1	0	1
Total			**27**	**5**	**22**
Commercial					
Commercial	10625	0.0081	86	69	17
Total			**86**	**69**	**17**
Bulk Retail					
Bulk Retail	8663	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.01	2	1	1
Retail	0	0.01	0	0	0
Total	**150**		**2**	**1**	**1**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**136**	**94**	**42**
TOTAL			**162**	**99**	**63**

Hotel 24 trips per 100 rooms -used for 88 Talavera Rd
Other rates based on NRSPP TMAP for consistency

Figure 10: AM Trip Generation Increase – 2:1 FSR

Thursday PM Peak

Land Use	Area/No.	RTA Generation Rate (trips/m2 or Unit)	Land Use Generation	Vehicles In	Vehicles Out
Apartments	**117**				
1 bed	47	0.23	11	9	2
2 bed	64	0.23	15	12	3
3 bed	6	0.23	1	1	0
Total			**27**	**22**	**5**
Commercial					
Commercial	10625	0.0081	86	17	69
Total			**86**	**17**	**69**
Bulk Retail					
Bulk Retail	8663	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.043	6	3	3
Retail	0	0.043	0	12	12
Total	**150**		**6**	**15**	**15**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**141**	**56**	**108**
TOTAL			**167**	**78**	**113**

Figure 11 PM Trip Generation Increase - 2:1 FSR

It can be seen that the indicative development yield with a compliant FSR of 2 to 1 under the incentive scheme results in 162 veh/hr in the AM peak and 167 veh/hr during the PM peak. This compares with 205 veh/hr in the AM peak and 226 veh/hr during the PM peak under a 2.39 to 1 FSR. The net increase is only 42-59 veh/hr during the AM and PM peaks respectively and this is a moderate increase, with this traffic distributed onto all available access routes. Indeed, it is one additional movement every 2-3 minutes at either access location.

It is considered that this increase is supportable having regard for the fact that these impacts are off-set by the following measures:

- Improved public road access to the precinct via Epping Road.
- Improved public road access via Wicks Road North.
- The implementation of Work Travel Plans in association with subsequent development applications.
- The establishment of a permeable road network that achieves the objectives of Council's DCP and is therefore in the public interest.

Assessment in the Context of the NRSUAP Site

It has been established that the Primary Scheme (with a 2.39 to 1 FSR) results in an additional 205 veh/hr in the AM peak and 226 veh/hr during the PM peak. This may be contrasted with the development of the NRSUAP site and it is noted that the TMAP report in support of that Planning Report (identified as Appendix K), examines the cumulative impacts associated with the five sites that comprise the NRSUAP site. These are predicted to generate a combined 1,360 veh/hr and 1,505 veh/hr in the AM and PM peaks respectively and the TMAP report identifies a range of traffic and transport improvements to deal satisfactorily with the resultant traffic impacts. The report also incorporates growth and takes account of other major development proposals in examining a 2031 land use development scenario.

The subject development, even at a 2.39 to 1 FSR, generates only about 15% of this traffic in both peak periods and this is not likely to alter the nature and scope of the overall conclusions of the TMAP report for the following reasons:

- The TMAP report includes growth in the region, which would already account for the subject site to some extent. Thus, to assess the impacts of the Domayne site as a net increase would be incorrect as there would be an element of double counting; and
- The Domayne site embodies localised improvements that provide increased accessibility to the precinct generally.

Accordingly, a worst case scenario would more likely see the TMAP improvements as identified being slightly advanced from 2031 as a consequence of the Planning Proposal, which is relatively modest in scope. It is noted in this regard that with the exception of the proposed traffic signals at the intersection of the NRSUAP spine road with Wicks Road opposite Waterloo Road (to form a four way junction) the TMAP identifies all other road improvements as being the responsibility of the RMS, in the context of addressing existing traffic congestion. The Planning Proposal is entirely consistent with this approach, noting that individual development applications will be required to assess the nature of improvements required over time.

Parking Provision

The parking requirements of the development will be assessed in detail at development application stage, based on the land use mix to be adopted. Nevertheless, on the basis of the indicative development adopted for this Planning Proposal, the development would require parking based on Council's DCP 2010. The parking controls that apply to the commercial component would be a pro-rated rate, noting that the site falls within two parking zones as depicted in LEP 2011, as shown in **Figure 12**.

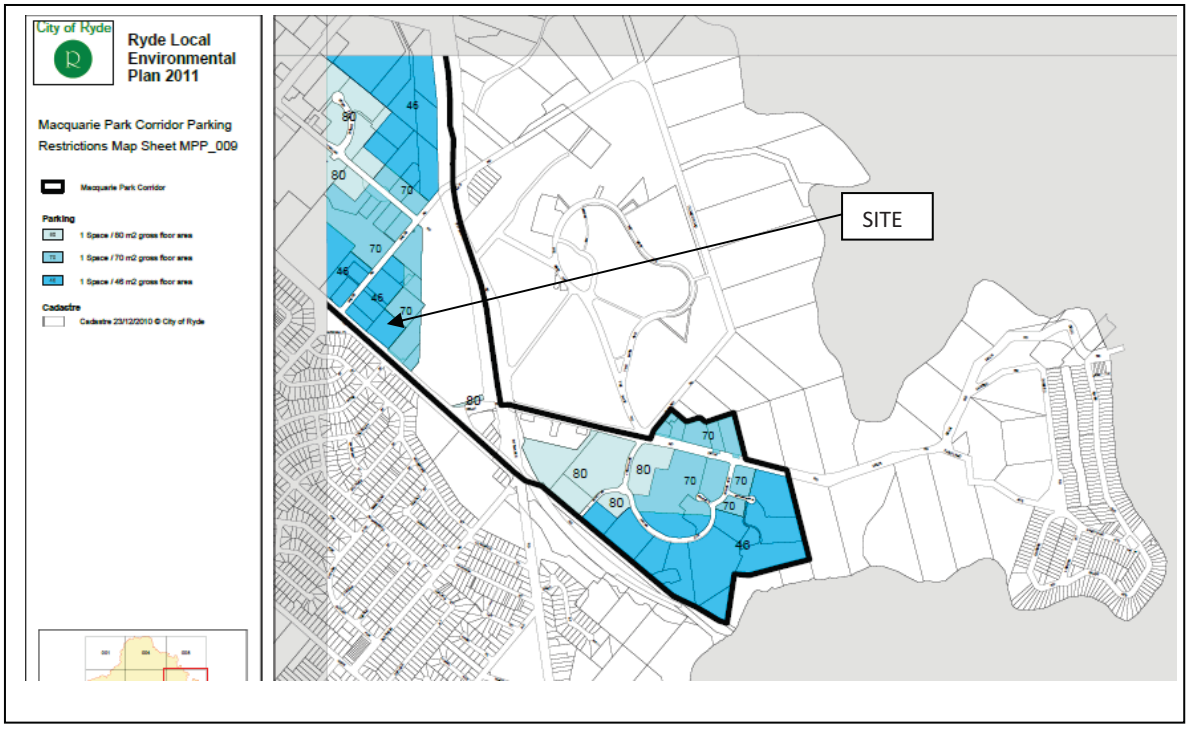


Figure 12: Parking Zones Under LEP 2011

On the basis of the above, the indicative development concept adopted for assessment purposes based on the Primary Scheme would require parking as shown in **Figure 13**.

Land Use	Area/No.	Parking Rate	Spaces Required	Spaces Proposed
Apartments	**162**			
1 bed	65	0.6-1.0	39-65	39
2 bed	89	0.9-1.2	80-107	90
3 bed	8	1.4 -1.6	11-13	13
Visitor	162	0.2	32	32
Residential Total			**162-217**	**174**
Commercial				
Commercial	13945	0.01465	204	
Total			**204**	**300**
Bulk Retail				
Bulk Retail	8663	0.01465	127	
Total			**127**	**164**
Café/Retail				
Café	150	0.0133	2	0
Retail	500	0.014	7	7
Total			**9**	**7**
Hotel				
Hotel	200	0.667	**133**	**70**
Non Residential Total			**474**	
TOTAL			**635-690**	**715**

Figure 13: Parking Requirements and Provision

It can be seen that the overall site requires up to 690 spaces based on Council's DCP 2010 and in response 715 spaces are proposed as shown. This is 'nominally' higher than required but serves to demonstrate that the site is capable of providing the requisite parking. In particular, the 'surplus' 15 spaces are attributable to the existing retail use (Domayne) which has 164 spaces for 8,860m^2 of retail area which on the basis of the DCP would require 127 spaces, so that the existing 37 space over-provision is effectively maintained. Notwithstanding, the following matters are noteworthy:

- The upper end of the range of the residential DCP parking rates has been adopted but is considered necessary to avoid on-street parking impacts;

- The bulky goods retail rate is largely irrelevant having regard to the fact that this level of parking (164 spaces) is already approved for the existing bulky goods use that occupies the site (Domayne);

- The provision of 300 commercial spaces is higher than permitted under current controls and equates to 1 space/47m^2 GFA. This level of provision is sought on the grounds of the known operational requirements of the Harvey Normal Head Office, whereby franchisees visit the site in significant numbers for training throughout the day. Importantly, these visits do not generally coincide with the commuter peak periods and as such, the additional parking does not contribute to peak period traffic generation. This is also reflected in the reduced trip rates which are permitted for the reasons discussed, including Council's adopted policy to reduce trips below RMS rates where a Work Travel Plan is adopted under future development consents; and

- The hotel use has been assessed having regard for RMS Guideline rates as well as surveys of comparable developments and the DCP rate is considered onerous and unnecessary and more reflective of a motel-type use rather than a business hotel.

Conclusions on Primary Scheme

In summary, the Planning Proposal is considered supportable on traffic planning grounds. The impacts associated with the proposal will have a manageable impact on the operation of critical intersections in the locality, based on the proposed access arrangements, which will be subject also to a further detailed merit assessment at development application stage. The need for a strategic assessment based on the cumulative impacts of all development in the locality but most notably the NRSUAP site, as well as recent infrastructure improvements, is recognised but is a matter that cannot be progressed separately under this Planning Proposal. Importantly, the development envisaged under the Planning Proposal is considered to be supportable in its own right and has an access solution that can be implemented independently of any other development in the locality.

Preferred Alternate Scheme

The Primary Scheme as discussed above is based on a design that is deliverable and self-sufficient, with no reliance on any external parties. In this regard, the applicant is obviously aware of the Transport for NSW's NRSUAP development which, if approved, will impose a local road network onto this precinct that poses both opportunities and constraints. In response to this, the Planning Proposal has identified an alternative access solution which acknowledges and integrates the resultant road network to achieve the optimal outcome for the precinct generally.

This alternative arrangement is shown in **Figure 14**. Generally, the improvements that are delivered by this Preferred Alternate Scheme are as follows:

- The provision of an improved road layout which incorporates a high standard entry constructed to public road requirements from Epping Road, which is essentially an upgraded extension to the existing service lane shown in Figure 5. This is proposed as an integrated road that will serve the precinct, but is also aligned with the road system developed for the NRSUAP site.

- An increase in the residential units from 162 to 222 apartments, with a commensurate reduction in the commercial office component from a combined 13,945m^2 to 10,860m^2; and

- An increase in parking from 715 spaces to 779 spaces;

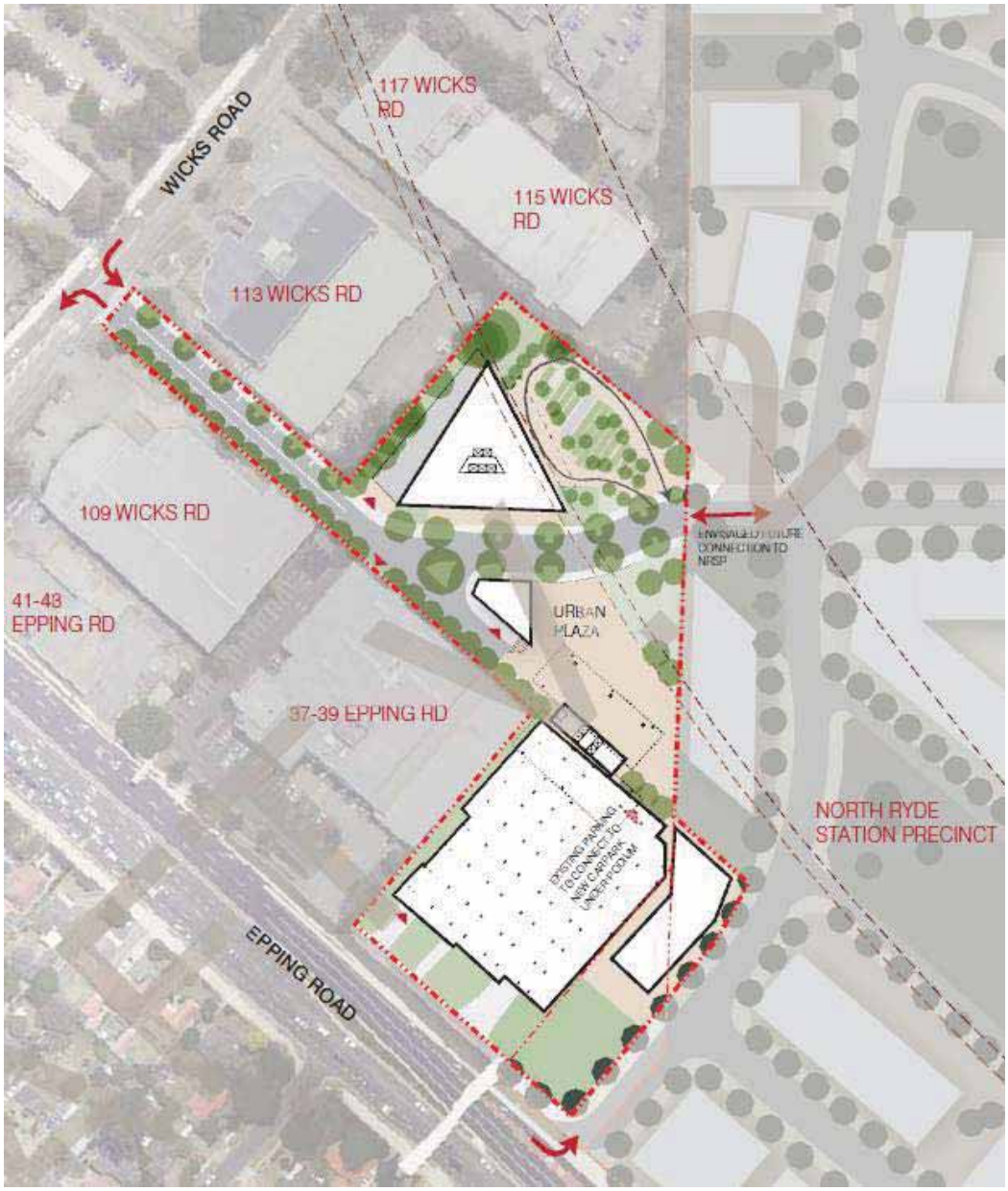


Figure 14: Preferred Alternate Concept

Traffic Implications of Preferred Alternate Scheme

The traffic implications are not significantly different to the Primary Scheme, with the main change being the conversion of the entry driveway from Epping Road into a higher-order public road entry connection that will serve the Precinct generally, rather than the site itself. This therefore has a significant public benefit.

The traffic generation under the Preferred Alternate Scheme also changes slightly, as shown in **Figures 15 and 16**.

Preferred 2.5 to 1 FSR					
Thursday AM Peak					
Land Use	**Area/No.**	**RTA Generation Rate (trips/m2 or Unit)**	**Land Use Generation**	**Vehicles In**	**Vehicles Out**
Apartments	**222**				
1 bed	89	0.23	20	4	16
2 bed	122	0.23	28	6	22
3 bed	11	0.23	3	1	2
Total			**51**	**10**	**41**
Commercial					
Commercial	10860	0.0081	88	70	18
Total			**88**	**70**	**18**
Bulk Retail					
Bulk Retail	8660	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.01	2	1	1
Retail	480	0.01	5	2	2
Total	**630**		**6**	**3**	**3**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**142**	**98**	**45**
TOTAL			**193**	**108**	**86**
Hotel 24 trips per 100 rooms -used for 88 Talavera Rd					
Other rates based on NRSPP TMAP for consistency					

Figure 15: AM Trip Generation Increase – 2.5:1 FSR (Preferred Alternate Scheme)

Thursday PM Peak					
Land Use	**Area/No.**	**RTA Generation Rate (trips/m2 or Unit)**	**Land Use Generation**	**Vehicles In**	**Vehicles Out**
Apartments	**222**				
1 bed	89	0.23	20	16	4
2 bed	122	0.23	28	22	6
3 bed	11	0.23	3	2	1
Total			**51**	**41**	**10**
Commercial					
Commercial	10860	0.0081	88	18	70
Total			**88**	**18**	**70**
Bulk Retail					
Bulk Retail	8663	0	0	0	0
Total		**EXISTING**	**0**	**0**	**0**
Retail					
Café	150	0.043	6	3	3
Retail	480	0.043	21	12	12
Total	**630**		**27**	**15**	**15**
Hotel					
Hotel	200	0.24	48	24	24
Total	**200**		**48**	**24**	**24**
Sub Total Retail/Café/Hotel			**163**	**57**	**110**
TOTAL			**214**	**98**	**120**
Hotel 24 trips per 100 rooms -used for 88 Talavera Rd					
Other rates based on NRSPP TMAP for consistency					

Figure 16: PM Trip Generation Increase – 2.5:1 FSR (Preferred Alternate Scheme)

It can be seen that there is a slight reduction from 205 veh/hr to 193 veh/hr in the AM Peak and a slight reduction from 226 veh/hr to 214 veh/hr in the PM peak under the Preferred Alternate Scheme. These changes are considered to be of no consequence and it is concluded that the traffic impacts remain essentially the same overall whether under the Primary Scheme (2.391 FSR) or the Alternate Preferred Scheme (2.5:1 FSR).

Accordingly, traffic impacts under the Planning Report are largely independent of the site access arrangements and the planning benefits arising from the Preferred Alternate Scheme may be regarded as net benefits, with no adverse impact arising from the slightly higher FSR.

Parking Implications of Preferred Alternate Scheme

The parking requirement and provision under the Preferred Alternate Scheme is shown in **Figure 17** below.

Land Use	Area/No.	Parking Rate	Spaces Required	Spaces Proposed
Apartments	**222**			
1 bed	89	0.6-1.0	54-89	54
2 bed	122	0.9-1.2	110-147	123
3 bed	11	1.4-1.6	15-16	16
Visitor	222	0.2	44	44
Residential Total			**224-297**	**237**
Commercial				
Commercial	10860	0.01465	159	
Total			**159**	**300**
Bulk Retail				
Bulk Retail *	8663	0.01465	127	
Total			**127**	**164**
Café/Retail				
Café	150	0.0133	2	0
Retail	480	0.014	7	7
Total			**9**	**7**
Hotel				
Hotel	200	0.667	**133**	**70**
Non Residential Total			**428**	
TOTAL			**652-725**	**778**
* Existing retail is served by 164 spaces				

Figure 17: Parking Provision Under Preferred Alternative Scheme

It can be seen that there is a requirement for up to 725 spaces, while 778 spaces can be provided. The main change relates to the high level of commercial parking (as also occurs under the Primary Scheme) which is required having regard for the unique operational requirements of Harvey Norman, as discussed.

Conclusions on Schemes

In summary, both the Primary and Preferred Alternate Schemes are supportable in principle on traffic planning grounds, noting that further detailed consideration and assessment will be undertaken at development application stage/s.

