CITY PLAN SERVICES

Planning Proposal

328-332 Annangrove Road
Rouse Hill NSW 2155

Submitted to The Hills Shire Council
On Behalf of ABAX Contracting

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Report Revision History

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01 Draft	24/10/17	**Francisco Medina** *Project Planner*	**Juliet Grant** *Executive Director*	**Juliet Grant** *Executive Director*
02 Revised Draft	1/11/17	**Francisco Medina** *Project Planner*	**Juliet Grant** *Executive Director*	**Juliet Grant** *Executive Director*
03 Final	3/11/17	**Francisco Medina** *Project Planner*	**Juliet Grant** *Executive Director*	**Juliet Grant** *Executive Director* 

This document is preliminary unless approved by a Director of City Plan Strategy & Development

CERTIFICATION
This report has been authorised by City Plan Strategy & Development, with input from a number of other expert consultants, on behalf of the Client. The accuracy of the information contained herein is to the best of our knowledge not false or misleading. The comments have been based upon information and facts that were correct at the time of writing this report.

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Appendix	Document	Prepared by
1	Combined Surveys	Leffler Simes Architects
2	Preliminary Ecological Assessment	Keystone Ecological
3	Traffic and Parking Assessment	Traffic Design Group
4	Economic Needs Assessment	Leyshon Consulting
5	Market Review and Tenant Possibilities	Deep End Services

Section A

1. Executive Summary

This Planning Proposal (PP) has been prepared on behalf of ABAX Contracting and relates to land known as 328-332 Annangrove Rd, Rouse Hill (the site).

This PP explains the intended effect of, and justification for, the proposed amendment to *The Hills Local Environmental Plan 2012* (THLEP 2012). It has been prepared in accordance with Section 55 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the relevant Department of Planning Guidelines including "A Guide to Preparing Local Environmental Plans and A Guide to Preparing Planning Proposals".

The site is within the Rouse Hill Urban Release Area and is currently vacant. At the time of writing, Development Application 172/2018/HC is under assessment by The Hills Shire Council for construction of a two-storey commercial / industrial development with at grade and basement car parking. The development as proposed will consist of light industry tenancies, offices, car sales display rooms and food and drink premises including a tavern.

This PP seeks to amend the planning controls applying to the site to support the provision of bulky goods premises. It is intended that the development complement the economic development of Rouse Hill Strategic Centre, as well as increasing employment opportunities stimulating further investment and expanding the range of retail services available to the rapidly growing local population. In addition, the intention to amalgamate the three existing lots provides the opportunity to address the local vegetation in a holistic way to achieve a more strategically beneficial biodiversity outcome.

Under the Hills LEP 2012, the site is currently zoned part 'B6 - Enterprise Corridor' and part Local Road Widening (SP2). Bulky goods premises are not a permissible use.

The proposed site-specific amendments to the Hills LEP respond to both the broad metropolitan strategic and detailed local planning framework. The objective of this PP is primarily to satisfy the current and projected demand for bulky goods in accordance with Rouse Hill's population growth and the region's changing demographics.

The PP identifies two potential pathways to achieve the desired outcome:

- Amending Schedule 1 - Additional Permitted Uses and the Additional Permitted Uses Map (Sheet APU_006) to include bulky goods premises;

or

- Amending the Land Zoning Map (Sheet LZN_006) from the existing B6 Enterprise Corridor to B5 Business Development Zone.

Further discussions with The Hills Shire Council will occur as part of this rezoning process to determine the most appropriate option.

In conclusion, this PP provides a detailed justification for the proposed amendments and demonstrates compliance with the strategic framework at a metropolitan, district and local level. Together with the traffic, ecological and economic reports supporting this PP, there is clear evidence to demonstrate the proposal to introduce bulky goods premises as a permissible use on the subject site will offer economic and social benefits to the community of Rouse Hill and is worthy of Council's support to proceed to the Department of Environment and Planning for a Gateway Determination.

2. The Site

2.1 Site Context

The subject site is located in the suburb of Rouse Hill within The Hills Local Government Area (LGA), approximately 45km north-west of the Sydney CBD. The site sits on the fringe of the Norwest Growth Centre, an area experiencing significant growth and change. The site is in close proximity to other release areas, including Box Hill and North Kellyville. The site is well connected to several major centres via the regional road network as seen in **Figure 1**. The site's context is illustrated in **Figure 2**.

Figure 1: Regional Context - Centres Structure Plan, subject site identified with a purple star (Source: Local Strategy, The Hills Shire Council)

Figure 2: Regional Context - Site Location (Source: The Hills IntraMaps)

2.2 Site Location and Description

The site is currently vacant and was previously used as farmland. The land has a gradual slope from north-west to south-east. A 1.2m high galvanized chain wire fence surrounds the property with a double gate providing vehicular access for mowing and maintenance.

The site consists of three (3) separate allotments located at the corner of Annangrove and Withers Roads, as described in **Table 1**. The site comprises roughly rectangular shaped allotments tapering toward the Annangrove Road frontage. The site has a total area of 60,683 sqm, with remanent bush land adjacent to the north-eastern and south-eastern boundaries. The site has an informal vehicular entry point though Withers Road.

A Survey has been undertaken and is provided at **Appendix 1**.

Table 1: Location and Description

Site Address	Legal Description
328 Annangrove Road	Lot 34 DP 834050
330 Annangrove Road	Lot 12 DP 833069
332 Annangrove Road	Lot 13 DP 833069

A detailed aerial view of the site is shown in **Figure 3**.

Figure 3: Aerial view, subject site outlined in red and shaded yellow (Source: SixMaps)

2.3 Surrounding Environment

The site sits within an area identified as a future Enterprise Corridor, which extends approximately 2km north-east along Annangrove Road. A portion of the north-western edge of the site is identified for future road widening to increase the capacity of Annangrove Road, which is designated as a sub-arterial road.

The land opposite Annangrove Road to the north-west is part of the Box Hill Industrial Precinct. Within this precinct, the lots fronting Annangrove Road are also identified as future Enterprise Corridor.

Second Ponds Creek lies to the rear of the subject site. The Creek is zoned SP2 Infrastructure – Stormwater Management. Across the Creek, the Rouse Hill Waste Water Treatment Plant is located approximately 330 metres to the northeast of the site.

Table 2: Surrounding Land Uses

North	To the north of the site there are several vacant commercially zoned lots. The Rouse Hill Pre-School Kindergarten and two commercial premises, such as a hydro shop and civil engineering facilities, are located at the north-east from the subject site, within 400 metres distance.
South	In close proximity to the south-west, there are a number of commercial facilities including the Rider Training Centre, the Australian Tap House Bar, the Australian Hotel and Brewery, and Bunnings.
East	To the east of the site there are large lots zoned for light industrial uses adjacent to Second Ponds Creek, along the south-east boundary. The Rouse Hill Waste Water Treatment Plant is located approximately 330 metres to the north-east of the site. The Rouse Hill Rural Fire Brigade and The Hills United Soccer Club are located at the south-east side of the subject site.
West	The western surroundings include a private property located across Annangrove Road, within approximately 25 metres distance from the subject site. The Box Hill Industrial area extends beyond that point to the north-west.

The adjacent and surrounding development consists of hobby farms and vacant land as seen in **Figures 4-13**:

Figure 4: Front view of 332 Annangrove Road (the site)

Figure 5: Front view of 330 Annangrove Road (the site)

Figure 6: North-east view of the site from the cnr of Annangrove Rd and Withers Rd

Figure 7: South-west view of the site from 328 Annangrove Rd

Figure 8: Private property fronting 332 Annangrove Rd at the north-west side

Figure 9: Adjacent land to the north-east of the subject site

Figure 10: North-west view from the cnr of Annangrove Rd and Withers Rd

Figure 11: View of the land fronting 328 & 330 Annangrove Rd

Figure 12: North-east view on Annangrove Rd

Figure 13: South-east view on Withers Rd

2.4 Natural Environment

2.4.1 Biodiversity of the Site and Surrounds

The subject site lies in the Sydney Basin Bioregion in the Hawkesbury-Nepean Catchment. The land comprising three adjoining allotments occupies a total area of 6.12 hectares. It is situated on a relatively flat parcel of land on a broad upper slope at 45m ASL. The closest formal conservation reserve is Scheyville National Park, 6km to the north.

Immediately to the rear of the lots is a corridor of reserved vegetation along Second Ponds Creek that is part of Sydney Water's Trunk Drainage Line for this area. The local area is partially within the North West Growth Centre and Council's urban growth lands; thus, surrounding land uses are rapidly changing from rural activities to industrial and residential.

The subject site has been highly modified in previous occasions, with a long history of clearing and rural land uses. The site is floristically and structurally simple as a result of its land use history. More than half of the site is made up of cleared exotic grassland, gardens and weed infestations. The native vegetation is generally young regrowth and dominated by serious weeds.

The native vegetation is representative of two state-listed Critically Endangered Communities (Cumberland Plain Woodland and Shale Sandstone Transition Forest), and an endangered ecological community (River-flat Eucalypt Forest). The vegetation patches are probably too disturbed and isolated to represent the equivalent Commonwealth entities.

The subject site is mapped as containing “Biodiversity Values” as shown in **Figures 14** and **15**. The new state legislative landscape prescribed by *the Biodiversity Conservation Act 2016* requires the ecological impact of such a proposal to be addressed by the use of the Biodiversity Assessment Method (BAM). This dictates that after a development footprint has been designed to avoid and minimise impacts, then residual unavoidable impacts must be offset.

A Preliminary Ecological Assessment has been prepared by Keystone Ecological and is provided in **Appendix 2**.

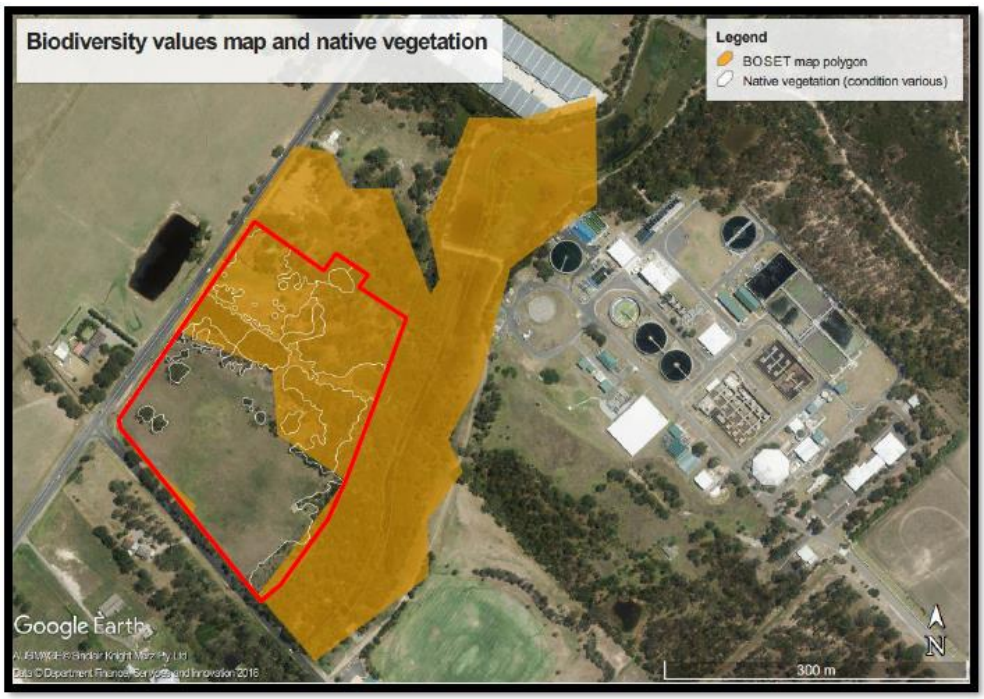


Figure 14: Biodiversity Values Map, subject site outlined in red (Source: Keystone Ecological)

Figure 15: Native Vegetation Map, subject site outlined in red (Source: Keystone Ecological)

2.4.2 Legislative Requirements

The criteria used to assess likely impacts upon threatened species, populations or endangered ecological communities varies between the Commonwealth and State jurisdictions.

a) Commonwealth

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is a nationally applicable Act that is administered by the Department of the Environment. This Act requires approval for actions that are likely to have a significant impact on matters of National Environmental Significance (NES).

There are seven matters of NES that are triggers for Commonwealth assessment and approval. These are:

1. World Heritage properties;
2. National Heritage places;
3. Ramsar wetlands of international importance;
4. Nationally threatened species and communities;
5. Migratory species;
6. Nuclear actions; and
7. Commonwealth marine environment.

Threatened species and ecological communities are listed under Part 13, Division 1, Subdivision A of the EPBC Act. Migratory species are listed under Part 13, Division 2, Subdivision A of the Act

b) New South Wales

The site is zoned B6 Enterprise Corridor and SP2 Infrastructure and is excluded from lands affected by the Local Land Services Act 2013. Therefore, the impacts of clearing of native vegetation will need to be addressed in accordance with the provisions of the *Biodiversity Conservation Act* (the BC Act) 2016 and *Biodiversity Conservation Regulation 2017*.

Under this new legislation, the type of ecological impact assessment, reporting and necessity for offsetting biodiversity impacts is determined by the application of a series of threshold questions. To that end:

- the first major trigger for an assessment in line with the Biodiversity Assessment Method (BAM) is whether the site is mapped as containing “Biodiversity Values”. This mapping is available at https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap, and if areas mapped as sensitive biodiversity are impacted by a proposed development, then a Biodiversity Development Assessment Report (BDAR) is to be prepared in accordance with the BAM, and undertaken by an Accredited Assessor; or
- the second major trigger for a BAM is the scale of clearing to be undertaken. A sliding scale is applied that is based on the minimum lot size for the applicable zoning against the area of clearing; and
- a subset of BAM assessments may be assessed via a ‘streamlined’ method, according to another sliding scale. The ‘streamlined’ assessment process has identical survey and analytical methodology to a full BAM, but has a somewhat simplified reporting requirement.

As shown in **Figures 14** and **15** above, the subject lots are all affected by this layer and therefore a BAM is required.

2.4.3 Impact, Amelioration and Offsetting

As the proposal is at a concept stage, there is some degree of flexibility in the design, including the scale of the development and the built form configuration. The proposed area for retention and revegetation of bushland Includes approximately 5,000sqm located at the rear of the site.

Such a configuration will deliver a superior conservation outcome, being contiguous with the substantial area of retained bushland in the riparian corridor associated with Second Ponds Creek. The proposal provides an opportunity to enrich the habitat for hollow-dependant species by the installation of more nest boxes and salvaged hollows. Other important fauna habitat features may also be enhanced, such as the placement of coarse woody debris.

The site has a minimum lot size of 4,000sqm and clearing of a total of 1.93ha of native vegetation is likely to be cleared as a result of future development. Any future development will need to demonstrate how any future building footprint has avoided and minimised impact. Unavoidable impacts may be offset using the Biodiversity Offset Tool within the BAM.