The only substantive issue that separates these two schemes in traffic planning terms relates to the changes access arrangements onto Epping Road, noting that there are significant urban design/planning benefits associated with the Preferred Alternate Scheme. In this regard, the Epping Road frontage under the Primary Scheme is shown in **Attachment 1**, while the arrangement under the Preferred Alternate Scheme is shown in **Attachment 2**. The following matters are noteworthy:

Primary Scheme (Drawing TX01 Issue B) – Attachment 1

- This arrangement delivers a compliant driveway entry to the subject site and the needs of the subject Planning Proposal are met and are deliverable;

- The NRSUAP site access needs to operate independently and cannot rely on the subject site for safe access, nor can it assume that land will be available to provide a compliant access design. In this regard, a preliminary assessment indicates that there are two access options for the NRSUAP and neither is considered supportable for the following reasons:

  Option 1: Reliance on a Parallel Slip Lane

  - This is the arrangement shown in Drawing TX01 and concern is expressed in relation to the available width of the road verge. The verge is only 5.6 metres wide adjacent to the existing Smash Repair Building. The slip lane needs to be 3.5m to comply with Austroads (the desired width for a deceleration lane), leaving only 2.1 metres for the road verge which is deficient (see insert box). Alternatively, a compliant footpath would result in a substandard slip lane;

  - The provision of two adjacent slip lanes is unconventional and results in hazardous conditions. Pedestrians would be at risk with the narrow footpath, while drivers on approach would be confused and those in the slip lane may incorrectly assume that they are able to access Delhi Road; and

  - Serious merging conflicts would occur in the event that a vehicle travelling in the through lane on the Lane Cove Tunnel approach decides to access the NRSUAP site (as per the swept path manoeuvre shown).

  Option 2: Reliance on a Deceleration Lane

  - This arrangement would involve the provision of a deceleration lane that commences at the eastern boundary of the Smash Repair Building, so as to avoid the need to encroach onto the verge as discussed above. This deceleration would be very substandard in length and could not be supported with the currently proposed alignment of the NRSUAP spine road.

  Based on the above factors, the access arrangement proposed for the NRSUAP development is considered to not be deliverable without land acquisition that has not been identified and is not planned.

Preferred Alternate Scheme (Drawing TX02 Issue B) – Attachment 2

- This arrangement delivers an access solution for the subject Planning Proposal as well as the NRSUAP site.
- The access to both sites occurs via a consolidated public road intersection (entry only) that is within a shared common boundary;
- The access provides a true consolidated 'gateway' to the precinct from Epping Road, rather than the driveway and road crossings that would otherwise occur;
- There is no separate access to the NRSUAP site and there are no diverge, deceleration or merging conflicts within Epping Road;
- The NRSUAP site frontage to Epping Road (east of the subject site) has no access, affording pedestrians maximum safety and amenity within a wide road verge; and
- This access arrangement is available to both sites subject to negotiation.

Based on the above factors, this arrangement is preferred and is considered to be in the public interest.

In conclusion, the Harvey Norman Group Macquarie Park Planning Proposal is supportable on traffic planning grounds. Please contact the undersigned should you have any queries or require any further information or assistance.

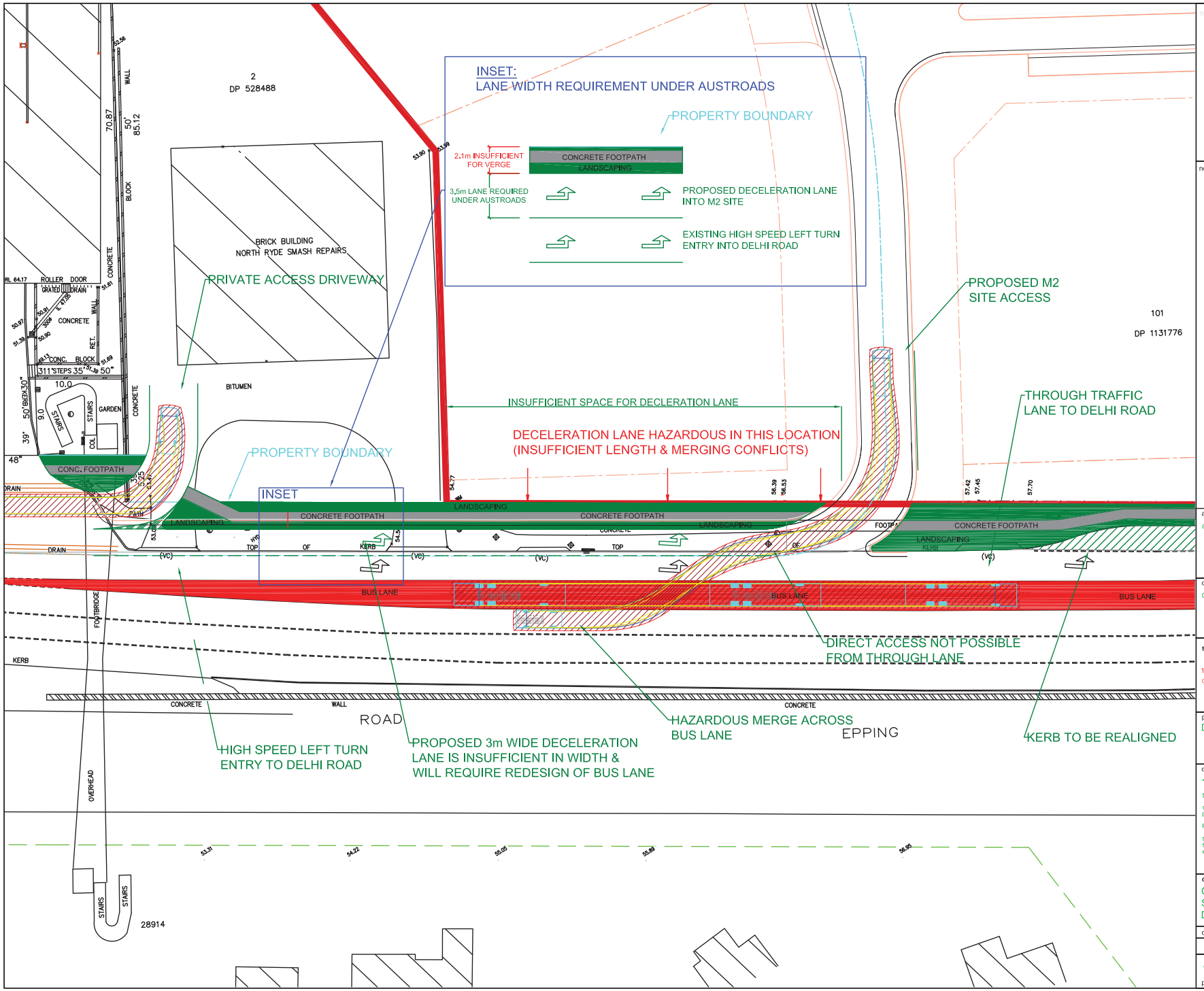
Yours faithfully,

traffix

Graham Pindar
Director

Encl: Attachments 1 and 2

Attachment 1



notes

This drawing is prepared for information purposes only. It is not to be used for construction.

no.	revision note	by.	date

architect

ajc

client

Calardu Pty Limited

scale

1:400 @ A3

0m 4 8 12 16

project

Domayne Macquarie Park

drawing prepared by

TRAFFIX

traffic and transport planners

suite 3.08 46a macleay street
potts point NSW 2011

PO Box 1061 potts point nsw 1335

t: +61 2 8324 8700
f: +61 2 9380 4481
e: info@traffix.com.au

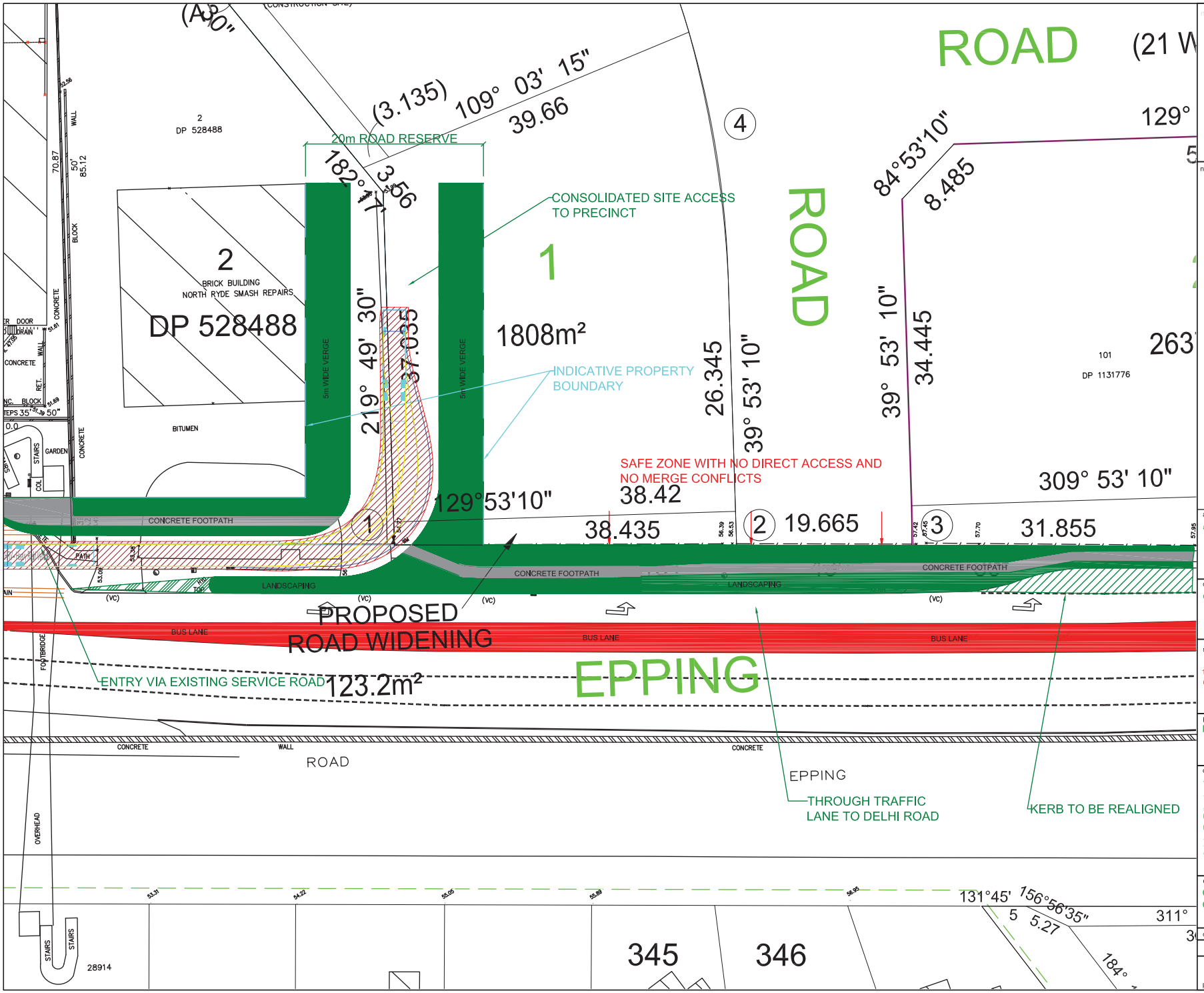
drawing title

Concept Design - Option 1
Separate Access Arrangements for both the Domayne & M2 Sites

drawn:	checked:	date:
PC	-	11/04/2013

project no.	drawing phase.	drawing no.	rev
12.175	-	TX.01	B

Attachment 2



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drawing prepared by
TRAFFIX
traffic and transport planners
suite 3.08 46a macleay street
potts point NSW 2011
PO Box 1061 potts point nsw 1335
t: +61 2 8324 8700
f: +61 2 9380 4481
e: info@traffix.com.au

drawing title
Concept Design - Option 2
Consolidated Site Access to Precinct

drawn:	checked:	date:
PC	-	11/04/2013

project no.	drawing phase.	drawing no.	rev
12.175	-	TX.02	B

BROWN

Smart Consulting

HARVEY NORMAN GROUP MACQUARIE PARK PLANNING PROPOSAL MACQUARIE PARK, NSW

CIVIL AND STRUCTURAL PLANNING REPORT

26 April 2013
Report No. 20120850-RPT1.08
Prepared for Harvey Norman Group

COMMERCIAL IN CONFIDENCE

December 2012

Brown Consulting (NSW) Pty Ltd
Smart Consulting ABN 30 109 434 513

Telephone 02 9004 8855 Facsimile 02 9004 8858
Ground Floor, 55 Chandos Street, St Leonards NSW 2065 PO BOX 127 St Leonards NSW 1590
E-mail sydney@brownconsulting.com.au Website www.brownconsulting.com.au

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G	26 April 2013	For Submission	Paul Davis Carlo Bartolome	Con Vink
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B	Section 7	General revisions
C	Sections 5 and 7	General revisions
D	Section 1	General revisions
	Section 3.1, Figure 1	Graphic changed
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E	Various Sections	Minor typographical revisions
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FINAL DRAFT ACCEPTED BY:

AUTHOR: .....
PAUL DAVIS
Date: 29/4/2013
Signing for and on behalf of
Brown Consulting (NSW) Pty Ltd

AUTHOR: .....
CARLO BARTOLOME
Date: 29/04/2013
Signing for and on behalf of
Brown Consulting (NSW) Pty Ltd

REVIEWER: .....
signing for **CON VINK**
Date: 29/04/2013
Signing for and on behalf of
Brown Consulting (NSW) Pty Ltd

Brown Consulting (NSW) Pty Ltd
Smart Consulting ABN 30 100 434 513

Telephone 02 9004 8855 Facsimile 02 9004 8858
Ground Floor, 55 Chandos Street, St Leonards NSW 2065 PO BOX 127 St Leonards NSW 1590
E-mail sydney@brownconsulting.com.au Website www.brownconsulting.com.au

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Civil and Structural Drawings – Brown Consulting

SKC0-00	Locality Plan and Drawing List
SKC2-00	Civil and Stormwater Concept Plan
SKC3-20	Public Road Longitudinal Section

Survey Drawings – Lockley Land Title Solutions

Plan of Detail and Levels	Sheets 1-8

Flood Depths Maps – Bewsher Consulting

Figure 8.5	Simulation of 100 Year ARI Flood (Sheet 5 of 5)

APPENDIX B: Included Documents

City of Ryde – *RE: Request for Flood Information – No. 111 Wicks Road, Macquarie Park* – Letter 1370547 to Brown Consulting issued 25 June 2012.

City of Ryde – *RE: Request for Flood Information* – No. 31-35 Epping Road, *Macquarie Park* – Letter 1370458 to Brown Consulting issued 25 June 2012.

City of Ryde – *RE: Request for Flood Information* – No. 37-39 Epping Road, *Macquarie Park* – Letter 1370537 to Brown Consulting issued 25 June 2012.

JK Geotechnics [2012] – RE: *Geotechnical Boreholes – Domain Store, North Ryde* – Email to Brown Consulting sent 30 November 2012

REFERENCES

Bewsher Consulting Pty Ltd [2010] – *Macquarie Park Floodplain Risk Management Study & Plan, Flood Study Report* – Report J1640R_3 to City of Ryde issued April 2010.

Bewsher Consulting Pty Ltd [2011] – *Macquarie Park Floodplain Risk Management Study & Plan, Final Report* – Report J1609R_4 to City of Ryde issued February 2011.

Maunsell Australia Pty Ltd [2008] – *ECRL Underground Infrastructure Protection Guidelines* – Report No. 20007300 / P0-4532 Revision 3 to Transport Infrastructure Development Corporation dated 16 May 2008 [Commercial in confidence]

City of Ryde – *Development Control Plan 2010 (DCP 2010) – Section 8.2 Stormwater Management*

Richmond + Ross Pty Limited [2001] – *Proposed Office and Retail Development North Ryde – Drawings C05 to C07 and Drawings CC01 to CC04* – Job No 010050 – issued to Council 9 July 2001

1 EXECUTIVE SUMMARY

This report has been prepared in support of an application to rezone land at 29 Epping Road, 31-35 Epping Road and 111 Wicks Road, North Ryde.

The report investigates structural and civil engineering issues that would affect future development of the sites.

The major structural engineering issues relate to the underground railway easement crossing the northern corner of the site. The report shows how the proposed development can proceed with no adverse impact on railway infrastructure.

The major civil engineering issues relate to a major stormwater drainage path crossing part of the site. The report demonstrates how the proposed development can be situated and typical floor levels to be applied to provide protection against flooding in accordance with Council standards. It also recommends drainage works to be undertaken that would eliminate the risk of flooding within the site up to the 100-year ARI flood event. These works include extension of the trunk stormwater culvert currently running under 37-39 Epping road and relocating the existing surcharge grates from the southern side to the northern side of the existing site access road connecting to Wicks Road as well as minor modifications around the upstream end of the culvert at Epping Road.

These drainage works would provide significant benefits to the surrounding community by potentially reducing flood levels in Epping Road, enabling continuation through the site and future extensions of the trunk stormwater drainage culvert to downstream properties of the Porters Creek Catchment.

The report concludes that there are no structural or civil engineering issues that would prevent the proposed rezoning from proceeding.

2 INTRODUCTION

It is proposed to redevelop the properties containing the existing Domayne warehouse and Domayne retail store in Macquarie Park, NSW. These properties currently serve as commercial and retail premises. The first step required in the process is to obtain an approval to rezone the site to allow for a mixed development and to establish appropriate floor space ratios and height controls. This civil and structural planning report has been prepared in support of the submission for rezoning application to the City of Ryde and is not intended to provide an assessment of the proposal but rather demonstrate that the site is capable of being developed for the scale of development and uses proposed.

Allen Jack+Cottier (AJ+C) Architects have prepared a separate Urban Design Study containing the concept plans for the site showing new and retained structures, open spaces, access roads and path ways, as well as interconnections to adjacent properties and future developments. A more detailed discussion of the proposed development can be found in Section 4 *Proposed Development*.

Brown Consulting has been commissioned to investigate and report on Structural and Civil engineering matters that may potentially affect the redevelopment of the Site. The following report summarises the site conditions and constraints including development restrictions over the railway tunnel, site access and potential impacts from overland flows and flooding. This report also discusses the Structural and Civil engineering principles that would be applied in relation to proposed and retained structures, vehicle and pedestrian access, flood and overland flow management, stormwater drainage and Water Sensitive Urban Design (WSUD). It also provides comment on how the railway tunnel restrictions, as detailed within Transport Infrastructure Development Corporation's (TIDC) *ECRL Underground Infrastructure Protection Guidelines* (Maunsell [2008]) will affect planning for the re-development.

3 SITE LOCATION AND DESCRIPTION

3.1 SITE LOCATION

The site location is shown on the Site Location Map below.

Figure 1. Site Location
(Source: Harvey Norman Group Macquarie Park Planning Proposal – Urban Design Study, AJ+C Arhitects)

The site is located in Macquarie Park, NSW and consists of three adjacent properties. The first is Lot 1 in DP 1151499 with a street address of 31-35 Epping Road. This lot contains the existing Domayne retail store. The second is Lot 2 in DP528488 with a street address of 29 Epping Road adjoining the first lot to the east. It currently contains a panel beating workshop. The third is Lot 10 in DP 1046090 with a street address of 111 Wicks Road immediately north of the first lot. This lot contains existing office buildings and the Domayne warehouse.

The three lots combined have a total area of approximately 19,763 sq.m.

3.2 SITE DESCRIPTION

The combined site has an irregular shape with a main street frontage to Epping Road and an existing access road connecting to Wicks Road. The site backs onto a Transport Infrastructure Development Corporation (TIDC) owned site to the northeast which is slated for future redevelopment (known as the M2 Transit Orientated Development (M2TOD) or North Ryde Station Precinct (NRSP)).

A railway tunnel corridor runs underneath the north-eastern corner of the site in a roughly north-south direction, and is protected both in plan and in height by a railway tunnel easement in favour of TIDC. The western edge of this easement, referred to as the "first reserve" by TIDC, is delineated and identified in the detailed survey drawings prepared by Lockley Land Title Solutions which have been included in Appendix A to this report. A second reserve about 5m outside of the first reserve is also shown in these plans and provides an implied covenant protecting Railcorp's infrastructure. Details of the easements have been provided in TIDC's *ECRL underground Infrastructure Protection Guidelines* (Maunsell 2008) and in particular drawing PRL GD 02476 and corresponding cross-sections.

A large reinforced concrete three (3) storey with two (2) basement level bulky goods retail store (Domayne retail store) currently occupies most of the southern portion of 31-35 Epping Road. It has a landscaped courtyard at the rear that is moderately sloping from southeast to northwest at a gradient of approximately 1 in 8 (1 vertical to 8 horizontal). A steep five metres high embankment within the adjacent NRSP site slopes down towards the site running along the eastern boundary. Ongoing earthworks were observed within the NRSP site at the time of site visit.