A hypothetical preliminary calculation determined that the design concept would ultimately require the offsetting of 35 ecosystem credits (for Plant Community Types 849 and 835), and 33 species credits (for Pteropus poliocephalus Grey-headed Flying-fox).

Detailed calculation will be undertaken in further ecological assessment and an offset package can be been determined and agreed to. There will be an opportunity to purchase the necessary credits or pay the Biodiversity Conservation Trust to source suitable credits. Such credits have been readily traded in the past.

It is therefore concluded that the proposed development can be facilitated by the application of the BAM. A detailed survey of the flora and fauna of the subject lots in accordance with the BAM is recommended in further ecological assessment. Mitigation of impact may also be provided by landscaping with species that occur naturally in the vegetation communities to be impacted, as well with the implementation of a Tree Protection Control.

2.5 Road Network

The site is located at the intersection of two sub-arterial roads, providing excellent road connectivity.

A Traffic and Parking Assessment has been prepared by Traffic Design Group and is provided in **Appendix 3**.

The assessment concluded that the potential traffic impacts generated by the introduction of an additional permitted land use (bulky goods) can be appropriately accommodated and are considered acceptable. Further detail is provided in **Table 3** below:

Table 3: Traffic and Parking Assessment

Development Access	The proposed access location is on Annangrove Road (left in and left out access) and Withers Road. A separate heavy vehicle access will be located adjacent the proposed car park access on Withers Road. The proposed access location is considered acceptable for the development (see **Figure 16**).
Car Parking	The proposed car parking supply for the site will be consistent with Council parking requirements. The proposed car parking layout will be designed to comply with Australian Standards and Council Development Control Plan requirements.
Traffic Impact	Assessment of the proposed development indicates that the development will not have a significant impact on the road network with the provisions of traffic signals at the intersections of Annangrove Road, The Water Lane and Withers Road.

Figure 16: Proposed Access Locations (Source: TDG Australia)

Based on the Traffic and Parking Assessment it is considered there no traffic engineering reason why approval should not be granted to progress this PP. It is anticipated that consultation with the RMS would be required as a condition of the Gateway Determination.

2.6 Public Transport Accessibility and Connectivity

Currently, the nearest train station to the subject site is Riverstone, located approximately 7km to the south-west (see **Figure 17** below). The new Rouse Hill station will service the Rouse Hill Town Centre, supporting the growing retail and entertainment precincts within the area. The new station will be located approximately 1.5km from the subject site and will extend above the existing T-way on the elevated skytrain route. The estimated travel time to Martin Place Station in the Sydney CBD (from 2024) will be 46 minutes. **Figures 18** and **19** illustrate the location and concept of the Rouse Hill metro station.

Figure 17: Current Train Network, Riverstone (closest train station) outlined in red and Rouse Hill Metro Station (under construction) outlined in blue (Source: Sydney Trains)

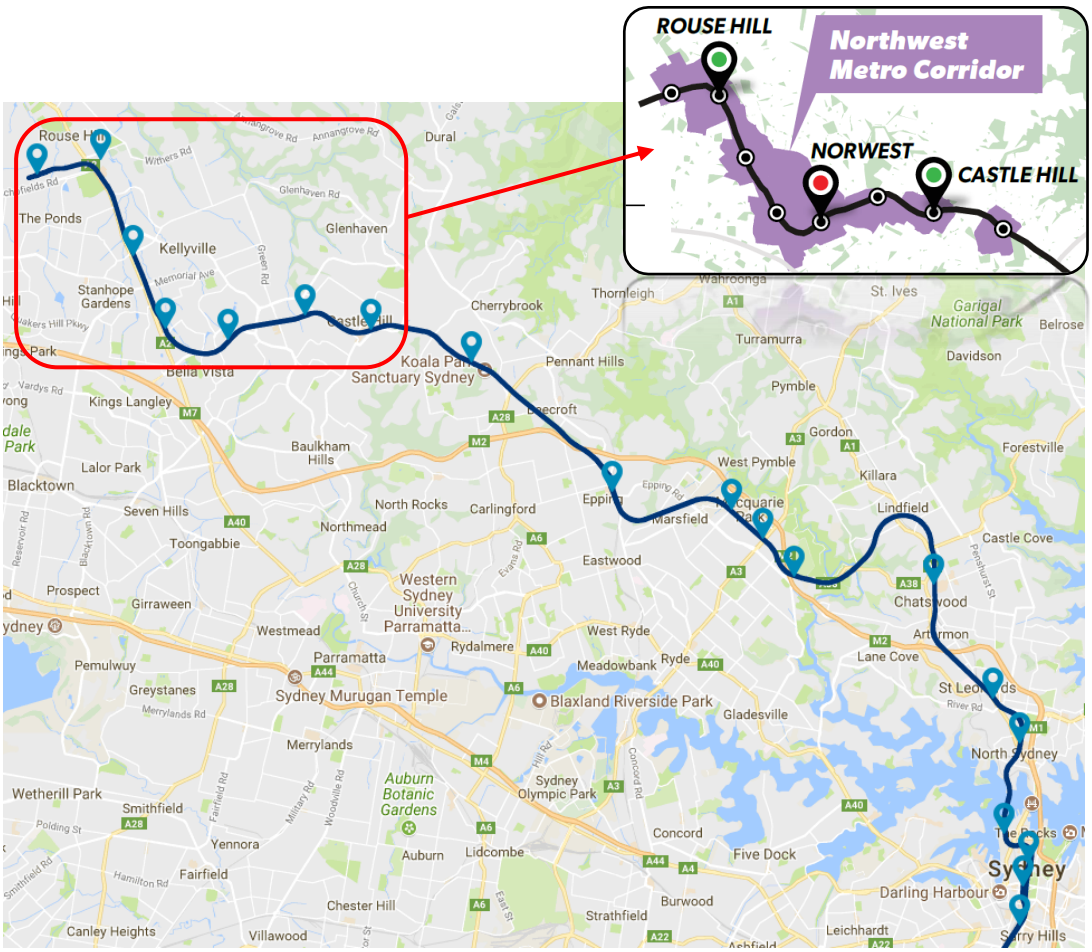


Figure 18: Sydney Metro Northwest Map. Location of Rouse Hill Metro Station outlined in red (Source: Sydney Metro)

Figure 19: Artist's impressions of Rouse Hill Metro Station (Source: Sydney Metro)

The site is connected to the (current and future) rail network by regular bus services. Bus stops are located fronting the site along Annangrove Road and Windsor Road. These bus routes include:

- Route 641 - Rouse Hill Town Centre to Dural;
- Route 608 - Windsor to Rouse Hill; and
- Route 746 – Riverstone to Box Hill and Rouse Hill.

These bus routes connect to the wider bus network (see **Figure 20**) which includes bus routes 661 (Riverstone to Windsor via McGraths Hill and Vineyard), 662 (Oakville and Maraylya to Riverstone) and T75 (Riverstone and Rouse Hill to Blacktown).

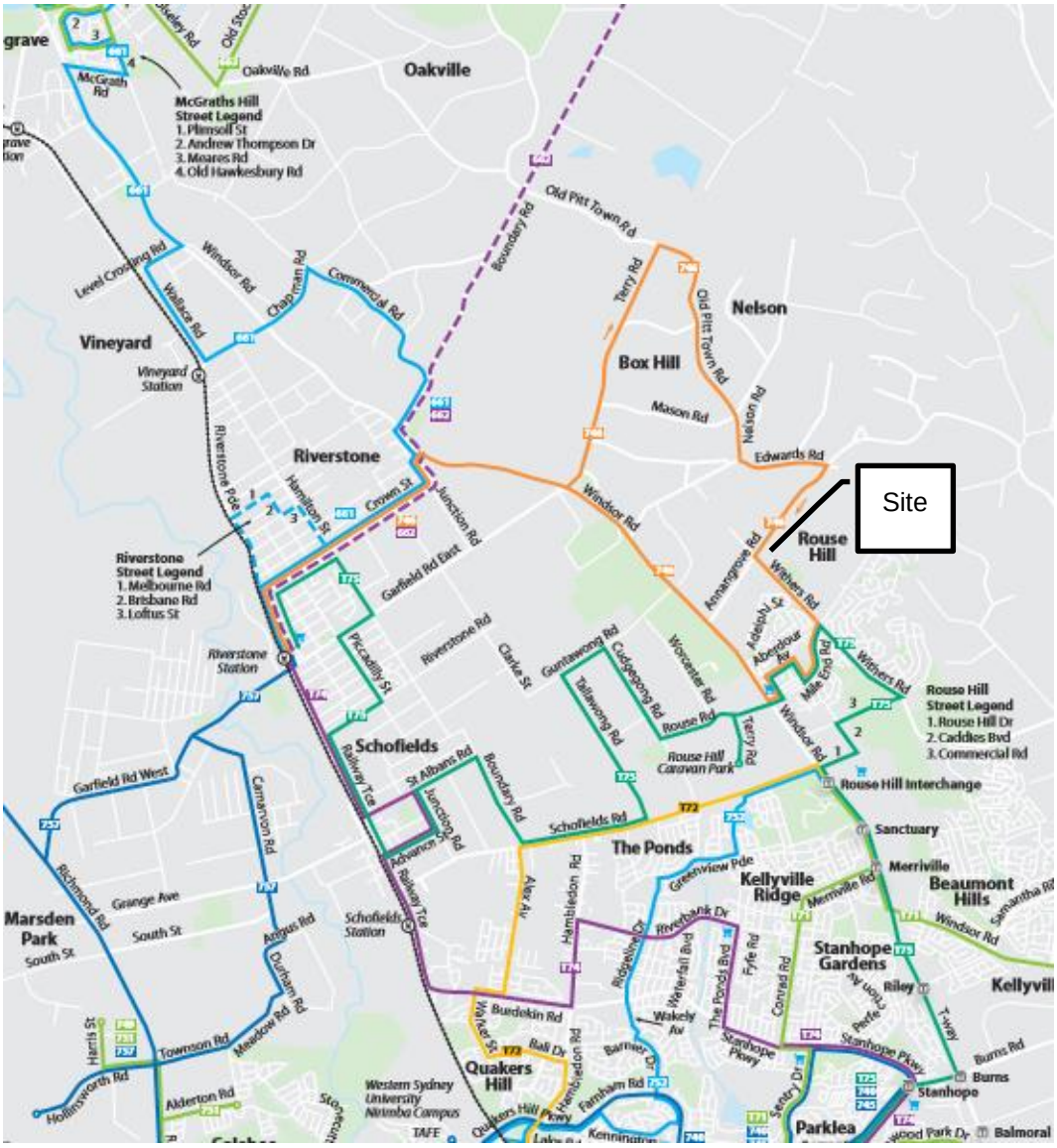


Figure 20: Existing Bus Network (Source: Busways)

The site is accessible via the local and regional cycle network, which includes a dedicated cycling lane along Annangrove Rd (terminating at the intersection of Annangrove and Edwards Roads) and a bicycle-friendly road at the intersection of Windsor Rd. This cycling network connects to the wider route to Rouse Hill Town Centre, as seen in **Figure 21**:

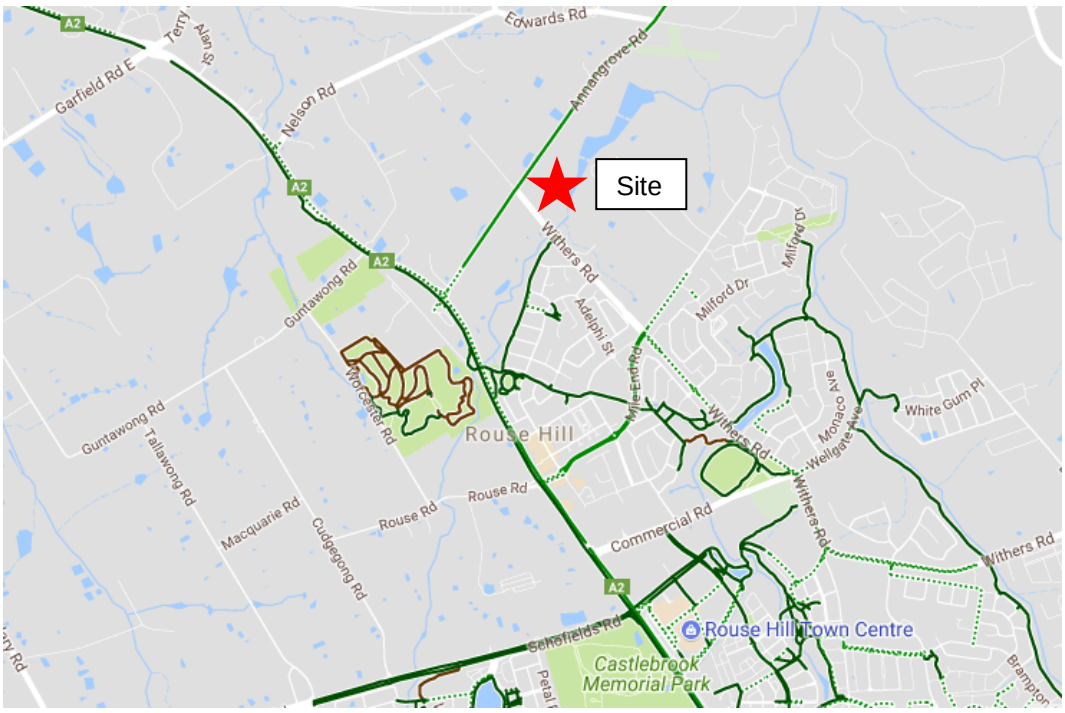


Figure 21: Existing cycle network (Source: Sydney Cycleways)

2.7 Current Development Controls

The THLEP 2012 has the following relevant planning controls applicable to this site:

2.7.1 Zoning

The site is currently zoned as B6 Enterprise Corridor and SP2 Infrastructure - Local Road Widening as seen in **Figure 22**:

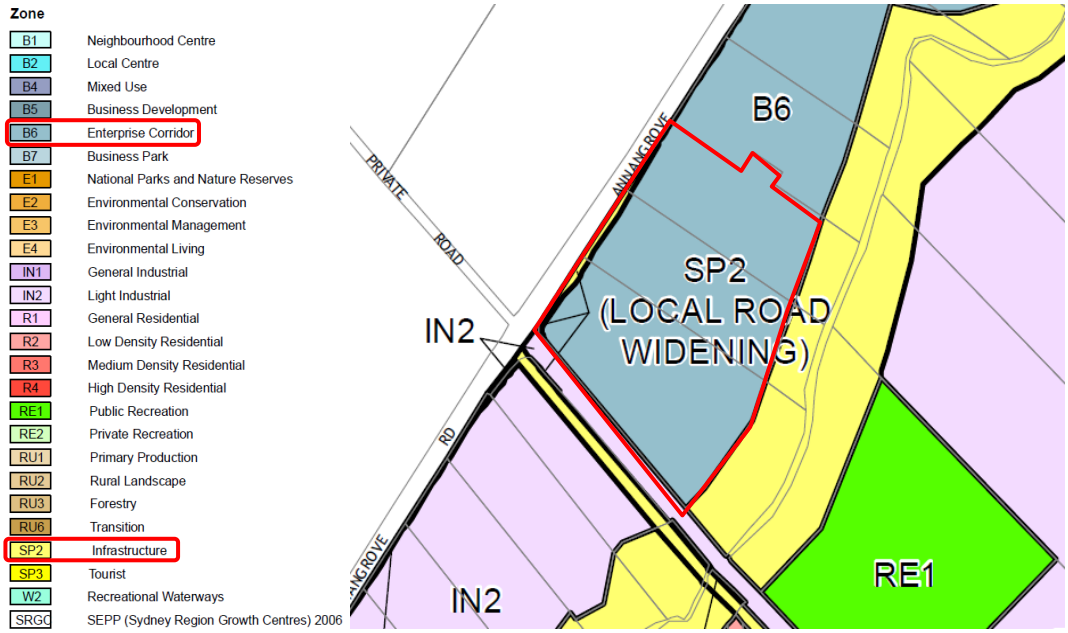


Figure 22: Extract of THLEP Zoning Map, subject site outlined in red (Source: NSW Legislation)

Table 4 identifies the land use table associated with the B6 Enterprise corridor zone under the THLEP 2012. Bulky goods premises are not a permissible use.

Table 4: Zone B6 Enterprise Corridor (Source: THLEP 2012)

Zone B6 Enterprise Corridor	
1. Objectives of the zone	▪ To promote businesses along main roads and to encourage a mix of compatible uses. ▪ To provide a range of employment uses (including business, office, retail and light industrial uses). ▪ To maintain the economic strength of centres by limiting retailing activity.
2. Permitted without consent	▪ Nil.
3. Permitted with consent	▪ Building identification signs; Business identification signs; Business premises; Community facilities; Food and drink premises; Garden centres; Hardware and building supplies; Hotel or motel accommodation; Landscaping material supplies; Light industries; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Roads; Self-storage units; Serviced apartments; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4.
4. Prohibited	▪ Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Entertainment facilities; Environmental facilities; Exhibition homes; Exhibition villages; Farm buildings; Forestry; Freight transport facilities; Function centres; Heavy industrial storage establishments; Helipads; Highway service centres; Home-based child care; Home businesses; Home occupations; Home occupations (sex services); Industrial training facilities; Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Recreation facilities (major); Research stations; Residential accommodation; Resource recovery facilities; Restricted premises; Rural industries; Sewerage systems; Sex services premises; Signage; Storage premises; Tourist and visitor accommodation; Transport depots; Waste disposal facilities; Water recreation structures; Water supply systems; Wharf or boating facilities.

2.7.2 Height of Buildings

The site is subject to a maximum building height of 16 meters as seen in **Figure 23**:

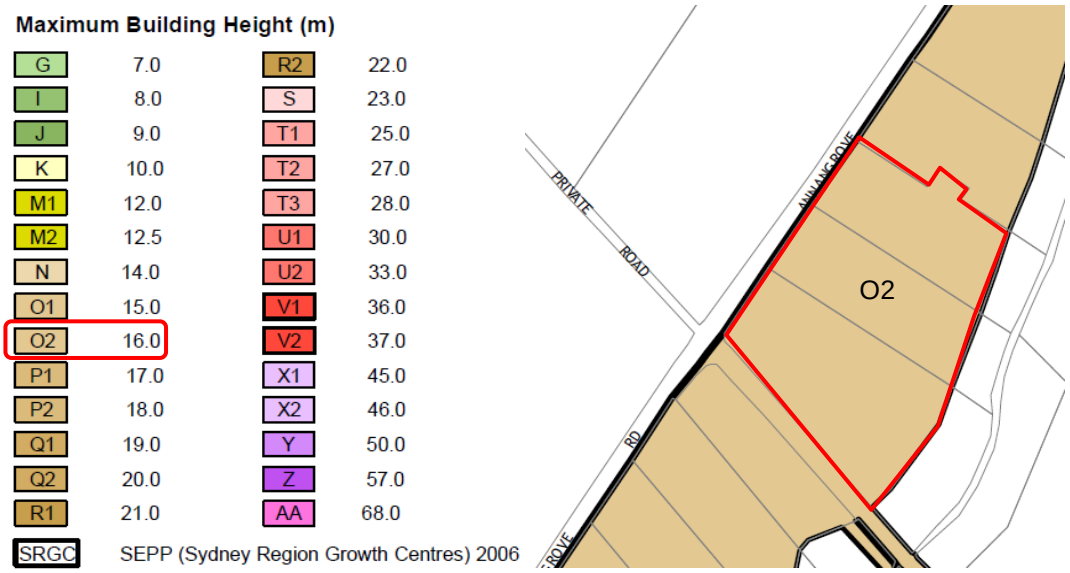


Figure 23: Extract of THLEP Height of Buildings Map, subject site outlined in red (Source: NSW Legislation)

2.7.3 Floor Space Ratio

The site currently has a maximum FSR standard of 1:1 as seen in **Figure 24**:

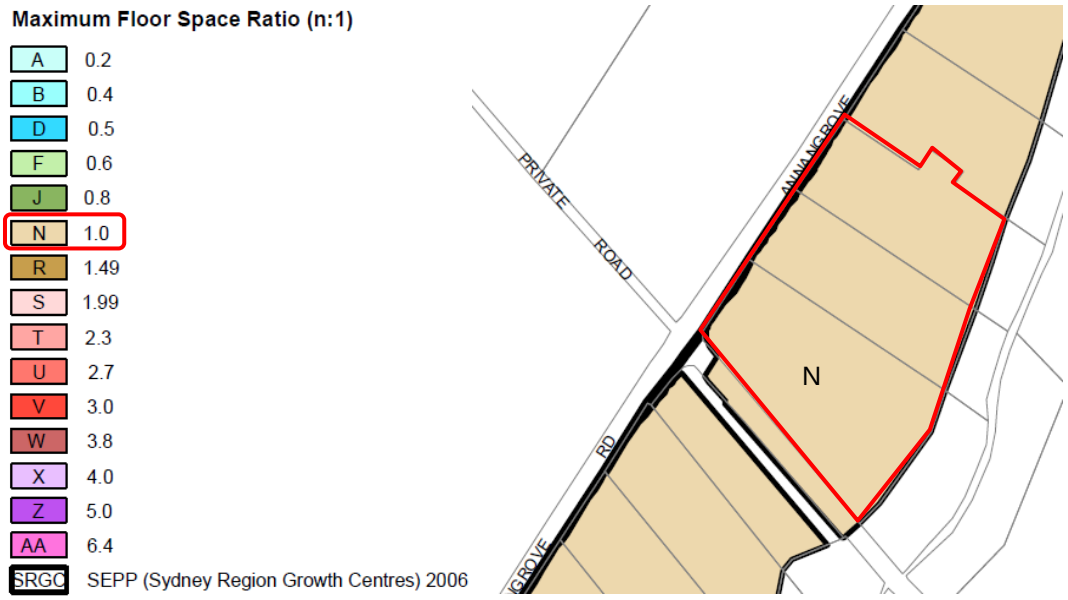


Figure 24: Extract of THLEP FSR Map, subject site outlined in red (Source: NSW Legislation)

2.7.4 Land Reservation Acquisition

Annangrove Road fronting the site is subject to Local Road Widening (SP2) as seen in **Figure 25**:

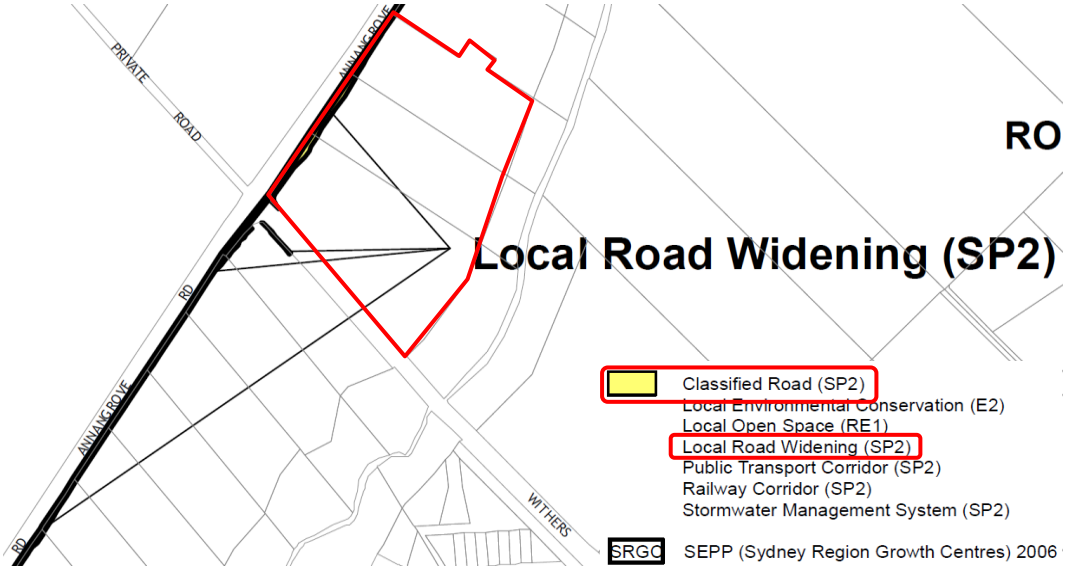


Figure 25: Extract of THLEP Land Reservation Acquisition Map, subject site outlined in red (Source: NSW Legislation)

2.7.5 Urban Release Area

The site sits within an Urban Release Area as seen in **Figure 26:**

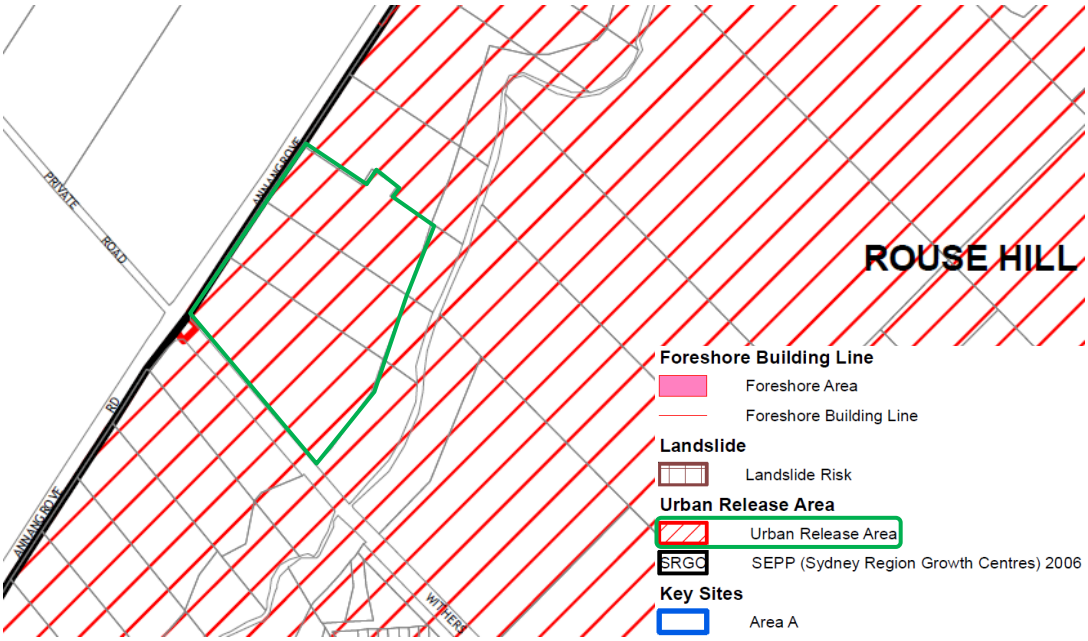


Figure 26: Extract of THLEP Urban Release Area Map, site outlined in green (Source: NSW Legislation)

3. Project Rationale

The rationale underpinning this PP is based on the interrelationship between increasing population growth and demand in the region, static supply of land zoned for bulky good premises, limited alternative options and the beneficial site-specific characteristics. Each of these elements are described in the following sections.

3.1 Increasing Demand

In 2016 the DP&E projected that The Hills LGA will have a population of 256,900 by 2031. That is 122% more residents than predicted by the Australian Bureau of Statistics in 2008 when local planning strategies were adopted by Council.

Population growth of this magnitude will give rise to a substantial demand for a wide range of additional services that are not currently planned for, including bulky goods premises.

3.2 Static Supply

In 2008, Hill PDA's retail analysis estimated that an additional 81,000m² of bulky goods space will be required by 2031. Since this time, no publicly available studies have examined the additional retail floorspace demand generated in the North-West Priority Growth Area as a whole. Individual studies have been undertaken with respect to certain parts of the overall growth area, as detailed below:

- **Box Hill**: In 2011, Hill PDA prepared the *Box Hill Retail and Employment Study*. The indicative Layout Plan subsequently approved by the DP&E, did not make any provision for land zoned B5 Business Development which is typically used to accommodate bulky goods-type retailing.
- **Vineyard Stage I**: SGS prepared an *Economic and Employment Report for Vineyard Stage I* for the DP&E. SGS did not make any recommendations concerning the provision of land or floorspace to meet the demand for bulky goods in the Vineyard Stage I release area.
- **Marsden Park**: A significant component of this land has already been developed and is occupied by retailers including Bunnings, Costco, IKEA, a former Woolworths Masters building and an integrated bulky goods centre, known as Home Hub Marsden Park. The vacant or under-utilised sites on the northern side of Richmond Rd are relatively small to accommodate major integrated bulky-type developments.

An Economic Needs Assessment has been prepared by Leyshon Consulting to support this PP and is provided in **Appendix 4.**

This analysis shows that the largest concentration of bulky goods floorspace in the region surrounding Rouse Hill is located in the Castle Hill industrial area. Demand assessment for Rouse Hill indicated that the total available trade area annual bulky goods expenditure is forecast to increase from $782.3 million in 2016 to $1,622.1 million in 2036. It is expected that online spending will have a lesser impact in the bulky goods sector than it will for other sectors of retailing activity in Australia.

Bulky goods centres also contain non-bulky goods floorspace such as food-related tenancies, gymnasiums, automotive services, etc. A provision of at least 60,000m² of additional space ultimately will be required by 2036.

The characteristics of major existing bulky goods retail centres in the region are summarised in **Figure 27**.

Minimal additional bulky goods floorspace has been created in the district in recent times. We are aware Council has recently approved the redevelopment of the former Masters store at Rouse Hill to be used for bulky goods premises.