At 111 Wicks Road there are two office buildings connected by a warehouse type structure (Domayne warehouse) in the middle. The two office buildings are generally glass and brick clad steel structures with the warehouse being brick and aluminium sheeting clad steel structure. A three metres high retaining wall with a one metre high embankment on top runs along the common boundary with 31-35 Epping Road between the courtyard and the rear of the office and warehouse structures. A combination of retaining walls and embankments bridges the step in level between 111 Wicks Road and the adjacent northern properties. The difference in level varies between zero and three metres.

A private access road connects a large open space, concrete car park and truck turning area to Wicks Road towards the northwest. This access road is at its highest at Wicks Road and grades down to a sag point around the northern corner of 37-39 Epping Road where large surcharge grates from a stormwater drainage culvert are located. The truck turning area is relatively flat while the rest of the car park grades from relatively flat to a moderately steep 1 in 8 slope towards the sag point.

3.3 GROUND CONDITIONS

Preliminary advice on geotechnical conditions relating to the site were obtained from Jeffery and Katauskas Pty Ltd (JK Geotechnics) in an email dated 30 November 2012. Copy of this correspondence is included in Appendix B to this report.

According to JK Geotechnics [2012], a range of low to higher strength sandstone bedrock can be expected at depths of 0.3-3.0m around the existing Domayne retail store. Geotechnical information is limited around the 111 Wicks Road property but it is expected that sandstone bedrock would also be at similar depths from the current surface. JK Geotechnics advised that a borehole near the north-eastern corner of 115 Wicks Road encountered low strength sandstone at a depth of 1m, medium strength sandstone at around 3.5m deep and higher strength sandstone from 16m deep.

No groundwater information was available at the time of writing this report. However, it may be assumed that groundwater, if present, would generally run along the surface of the rock strata, below the overlying soil.

4 PROPOSED DEVELOPMENT

Figure 2. Concept Masterplan

(Source: Harvey Norman Group Macquarie Park Planning Proposal – Urban Design Study, AJ+C Arhitects)

4.1 DESCRIPTION

The proposed development consists of the following elements:

Commercial premises: Commercial use would generally consist of commercial office space accommodated within a 12-storey addition to the existing bulky goods retail store on the site. A 6-storey standalone commercial building is also being considered to the eastern boundary adjacent to the NRSP development.

Retail premises: It is anticipated that the site could accommodate a limited range of retail development within walking distance of commercial and residential uses. Retail provision in the northern portion of the site, located away from Epping Road, would be limited to neighbourhood shops, cafes or the like that would meet the local convenience needs of the existing and likely future residents and workers. The southernmost part of the site would continue to provide more active bulky goods uses that integrate with the existing non-residential uses along Epping Road.

Residential accommodation: Residential development is proposed to the north in the form of a landmark 27-storey tower which would also accommodate hotel use. It is proposed to provide a variety of apartment types in varying price ranges that will assist in meeting existing and likely future housing demand within the subregion. An Alternate Preferred Concept Masterplan (Not shown. Refer to Harvey Norman Group Macquarie Park Planning Proposal – Urban Design Study, AJ+C Arhitects) proposes a residential development (apartments) instead of the previously mentioned commercial building to the eastern boundary in the form of a 12-storey building, responding directly to the NRSP development concept which proposes residential towers adjacent to the site.

Hotel and/or Serviced Apartments: The lower levels of the 27-storey tower would comprise hotel and/or serviced apartment accommodation.

Open space: Open space would be integrated within the development concept and would include a public road, publicly accessible plaza, pedestrian links and private open space associated with the hotel / residential tower.

4.2 ROAD AND PATH NETWORK

As shown in the Concept Masterplan in Figure 2, the proposed development includes the construction of a tower of 27-storeys in height located against but not over the rail corridor easement at the north-western portion of the site, a single storey café generally at the centre of the overall development and a commercial building of eight storeys in height located adjacent and over the existing bulky goods retail store on the south-eastern portion of the site.

A new public road is proposed across the site between the residential / hotel tower and the café. The proposed new road would intersect Wicks Road at the same location as the existing private access road and generally would follow the existing alignment for about 120m into the site where it

would then deviate east towards the NRSP development to connect to that site's future road network. This main access road is proposed to grade gently from approximately RL 46.5m at Wicks Road to RL 44.5m at the bend in the road. It would then grade uphill towards the NRSP site to match with their future road network at approximately RL 50 m.

Access driveways with vehicular layback crossings will connect each building's underground car park to the proposed public road. A driveway connection is also proposed between the existing car park at 37-39 Epping Road and the proposed public road.

A network of footpaths is also proposed along the access road, through open spaces and around the buildings, connecting with existing Council footpaths at Wicks Road and the future NRSP development.

5 STRUCTURAL SCHEME

The two main structures have been strategically located outside of the rail corridor to ensure that the footings for both the 27-storey tower and the 12-storey commercial building do not encroach into the rail corridor's first and second reserves.

The residential / hotel tower and the commercial building are located on top of basement car parks which are proposed to be constructed over both the first and second reserves. These structures will be supported on shallow footings external to the support zone of the first reserve.

5.1 BUILDING OVER AND AROUND RAILWAY TUNNELS

The proposed development has two separate basements, one of which is located under the residential / hotel tower while the other is located under the commercial building.

The lowest residential / hotel basement level is proposed to be constructed at RL 40.5 which is 2.5m above the first reserve's support zone. In accordance with TIDC's guidelines, no excavation or footings will be constructed within the first reserve support zone. Proposed bulk excavation for the hotel / residential basement will be kept above the support zone and vary in depth from about 1.2m at the northern corner to about 8.0m at the eastern corner of the basement. Localised detailed excavation for lightly loaded footings may extend deeper but will remain above the support zone. We understand from information provided by JK Geotechnics that moderate to high strength sandstone bedrock may be expected at reasonably shallow depths which should enable the excavation to proceed without impact on the rail tunnel below. A detailed assessment of the effects of the excavation will be required at the time of development application.

Footings for the residential / hotel tower can be classified in two categories, namely the tower footings and the lightly loaded basement footings.

The tower footings, with bearing pressures typically exceeding 150kPa, would be located outside of the first reserve. However there will be some constructed within the second reserve. These footings are expected to be supported by deep foundations that extend below the rail tunnel level. These would also be de-bonded to ensure that there is no load influence on the rail tunnel.

Some of the lightly loaded basement shallow footings would be located above but outside of the first reserve support zone. As part of the detailed assessment mentioned above, a detailed assessment will also be required to determine the effects that these footings will have on the rock strata surrounding the railway tunnel. This assessment would include a detailed analysis of the effects of loading and unloading of the rock mass adjacent and over the tunnel and would be supported by detailed geotechnical investigations.

The lowest commercial building basement level is proposed to be constructed entirely outside of the first reserve at RL 36.0m which is about 7.8m to 13.8m below current surface levels. Upper basement levels would extend into the first reserve. Similarly to the residential / hotel tower, all major footings would be kept outside of the first reserve support zone. Only lightly loaded footings (less than 150kPa bearing pressure) would be constructed over the first reserve, above and outside of the support zone. Similarly, the bulk excavation and footings for the commercial building would also require detailed assessment supported by detailed geotechnical investigations.

5.2 RAIL AND TUNNEL CONSIDERATIONS

Apart from the effects of excavation and building loads imposed on the rail tunnel, other considerations will be assessed during the design development phase of the project. Provided below are typical issues encountered on many similar projects over and adjacent to the rail corridor and rail tunnels along with proposed solutions that are known to work and have been found acceptable by the relevant transport and rail authorities.

5.2.1 Vibration Cause by Machinery

This issue is typical and unavoidable as a result of excavation work and construction activity. It is even more significant when excavating through rock. Vibration level limits, metering and monitoring is typically imposed by authorities during the excavation and construction phase. Vibration mitigation and management is commonly resolved through the use of smaller or non-vibratory equipment and machinery as well as coordination and approval of the contractor's construction methodology with the relevant authorities.

5.2.2 Stray Current Assessment

This development may require the use of reinforced concrete with additional cover and durability specifications to overcome any long term issues from stray current. Detailed assessment will be carried out during the detailed design phase.

5.2.3 Vibration Impact on the Hotel / Residential Tower

Train movements and rail maintenance activities typically produce ground borne vibration noise. This issue should be easily resolved through the utilization of vibration mounts (if required) at the base of the columns within the second reserve.

5.2.4 Temporary Ground Anchors

No ground anchors are proposed within the first support zone.

6 SITE ACCESS: ROADS, DRIVEWAYS AND FOOTPATHS

The proposed road layout is shown in the Civil and Stormwater Concept Plan, SKC2-00. Typical sections can be found on drawing SKC3-20. These drawings have been enclosed in the Appendix.

6.1 MAIN ACCESS ROADS

As mentioned in Section 4.2, a new public road is proposed across the site between the residential / hotel tower and the café. The western section of is road will have a 9.0m wide three lane, two-way carriageway consisting of two West bound lanes and one east bound lane. A row of parallel parking bays are proposed on the north side of the road interspersed by a tree pit between pairs of parking bays. The eastern section will have a 7.0m wide two lane, two-way carriageway with parallel parking on both sides also interspersed by a tree pit between pairs of parking bays.

The Civil and Stormwater Concept Plan show preliminary levels along the new public road, from which the surrounding site levels may also be derived.

6.2 PRIVATE ROADS AND DRIVEWAYS

A minor access driveway is proposed to provide access to the commercial building's basement car park. This road would intersect the main access road at the bend and run parallel to the common boundary with 37-39 Epping Road.

A one-way driveway is also proposed between the existing Domayne retail store and the proposed commercial building in 29 Epping Road. Entry into the driveway will be from Epping Road while the exit will connect with the new public road at the northeastern corner of the site.

The residential / hotel tower would have two minor access driveways connecting to the main access road. The first one on the western side of the tower would provide access to its basement car parks while the other one would lead to a loop road and port-cochère.

6.3 FOOTPATHS AND PEDESTRIAN AMENITIES

As previously mentioned, a network of footpaths is proposed along the access road, through open spaces and around the buildings, connecting with existing Council footpaths at Wicks Road and the future NRSP development.

6.4 SITE ACCESS PLANNING PRINCIPLES

In the following sections, minimum standards for roads and public domain infrastructure are proposed for the site.

The proposed public road should generally be designed in accordance with the NSW Roads and Maritime Service (RMS) and Austroads requirements while footpaths and vehicular driveway crossings within the public domain should be designed in accordance with the City of Ryde's

standards and specifications and the Macquarie Park Corridor Development Control Plan (DCP) in particular.

6.4.1 Design Traffic Speed

The proposed public road is intended to provide a level of service typical of a local access road. As such, vehicle speeds within limited to a maximum 50km/h via traffic management controls. Vehicle speed along private driveways will be limited to 10km/h.

6.4.2 Vehicular Driveway Crossings

All vehicular driveways and crossings shall be constructed in accordance with Council's standard layback and vehicle crossings to ensure priority to pedestrians on the footpaths.

6.4.3 Surface Grading and Crossfalls

Roads and footpaths shall have nominal crossfalls of 2.5% (1:40). The proposed public road shall be graded to a maximum longitudinal gradient of 10% with curved transitions for smooth changes of grade. Disabled access routes and facilities shall be designed in accordance with the Australian Standard AS 1428.1-2009.

6.4.4 Loading / Unloading and Parking Bays

Car parking bays shall be designed in accordance with Council and RMS requirements and the Australian Standard AS/NZS 2890.

6.4.5 Pavements

The proposed public road and footpaths will be paved to match the surface finishes specified in Council's Macquarie Park Corridor DCP with the pavements designed to suit expected vehicular and pedestrian traffic and loadings.

7 FLOODING, OVERLAND FLOWS AND STORMWATER DRAINAGE

7.1 EXISTING FLOODING AND OVERLAND FLOW PATHS

This report draws on the Macquarie Park Floodplain Risk Management Study & Plan (Macquarie Park FRMS&P) prepared for the City of Ryde by Bewsher Consulting Pty Ltd. The FRMS&P consists of two reports: the Flood Study Report (Bewsher [2010]) containing the hydrologic and hydraulic modelling and analyses and the Final Report (Bewsher [2011]) which explains the floodplain risk management plans. These reports were adopted by the City of Ryde on 1 February 2012.

The flood reports indicated significant overland and underground flows crossing the site at the low point in the internal access road, as well as minor overland flows at the eastern and northern boundaries.

7.2 FLOOD RISK TERMINOLOGY

Throughout this report, several terms are used to describe flood risks.

Rainfall intensities have been measured and collated by the Bureau of Meteorology over many years in order to determine the statistical relationship between rainfall of a particular intensity and the frequency of its occurrence. The probability that a particular intensity might be exceeded in a storm in any one year is denoted as its *Annual Exceedance Probability* (AEP). Thus an intensity which has an AEP of 1% has a probability of 0.01 of being exceeded in any one year. This may also be considered as the intensity that might be exceeded on average once every 100 years (the inverse of 0.01). This intensity can thus be termed as the 100-year *Average Recurrence Interval* (ARI) intensity, and the greatest rate of runoff generated from this rainfall would be termed the *Q100 peak runoff*.

The absolute worst case flood risk does not rely on extrapolation of rainfall records, but on the physical capacity to generate rainfall based on climatic considerations. The *Probable Maximum Precipitation* (PMP) is defined by the Bureau of Meteorology as the greatest depth of rainfall that is physically possible according to meteorological constraints for a given duration for a given size storm area at a particular location at a particular time of year, with no allowance for long-term climatic trends. The most extreme flood generated by any storm duration at a particular site is called the *Probable Maximum Flood* (PMF). The PMF is commonly considered to be approximately 10,000 years ARI.

The Macquarie Park FRMS&P analysed the various catchments within the precinct and presented results for ARIs of 1, 2, 5, 10, 20 and 100 years and the PMF. This report will only consider the peak 100-year ARI flood event, which is the basis for setting floor levels within the site, as discussed in the following section.

7.3 FLOOD PROTECTION

In areas where flood risks have been identified, protection against flooding is normally provided by careful attention to siting of the development so that it does not obstruct overland flow, and by setting floor levels above design flood levels by a height known as the *freeboard* above flood levels.

City of Ryde has established criteria for the freeboard to be applied in specific areas in Section 7.1 of Part 8.2 Stormwater Management in the City of Ryde Development Control Plan (DCP) 2010. This section is reproduced below:

> **d. Freeboard to Floor Levels**
> Floor levels of dwellings, including garages, should be at a level that will ensure that they are not subject to stormwater inundation or nuisance flooding. Generally, floor levels would need to be set at least 150 mm above the level of adjacent ground for habitable areas to be suitably protected from sheet stormwater flows. Where it is proposed to build in an area known to be affected by flooding the floor levels of buildings are generally to be not be less than 300 mm above the predicted design flood level. Garage floors, shed floors and other structures are to be not less than 150 mm above the predicted design-flood level. The freeboard may need to be increased where there are high flow-rates, high flow depths, and/or potential damages in the event of stormwater inundation and/or low confidence in the accuracy of the prediction model. An adverse combination of factors may result in a freeboard of 500 mm or greater being required.

Council has separately defined the "design flood" in Section 7.0.2 of the Schedule (Stormwater Management Technical Material) attached to Part 8.2 of DCP 2010.

It is reproduced below:

> **7.0.2 Design Flood Standard**
>
> The design standard for consideration of hazard and property inundation is the 100-year Average Recurrence Interval (ARI) storm event. Council may require the adoption of a longer recurrence interval design storm such as the PMF, in instances of high danger to persons or greater risk of significant property damage.

These criteria will be used to set recommended floor levels within the site.

7.4 DATUM FOR LEVELS

Throughout this report, levels are indicated as an R.L. ("Reduced Level") in metres relative to Australian Height Datum (A.H.D.). RL 0.0m on AHD is approximately mean sea level. The survey drawings in Appendix A and the flood reports referenced in this report all quote levels in metres to AHD.

7.5 FLOOD DEPTHS

Flood depths in the vicinity of the site have been obtained from the Macquarie Park FRMS&P, which presented drawings showing flood depths within discrete depth ranges. Flood depths are shown by colour coding, using the following colour coding legend.

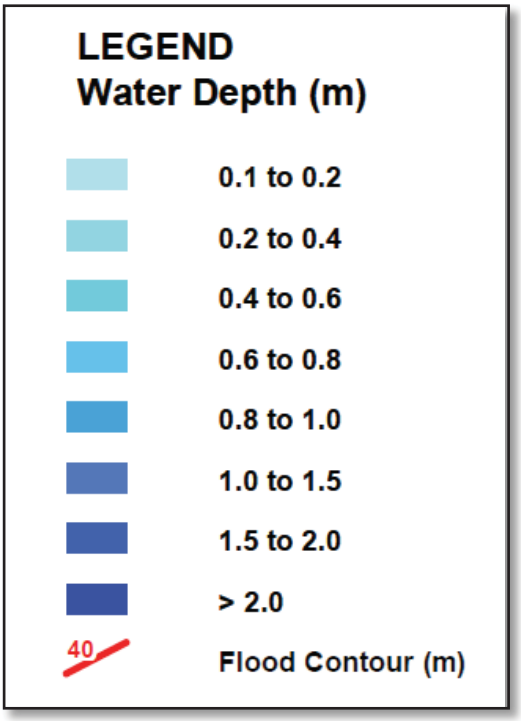


Figure 2. Depth Colour Coding

Each depth range is indicated by a different colour. Figure 8.5 in Bewsher [2010] shows 100-year ARI flood depths in the vicinity of the site. However, the colours for different ranges are not greatly dissimilar, and the scale of the drawing is very small (the site is at the top left corner of the drawing), so that it is difficult to determine flood depths at the site. Accordingly, the area around this site has been enlarged for clarity in Figure 3 on the following page. The site is outlined in yellow. From this drawing we can deduce the following flood depths and the estimated range in flood levels at critical locations relative to this site.

Location	Ground Level (from survey)	Depth (from Figure 8.5)	Flood Level Range
Epping Road median	RL 46.63	0.4 to 0.6 m	RL 47.03 to RL 47.23
Epping Road boundary	RL 46.10	0.8 to 1.0 m	RL 46.9 to RL 47.1
Internal road sag point	RL 41.4	1.0 to 1.5 m	RL 42.4 to RL 42.9

Table 1. Estimated Flood Levels (from flood report)

Figure 6.10 in Bewsher [2010] plots the flood profile across Epping Road. The estimated 100-year ARI flood level can be read off this profile at approximately RL 47.0m, which is consistent with the above table.