Planning approval also has been given for the development of land owned by the Sydney Parklands Trust at Eastern Creek for a major centre of some 52,800m² gross floor area (GFA) which could include a component of bulky goods premises.

TABLE 3.1
EXISTING MAJOR BULKY GOODS CENTRES and PRECINCTS – ROUSE HILL TRADE AREA, 2017

Centre/Type ...	Area (Sq.M.) (GLA)	Major Tenants
Castle Hill		
Home Hub	50,000	Harvey Norman, Domayne, JB Hi-Fi, Nick Scali, Officeworks, Freedom
Castle Hill Homemaker Centre	13,000	Fantastic Furniture, Rays Outdoors
Castle Hill – Other	15,000	Bunnings, Petbarn
Sub-Total	78,000	
McGraths Hill		
McGraths Hill Home	16,500	Bunnings, BCF, Harvey Norman
Marsden Park		
Home Hub	19,000	The Good guys, JB Hi-Fi, BCF, Snooze
IKEA	28,500	
Bunnings	13,700	
Costco	13,600	
Sub-Total	74,800	
Rouse Hill		
Various Locations	20,000	Bunnings, Rebel Sport, JB Hi-Fi, Hudsons
Sub-Total	20,000	
Total	189,300	

Sources: Macroplan Dimasi, 2017; Property Council of Australia, 2017; Vicinity Centre Website, 2017.

Figure 27: Existing bulky goods centres in Rouse Hill (Source: Leyshon Consulting)

3.3 Limited Alternatives

The Economic Needs Assessment (**Appendix 4**) has identified there are limited alternative sites options suitable to accommodate additional bulky goods premises in the district. In particular:

- **Castle Hill**: This precinct is no longer central to the main location of future population growth in the trade area in general and in The Hills LGA in particular.
- **Marsden Park**: The remaining sites which comprise the bulk of this land are relatively small, however, and thus would not be suitable for the development of another major bulky goods centre in addition to the existing development on the southern side of Richmond Road.
- **McGraths Hill:** This area is located to the west of the main focus of population settlement in the growth area. Therefore, it would be an inefficient location for future development to serve population growth in areas such as Box Hill, Riverstone, Kellyville North and the Cudgeong Road area.

- **Rouse Hill**: The extent of the projected growth is substantial enough that any large-scale bulky goods development undertaken on the site should be able to be introduced to the market without resulting in any unacceptable impact on the current trading levels and viability of existing bulky goods centres.

Moreover, by 2021 it is likely these existing bulky goods centres will be trading at above average levels due to lack of competition and strong annual growth in available spending in the surrounding catchment. Therefore, it is highly unlikely the proposed development would alter either the viability or long-term performance of any existing bulky goods centre/precinct in the region surrounding Rouse Hill.

3.4 Locational Benefits

The site provides an opportunity to address an already substantial and growing need for additional bulky goods floorspace in the Rouse Hill in an area which is currently designated for economic uses.

The site's location at the intersection of Annangrove and Withers Roads provides a high degree of accessibility and makes it an ideal location for bulky goods premises.

The site does not abut residential areas and therefore will not generate the potential for land-use conflict between a major bulky goods retail operation and the need to maintain a high standard of residential amenity.

4. Proposed Design Concept

4.1 Vision

The vision underpinning this PP is to provide a contemporary and attractive commercial space for bulky goods premises. This proposal represents a positive outcome by:

- Supporting economic development and growth in bulky good retiling to satisfy the needs of the current and future population; and
- Leveraging off the site's accessibility and locational advantages.

4.2 Constraints and Opportunities

The identification of constraints and opportunities relating to the site help to frame the planning principles that will guide future development.

In summary, these constraints include:

- The site contains some terrestrial biodiversity in need of further ecological assessment; and
- The current zoning does not specifically support the proposed land use for bulky goods premises.

The opportunities include:

- The site's location and physical characteristics can provide a large built form in a land that is currently unused;
- The site is strategically located in a road intersection, close to the Rouse Hill Town Centre and its supporting services;
- The site is highly accessible to vehicles and public transport, with access via Annangrove Road and Withers Road;
- As a consequence of the consolidation of three allotments, the site will beneficiate from the opportunity to offset the loss of vegetation as the land is already zoned for development; and
- The proposal can support Rouse Hill's commercial capacity and could potentially trigger future investment within the area.

Section B - Planning Proposals

5. Objectives and Intended Outcomes

5.1 Objectives of the Planning Proposal

The objective of this PP is to contribute to the economic functioning of the North West Priority Growth Area through the provision of additional bulky goods floorspace to satisfy the current and projected demand, without interfering with any existing bulky goods centres within the district.

5.2 Intended Development Outcome

The intended development outcomes are:

- Provision of modern and accessible commercial premises set within a landscaped setting that is compatible with the existing and future surrounding context; and
- A conceptual design for the future development of bulky good premises, including car parking spaces and supporting amenities.

The conceptual design will be integrated into the design development at Development Assessment stage.

Leffler Simes Architects has prepared the photomontages illustrating the design concept as seen in **Figures 28** and **29**.

Table 5: Potential Yield

Element	Provision
Site Area	60,683m²
GFA	59,071m²
FSR	1:1
Height	16m maximum
Parking	Approx. 1,570 spaces

Figure 28: Photomontage of the proposal seen from the cnr of Annangrove Rd and Withers Rd (Source: Leffler Simes Architects)

Figure 29: Aerial photomontage from the cnr of Annangrove Rd and Withers Rd (Source: Leffler Simes Architects)

6. Explanation of the Provisions

This PP seeks to amend the THLEP 2012 to permit bulky goods premises on the subject site. This could be achieved by:

- Amending **Schedule 1 - Additional Permitted Uses** and the **Additional Permitted Uses Map** (Sheet APU_006) to include bulky goods premises;

or

- Amending the **Land Zoning Map** (Sheet LZN_006) from the existing B6 Enterprise Corridor to B5 Business Development Zone.

Further discussion will be undertaken with Council during the course of the PP to determine the most appropriate pathway. Each of these alternatives is discussed in the following sections.

6.1 Schedule 1 - Additional Permitted Uses

One option to achieve the desire outcome of this PP is to amend the Schedule 1 - Additional Permitted Uses and the Additional Permitted Uses Map (Sheet APU_006) (see **Figure 30**) to include bulky goods premises:

> *E.g.*
>
> *Use of certain land at 328-332 Annangrove Road, Rouse Hill*
>
> *(1) This clause applies to land at 328-332 Annangrove Road, Rouse Hill, comprising Lot 34, DP 834050 and Lots 12 and 13, DP 833069, shown as "Item X" on the Additional Permitted Uses Map.*
>
> *(2) Development for the purposes of "bulky goods premises" is permitted with development consent.*

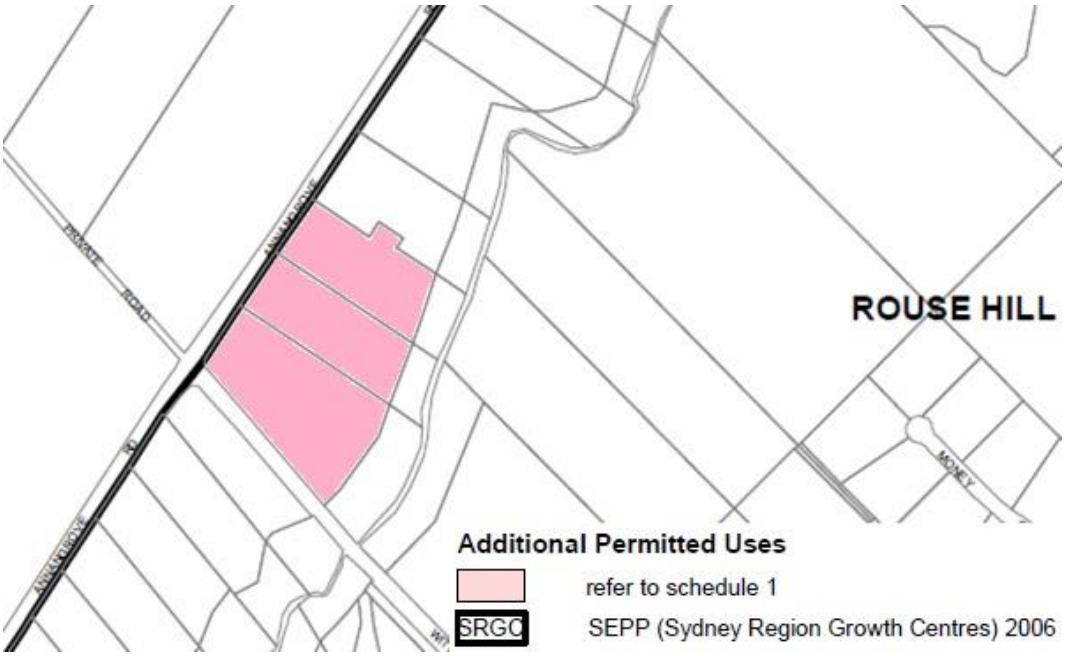


Figure 30: Proposed Additional Permitted Uses Map under THLEP, subject site shaded in pink

6.2 Amend Land Zoning Map

The second option is to be rezone the site from B6 Enterprise Corridor to B5 Business Development by amending the land zoning map (Sheet LZN_006) as shown in **Figure 31**:

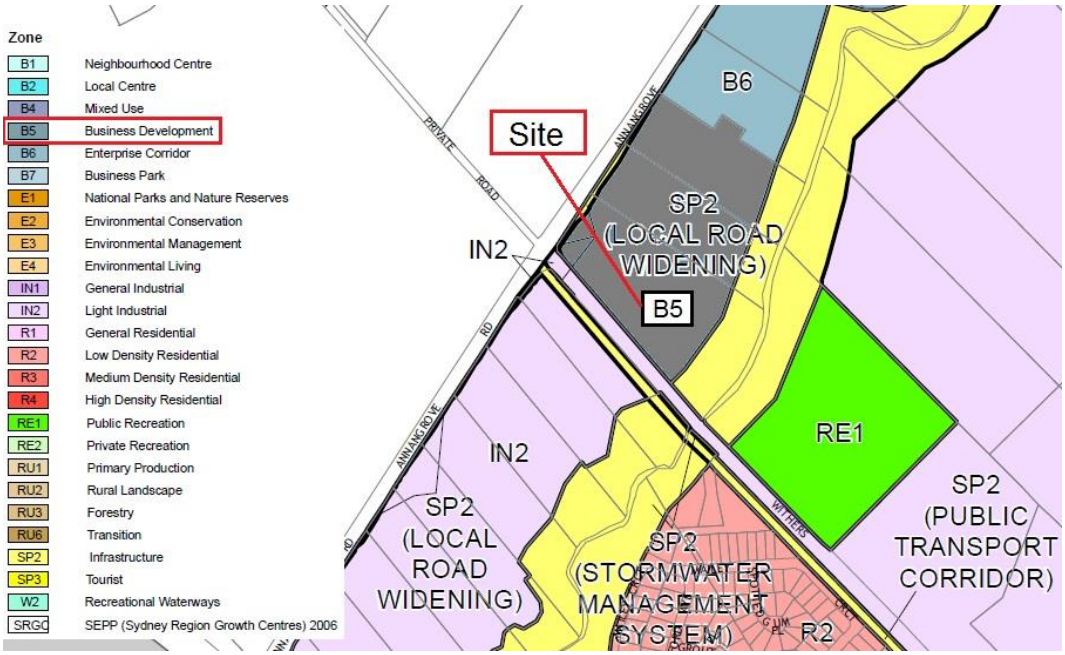


Figure 31: Proposed Land Zoning Map under THLEP, subject site shaded in dark grey

7. Justification

7.1 Need for a Planning Proposal

7.1.1 Is the PP a result of any strategic study or report?

This PP has arisen from an increasing awareness of the need for additional bulky good premises to support growth in Rouse Hill and the North West Priority Growth Area more broadly.

A detailed Economic Needs Assessment has been undertaken by Leyshon Consulting (**Appendix 4**) to examine this thesis. To further this analysis, a review of the Market and Tenant Possibilities was prepared by Deep End Services (**Appendix 5**).

7.1.2 Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The existing permissibility under zone B6 Enterprise Corridor prevents the intended development outcome from being realised. Therefore, a PP is the most appropriate legal mechanism to adjust these controls.

7.2 Relationship to Strategic Planning Framework

7.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable region or sub regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

Draft Greater Sydney Region Plan

The *Draft Greater Sydney Region Plan* was released in October 2017 and is the first Region Plan by the Greater Sydney Commission. Once adopted, this Plan will replace *A Plan for Growing Sydney*.

The draft Plan encompasses a global metropolis of three cities – the Western Parkland City, the Central River City and the Eastern Harbour City (see **Figure 32**). It is envisioned that people of Greater Sydney will live within 30 minutes of their jobs, education and health facilities, services and great places.

Consistency with the relevant parts of the *Draft Greater Sydney Region Plan* is outlined in **Table 6**:

Table 6: Consistency with the *Draft Greater Sydney Region Plan*

Direction	Response
Employment growth	The proposal provides employment opportunities for residents in the growth areas of the Central River City. This will rebalance opportunities for local residents to have greater access to jobs, shops and services.
Strategic centres	This planning proposal has potential to attract investment and business activity within the Rouse Hill Strategic Centre, improving the attractiveness of the centres as a place to live and work.
A well-connected city	The site is well connected to the road network and bus services due to its proximity to the Rouse Hill Town Centre. The site's accessibility and connectivity will be increased and improved by the Sydney Metro Northwest project.

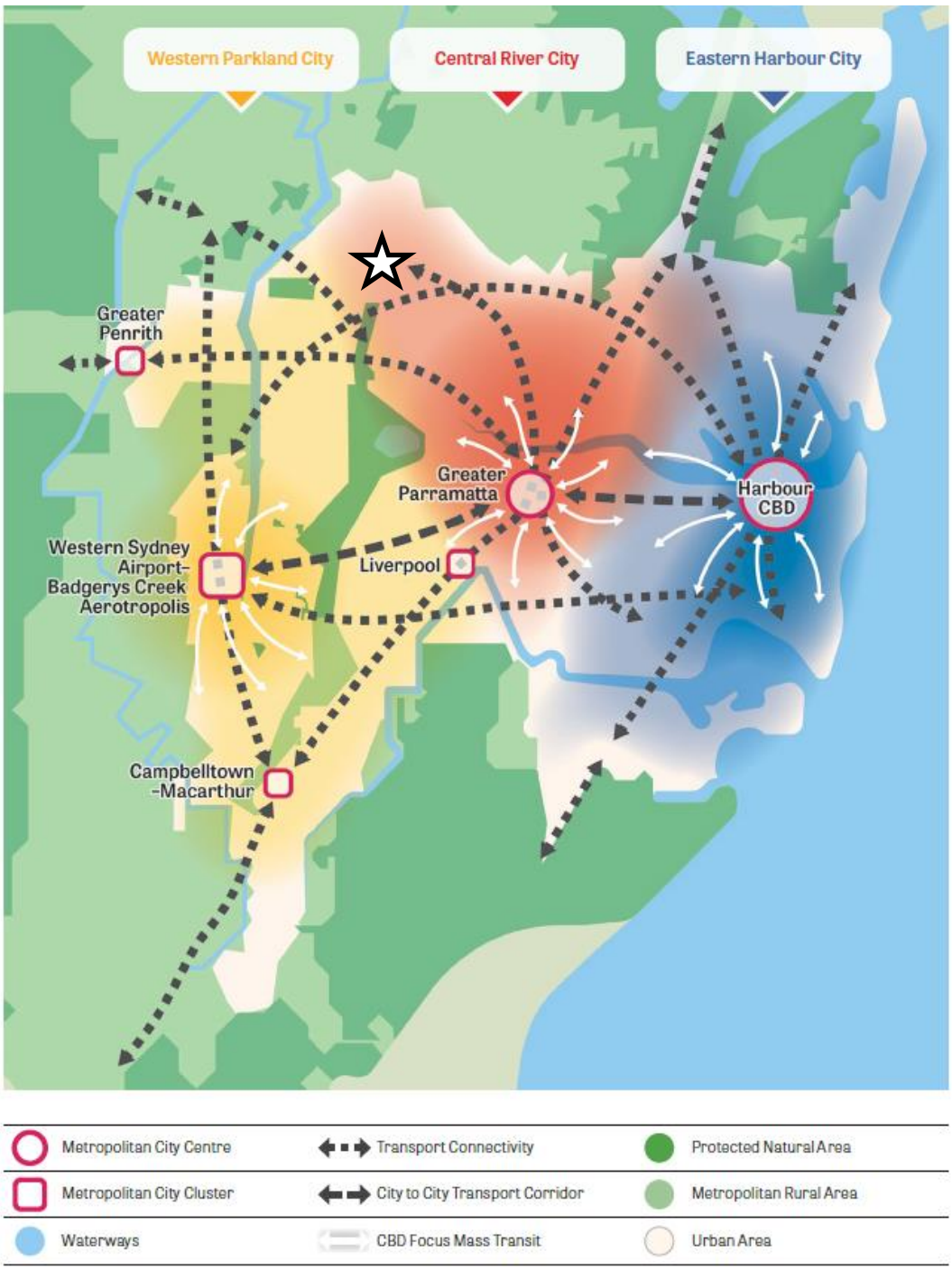


Figure 32: 'A Metropolis of Three Cities', subject site identified with a star (Source: Draft Greater Sydney Region Plan)

A Plan for Growing Sydney

A Plan for Growing Sydney was released in December 2014 and is the NSW Government's current 20-year plan for the Sydney metropolitan area. It provides direction for Sydney's productivity, environmental management, and liveability; and for the location of housing, employment, infrastructure and open space.

The site sits at the north-western end of the Global Economic Corridor, within an Urban Renewal Corridor and the Rail Network Extension under construction. The subject site is located between the Box Hill Growth Centre and the Norwest Priority Precinct. Under the *Plan*, Rouse Hill is considered as one Sydney's strategic centres (**Figure 33**).

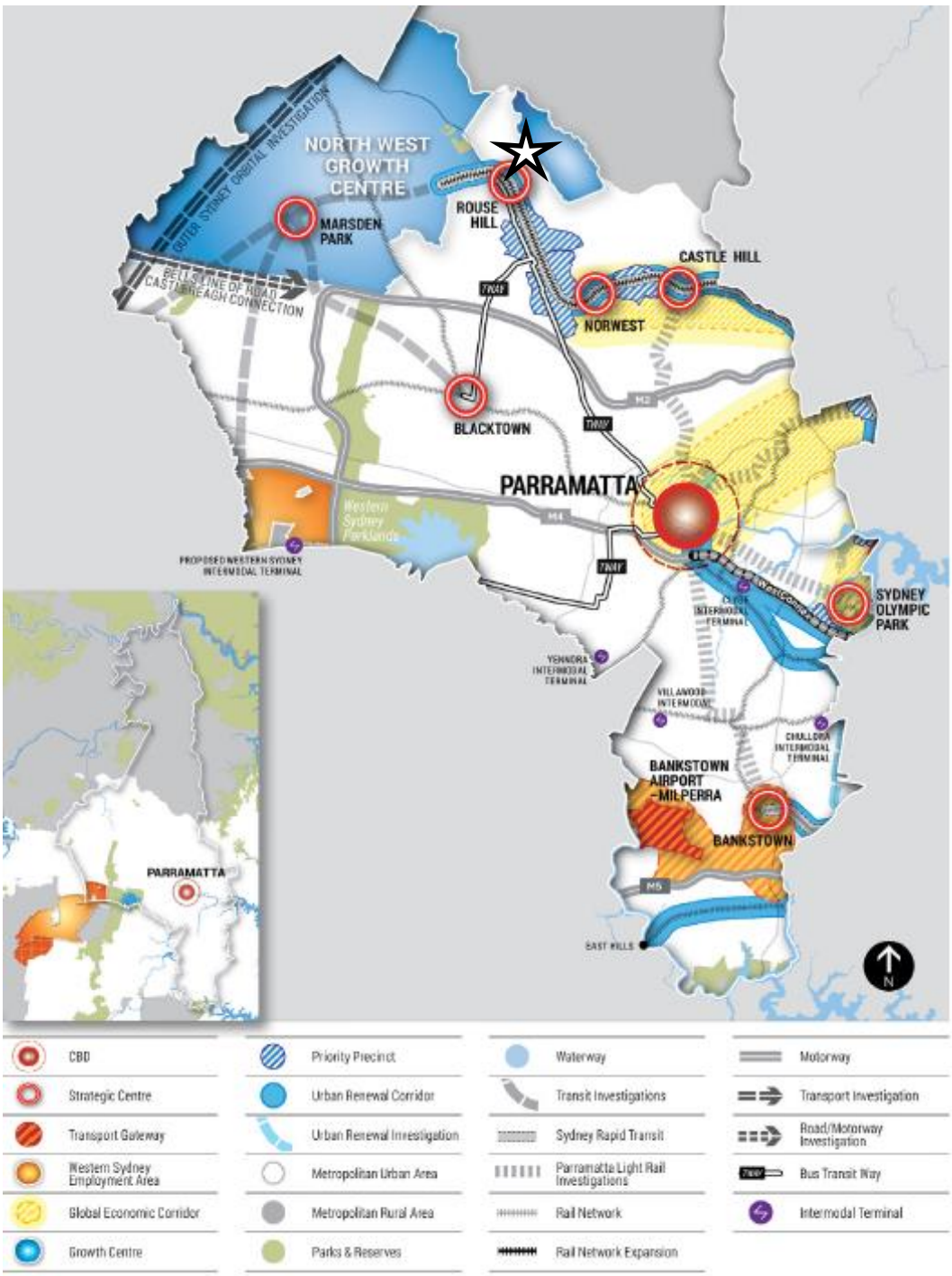


Figure 33: Extract from *A Plan for Growing Sydney*

Consistency with *A Plan for Growing Sydney* is outlined in **Table 7**.

Table 7: Consistency with *A Plan for Growing Sydney*

Direction	Response
Goal 1: A competitive economy with world-class services and transport	
Direction 1.4 Transform the productivity of Western Sydney through growth and investment	The proposal will contribute to the expansion of the economic role of Western Sydney's key centres. Significant population growth will occur in the North-West Centres, including Rouse Hill. It will be necessary to create a setting for jobs, infrastructure and services to meet the needs of current and future populations. The proposal will provide jobs close to centres and transport, improving the scale and mix of job opportunities, while it helps more local people to work close to home.
Direction 1.6 Expand the Global Economic Corridor	The site is located right outside the edge of the northwest side of the Global Economic Corridor. Given its proximity to other strategic centres within the Corridor, such as Castle Hill and Norwest, the proposal has the potential to support and enhance the expansion of economic activity. This will be achieved by providing additional bulky good premises that meet the current and projected demand, as well as it facilitates the viability of economic activity by growing jobs and commercial productivity.
Direction 1.7 Grow strategic centres - providing more jobs closer to home	The site is approximately 3km from Rouse Hill Town Centre. The proposal will unlock developable land to stimulate economic activity within the area. The proposal will contribute to the growth of Rouse Hill by: ▪ Increasing job opportunities close to where people live; ▪ Providing a range of services while improving accessibility; ▪ Expanding the centre's commercial capacity and attracting further investment.
Goal 3: Sydney's great places to live	
Direction 3.1 Revitalise existing suburbs	This planning proposal will improve the amenity and presentation of the streetscape by providing a high quality built form. It will provide accessible commercial premises to meet the demands of the local community. It will also provide improved public domain spaces, improving the locality's overall streetscape amenity.
Goal 4: Sydney's sustainable and resilient environment	
Direction 4.3 Manage the impacts of development on the environment	The proposal embraces a holistic approach with effective design and sustainable built forms. The proposed development and the surrounding design can potentially provide benefits such as reduced energy, waste minimisation, stormwater management and green/recreational spaces.

The goals and directions addressed above are supported by planning principles that will guide how Sydney grows. These principles include:

- Stronger economic development in strategic centres and transport gateways; and
- Connecting centres with a networked transport system.

This PP directly responds to and provides outcomes in accordance with the principles above.

Draft Central City District Plan

The *Draft Central City District Plan* has identified Rouse Hill as a "Strategic Centre" (refer to **Figure 34**) and provides a series of priorities and actions to guide development and accommodate the expected growth across the district.

This draft District Plan has been prepared to give effect to the draft Greater Sydney Region Plan. Consistency with the plan's planning priorities, objectives and actions is demonstrated in **Table 8**.

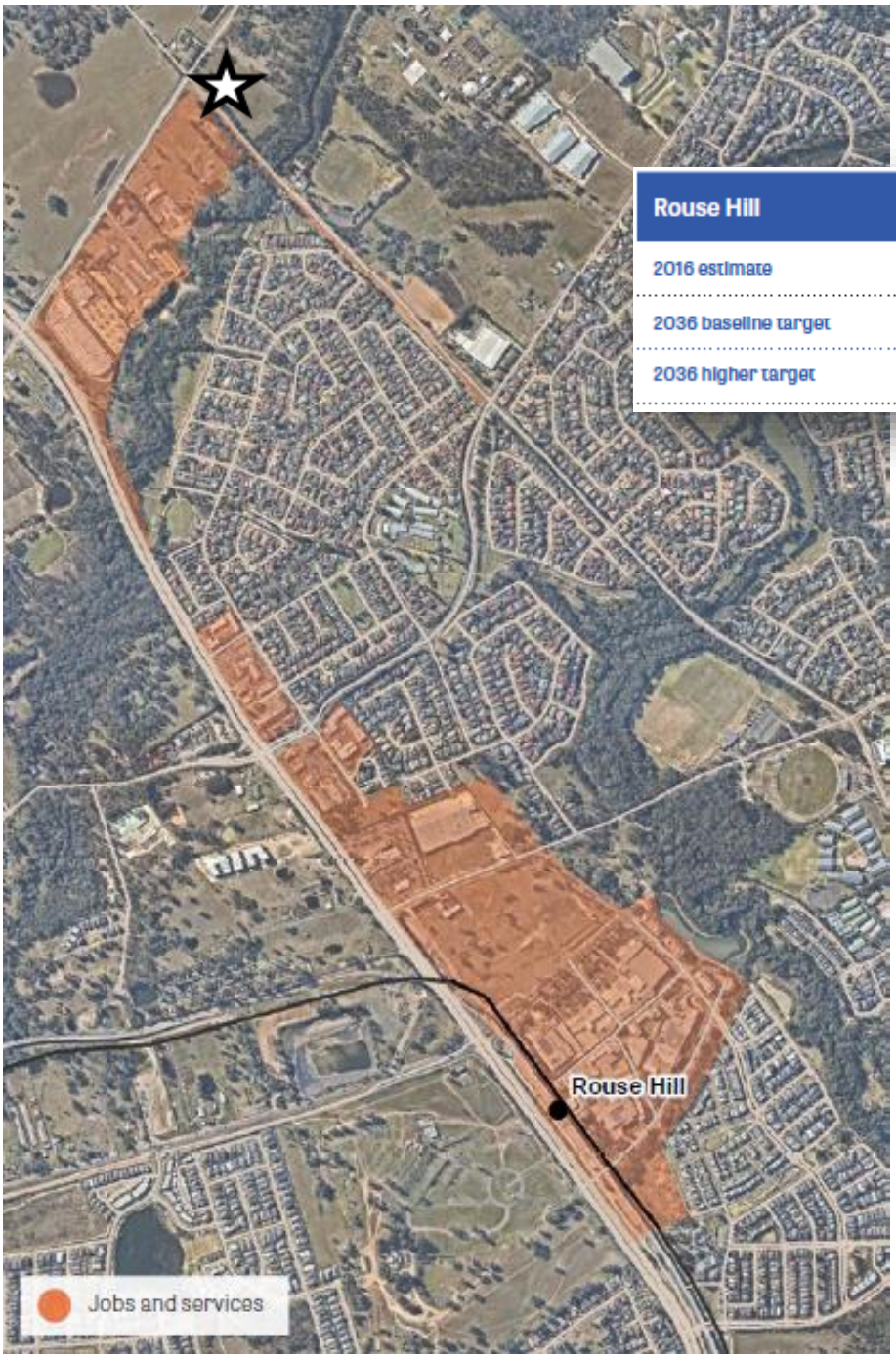


Figure 34: Rouse Hill "Strategic Centre", approximate location of subject site highlighted with a star (Source: Draft Central City District)

Table 8: Consistency with the *Draft Central City District Plan*

Planning Priority	Draft Greater Sydney Region Plan Objective	Action	Comment	Consistent
Chapter 3: ***Liveability.*** **Priority C5: Creating and renewing new places and local centres**	Objective 12: Great places that bring people together; and Objective 28: Scenic and cultural landscapes one protected.	Action 17: Recognising and balancing the dual function of streets as places for people and movement; and Action 20: Ensure parking availability takes into account the level of access by public transport, while considering the capacity for places to change and evolve, and accommodate diverse activities over time.	The proposal has potential to provide specific and flexible measures to improve the activation and viability of Rouse Hill as a strategic centre. These include: ▪ provide, increase and improve local infrastructure and open space; ▪ expand commercial floor space and employment options; ▪ provide parking that is adaptable to future uses and takes account of access to public transport, walking and cycling connections.	Yes
Chapter 4: ***Productivity.*** **Priority C10: Growing investment, business opportunities and jobs in strategic centres**	Objective 22: Investment and business activity in centres.	Action 37: Provide access to jobs, goods and services in centres by attracting significant investment and business activity in strategic centres to provide jobs growth, while diversifying the range of activities in all centres; Action 39: Engage with the retail sector on its changing planning requirements and update planning controls as required; and Action 48: Strengthen Rouse Hill through approaches that investigate opportunities for future expansion of the centre and promote complementary business uses on land adjacent to the Rouse Hill Town Centre.	Rouse Hill provides retail and community services to a large population catchment in Sydney's north west. A future Sydney Metro station provides the opportunity for commercial developments and employment opportunities. The job target for Rouse Hill is estimated at 11,000 (2036) (see **Figure 34**). The proposal has potential to provide complementary business use on land close to the Rouse Hill Town Centre and will increase opportunities for local jobs and ongoing investment. The Central City District the highest proportion of Greater Sydney's total stock of industrial and urban services land (40%). About 24% is undeveloped. The Annangrove precinct has a total of 145 ha, from which 115 ha is yet undeveloped land (79%). Bulky goods retail, amongst other activities, represents a proportion of the jobs in the area, which the proposal has potential to expand upon.	Yes
Chapter 5: ***Sustainability.*** **Reducing carbon emissions and managing energy, water and waste efficiently**	Objective 33: A low-carbon city contributes to net-zero emissions by 2050 and mitigates climate change.	Action 74: Support initiatives that contribute to the aspirational objective of achieving net-zero emissions by 2050, especially through the establishment of low-carbon precincts; and Action 75: Support precinct-based initiatives to increase renewable energy, and energy and water efficiency.	Future development arising from this PP will incorporate the latest Ecologically Sustainable Development (ESD) principles. The proposed built for will eventually seek to maximise solar orientation, natural ventilation and on-site stormwater detention. Future DAs will explore innovative architectural design solutions for ESD, which could minimise carbon emissions, potable water use and waste.	Yes

Strategic Merit Assessment

The Department of Planning and Environment have identified assessment criteria to justify and determine if a PP has strategic planning merit.