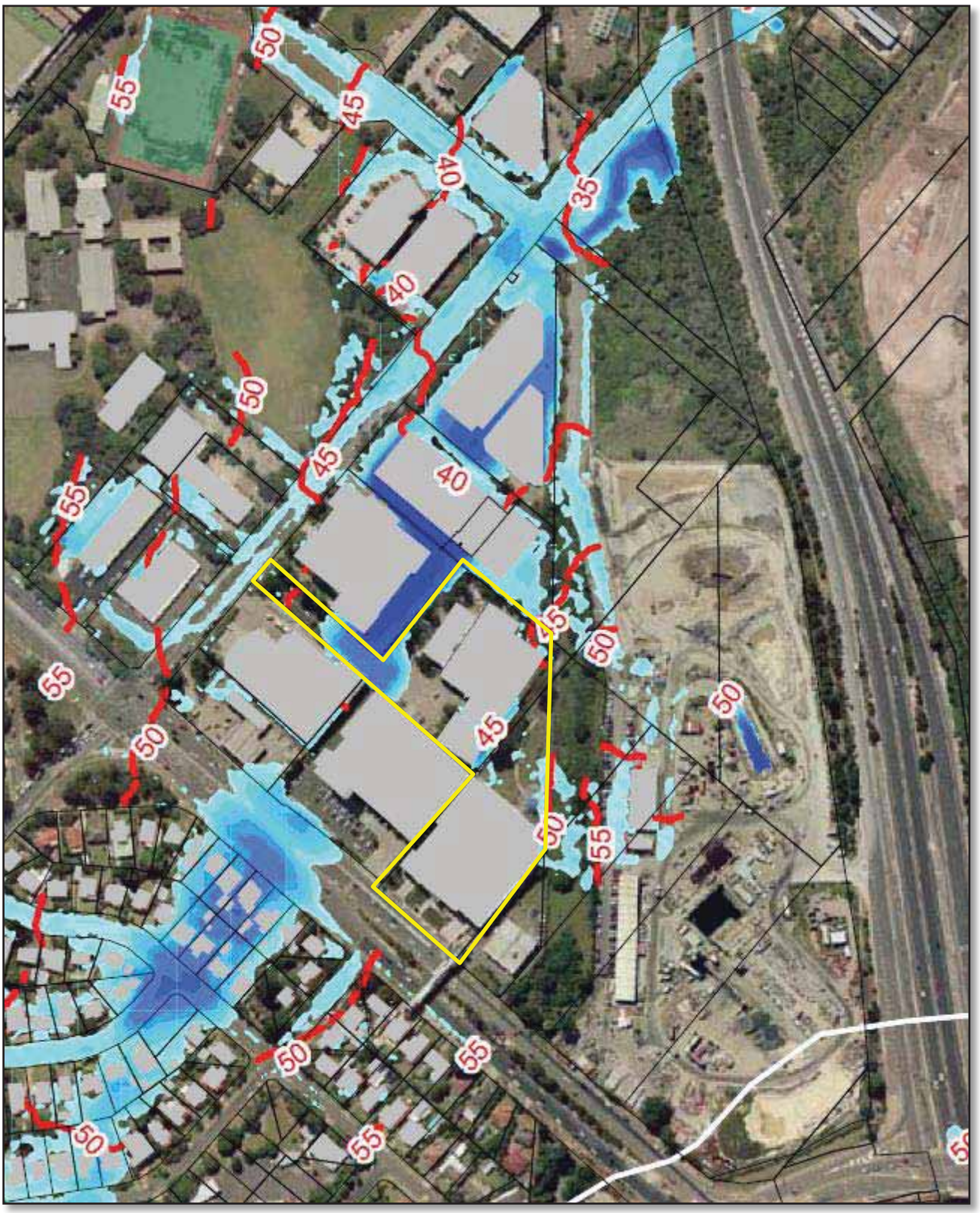


Figure 3. Excerpt from Figure 8.5 in Bewsher [2010] report.

7.6 COUNCIL FLOOD ADVICE

To supplement the information obtained from the Macquarie Park FRMS&P, formal requests for flood information were made to City of Ryde Council for each parcel of land within the site. Council's responses are included in Appendix B to this report, and are summarised in the following Table 2. Flood levels were obtained from the earlier Eastwood and Terrys Creek Flood Study Report carried out by Bewsher Consulting for City of Ryde in November 2008.

Site	Location	20-year ARI	100-year ARI	PMF
31-35 Epping Road	Northern corner [B]	49.01	49.04	49.09
	Western boundary [C]	46.93	46.95	47.00
	Eastern boundary [D]	50.42	**50.43**	50.59
	Epping Rd frontage – east side [E]	N/A	N/A	51.73
	Epping Rd frontage – mid-block [F]	N/A	N/A	50.30
	Epping Rd frontage – west side [G]	N/A	N/A	48.44
37-39 Epping Road	Epping Rd frontage – west side [A]	46.90	**46.99**	47.69
	Western boundary [B]	N/A	**45.37**	46.92
	Epping Rd frontage – east side [G]	47.42	**47.42**	47.76
111 Wicks Road	Wicks Road frontage [A]	46.55	46.55	46.56
	Internal road sag [D]	42.58	**42.76**	44.22
	Northern corner [G]	42.58	**42.76**	44.21
	Northern boundary [H]	44.13	**44.13**	44.32
	Eastern boundary [J]	47.11	**47.11**	47.30
	Eastern boundary to No 37-39 Epping Rd [K]	44.88	**45.91**	46.63

Table 2. Estimated Flood Levels (from Council)

An examination of the above table indicates that there is only a small difference in levels, typically less than 50mm, between the 20-year ARI and the 100-year ARI at several points. This indicates that the catchment supplying the overland flow is small, or that the mainstream flooding does not extend as far as that point.

Where there are significant changes in depths (greater than 100mm) from the 20-year ARI to the PMF, flows are more significant. The 100-year ARI levels at these locations are highlighted in bold text.

The quoted 100-year ARI flood level at the critical sag point in the internal road is RL 42.76. This is in the upper range of flood levels derived from Figure 8.5 of the Bewsher [2010] report, estimated to be in the range RL 42.4 to RL 42.9.

7.7 EXISTING TRUNK STORMWATER DRAINAGE SYSTEM

The trunk drainage system crossing the site has been identified on the survey by Lockley Land Title Solutions. Further details of the system have been obtained by examination of the original design drawings submitted to City of Ryde Council in July 2001 by Richmond & Ross Pty Limited. The trunk drainage extends from Epping Road at its low point across No 37-39 Epping Road (currently occupied by an Officeworks retail store) and then crosses the site at the low point in the existing access road. It then continues northward through the rear of 113 Wicks Road. Details of the existing system are as follows:

From edge of Epping Road to Epping Road boundary:

Four 375mm diameter circular pipes from two separate extended kerb inlet pits. These pits collect surface runoff from Epping Road.

A single 1350mm diameter circular pipe, extending from opposite side of Epping Road. This pipeline conveys flows from the external catchment south of Epping Road.

From Epping Road boundary to internal access road:

A concrete chamber 2 metres wide extending along the frontage of No 37-39 Epping Road. This chamber collects surface water overtopping Epping Road through a sloping grate for the full length of the chamber (46.6 metres) and 0.55 m in height. It also distributes flows collected from the four 375mm diameter and single 1350 mm diameter incoming pipelines. The floor of the chamber slopes steeply towards two outlet culverts.

A 3.0 m wide box channel extending 16.7 m from a point approximately 12 metres from the left end of the collection chamber to a junction to the north. This channel has a bed slope of 0.42% (1 in 240) and internal height varying from 3.1 m to 4.5 m.

A 4.0 m wide box channel extending 26.1 m from a point approximately 15 metres from the right end of the collection chamber (20 metres from the 3.5m wide box channel) to the same junction to the north. This channel has a bed slope of 0.27% (1 in 370) and internal height reducing from 4.5 m to 3.1 m.

From the junction of the 3.5m and 4.0m wide box culverts, a single 5.0m wide box culvert with a floor slope of 0.4% (1 in 250) extending 67.2 metres to the internal access road. The channel has a step of 2.5 metres in height in the floor about 23 metres upstream of the outlet, and then widens to a maximum width of 14 metres at the outlet.

Across and downstream of internal access road:

A single 1800mm diameter circular pipe with a surface overland flow path.

A grated opening above the pipe allowing surcharge flows to escape the box channel and cross the roadway.

Q100 flow through the trunk drainage system has been calculated by Bewsher [2011] as 25.7 cubic metres per second. Preliminary calculations confirm that the total flow can be carried through the box channel system, with an inlet blockage factor of 50%. The limiting condition is the capacity of the intake grating. The channels themselves have reserve capacity, with each of the smaller channels having sufficient capacity to convey the entire Q100 flow.

7.8 PROPOSED STORMWATER DRAINAGE SYSTEM

The proposed new drainage system would consist of local and trunk drainage as described below.

7.8.1 Local Stormwater Drainage

The local stormwater drainage system would consist of pits and pipes to collect runoff from the new roadway, and new pipe drainage from each building site. The local drainage system would discharge to the extended trunk drainage system.

Design criteria for this local drainage system are discussed in Section 7.10.

7.8.2 Extension to Trunk Stormwater Drainage

The existing box channel passing through 37-39 Epping Road would be extended across the proposed new roadway. This new channel would replace the existing 1800mm diameter pipeline, and would convey the full Q100 flow without overtopping of the road. The proposed channel extension would be the same width as the existing (5 metres) and variable in height to match the invert level of the existing 1800mm diameter pipe downstream, while providing required clearances for services to run in-ground along the roadway.

As calculations indicate that the existing channel has significant reserve capacity, no further expansion will be required.

The existing outlet grating would be relocated to the opposite side of the road and enlarged to allow increased surcharge flows, to allow for the additional flow from the new building sites.

Detailed hydraulic calculations would be required to confirm the size of the outlet grating, and detailed structural design would be required for the specially sized channel and chambers.

7.8.3 Modification to Trunk Stormwater Drainage Intake

The capacity of the trunk drainage system is limited by the capacity of the intake structure off Epping Road, due to the application of a 50% blockage factor. Site inspection reveals that flooding in Epping Road could be reduced by carrying out minor civil works around the intake grating. These works could include:

- Removal of vegetation directly in front of the intake grating, and limiting it to a distance away from the grating equal to its mature height;

- Regrading of surface levels in front of the intake grating to direct flows towards the grates to improve hydraulic efficiency; and
- Placing a concrete apron in front of the intake structure to improve hydraulic efficiency, control the spread of vegetation, and facilitate maintenance including removal of debris.

7.8.4 Overland Flow

Overland flow from the site would continue along the same path as currently existing, at the rear of 113 Wicks Road heading northwards.

The total flow in the system would be the same or less than existing, taking into account any on-site detention that may be provided in accordance with Council requirements.

7.9 RECOMMENDED FLOOR LEVELS

Based on the 1:100yr ARI flood information provided by Council and summarised in Section 7.6, and applying Council's minimum freeboard requirements as set out in Section 7.3, minimum habitable floor and threshold levels for each of the main building structures have been calculated and are summarised in the following Table 3.

Location	**100-year ARI Flood / Overland Flow Water Level (AHD)**	**Freeboard**	**Minimum Floor / Threshold Level (AHD)**
Epping Road			
Domayne Retail Store	Nil	Retain existing	Retain existing
New Public Road			
Commercial Office Basement Car Park	Nil	Nil	Road level
Café	Below top of kerb levels	0.15m	Access road kerb level + 0.15m
Residential / Hotel Tower Porte Cochere	Below top of kerb levels	0.15m	Access road kerb level + 0.15m
Residential / Hotel Tower Basement Car Park	42.75	0.5m	43.25
New Car Park Access Ramp to rear of 37-39 Epping Road	42.765	0.5m	43.265

Table 3. Minimum Floor Levels

The proposed new public road traversing the site will be unaffected by mainstream flooding. Overland flows will be constrained to the roadway between kerbs. Accordingly, freeboard levels as required by Council's guidelines may be measured from the top of kerb levels.

Where thresholds are located adjacent to the main overland flow path, freeboard of 500mm has been adopted to take into account the higher risk associated with blockages of piped flow.

These levels would need to be verified by detailed analysis at the time of submission of the Development Application for each building.

7.10 SITE STORMWATER MANAGEMENT PRINCIPLES

In the following sections, minimum standards for stormwater management are proposed for the site.

Stormwater drainage should generally be designed in accordance with the City of Ryde's stormwater drainage policies, the Australian Rainfall and Runoff design guidelines, and the relevant Australian Standards with particular considerations to incorporating Water Sensitive Urban Design (WSUD) principles.

7.10.1 Rainfall Return Periods

In accordance with Section 5.1 of the Schedule to Part 8.2 of City of Ryde DCP 2010 for commercial developments, sub-surface (piped) drainage systems should be designed for the peak flow from a 1:50-year ARI storm event (Q50). Where trapped areas are unavoidable, the piped drainage system should be designed with enough capacity for the 1:100yr ARI storm event.

Where building drainage is designed to a higher ARI standard than road drainage, the excess flow should be designed to flow down roadways without entering buildings.

Overland flow paths should be designed to accommodate the difference between the capacity of the underground piped system and the peak flow from a 100-year ARI storm event (Q100) with the appropriate allowances for pit blockage.

7.10.2 Freeboard

In accordance with Council's DCP 2010, the design freeboard for site thresholds and habitable floor levels should be as follows:

- minimum 150mm above maximum operating level adjacent to OSD overflow spillways;
- minimum 150mm above surrounding finished ground levels where no flooding occurs
- minimum 150mm above 100-year ARI flood level for garage, shed and basement parking thresholds;
- minimum 300mm above 100-year ARI flood level along major overland flow paths and flood prone areas;
- minimum 500 above 100-year ARI flood level where adverse combination of factors may occur.

7.10.3 Roadway and Footpath Trafficability

Gully pits should be located at spacings which will ensure that footpaths and pedestrian crossings are traversable by cyclists and pedestrians and roads are trafficable during the Q20 storm event. The width of flow down roadways during that storm event should be limited to 2.0 metres along the low side of each road carriageway. At sag points, gully pits should be sized to ensure that the depth of ponding during the Q20 storm event will not exceed the top of kerb level.

7.10.4 Hydraulic Calculations

Hydraulic calculations should be carried out to ensure that all surface and piped drainage systems perform to the required standard. In particular, friction losses at junctions should be calculated in accordance with the latest published data for pipe / junction configurations. Friction losses in pipes and surfaces should be based on the Manning formula with the following values for the roughness coefficient 'n':

Concrete pipes and gutters	0.013
Asphalt surfaces	0.015
Grassed surfaces	0.030

7.10.5 Materials

Pipe materials would typically be rubber-ring jointed uPVC and reinforced concrete pipes. The pipe class would be generally Class 2, except where expected loads on the pipe (caused by constraints of joining into existing systems, construction traffic, etc) warrant a heavier class of pipe.

Gully pits should be conventional cast-in-situ, reinforced concrete rectangular pits. Grates to inlet pits and trench drains within access roads and truck delivery areas should be Class D (heavy duty) as defined in AS 3996 Metal Access Covers, Road Grates and Frames. Grates in other areas should be a minimum class B (medium Duty) as defined in AS 3996.

The use of recycled materials such as crushed concrete and glass sand for pipe bedding and backfill, as well as "green" concrete incorporating fly ash and granulated blast furnace slag, should be encouraged.

7.10.6 Onsite Stormwater Detention

Council's standards as set out in Section 3 of the Schedule to Part 8.2 of DCP 2010 stipulate that On Site Detention (OSD) is to be provided for all commercial developments and redevelopment where the footprint of the building is altered.

However, if it can be shown that provision of OSD would have an adverse impact on existing flood conditions, Council may waive the OSD requirement.

According to the Bewsher [2010], the peak storm flow in this catchment occurs in response to a storm of 2 hours duration. Peak flows from the site would occur in response to storms of much

shorter duration, typically less than 10 minutes, so the peak of that flow would have passed before the peak from the overall catchment would arrive in the main channel. In these circumstances, delaying the discharge by OSD may result in the local peak coinciding with the overall catchment peak, with resulting adverse effects.

Accordingly it is recommended that the effect of OSD should be modelled as part of the overall catchment modelling to determine whether it is beneficial or has adverse effects.

7.10.7 Rainwater Harvesting

It is recommended to retain roof runoff in rainwater tanks to be used for sanitary flushing and/or landscape irrigation.

The waste water generated on site would predominantly consist of toilet sewage and can discharge to Sydney Water sewers without pre-treatment.

Where trade waste is generated on site, removal or on-site treatment should be provided in accordance with Council's and Sydney Water Trade Waste Division requirements.

Grey and Black water is not proposed to be treated or re-used on site.

7.10.8 Pollution Controls

Stormwater drainage treatment measures, such as pit litter baskets, permeable pavements, and sediment and erosion management should be incorporated throughout the drainage system to treat stormwater at various points along the system and improve stormwater quality as it leaves the site. These measures are ultimately intended to contribute to water quality improvement and pollution reduction to downstream natural watercourses.

8 EROSION AND SEDIMENT CONTROL

8.1 CONSTRUCTION PHASE SOIL AND WATER MANAGEMENT

During construction, the existing access road off Wicks Road will be retained for use by construction traffic. Vehicle and pedestrian circulation routes within the site will be adjusted to suit the changing construction conditions but will always be maintained to ensure minimal disruption to construction and ongoing site operations.

Soil erosion and sedimentation control measures will be installed in all areas disturbed and affected by construction activities to prevent silt and sediment from leaving the construction site. Details of these measures are described below and shown on drawing SKC1-10.

All construction phase erosion and sediment control measures will be provided and installed in accordance with Council's guidelines and Landcom's "Managing Urban Stormwater - Soils and Construction".

8.1.1 Site Access for Construction

Construction vehicles will access the site from the existing access road off Wicks Road. Soil adhering to truck wheels will be prevented from leaving the site by the use of shaker grids. These will be located at the construction exit so that all trucks leaving the site may be inspected and cleaned before leaving the site. Sediment will be scraped off the shaker grid on a regular basis. The frequency of sediment removal will depend on the rate at which it collects. Typically, the shaker grid would be scraped off daily during bulk earthworks activities and weekly once construction starts.

8.1.2 Upstream Runoff Drainage and Diversion

Stormwater runoff from upstream of the construction site will be drained into existing stormwater drains where possible or diverted around the site to reduce erosion. Diversion can be achieved by forming lined channels and embankments along the upstream edge of the site. These will be directed to the nearest downstream drainage points to ensure safe and controlled stormwater discharge.

8.1.3 Earthworks Batters

Temporary earthworks batters in cut and fill will be sloped at 1 vertical to 1 horizontal, unless specified otherwise in the geotechnical report.

Earthworks batters that will remain for extended periods due to staging considerations will be stabilised against erosion by wind and rain. Methods of stabilisation would include top-soiling and grassing, with or without the use of biodegradable erosion blanket such as Enviromat. This type of blanket would provide protection against erosion until vegetation becomes established, thereby minimising maintenance costs.

8.1.4 Perimeter Protection

Until all disturbed surfaces are stabilised, the transport of sediment will be minimised by the installation of sediment fences. These will be installed along the downstream edge of the construction site, and at the toe of all earth batters and soil stockpiles. Sediment collected by the fences will be removed regularly to prevent the fence from collapsing.

8.1.5 Drainage Pit and Outlet Protection

All remaining stormwater drainage pits within the construction site will be fitted with sediment traps consisting of sediment fences staked around each pit. Stormwater drainage pits downstream of the construction site will be fitted with sediment filters composed of sand-filled filter bags/socks and spacer blocks. These will be kept in place and maintained until completion of all construction work upstream of each drainage pit.

8.1.6 Site Runoff Treatment

A temporary sediment basin will be constructed at the lowest point of the site, near the existing site drainage outlet. Stormwater runoff within the site will be directed to the sediment basin for collection, treatment and pump-out. This water will typically contain silt and suspended soil particles, which must be removed before discharge from the site. Site runoff will initially be allowed to settle. Settlement of finer particles will be accelerated by the addition of a flocculating agent such as alum. The water will then pass through a filter medium into a pump. This pump will direct the water into the existing stormwater manhole.

8.1.7 Dust Control

Airborne dust particles are generated in a construction site as a result of construction activity, vehicular and pedestrian traffic movements, or strong wind across bare earth or dusty surfaces. It is ultimately controlled by the completion of construction work, stabilisation of exposed earth surfaces (by paving, landscaping, etc.) and after final site clean-up.

During construction, dust generation can be minimised by applying the following dust control measures:

8.1.8 Bare Earth Surfaces

Bare earth surfaces will be kept damp during construction activity by spraying water from water trucks or hand-held hoses. Water for this purpose will be obtained under licence from street hydrants or from the internal fire hydrants.

Nominated site personnel will be assigned the task of monitoring the environmental conditions to determine the frequency of water application. Water is to be applied sufficiently to prevent dust particles becoming airborne but not enough to make the site muddy or to hamper free movement of vehicles.

At the end of each working day in dry conditions, a final application of water will be sprayed over bare earth surfaces to reduce dust transmission during the night.

8.1.9 Constructed Surfaces

Workplace Health and Safety regulations stipulate the regular collection of rubbish from site into skips for disposal to approved waste depots. As part of this operation, construction surfaces will be swept regularly (typically weekly, but as site conditions dictate).

Skips for the collection of rubbish will be located in areas with suitable truck access. If these areas are exposed to the wind, they will be kept covered to prevent dust (and other rubbish) from being picked up and conveyed by wind.