In this respect, as outlined in the below summary tables, there can be no doubt that this site has strategic and specific merit.

Table 9: Strategic Merit Test

1) Consistent with the relevant draft district plan or corridor/precinct plans applying to the site, including ant draft plans released for public comment; or	As discussed above, this PP is consistent with the *Draft Greater Sydney Region Plan* and the *Draft Central City District Plan*.
2) Consistent with a relevant local strategy that has been endorsed by the Department; or	The planning proposal is consistent with: ▪ Local Strategy: New Strategic Direction for Baulkham Hills Shire ▪ North West Rail Link Corridor Strategy ▪ The Hills Corridor Strategy
3) Responding to a change in circumstances, such as the investment in new infrastructure or changing demographic trends that have not been recognised by existing planning controls.	Data provided by the Greater Sydney Commission in relation to the *Draft Central City District Plan* indicates that: ▪ The job target for Rouse Hill is estimated at 11,000 (2036); and ▪ The Annangrove precinct has a total of 145 ha, from which 115 ha is yet undeveloped land (79%). This job target for Rouse Hill in conjunction with the undeveloped commercial land provides the base for future development that meets the current and future needs for the area. Bulky goods premises represent a proportion of the current and projected economic activity within the area, therefore, this PP has strategic merit.

Specific Merit Assessment

Table 10: Specific Merit Test

1) The natural environment (including known significant environmental values, resources or hazards);	A preliminary Ecological Assessment (**Appendix 2**) determined that the proposal will not result in a significant adverse impact on any matters of import. The site contains native vegetation as prescribed by the new state legislative landscape within the *Biodiversity Conservation Act 2016*; nonetheless, the proposal will have potential to provide significant remediation and rehabilitation actions, as well as the purchase of the necessary credits or payment of the corresponding Biodiversity Conservation Trust.
2) The existing uses, approved uses and likely future uses of land in the vicinity of the land subject to the proposal; and	The PP has taken into consideration its surrounding context. It will not adversely impact any surrounding development (existing or proposed). The proposal is a rare opportunity to amalgamate three lots to create a development site which can provide economic benefits and enhance biodiversity outcomes.

3) The services and infrastructure that are or will be available to meet the demands arising from the proposal and any proposed financial arrangements for infrastructure provision.	The Traffic Assessment indicates the road network / transport infrastructure will be able to accommodate the potential traffic generation created by permitting bulky goods retailing on the site. The nature of this PP will not create any other additional demands on services or infrastructure beyond those already envisaged by the current zoning.

The conclusion of this assessment is that the proposal has both strategic and site-specific merit and should be progressed for a Gateway Determination.

7.2.2 Is the planning proposal consistent with the council's local strategy or other local strategy plan?

The planning proposal is consistent with the objectives and actions contained within the following local strategies:

- **Local Strategy: New Strategic Direction for Baulkham Hills Shire**
  - Centres Direction
  - Employment Lands Direction
  - Integrated Transport Direction
- **North West Rail Link Corridor Strategy**
- **The Hills Corridor Strategy**

Tables 11-13 below demonstrate the consistency of the planning proposal with The Hills Shire's's local plans and strategies, specifically in relation to public benefits such as improved housing, public spaces and community facilities.

Local Strategy: New Strategic Direction for Baulkham Hills Shire

The Local Strategy, adopted by Council on 10 June 2008, responded to the state and local needs focusing on seven key areas of direction. Relevant to this PP are the following:

Table 11: Compliance with the *Local Strategy*

Direction	Response
Centres Direction	Given the consistent population growth in Rouse Hill, the proposal has potential to expand trade areas as new homes generate higher demand for bulky goods than traditional homes. The strategy suggests that there will be a demand of 81,000m2 of bulky goods space by 2031.
Employment Lands Direction	The Strategy sets an overall employment capacity target of an additional 47,000 jobs for the Shire from 2010 to 2031, comprising 9,000 jobs for Rouse Hill. The proposal has potential to support the targeted employment growth. Vacant business zoned lands in the area can contribute to the generation of jobs closer to home, while integrating local economic growth.
Integrated Transport Direction	The ongoing Sydney Metro Northwest will contribute to the Centre's transition into a major commercial/retail centre. Conjunctively, the proposed site's location is established on a major road with high visibility and accessibility via the local road network.

North West Rail Link Corridor Strategy

The proposal is relevant to the Strategy as detailed on **Table 12**:

Table 12: Compliance with the *North West Rail Link Corridor Strategy*

Direction	Response
Chapter 2 - Strategic Context	
2.5 Employment in North West Sydney	The proposal will contribute to the enhancement of employment lands within the Corridor. A significant proportion of these employment lands have been identified as industrial lands and bulky goods areas. The proposal will also provide additional employment opportunities for the adjacent Box Hill Industrial Precinct. The proposal will strengthen the employment demand by providing jobs closer to home in the area.
Chapter 12 - Rouse Hill	
12.1 Vision for the Study Area	The proposal will contribute to the commercial uptake in the surrounding areas of the Rouse Hill. In addition, the proposal has potential to increase connectivity within the area, drawing on a modern and permeable built form, supported by an enhanced vehicular connection and built-in parking spaces.

The Hills Corridor Strategy

The Hills Corridor Strategy was prepared to provide a more detailed response to the *North West Rail Link Corridor Strategy* published in September 2013. The Sydney Metro Northwest will create new opportunities to live close to transport, well-connected to jobs and services. The proposal is relevant to the Strategy as detailed on **Table 13**:

Table 13: Compliance with *The Hills Corridor Strategy*

Direction	Response
Chapter 4 - Guiding Principles	
4.5 Jobs to Match the Shire's Needs	The proposal will continue to provide a range of employment opportunities for the local residents, facilitating more jobs close to home. With significant population growth of over 129,000 persons forecast for the Shire (NSW Population Forecast 2014 plus growth envisaged under this Strategy) there needs to be a long-term increase in employment opportunities for local residents to enable the opportunity to live and work in one location.
4.6 Grow our Strategic Centres	Rouse Hill is currently recognised as a strategic centre in the transition to a major centre. The proposal has potential to provide jobs and expand the range of services. Therefore, in the metropolitan context for employment and business, supporting the growth of the Centre will reinforce its role as an important destination along the rail link.
Chapter 12 - Rouse Hill Precinct	
11.2 Opportunities	The proposal will provide additional employment floor space as well as opportunities to improve vehicular connections around the new development. The proposal will respond to the increased demand created by incoming population, which will be characterised by a predominance of family households.

12.3 Desired Outcomes	The desired outcome for The Rouse Hill Precinct is to enable the transition to become a major transport and commercial hub. The proposal responds to the influence from the *Rouse Hill Regional Centre Plan*. This plan identifies the Northern Frame of Rouse Hill as a major area which is primarily intended for a mix of uses. The proposal will support to accommodate long-term change, and intensification and mix of use including bulky goods and innovative commercial typologies. The area will evolve over time and the proposal will allow for expansion and support of the Rouse Hill core area.

7.2.3 Is the planning proposal consistent with applicable state environmental planning policies?

Table 14: Consistency with the State Environmental Planning Policies (SEPPs)

SEPP Title	Consistency	Comment
1. Development Standards Consistent	N/A	Not applicable
4. Development Without Consent and Miscellaneous Exempt and Complying Development	Yes	The PP will not contain provisions that will contradict or would hinder the application of this SEPP.
6. Number of Storeys in a Building	N/A	Not applicable
14.Coastal Wetlands	N/A	Not applicable
15.Rural Landsharing Communities	N/A	Not applicable
19.Bushland in Urban Areas	Yes	A preliminary Ecological Assessment (**Appendix 2**) has determined that the subject site contains native vegetation within the 'Biodiversity Values Map' in accordance with the *Biodiversity Conservation Act 2016.* The proposal represents an opportunity to retain and restore some of the mapped vegetation, as well as to offset through the associated legal mechanisms applicable to the biodiversity values of this land.
21.Caravan Parks	N/A	Not applicable
22.Shops and Commercial Premises	N/A	Not applicable
26.Littoral Rainforests	N/A	Not applicable
29.Western Sydney Recreation Area	N/A	Not applicable

SEPP Title	Consistency	Comment
30.Intensive Agriculture	N/A	Not applicable
33.Hazardous and Offensive Development Complex	N/A	Not applicable
36.Manufactured Home Estates	N/A	Not applicable
39.Spit Island Bird Habitat	N/A	Not applicable
41.Casino Entertainment	N/A	Not applicable
44.Koala Habitat Protection	N/A	Not applicable
47.Moore Park Showground	N/A	Not applicable
50.Canal Estate Development	N/A	Not applicable
52.Farm Dams, Drought Relief and Other Works	N/A	Not applicable
53.Metropolitan Residential Development	N/A	Not applicable
55.Remediation of Land	Yes	No change of land use is proposed for the site. It is highly unlikely the land would be subject to a level of contamination that would preclude its use for commercial premises. Notwithstanding this, any future DA will ascertain the need to undertake a site investigation and if any remediation is required.
59.Central Western Sydney Economic and Employment Area	N/A	Not applicable
60.Exempt and Complying Development	N/A	Not applicable
62.Sustainable Aquaculture	N/A	Not applicable
64.Advertising and Signage	N/A	Not applicable

SEPP Title	Consistency	Comment
65.Design Quality of Residential Flat Development	N/A	Not applicable
70.Affordable Housing (Revised Schemes)	N/A	Not applicable
71.Coastal Protection	N/A	Not applicable
SEPP (Building Sustainability Index: BASIX) 2004	Yes	The PP will not contain provisions that will contradict or would hinder application of this SEPP.
SEPP (Housing for Seniors or People with a Disability) 2004	N/A	Not applicable
SEPP (Major Projects) 2005	N/A	Not applicable
SEPP (Sydney Region Growth Centres) 2006	N/A	Not applicable
SEPP (Infrastructure) 2007	N/A	Not applicable
SEPP (Kosciuszko National Park-Alpine Resorts) 2007	N/A	Not applicable
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	N/A	Not applicable
SEPP (Temporary Structures and Places of Public Entertainment) 2007	N/A	Not applicable
SEPP (Exempt and Complying Development Codes) 2008	Yes	The PP will not contain provisions that will contradict or would hinder application of this SEPP.
SEPP (Rural Lands) 2008	N/A	Not applicable
SEPP (Western Sydney Parklands) 2009	N/A	Not applicable
SEPP (Affordable Rental Housing) 2009	N/A	Not applicable
SEPP (Urban Renewal) 2010	N/A	Not applicable

There are no deemed State Environmental Planning Policies (former Regional Environmental Plans (REPs)) applicable to the PP.

7.2.4 Is the planning proposal consistent with the applicable Ministerial directions (s.117 directions)?

It is considered that the PP is consistent with the relevant Directions issued under Section 117(2) of the Act by the Minister to Councils, as demonstrated in the assessment of the following:

Table 15: Consistency with the S117 Ministerial Directions

Direction Title	Consistency	Comment
Employment and Resources		
1.1 Business and Industrial Zones	Yes	This PP maintains the provision of commercial premises and the associated employment opportunities for the locality.
1.2 Rural Zones	N/A	Not applicable
1.3 Mining, Petroleum Production and Extractive Industries	N/A	Not applicable
1.4 Oyster Aquaculture	N/A	Not applicable
1.5 Rural Lands	N/A	Not applicable
Environment and Heritage		
2.1 Environment Protection Zones	N/A	Not applicable
2.2 Coastal Protection	N/A	Not applicable
2.3 Heritage Conservation	N/A	Not applicable
2.4 Recreation Vehicle Areas	N/A	Not applicable
Housing, Infrastructure and Urban Development		
3.1 Residential zones	N/A	Not applicable
3.2 Caravan Parks and Manufactured Home Estates	N/A	Not applicable
3.3 Home Occupations	N/A	Not applicable
3.4 Integrating land use and transport	Yes	This PP is consistent with this direction in providing commercial premises in a location that is well served by public transport.
3.5 Development Near Licensed Aerodromes	N/A	Not applicable

Direction Title	Consistency	Comment
3.6 Shooting Ranges	N/A	Not applicable
Hazard and Risk		
4.1 Acid sulphate soils	N/A	Not applicable
4.2 Mine Subsidence and Unstable Land	N/A	Not applicable
4.3 Flood Prone Land	N/A	The site is not located within flood prone land Accordingly, Direction 4.3 is not applicable.
4.4 Planning for Bushfire Protection	N/A	The site is not located within a Bushfire prone area. Accordingly, Direction 4.4 is not applicable.
Regional Planning		
5.1 Implementation of Regional Strategies	N/A	Not Applicable. No regional strategies apply to the subject site.
5.2 Sydney Drinking Water Catchments	N/A	Not applicable
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	N/A	Not applicable
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	N/A	Not applicable
5.5 Second Sydney Airport: Badgerys Creek	N/A	Not applicable
Local Plan Making		
6.1 Approval and Referral Requirements	Yes	The PP will be consistent with this Ministerial Direction.
6.2 Reserving Land for Public Purposes	Yes	The PP will be consistent with this Ministerial Direction.
6.3 Site Specific Provisions	Yes	The PP will be consistent with this Ministerial Direction.
Metropolitan Planning		
7.1 Implementation of the Metropolitan	Yes	Refer to **Section 7.2**

Direction Title	Consistency	Comment
Plan for Sydney 2036		

7.3 Environmental, Social and Economic Impact

7.3.1 Is there any likelihood that critical habitat or threatened species will be adversely affected as a result of the proposal?