8.1.10 Transported Materials

Materials likely to generate dust will be transported to or from site under cover and dampened to prevent dust from being picked up and transported by wind.

8.2 PERMANENT SOIL AND WATER MANAGEMENT

Permanent erosion controls will be incorporated in the civil and landscape design. Batters, embankments and disturbed areas shall be structurally retained, paved or re-vegetated to stabilise the soil. Concentration of surface runoff and overland flows will be avoided. Additional stabilisation or flow dissipaters shall be provided where required.

Sediment traps shall be incorporated in the stormwater drainage design. Sediment and litter baskets shall be installed at grated stormwater inlet pits to capture pollutants at the source end whilst built-in sediment traps will also be incorporated at the end pits of stormwater drainage lines to capture any sediment that may have bypassed the upstream treatment measures. Where necessary, proprietary filtration systems and/or Gross Pollutant Traps capable of screening and trapping fine sediment particles will also be considered for incorporation into the stormwater drainage system..

All sediment and erosion control measures will be provided and installed in accordance with Council's guidelines and Landcom's "Managing Urban Stormwater - Soils and Construction".

9 WATER SENSITIVE URBAN DESIGN

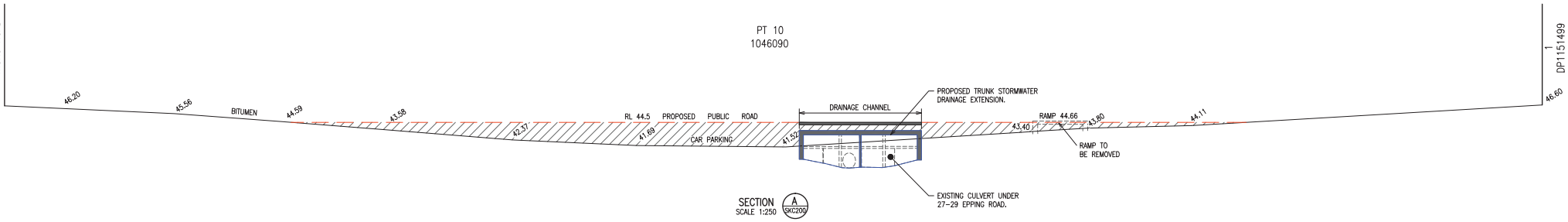
Water Sensitive Urban Design (WSUD) principles shall be incorporated in the various design elements of the proposed civil infrastructure – from construction to completion. Below is a summary of the proposed measures. These have been discussed in detail in previous sections.

WSUD Measure	**Proposed Design Response**
Permeable / porous pavements	Some permeable concrete paving may be used over lightly trafficked and pedestrian pavements such as kerb side parking to increase site surface permeability and improve stormwater drainage quality.
Water and soil management compliance	Stormwater drainage, sediment and erosion management measures shall be designed in accordance with the Council guidelines and Landcom's "Managing Urban Stormwater - Soils and Construction"
Water quality management	Measures such as bio-retention systems, gross pollutant traps, sediment traps, trash screens and pit litter baskets shall be incorporated in the design of civil infrastructure to remove gross litter, sediment and other pollutants from stormwater prior to discharge into the downstream drainage systems.
Rainwater re-use tanks	Rainwater harvesting and re-use tanks will be used to store roof runoff for use in landscape irrigation and sanitary flushing resulting in an overall reduction to the volume of stormwater being discharged into the downstream drainage systems and water courses.
Sediment and Erosion Management	Various sediment and erosion control measures will be provided to suit the requirements of each application stage.

10 APPENDICES

Appendix A	Drawings
Appendix B	Included Documents

APPENDIX A



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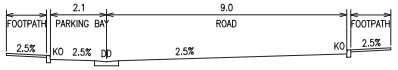

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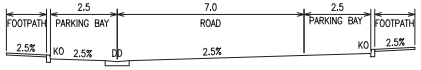

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Rev	Revision Description	By	App	Date
A	FOR INFORMATION	TO	CB	18.01.2013
B	FOR SUBMISSION	TO	CB	26.04.2013

Rev	Revision Description	By	App	Date

Engineering Consultant
BROWN Smart Consulting
55 Chandos Street St Leonards NSW 2065
Ph: (02) 9004 8855
Email: sydney@brownconsulting.com.au
Website: www.brownconsulting.com.au

Client
HARVEY NORMAN GROUP

Title
PUBLIC ROAD LONGITUDINAL AND TYPICAL SECTIONS

Project
HARVEY NORMAN GROUP
MACQUARIE PARK
PLANNING PROPOSAL

FOR INFORMATION

Date	Design	Checked
13.01.2013	CB	
Scale @ A1	Drawn	Approved
AS SHOWN	TO	
Job Number	Drawing Number	Revision
20120850	SKC3-20	B

A1
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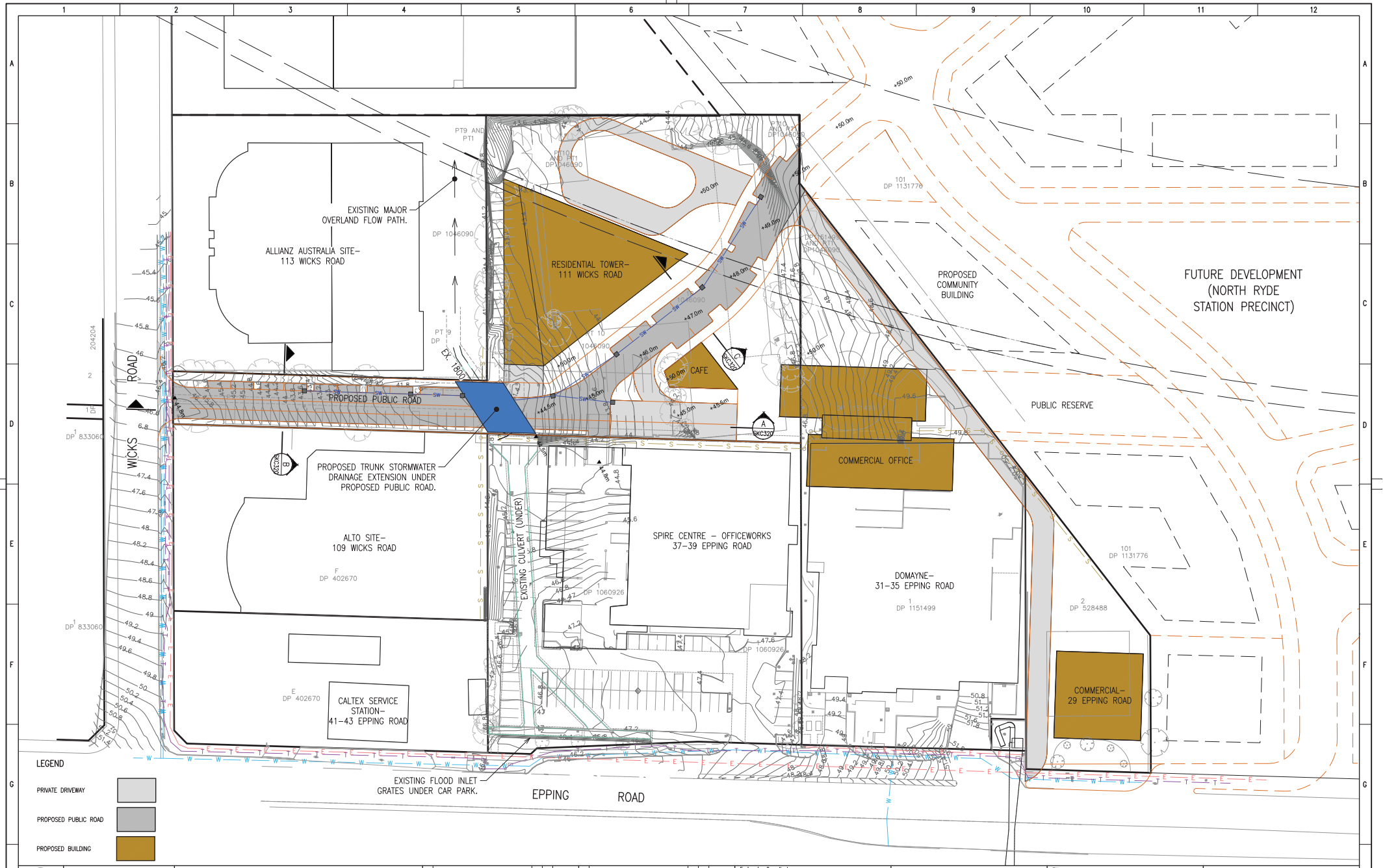

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Rev	Revision Description	By	App	Date
A	FOR INFORMATION	TO	CB	18.01.2013
B	FOR SUBMISSION	TO	CB	26.04.2013

Engineering Consultant
BROWN Smart Consulting
55 Chandos Street St Leonards NSW 2065
Ph: (02) 9004 8855
Email: sydney@brownconsulting.com.au
Website: www.brownconsulting.com.au

Client
HARVEY NORMAN GROUP

Title
CIVIL AND STORMWATER CONCEPT PLAN

Project
HARVEY NORMAN GROUP
MACQUARIE PARK
PLANNING PROPOSAL

FOR INFORMATION

Date	Design	Checked
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AS SHOWN	TO	
Job Number	Drawing Number	Revision
20120850	SKC2–00	B

A1

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HARVEY NORMAN GROUP MACQUARIE PARK PLANNING PROPOSAL MACQUARIE PARK, NSW

CIVIL INFRASTRUCTURE

Sheet List Table	
Sheet Number	Sheet Title
SKC0–00	LOCALITY PLAN AND DRAWING LIST
SKC2–00	CIVIL AND STORMWATER CONCEPT PLAN
SKC3–20	PUBLIC ROAD LONGITUDINAL AND TYPICAL SECTIONS

LOCALITY MAP
(IMAGE ACQUIRED FROM GOOGLE EARTH)
NTS

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

Rev	Revision Description	By	App	Date
A	FOR INFORMATION	TO	CB	18.01.2013
B	FOR SUBMISSION	TO	CB	26.04.2013

Engineering Consultant
BROWN Smart Consulting
55 Chandos Street St Leonards NSW 2065
Ph: (02) 9004 8855
Email: sydney@brownconsulting.com.au
Website: www.brownconsulting.com.au

Client
HARVEY NORMAN GROUP

Title
LOCALITY PLAN AND DRAWING LIST

Project
HARVEY NORMAN GROUP MACQUARIE PARK PLANNING PROPOSAL

FOR INFORMATION

Date	Design	Checked
13.01.2013	CB	
Scale @ A1	Drawn	Approved
AS SHOWN	TO	

Job Number	Drawing Number	Revision
20120850	SKC0–00	B

A1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND

BENCH MARK	▲
TELSTRA PIT	TEL
TELSTRA PILLAR	TP
POWER POLE	PP
ELECTRIC LIGHT POLE	ELP
STREET SIGN	SIGN
GRATED INLET PIT	GIP
MANHOLE	MH
STOP VALVE	SV
HYDRANT	HYD
SEWER INSPECTION POINT	SIP
SEWER VENT	SEV
ELECTRICITY BOX	EL
VEHICLE CROSSING	VC
PRAM CROSSING	PC
WATER VALVE	WV
SMALL LIGHT	L
GAS VALVE	GAS
WATER METER	WM
WATER	W
SEWER	S
ELECTRICITY (U'GROUND)	E
TELSTRA	T

NOTES

1) THE BOUNDARIES HAVE NOT BEEN MARKED
2) ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY THE OFFICE of LAND & PROPERTY INFORMATION (NSW) AND ARE SUBJECT TO FINAL SURVEY
3) ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM PM 46985 R.L. 53.814 (A.H.D.) IN EPPING ROAD
4) CONTOUR INTERVAL 0.2m
5) CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
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8) 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
9) APPROXIMATE POSITION OF ROAD LINEMARKING SHOWN IS INDICATIVE ONLY

MGA

ROAD

WICKS

WARNING : OPTICAL FIBRE CABLES UNDERGROUND ELECTRICITY AND POWERTEL CABLES

CONCRETE PANEL AND GLASS BUILDING METAL ROOF

WAREHOUSE FL 40.70

No.113 "ALLIANZ AUSTRALIA" SITE

No.109A "ALTO"

DP 1046090

PT9 AND PT1

PT10 AND PT1 DP1046090 (2901m²) (W)

"DOMAYNE" WAREHOUSE BRICK, METAL & GLASS BUILDING

BOUNDARY OF RAILCORP STRATUM LOT 1 DP 1046090 LIMITED IN HEIGHT TO RL 35 METRES

PT 10 (6903m²) TOTAL 9804m² 1046090

PT 9 DP

PT 10

BITUMEN

DRIVEWAY

CARSPACES

GARDEN

CONCRETE

BUILDING

BRICK

RAMP

LIFT

FOOTPATH

FENCE

WALL

CYCLONE WIRE FENCE

MESH FENCE

KERB & GUTTER

HEADWALL BELOW

PARAPET RL 53.74

PARAPET RL 55.61

BASEMENT RL 44.

JOINS SHEET 2

JOINS SHEET 3

(A) EASEMENT TO DRAIN WATER 4, 5, 6 & VAR. WIDTH (DP 1060721)
(B) RIGHT OF CARRIAGEWAY 1.2, 4 & 6.2 WIDE (DP 1060721)
(C) EASEMENT FOR ELECTRICITY PURPOSES 2 WIDE AND VAR. (DP 1060721)
(D) EASEMENT FOR DRAINAGE 3.66 WIDE (DP 642480)
(E) EASEMENT FOR DRAINAGE 4 WIDE (DP 642480)
(F) EASEMENT FOR DRAINAGE 3.66 WIDE VIDE F224319
(G) EASEMENT TO DRAIN WATER 2 & 2.5 WIDE & VAR. WIDTH (DP 1066922)
(H) EASEMENT TO DRAIN WATER 1.5 WIDE (W392943)
(J) RIGHT OF WAY & EASEMENT FOR ELECTRICITY PURPOSES (W317456)
(K) RIGHT OF WAY (W317456)
(L) EASEMENT FOR ELECTRICITY PURPOSES (W317456)
(M) EASEMENT FOR ELECTRICITY SUBSTATION PURPOSES 2 & 6 WIDE
(N) RIGHT OF WAY VARIABLE WIDTH

WHERE DESIGNATED BY (W), LOT 10 IN DP 1046090 AND LOT 1 IN DP 1151499 LIMITED IN DEPTH TO THE TOP OF LOT 1 IN DP 1046090 AT RL 38 AHD

(SR) DENOTES APPROXIMATE POSITION OF RAILCORPS SECOND RESERVE BOUNDARY WITHIN WHICH EXISTS AN IMPLIED COVENANT PROTECTING RAILCORP INFRASTRUCTURE.

0 5 10 15 20
1:200

AMENDMENT:STORMWATER ADJACENT BUILDINGS DOMAYNE COLUMNS AND M2 ADDED AND DETAIL UPDATED SHEETS 5-7 ADDED REF:34878 DATE:08-06-2012

THIS IS THE PLAN REFERRED TO IN MY LETTER
DATED:-
Registered Surveyor NSW

DATE OF SURVEY: 24/7/06
DATUM: AHD
SITE AREA: N/A

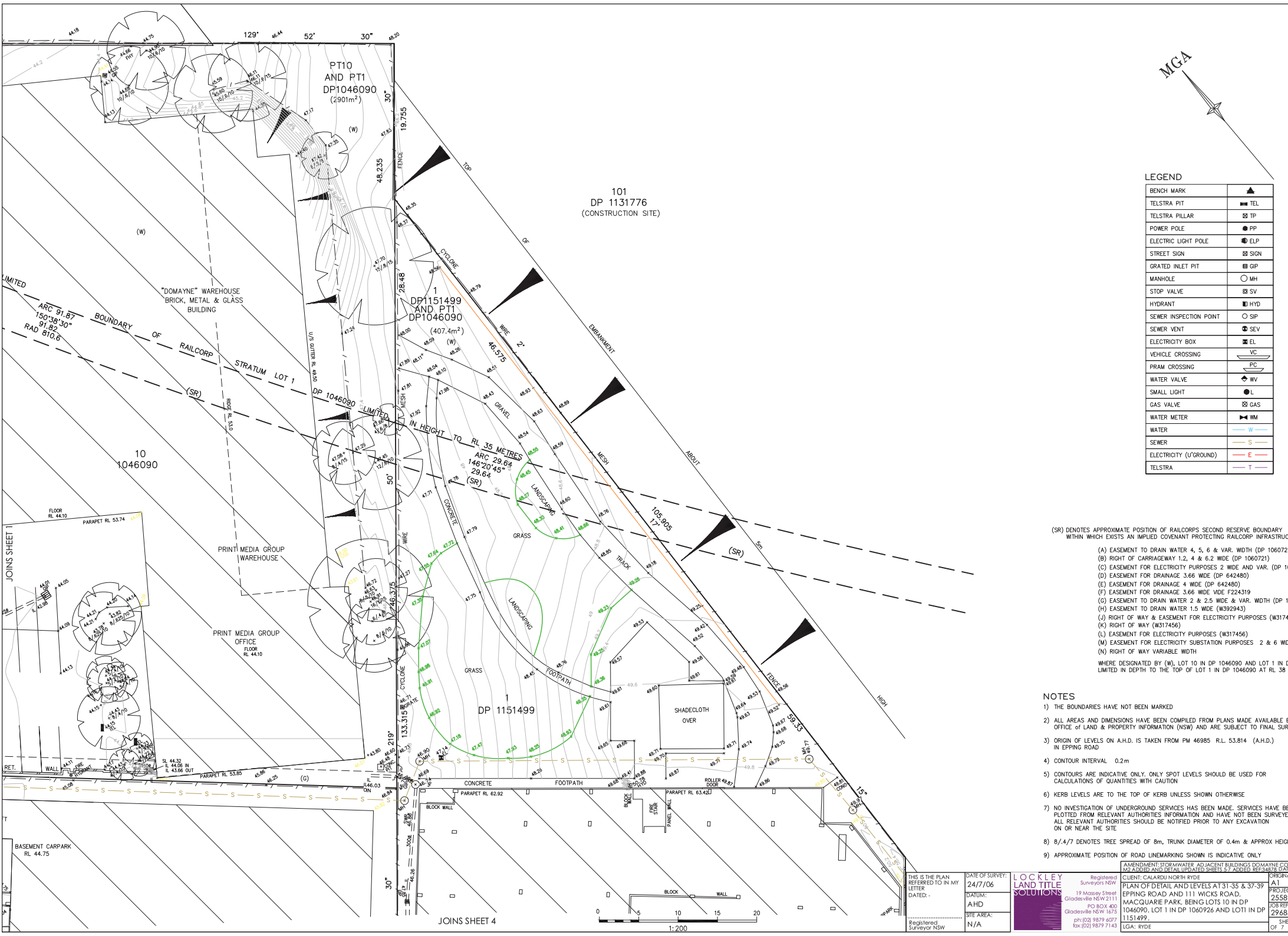
LOCKLEY LAND TITLE SOLUTIONS
Registered Surveyors NSW
19 Massey Street
Gladesville NSW 2111
PO BOX 400
Gladesville NSW 1675
ph:(02) 9879 6077
fax:(02) 9879 7143

CLIENT: CALARDU NORTH RYDE

PLAN OF DETAIL AND LEVELS AT 31-35 & 37-39 EPPING ROAD AND 111 WICKS ROAD, MACQUARIE PARK, BEING LOTS 10 IN DP 1046090, LOT 1 IN DP 1060926 AND LOT1 IN DP 1151499.