A Preliminary Ecological Assessment (see **Appendix 2**) determined that the site contains native vegetation in accordance with the *Biodiversity Conservation Act 2016*.

This native vegetation is representative of two state-listed Critically Endangered Communities and an endangered ecological community (refer to **Section 2.4** of this report).

The proposal has the potential to deliver a superior conservation outcome, being contiguous with the substantial area of retained bushland in the riparian corridor associated with Second Ponds Creek.

This PP provides an opportunity to enrich the habitat for hollow-dependant species by the installation of more nest boxes and salvaged hollows. Other important fauna habitat features may also be enhanced, such as the placement of coarse woody debris, as recommended by the Preliminary Ecological Assessment.

7.3.2 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

The subject site is located within an existing urban environment. The proposal is unlikely to result in any detrimental environmental effects as outlined on **Section 2.4** of this PP.

The subject site is mapped as containing “Biodiversity Values” in accordance with the *Biodiversity Conservation Act 2016*. The Act requires the ecological impact of such a proposal to be addressed by the use of the Biodiversity Assessment Method (BAM). This dictates that after a development footprint has been designed to avoid and minimise impacts, then residual unavoidable impacts must be offset.

Preliminary ecological assessment determined not to pose a significant adverse impact on the natural environment, however, remediation and offsetting has been anticipated. It is therefore necessary that the proposed development is accompanied by the application of the corresponding BAM in accordance to the new state legislative requirements.

7.3.3 Has the planning proposal adequately addressed any social and economic effects?

- The proposal will satisfy the current and projected demand for bulky goods premises in accordance with the North-West Priority Growth Area's population growth estimates;
- The proposal will generate employment opportunities for the local community, facilitating jobs close to home and well connected to public transport, which include the new Sydney Metro Northwest Light Rail system;
- The proposal has potential to expand Rouse Hill Centre's commercial capacity while triggering further investment in the area; and
- The proposal envisions modern and accessible commercial premises attractive for local residents and people from neighbouring strategic centres.

Accordingly, it is considered that the planning proposal will have a positive effect on the local economy and community.

7.4 State and Commonwealth Interests

7.4.1 Is there adequate public infrastructure for the planning proposal?

This PP does not seek a wholesale change to the nature of development anticipated on the site, but rather seeks the inclusion of bulky goods retailing. Therefore, it is anticipated that transport infrastructure is the only area of public infrastructure that may be impacted by the proposed development.

The traffic analysis undertaken to support this PP concludes the existing public infrastructure, in conjunction with the proposed improvements to the local traffic networks, is capable of accommodating this proposal. In addition, the site is well serviced by public transport, providing connections to the surrounding strategic centres.

The area is generally well-serviced with Police, Ambulance, Fire and other emergency services.

Existing utility services will adequately service the future development proposal as a result of this proposal, and will be upgraded or augmented where required. Waste management and recycling services are available through The Hills Shire Council.

7.4.2 What are the views of state and Commonwealth public authorities consulted in accordance with the Gateway determination?

State and Commonwealth public authorities have not yet been identified or consulted. It is anticipated that this will occur as a condition of Gateway Determination.

8. Community Consultation

This PP is considered to be of a type that falls within the definition of a 'low impact Planning Proposal.1' It is likely to be on exhibition for a minimum period of 28 days. The community will be notified of the commencement of the exhibition period via a notice in a local newspaper and via a notice on The Hills Shire Council's website. The written notice will:

- Give a brief description of the objectives or intended outcomes of the PP;
- Indicate the land affected by the PP;
- State where and when the PP can be inspected;
- Give the name and address of the RPA for the receipt of any submissions; and
- Indicate the last date for submissions.

During the exhibition period, the following material will be made available for inspection:

- The PP, in the form approved for community consultation by the Secretary of Planning and Infrastructure;
- The Gateway determination; and
- Any studies relied upon by the PP.

[1] Low impact planning proposal means a planning proposal that in the opinion of the person making the Gateway determination is consistent with the pattern of surrounding land use zones and/or land uses, is consistent with the strategic planning framework, presents no issues with regard to infrastructure servicing, is not a principle LEP, and does not reclassify public land.

9. Project Timeline

An indicative timeframe for the completion of this PP is outlined in **Table 16**. This may be amended at Gateway.

Table 16: Project Timeline

Step	Indicative Timeframe
Commencement date	Submission to The Hills Shire Council in November 2017 for consideration. Submission to DP&E for GWD in February/March 2018. GWD issued March/April 2018
Completion of required technical information	Technical studies have been commissioned to support the PP. Additional biodiversity assessment may be undertaken (if required) prior to public exhibition.
Timeframe for government agency consultation (pre-and post exhibition as required by Gateway determination)	As specified in Gateway determination, potentially May 2018. Anticipated timeframe is to run concurrently with public exhibition period.
Public exhibition period	As specified in Gateway determination, potentially May/June 2018. Anticipated timeframe for public exhibition is 28 days.
Consideration of submissions	To be determined by Council, potentially July / August 2018
Dates for public hearing (if required)	To be determined by Council if required.
Submission to the Department to finalise the LEP	To be determined by Council, potentially September 2018.
Plan notification	Within 9 months of GWD, potentially December 2018.

10. Conclusion

This Planning Proposal submitted to The Hills Shire Council by ABAX Contracting seeks to amend the existing zoning controls applicable to land at 328-332 Annangrove Road, Rouse Hill.

The Planning Proposal will enable the development of bulky good premises in addition to other currently permitted uses.

The Planning Proposal:

- Is consistent with the *Draft Greater Sydney Region Plan, A Plan for Growing Sydney* and the revised draft *West Central District Plan* particularly in relation to the provision of increased commercial capacity, economic activity and job opportunities closer to home and public transport;
- Is consistent with local planning strategies;
- Supports suitable future development which meets the needs of the future population of Rouse Hill and the North West Priority Growth Area;
- Provides the opportunity to address the local vegetation in a holistic way to achieve a more strategically beneficial biodiversity outcome; and
- Supports suitable future development form which is consistent with the existing streetscape and will not adversely impact on the locality.

In summary, there is no reasonable planning basis which would not support the permissibility of bulky good premises in the proposed location to support economic growth in the area.

APPENDIX 1

Survey Plans

APPENDIX 2

Preliminary Ecological Assessment

APPENDIX 3

Traffic Assessment Report

APPENDIX 4

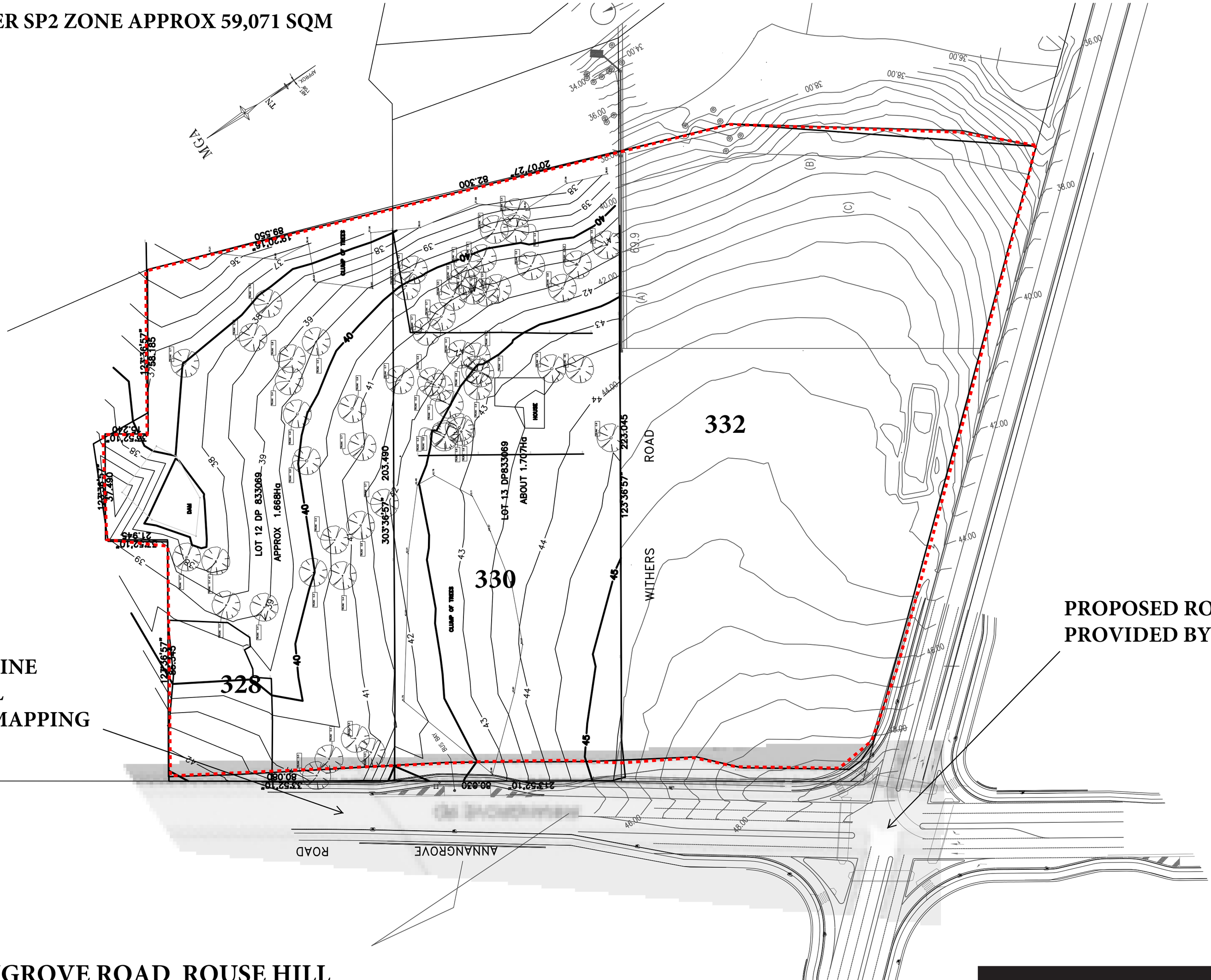
Economic Needs Assessment

APPENDIX 5

Market Review and Tenant Possibilities Study

TOTAL AREA OF SITES COMBINED 60,683 SQM

TOTAL AREA AFTER SP2 ZONE APPROX 59,071 SQM



SP2 ZONE OUTLINE FROM COUNCIL INTERACTIVE MAPPING STRUCTURE

PROPOSED ROAD DESIGN AS PROVIDED BY COUNCIL

328- 332 ANNANGROVE ROAD ROUSE HILL
1:1000 @ A2 **29.09.17**

LEFFLER SIMES ARCHITECTS

Preliminary Ecological Assessment

328-332 Annangrove Road
Rouse Hill
The Hills LGA

For: ABAX Contracting Pty Ltd

REF: HiSC 15-756
3rd November 2017

Keystone Ecological Pty Ltd
abn 13 099 456 149
PO Box 5095 Empire Bay NSW 2257
telephone 1300 651 021
email office@keystone-ecological.com.au

Preliminary Ecological Assessment
328-332 Annangrove Road
Rouse Hill
The Hills LGA

REF: HiSC 15-756

3rd November 2017

Authors:

Elizabeth Ashby and Ashleigh McTackett

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Flora and Fauna Specialists

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Cover photograph: Mown grass beneath young native trees at number 328 Annangrove Road.

Photo: E. Ashby, 17th October 2017.

TABLE OF CONTENTS

1 INTRODUCTION

Keystone Ecological has been contracted by ABAX Contracting Pty Ltd to explore the ecological constraints and opportunities to the development of three adjoining lots on Annangrove Road Rouse Hill in The Hills Local Government Area.

The subject site is located at 328 to 332 Annangrove Road, Rouse Hill in The Hills Local Government Area (LGA):

- 328 Annangrove Road – Lot 34 DP 834050
- 330 Annangrove Road – Lot 12 DP 833069
- 332 Annangrove Road – Lot 13 DP 833069

A topographic map showing the location of the site and an aerial photograph are provided at Figures 1 and 2 respectively, with a closer aerial view at Figure 3.

The site lies in the Sydney Basin Bioregion in the Hawkesbury-Nepean Catchment. Its centre is approximately at grid reference 306916 E 6272579 N MGA on the Sydney 1:100,000 topographic map sheet.

The subject site is at the corner of Annangrove Road and Withers Road, and occupies a total area of 6.12 hectares. It is situated on a relatively flat parcel of land on a broad upper slope at 45 metres ASL. The closest formal conservation reserve is Scheyville National Park, 6 kilometres to the north.

Immediately to the rear of the lots is a corridor of reserved vegetation along Second Ponds Creek that is part of Sydney Water's Trunk Drainage Line for this area. The local area is partially within the North West Growth Centre and Council's urban growth lands; thus surrounding land uses are rapidly changing from rural activities to industrial and residential.

Number 332 Annangrove Road is essentially a cleared paddock with three remnant mature trees near the top of the site and a small area of regenerating young woodland at the rear. The majority of the site is comprised of very thick exotic grass that is regularly slashed.

Number 330 Annangrove Road contains a derelict building, with almost half the site entirely cleared of native woody vegetation. The open areas are regularly slashed.

Number 328 contains an occupied residence and a large well-tended garden in the front half of the lot. The rear half supports scattered trees, and the ground layer is also regularly slashed.

The proposal is to consolidate the lots and develop a bulky goods retail outlet. A concept design developed by Leffler Simes Architects in associated plans demonstrates its essential elements, being retail space with parking, and landscaped surrounds. Importantly, there will be a block of retained natural vegetation, which is in turn connected to the reserved lands to the rear. The built form will respond to that natural setting, with, for example, food and drink outlets exploiting the view into and over the bushland.