LGA: RYDE

ORIGINAL PLAN SIZE: A1 1:200
PROJECT No: 25589
JOB REFERENCE: 29683DT
SHEET OF 7 SHEETS 1



LEGEND

BENCH MARK	▲
TELSTRA PIT	TEL
TELSTRA PILLAR	TP
POWER POLE	PP
ELECTRIC LIGHT POLE	ELP
STREET SIGN	SIGN
GRATED INLET PIT	GIP
MANHOLE	MH
STOP VALVE	SV
HYDRANT	HYD
SEWER INSPECTION POINT	SIP
SEWER VENT	SEV
ELECTRICITY BOX	EL
VEHICLE CROSSING	VC
PRAM CROSSING	PC
WATER VALVE	WV
SMALL LIGHT	L
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WATER	W
SEWER	S
ELECTRICITY (U'GROUND)	E
TELSTRA	T

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Registered Surveyor NSW

DATE OF SURVEY: 24/7/06
DATUM: AHD
SITE AREA: N/A

LOCKLEY LAND TITLE SOLUTIONS
Registered Surveyors NSW
19 Massey Street
Gladesville NSW 2111
PO BOX 400
Gladesville NSW 1675
ph:(02) 9879 6077
fax:(02) 9879 7143

AMENDMENT: STORMWATER ADJACENT BUILDINGS DOMAYNE COLUMNS AND M2 ADDED AND DETAIL UPDATED SHEETS 5-7 ADDED REF:34878 DATE:08-06-2012

CLIENT: CALARDU NORTH RYDE

ORIGINAL PLAN SIZE: A1 1:200

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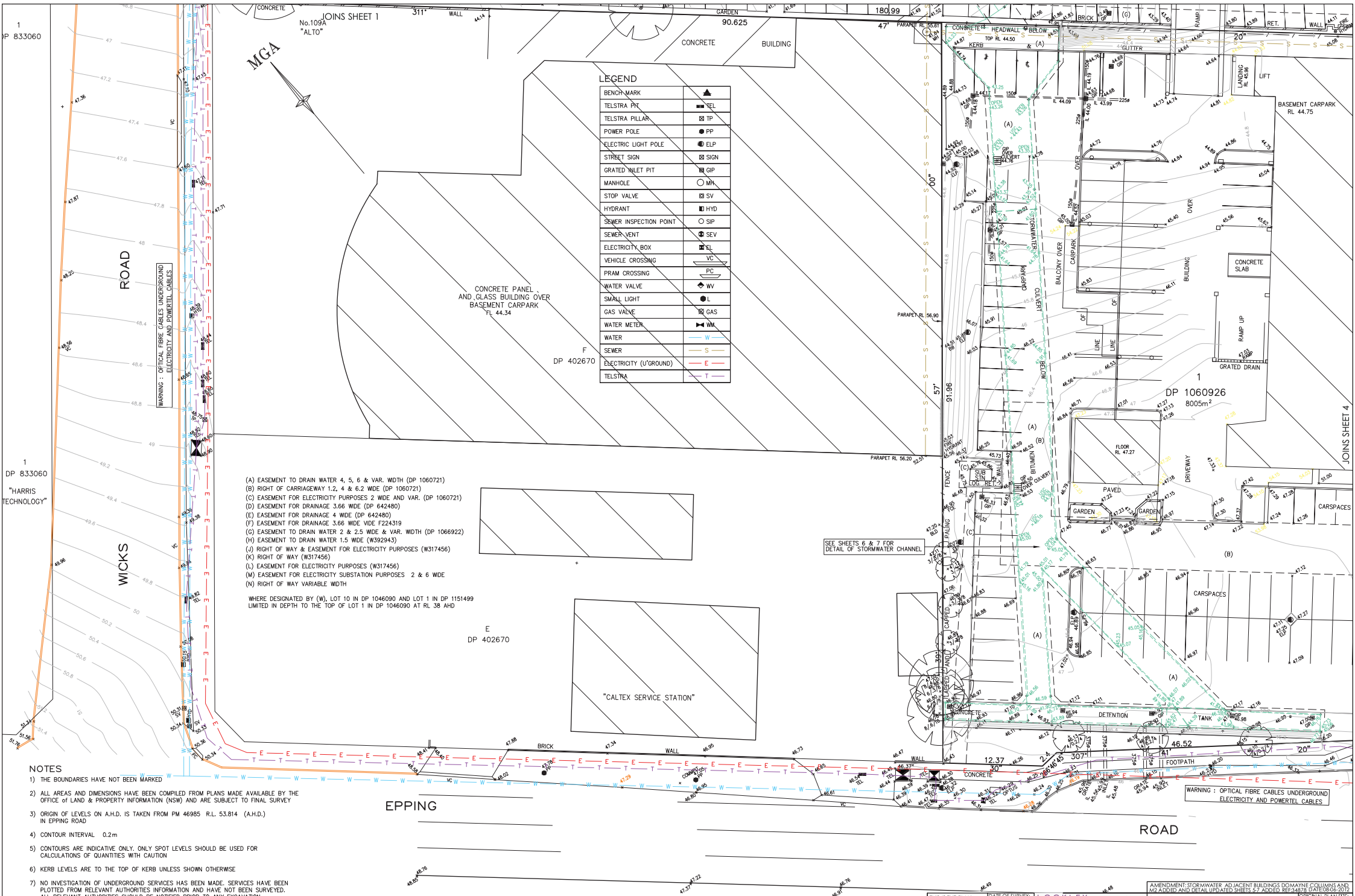
PROJECT No: 25589

JOB REFERENCE: 29683DT

LGA: RYDE

SHEET OF 7 SHEETS 2



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1:200

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CLIENT: CALARDU NORTH RYDE

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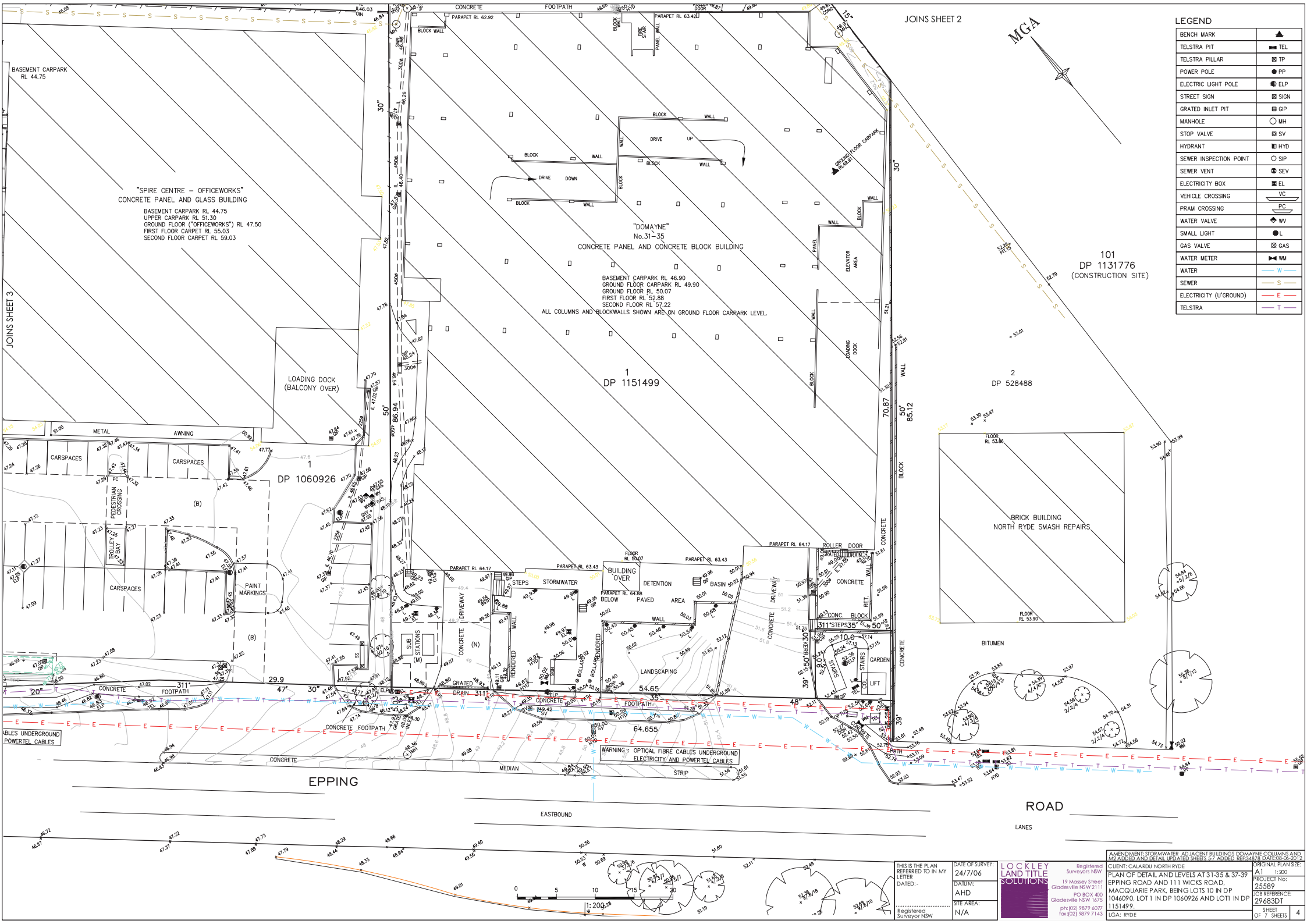
LGA: RYDE

ORIGINAL PLAN SIZE: A1 1:200
PROJECT No: 25589
JOB REFERENCE: 29683DT
SHEET OF 7 SHEETS 3



LEGEND

BENCH MARK	▲
TELSTRA PIT	TEL
TELSTRA PILLAR	TP
POWER POLE	PP
ELECTRIC LIGHT POLE	ELP
STREET SIGN	SIGN
GRATED INLET PIT	GIP
MANHOLE	MH
STOP VALVE	SV
HYDRANT	HYD
SEWER INSPECTION POINT	SIP
SEWER VENT	SEV
ELECTRICITY BOX	EL
VEHICLE CROSSING	VC
PRAM CROSSING	PC
WATER VALVE	WV
SMALL LIGHT	L
GAS VALVE	GAS
WATER METER	WM
WATER	W
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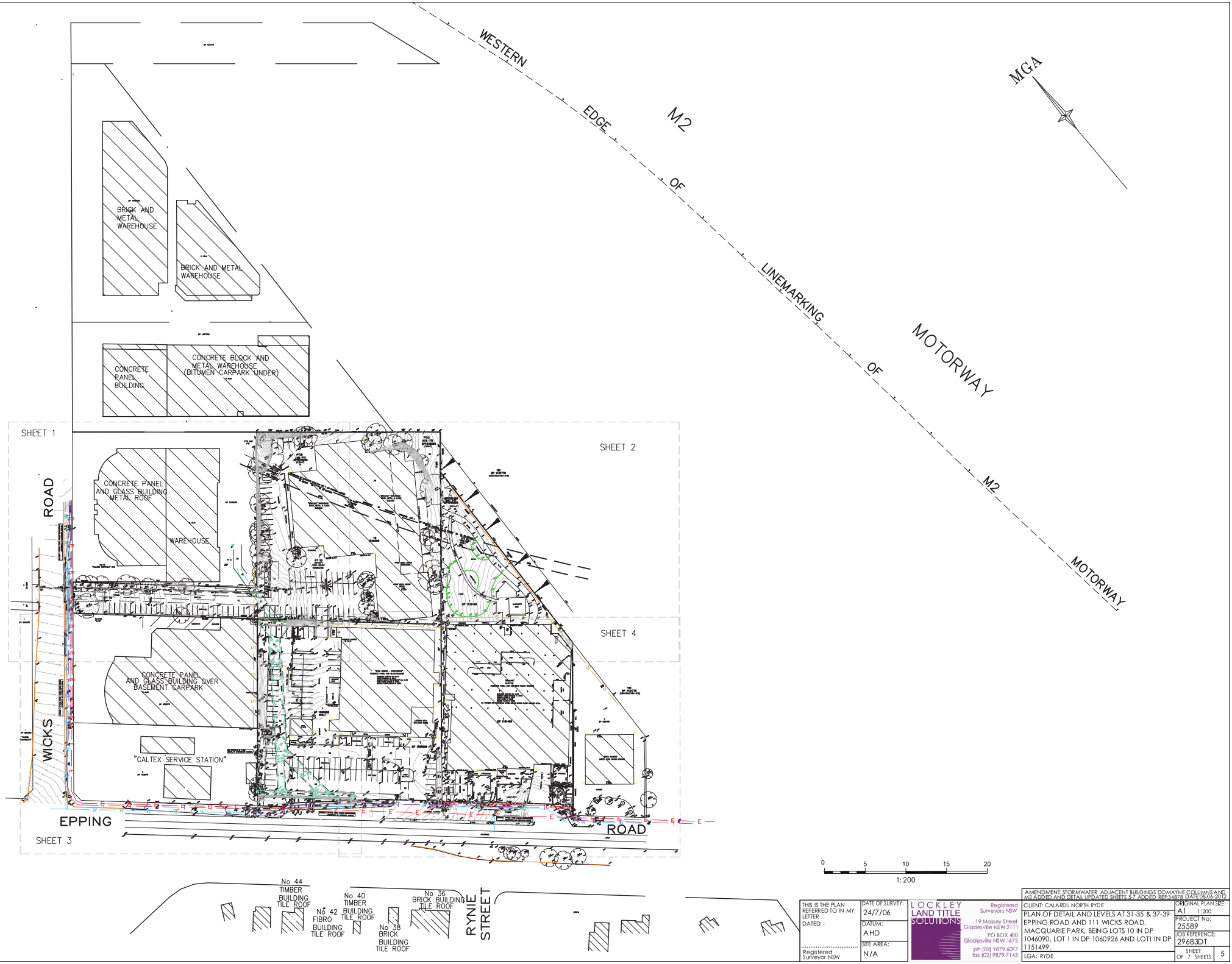
ORIGINAL PLAN SIZE: A1 1:200

PROJECT No: 25589

JOB REFERENCE: 29683DT

SHEET OF 7 SHEETS 4



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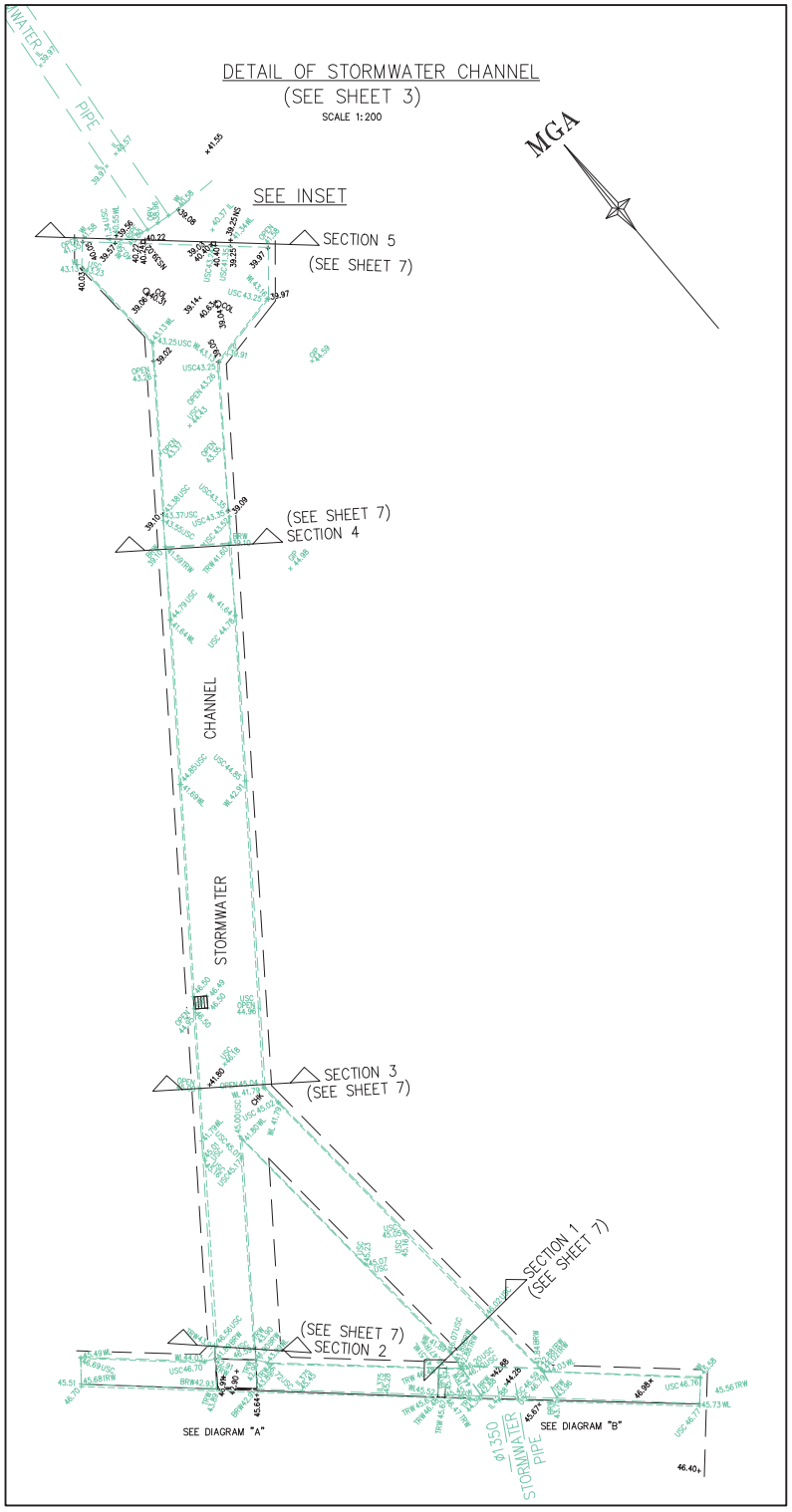
LGA: RYDE

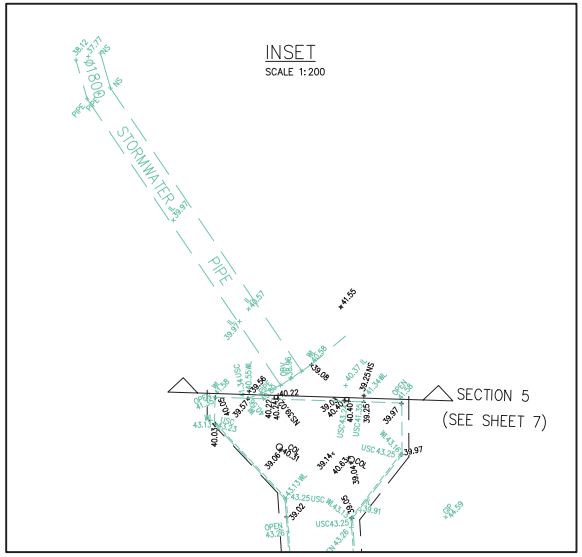
ORIGINAL PLAN SIZE: A1 1:200

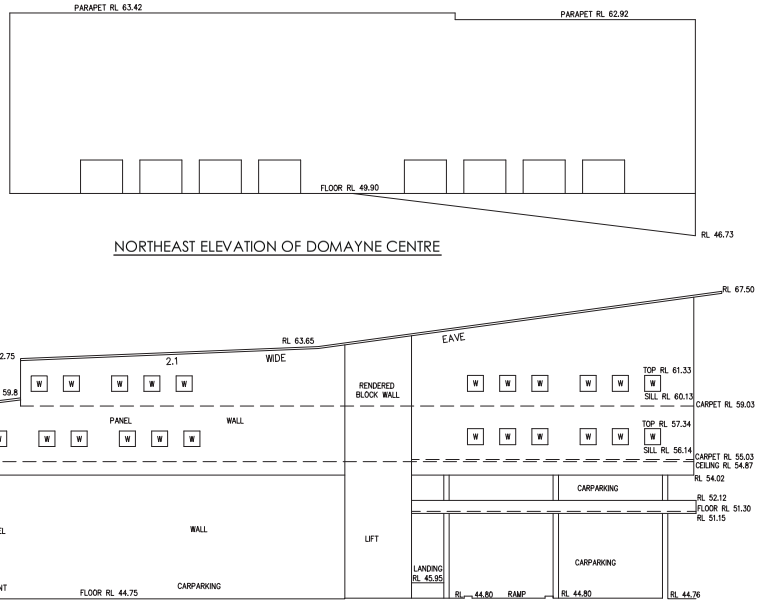
PROJECT No: 25589

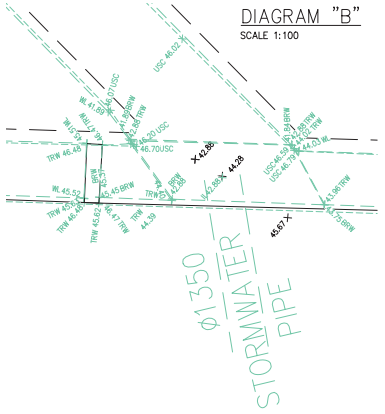
JOB REFERENCE: 29683DT

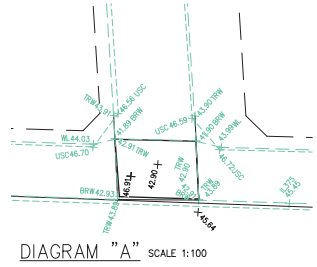
SHEET OF 7 SHEETS 5











LEGEND

BOTTOM OF RETAIN.WALL	BRW
TOP OF RETAIN.WALL	TRW
BOTTOM OF WALL	WL
UNDERSIDE OF CHANNEL	USC

0 5 10 15 20
1:200

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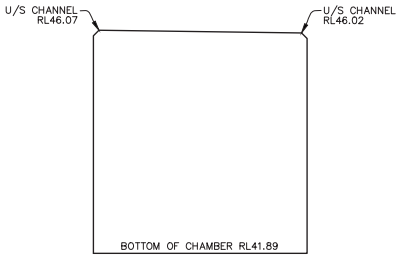
LGA: RYDE

ORIGINAL PLAN SIZE: A1 1:200
PROJECT No: 25589
JOB REFERENCE: 29683DT
SHEET OF 7 SHEETS 6

SECTIONS THROUGH STORMWATER CHANNEL
(SEE SHEET 6 FOR SECTION LOCATION AND DIRECTION OF VIEW)



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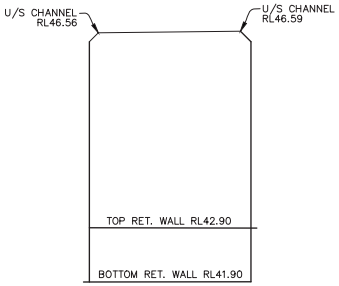

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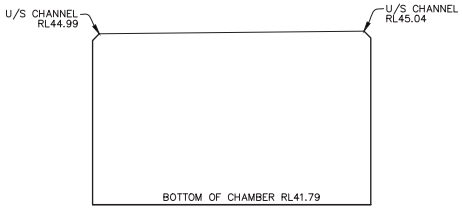

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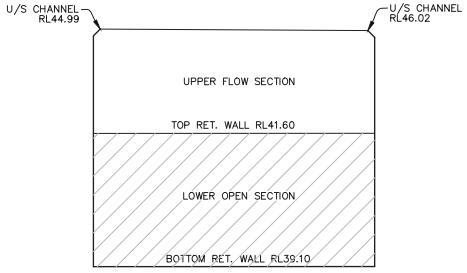

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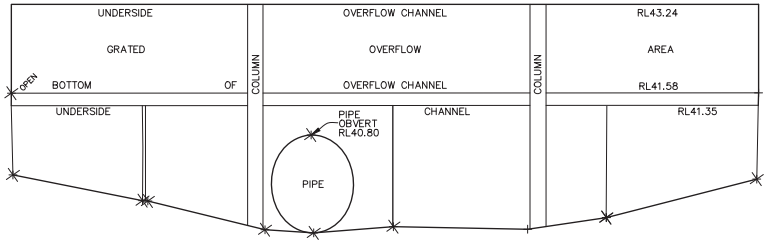

SECTION 5–5

LEGEND

BOTTOM OF RETAIN.WALL	BRW
TOP OF RETAIN.WALL	TRW
BOTTOM OF WALL	WL
UNDERSIDE OF CHANNEL	USC

0 1 2 3 4 5
1:50

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Registered Surveyor NSW

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DATUM: AHD
SITE AREA: N/A

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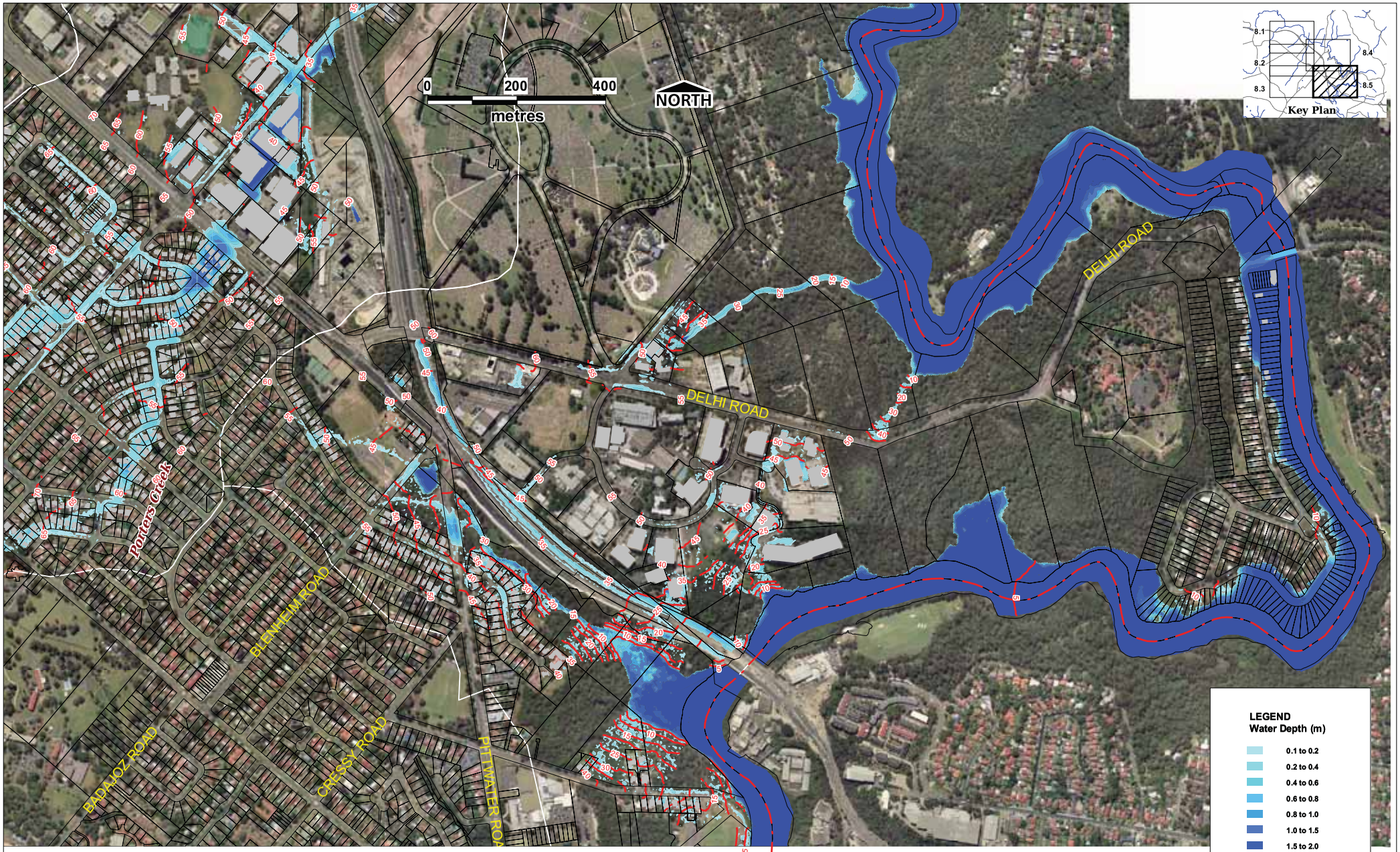
LGA: RYDE

ORIGINAL PLAN SIZE: A1 1:50
PROJECT No: 25589
JOB REFERENCE: 29683DT
SHEET OF 7 SHEETS 7



Bewsher

Job No: J1609
File: Fig8.5_MP_Exg100y_02
Date: 4 May 10

City of Ryde - Macquarie Park Floodplain Risk Management Study and Plan

Figure 8.5
Simulation of 100 Year ARI Flood
(Sheet 5 of 5)

APPENDIX B

City of Ryde

ABN 81 621 292 610
Civic Centre
1 Devlin Street Ryde
Locked Bag 2069
North Ryde NSW 1670
cityofryde@ryde.nsw.gov.au
www.ryde.nsw.gov.au
TTY (02) 9952 8470
Facsimile (02) 9952 8070
Telephone (02) 9952 8222

Mr Carlo Bartolome
55 Chandos Street
St Leonards NSW 2065

25 June 2012

Our ref: 1370458

Dear Carlo,

RE: Request for Flood Information – No. 31-35 Epping Road, Macquarie Park

Reference is made to your application received on 21 June 2012 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 20 year and 100 year ARI (Average Recurrence Interval) flood events as well as the PMF (Probable Maximum Flood) event.

This information has been provided to Council by Bewsher Consulting Pty Ltd, and is derived from models established as part of the Eastwood & Terry's Creek Flood Study and Floodplain Risk Management Study and Plan.

Please be advised that flood models only approximate flood behaviour. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact me on (02) 9952 8222.

Yours sincerely,

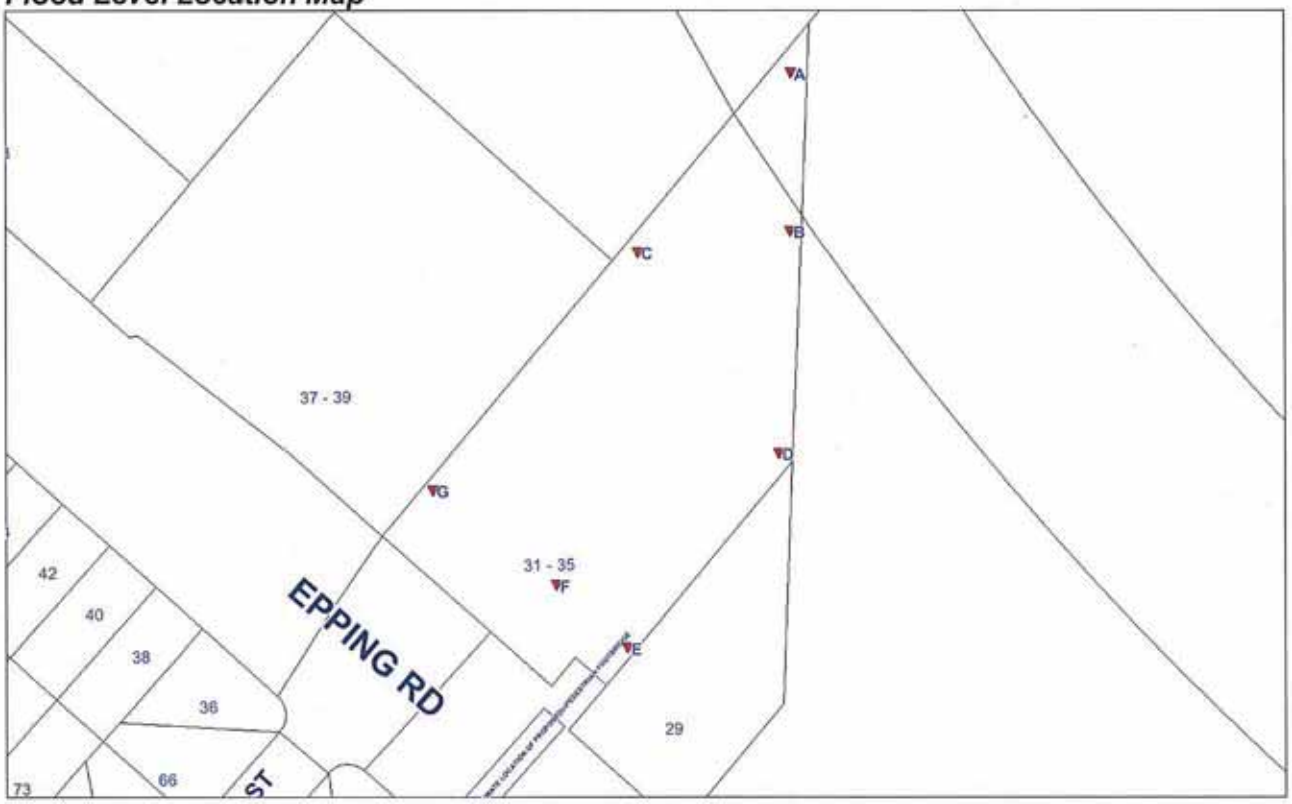
Austin Morris
Manager - Infrastructure Integration

City of Ryde

FLOOD INFORMATION REQUEST

Property Address: No. 31-35 Epping Road, Macquarie Park
Issue Date: 25 June 2012
Flood Study Reference: Eastwood & Terrys Creek Flood Study Report (Nov 2008)
Flood Model Reference: TUFLOW Model (April 2010)

Flood Level Location Map



Flood Level Data Table

Location	20 Year ARI Flood Event (m AHD)	100 Year ARI Flood Event (m AHD)	Probable Maximum Flood (m AHD)
A	**Nil**	**Nil**	48.3296
B	**49.0138**	**49.0363**	49.0901
C	**46.9349**	**46.953**	47.0021
D	**50.4224**	**50.4251**	50.5873
E	**Nil**	**Nil**	51.7309
F	**Nil**	**Nil**	50.3014
G	Nil	Nil	48.4364

Notes:

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- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

City of Ryde

ABN 81 621 292 610
Civic Centre
1 Devlin Street Ryde
Locked Bag 2069
North Ryde NSW 1670
cityofryde@ryde.nsw.gov.au
www.ryde.nsw.gov.au
TTY (02) 9952 8470
Facsimile (02) 9952 8070
Telephone (02) 9952 8222

Mr Carlo Bartolome
55 Chandos Street
St Leonards NSW 2065

25 June 2012

Our ref: 1370537

Dear Carlo,

RE: Request for Flood Information – No. 37-39 Epping Road, Macquarie Park

Reference is made to your application received on 21 June 2012 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 20 year and 100 year ARI (Average Recurrence Interval) flood events as well as the PMF (Probable Maximum Flood) event.

This information has been provided to Council by Bewsher Consulting Pty Ltd, and is derived from models established as part of the Eastwood & Terry's Creek Flood Study and Floodplain Risk Management Study and Plan.

Please be advised that flood models only approximate flood behaviour. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact me on (02) 9952 8222.

Yours sincerely,

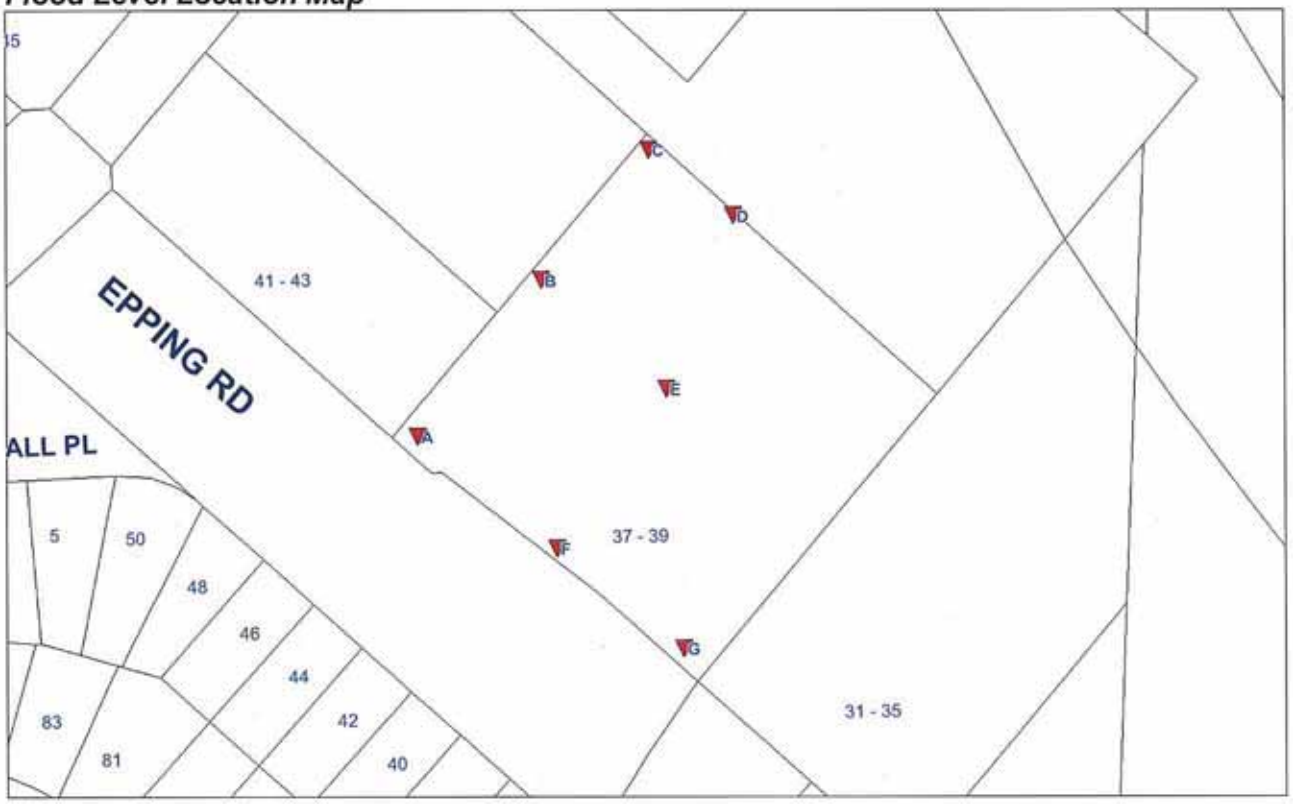
Austin Morris
Manager - Infrastructure Integration

City of Ryde

FLOOD INFORMATION REQUEST

Property Address: No. 37-39 Epping Road, Macquarie Park
Issue Date: 25 June 2012
Flood Study Reference: Eastwood & Terrys Creek Flood Study Report (Nov 2008)
Flood Model Reference: TUFLOW Model (April 2010)

Flood Level Location Map



Flood Level Data Table

Location	20 Year ARI Flood Event (m AHD)	100 Year ARI Flood Event (m AHD)	Probable Maximum Flood (m AHD)
A	**46.8991**	**46.9909**	47.6902
B	**Nil**	**45.3734**	46.9179
C	**Nil**	**Nil**	44.576
D	**Nil**	**Nil**	44.3684
E	**Nil**	**Nil**	47.1195
F	**Nil**	**Nil**	47.7471
G	47.4155	47.4151	47.7566

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Mr Carlo Bartolome
55 Chandos Street
St Leonards NSW 2065

25 June 2012

Our ref: 1370547

Dear Carlo,

RE: Request for Flood Information – No. 111 Wicks Road, Macquarie Park

Reference is made to your application received on 21 June 2012 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 20 year and 100 year ARI (Average Recurrence Interval) flood events as well as the PMF (Probable Maximum Flood) event.

This information has been provided to Council by Bewsher Consulting Pty Ltd, and is derived from models established as part of the Eastwood & Terry's Creek Flood Study and Floodplain Risk Management Study and Plan.

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Yours sincerely,

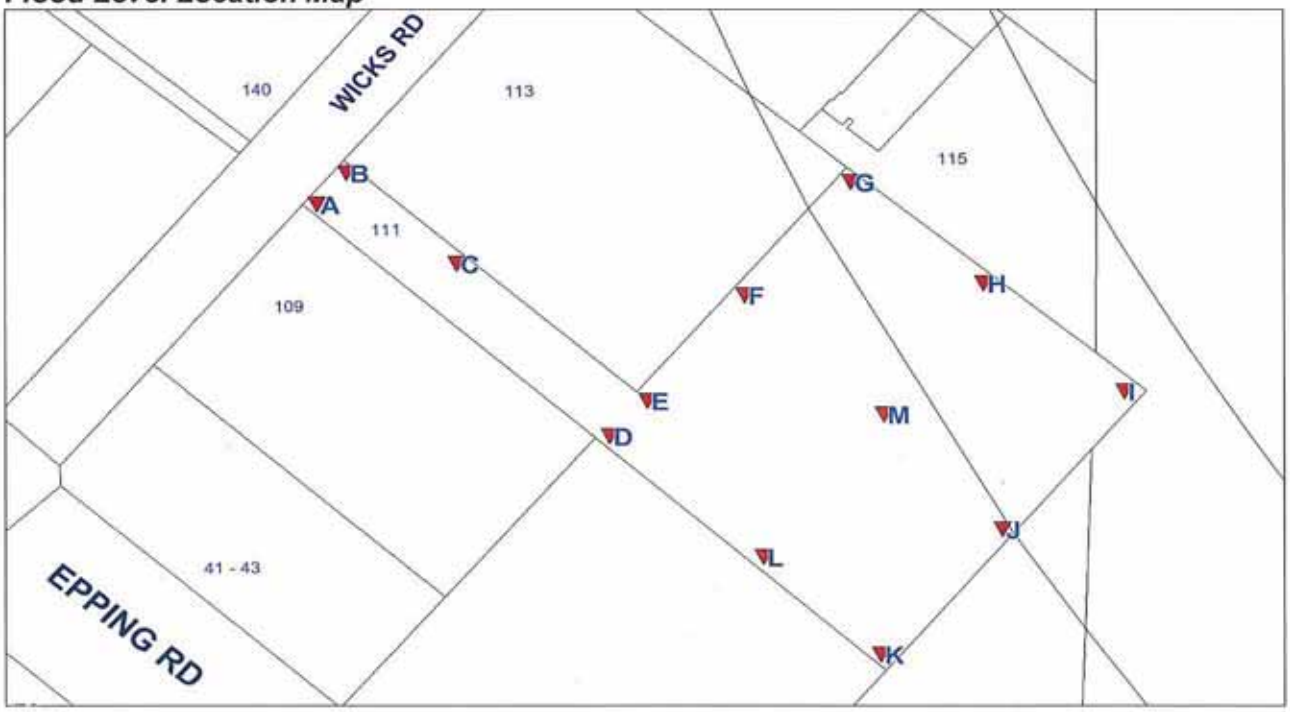
Austin Morris
Manager - Infrastructure Integration

City of Ryde

FLOOD INFORMATION REQUEST

Property Address: No. 111 Wicks Road, Macquarie Park
Issue Date: 25 June 2012
Flood Study Reference: Eastwood & Terrys Creek Flood Study Report (Nov 2008)
Flood Model Reference: TUFLOW Model (April 2010)

Flood Level Location Map



Flood Level Data Table

Location	20 Year ARI Flood Event (m AHD)	100 Year ARI Flood Event (m AHD)	Probable Maximum Flood (m AHD)
A	**46.5529**	**46.5483**	46.5572
B	**46.2904**	**Nil**	46.2998
C	**Nil**	**Nil**	44.188
D	**42.5848**	**42.7632**	44.2153
E	**42.5798**	**42.7497**	44.1833
F	**Nil**	**Nil**	44.2011
G	**42.5835**	**42.7595**	44.2118
H	**44.1338**	**44.1337**	44.3209
I	**Nil**	**Nil**	Nil
J	**47.1136**	**47.1131**	47.301
K	**44.8818**	**45.9101**	46.6331
L	**Nil**	**Nil**	44.5107
M	Nil	Nil	44.7029

Notes:

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- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

From:	Tony Walker
To:	Carlo Bartolome; Paul Davis
Cc:	"Adrian Kingswell"
Subject:	RE: Geotechnical Boreholes - Domain Store, North Ryde
Date:	Friday, 30 November 2012 1:24:57 PM
Attachments:	image004.png image001.jpg

Carlo and Paul

JKG have undertaken several geotechnical borehole investigations in the area, including the existing Domayne building, the Epping to Delhi Road section of the underground rail line, 113 Wicks Road, 115-117 Wicks Road.

1. At the Domayne site, sandstone bedrock was encountered at depths between 0.3m and 3.0m below existing levels at that time. Low strength or stronger sandstone was intersected at about RL51m at the south-east corner, at about RL47m at the south-west and north-east corners, and at about RL45m at the north-west corner of the building. We also inspected 13 pier footings, which had been designed for an allowable bearing pressure of 3500kPa. 8 of the 13 piers were founded at about 3m depth and the other 5 at about 5m depth.
2. It would appear that the rail easement was moved after our investigation. The southern boundary only just passed through the north-east corner of 115 Wicks Road at that time. The rock was encountered between 1m and 2m depth. One borehole located approximately on a line running along the northern boundary and about 200m to the east of 111 Wicks Road initially encountered interbedded Class V/IV shale and sandstone then sandstone Class I/II sandstone from 5.5m depth to below the tunnel invert. The borehole adjacent to the north-east corner of 115 Wicks Road encountered Class III/IV sandstone at 1m, Class II/III at 3.5m and Class I/II sandstone from 16m.

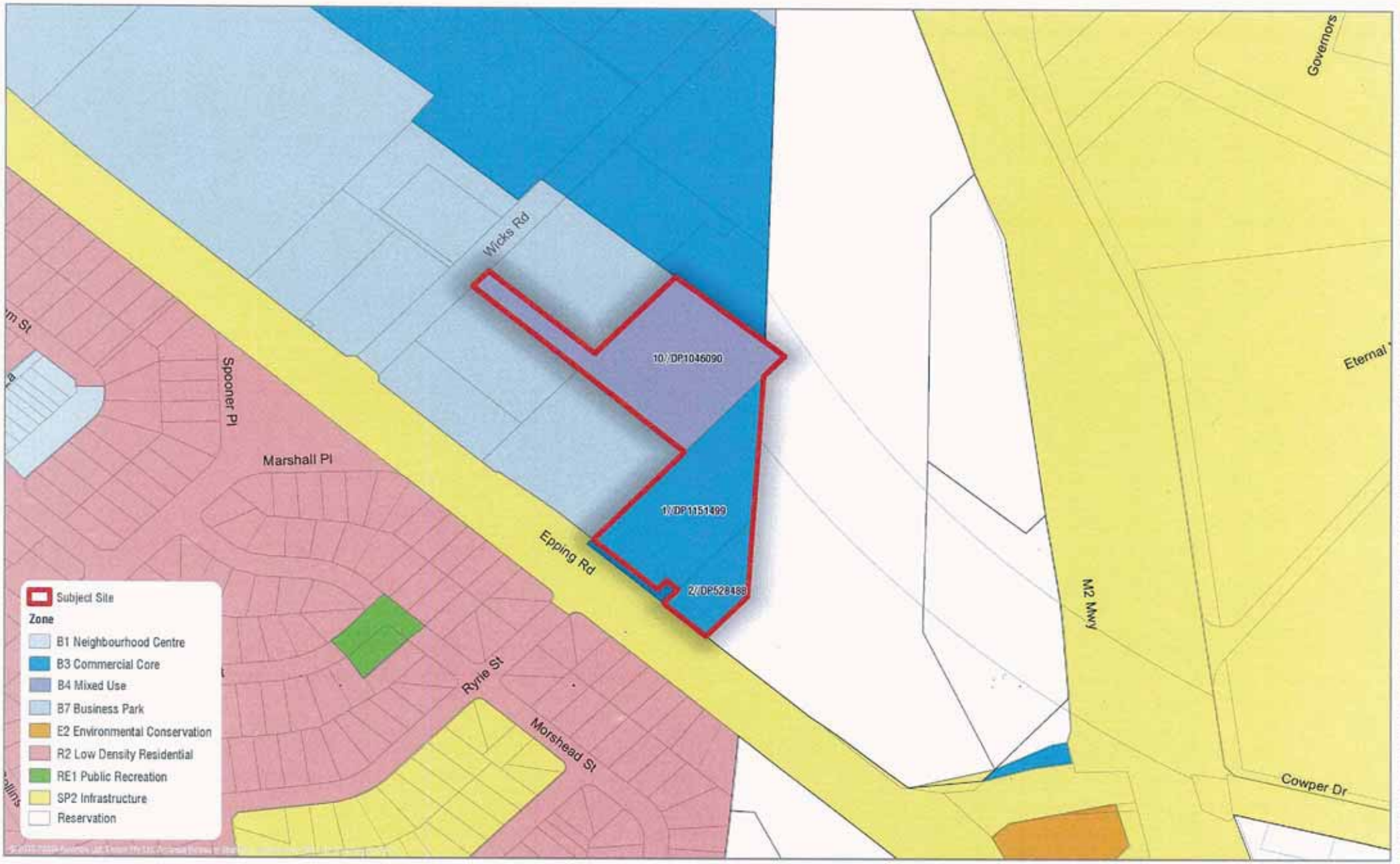
Regards,

Tony Walker
Associate

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Tel: 02 9888 5000
Fax: 02 9888 5001
PO Box 976
North Ryde BC NSW 1670
115 Wicks Road
Macquarie Park NSW 2113
twalker@jkgeotechnics.com.au
www.jkgeotechnics.com.au

From: Carlo Bartolome [mailto:Carlo.Bartolome@brownconsulting.com.au]
Sent: Thursday, 29 November 2012 3:46 PM
To: Tony Walker; Paul Davis
Cc: Adrian Kingswell
Subject: RE: Phase 1 Contamination audit - Domain Store, North Ryde



Calardu Planning Proposal

PROPOSED AMENDMENT - RYDE LEP ZONING

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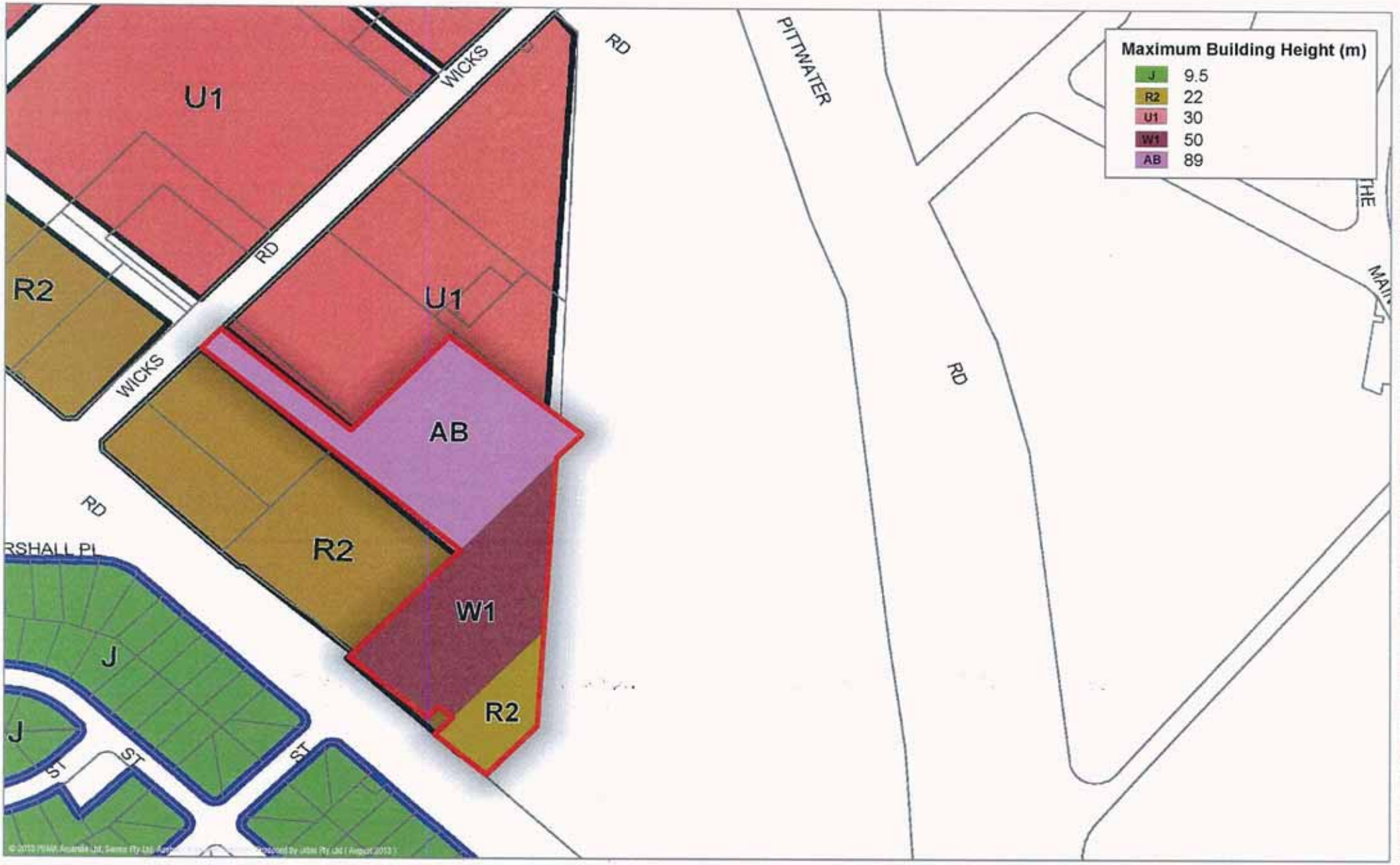
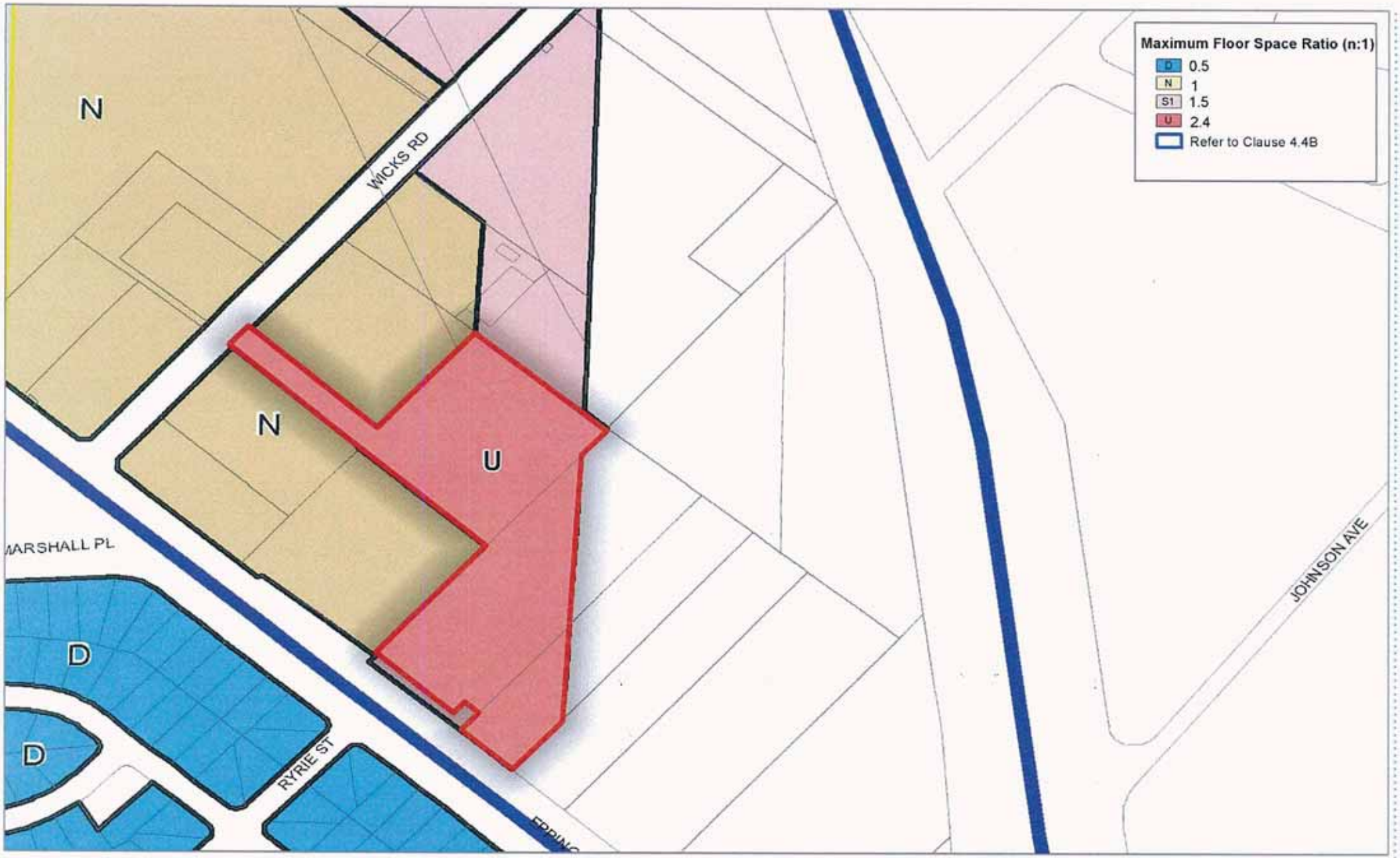


Calardu Planning Proposal

PROPOSED AMENDMENT - RYDE LEP MAXIMUM BUILDING HEIGHT

urbis



Calardu Planning Proposal

RYDE LEP FLOOR SPACE RATIO

urbis

Calardu North Ryde No 1 Pty Limited
B1 Richmond Road
Homebush West NSW 2140

16 May 2013

The Acting General Manager
Ryde City Council
Locked Bag 2069
North Ryde NSW 1670

Dear Ms Dickson

Planning propsal relating to 111 Wicks Road, 29 Epping Road and 31-35 Epping Road, Macquarie Park (Site)
Offer to enter into a voluntary planning agreement

Calardu is lodging a planning proposal with the Council seeking amendments to *Ryde Local Environmental Plan 2010* to enable the development of the Site for a high density mixed use scheme comprising commercial, retail, hotel and residential development.

In conjunction with the changes sought to *Ryde Local Environmental Plan 2010*, Calardu offers to enter into a voluntary planning agreement with the Council in accordance with Subdivision 2 of Division 6 of Part 4 of the *Environmental Planning and Assessment Act 1979*.

Calardu offers to pay a monetary contribution to the Council in the amount of $4.4 million to be paid to the Council in stages as each of the three parts of the Site are developed. Payment for each stage would be paid to the Council prior to the issue of a construction certificate for any construction works above ground level relating to the construction of the substantive building for that stage.

The amount of the monetary contribution has been calculated:

(a) based on the additional commercial floor space that will be provided by the development above that would conform with the current floor space ratio control of 1.5:1 for the Site; and

(b) using a rate of $250 per m^2 which is the rate adopted by the Council for the deferred incentive bonus floor space ratio scheme in Draft Amendment No. 1.

Calardu's obligations under the voluntary planning agreement will provide that it is not required to pay any monetary contribution unless:

1. the amending LEP to RLEP 2010 is made so as to rezone 111 Wicks Road and amend the controls applying to 29 and 31-35 Epping Road to permit development in accordance with the Concept Master Plan submitted by Calardu Pty Limited; and

2. development consent(s) are granted for the carrying out of development in accordance with the Concept Master Plan and in particular consents have been granted that will enable the development to achieve the height and maximum FSR controls provided in the Concept Master Plan; and

3. Calardu seeks to implement the development consent(s).

Calardu is prepared to pay any section 94 of 94A contributions that will apply, in addition to the monetary contribution. However, the monetary contribution is to be offset by any works in kind including, but not limited to roads and open space provided by the development. That is, section 94(6) of the *Environmental Planning and Assessment Act 1979* will apply to any future proposed development on the Site.

The voluntary planning agreement will provide for the registration of the agreement on title and include an obligation on the Council to remove the agreement on title upon Calardu satisfying its obligations under the voluntary planning agreement. Flexibility is to be provided to allow for the staged removal of the voluntary planning agreement from a title within a stage once the contributions relevant to that stage have been paid by Calardu.

The voluntary planning agreement will provide that the Council is required to refund the monetary contributions to Calardu and release it from its obligations to pay the contribution if there is a successful third party challenge to the rezoning LEP.

It is proposed that the detailed terms of the offer will be provided to the Council if this initial offer is acceptable to the Council. Once those terms are settled we will prepare a draft of the voluntary planning agreement.

If you have questions in relation to this offer please telephone the undersigned.

Yours Faithfully,

John Hack-Smith

Calardu North Ryde No. 1 Pty Limited