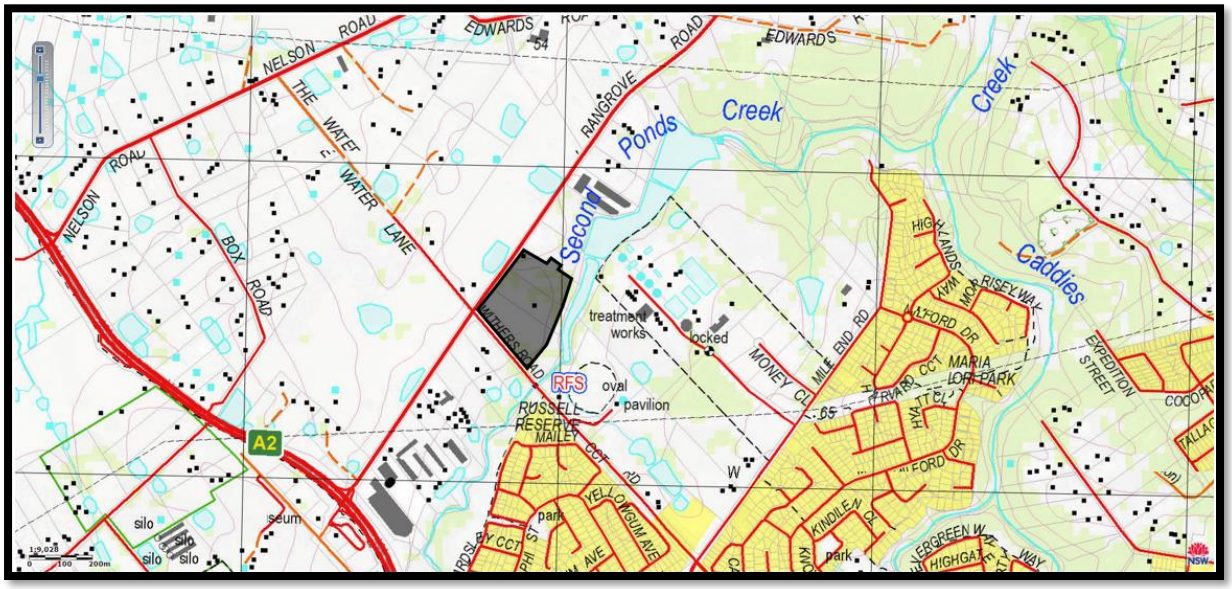

Figure 1: Location.

Figure 2: Aerial photograph.

Figure 3: Closer aerial view.

2 LEGISLATIVE BACKGROUND

The criteria used to assess likely impacts upon threatened species, populations or endangered ecological communities varies between the Commonwealth and State jurisdictions.

2.1 Commonwealth

The Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (*EPBC Act*) is a nationally applicable Act that is administered by the Department of the Environment. This Act requires approval for actions that are likely to have a significant impact on matters of National Environmental Significance (NES).

There are seven matters of NES that are triggers for Commonwealth assessment and approval. These are:

1. World Heritage properties;
2. National Heritage places;
3. Ramsar wetlands of international importance;
4. Nationally threatened species and communities;
5. Migratory species;
6. Nuclear actions; and
7. Commonwealth marine environment.

Threatened species and ecological communities are listed under Part 13, Division 1, Subdivision A of the *EPBC Act*. Migratory species are listed under Part 13, Division 2, Subdivision A of the Act.

The Department of the Environment identifies the following:

> *"Under the EPBC Act a person must not take an action that has, will have or is likely to have a significant impact on any of these matters of NES without approval from the Commonwealth Environment Minister. There are penalties for taking such an action without approval.*
>
> *In general, an action that may need approval under the Act will involve some physical interaction with the environment, such as clearing native vegetation, building a new road, discharging pollutants into the environment, or offshore seismic survey.*
>
> *If, following a referral, it is determined that an action is likely to have a significant impact, and approval is therefore required, the action is called a 'controlled action'. The proposal will then undergo a formal assessment and approval process, and cannot proceed unless approval is granted.*
>
> *If it is determined that an action is not likely to have a significant impact, then the action is not a controlled action. Approval under the EPBC Act is not required and*

the action may proceed, subject to obtaining any other necessary permits or approvals."

2.2 State

The site is zoned B6 Enterprise Corridor and SP2 Infrastructure and is excluded from lands affected by the *Local Land Services Act 2013*. Therefore, the impacts of clearing of native vegetation will need to be addressed in accordance with the provisions of the *Biodiversity Conservation Act* (the *BC Act*) *2016* and *Biodiversity Conservation Regulation 2017.*

Under this new legislation, the type of ecological impact assessment, reporting and necessity for offsetting biodiversity impacts is determined by the application of a series of threshold questions. To that end:

- the first major trigger for an assessment in line with the Biodiversity Assessment Method (BAM) is whether the site is mapped as containing "Biodiversity Values". This mapping is available at https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap, and if areas mapped as sensitive biodiversity are impacted by a proposed development, then a Biodiversity Development Assessment Report (BDAR) is to be prepared in accordance with the BAM, and undertaken by an Accredited Assessor; or
- the second major trigger for a BAM is the scale of clearing to be undertaken. A sliding scale is applied that is based on the minimum lot size for the applicable zoning against the area of clearing; and
- a subset of BAM assessments may be assessed via a 'streamlined' method, according to another sliding scale. The 'streamlined' assessment process has identical survey and analytical methodology to a full BAM, but has a somewhat simplified reporting requirement.

An extract of the Biodiversity values map is provided at Figure 4. This shows that the subject lots are all affected by this layer and therefore a BAM is required.

In order to determine if this is a full or streamlined BAM, then the additional thresholds are explored. The areas occupied by native vegetation were delineated, as shown in Figure 5.

This land zoning has a minimum lot size of 4,000 square metres associated with it, and clearing of a total of 1.93 hectares of native vegetation is likely. The threshold area of vegetation impact is <1 hectare for a lot of this scale, and so a streamlined BAM is not appropriate.

The proposal will need to demonstrate how the footprint has avoided and minimised impact, and then unavoidable impacts may be offset using the Biodiversity Offset Tool within the BAM.

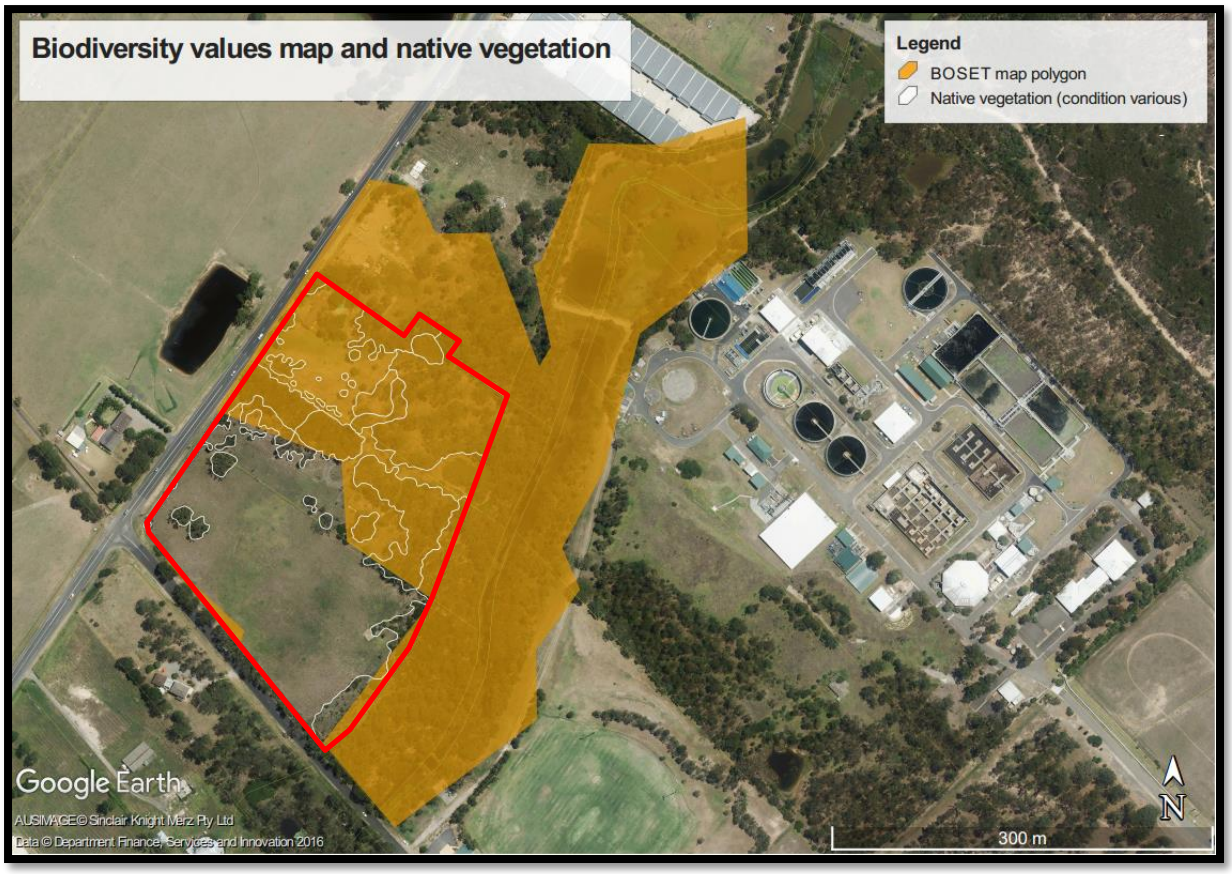

Figure 4: Biodiversity Values map.

Figure 5: Native vegetation.

3 FLORA AND FAUNA SURVEY

Detailed survey of the flora and fauna of the subject lots in accordance with the BAM have not been carried out for this Preliminary Ecological Assessment. However, number 332 Annangrove Road was the subject of a previous development application for which Keystone Ecological provided an impact assessment, and other ecological work has also been undertaken by Keystone Ecological and others on many neighbouring properties. That body of work was relied upon to inform this Preliminary Ecological Assessment and are described below, along with the relevant scientific literature.

In addition, site-specific mapping of native vegetation boundaries was undertaken on the subject lots for this study.

3.1 Other Relevant Studies

Proposed Light Industrial Development, Corner of Annangrove and Withers Roads, Rouse Hill, Flora Fauna Survey and Assessment (Ambrose Ecological Services 2007)

This survey and assessment report was prepared for the current subject site. It found that the site was cleared with only a few remnant trees. The neighbouring private property to the north was considered to support Cumberland Plain Woodland endangered ecological community, with another endangered ecological community (Shale Sandstone Transition Forest) occurring along Second Ponds Creek in the protected riparian lands to the rear.

It was concluded that the subject site had no potential to support threatened flora species and provided potential habitat for only a few highly mobile threatened species. Moreover, such habitats were considered to be of marginal value, perhaps only being used occasionally.

The overall conclusion was that the proposed development of the site would not result in a significant adverse impact on any matters of import.

Flora and Fauna Impact Assessment, 314 Annangrove Road, Rouse Hill (Ashby and Suesse 2007)

The survey and impact assessment was carried out on a property 700 metres to the north of the subject site along Annangrove Road. The habitats on site, its condition, land use history and topographic position are all similar to those of the subject site of the present study.

Investigations established that the native vegetation elements on site comprised River-flat Eucalypt Forest and two threatened species of microchiropteran were recorded - *Mormopterus norfolkensis* Eastern Freetail-bat and *Miniopterus schreibersii* (now *orianae*) *oceanensis* Eastern Bent-wing Bat.

The proposed development for a commercial / industrial enterprise (including riparian areas to be retained and rehabilitated) was determined not to pose a significant adverse impact on any matters of import.

Flora and Fauna Impact Assessment, 338-340 Annangrove Road, Rouse Hill (Ashby 2013)

The survey and impact assessment was carried out on a property 100 metres to the south of the subject site along Annangrove Road. The habitats on site, its condition, land use history and topographic position are all similar to those of the subject site of the present study.

Survey and habitat assessment revealed realised foraging habitat for three threatened microchiropteran bat species (*Mormopterus norfolkensis* Eastern Freetail-bat, *Miniopterus australis* Little Bent-wing Bat, *Miniopterus schreibersii* (now *orianae*) *oceanensis* Eastern Bent-wing Bat) and potential habitat for one threatened flora species (*Acacia pubescens*), a number of other bats (*Pteropus poliocephalus* Grey-Headed Flying-fox, *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat, *Miniopterus schreibersii oceanensis* Eastern Bent-wing Bat), birds (*Hieraaetus morphnoides* Little Eagle, *Glossopsitta pusilla* Little Lorikeet, *Lathamus discolor* Swift Parrot, *Ninox strenua* Powerful Owl, *Daphoenositta chrysoptera* Varied Sittella) and *Meridolum corneovirens* Cumberland Plain Land Snail.

The proposed development of a bus depot was determined not to pose a significant adverse impact on any matters of import.

Amended Impact Assessment, 332 Annangrove Road, Rouse Hill (Ashby and McTackett 2017)

This lot was almost entirely cleared of natural vegetation, with just 3 remnant trees and a narrow band of regenerating vegetation along its rear boundary. This was determined to be consistent with Shale Sandstone Transition Forest.

The habitats available on site were considered likely to be used, at least on occasion, by the following highly mobile fauna species:

- *Glossopsitta pusilla* Little Lorikeet
- *Artamus cyanopterus* Dusky Woodswallow
- *Daphoenositta chrysoptera* Varied Sittella
- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Miniopterus australis* Little Bentwing-bat
- *Miniopterus orianae oceanensis* Eastern Bent-wing Bat
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Scoteanax rueppellii* Greater Broad-nosed Bat

Meridolum corneovirens Cumberland Plain Land Snail may also potentially occur, although the absence of coarse woody debris makes it less suitable.

The loss of vegetation and the associated potential habitats for a number of threatened fauna species was to be ameliorated by the implementation of the following actions:

1. The use of Shale Sandstone Transition Forest species in the landscape plan;

2. The protection of trees in adjacent lots by the observation of appropriate Tree Protection Zones;
3. The survey of the vegetation on site immediately prior to clearing for nesting birds; and
4. The survey of the vegetation on site immediately prior to clearing for the presence of *Meridolum corneovirens* Cumberland Plain Land Snail. If found, then it is recommended that this species is relocated in adjacent protected land under an approved relocation protocol.

The proposed development of a mixed use retail and residential development was determined not to pose a significant adverse impact on any matters of import.

Flora and Fauna Impact Assessment, 318 Annangrove Road, Rouse Hill (Ashby and McTackett 2017)

The survey and impact assessment was carried out on a property 370 metres to the north of the subject site along Annangrove Road. The habitats on site, its condition, land use history and topographic position are all similar to those of the subject site of the present study.

Survey established that the property supports very disturbed remnant and regrowth trees characteristic of Shale Sandstone Transition Forest. Although it is in very poor condition, it contains potential habitat for a number of threatened species, including snails (*Meridolum corneovirens* Cumberland Plain Land Snail, Pommerhelix duralensis Dural Woodland Snail), birds (*Lophoictinia isura* Square-tailed Kite, *Hieraaetus morphnoides* Little Eagle, *Circus assimilis* Spotted Harrier, *Falco subniger* Black Falcon, *Callocephalon fimbriatum* Gang-gang Cockatoo, *Glossopsitta pusilla* Little Lorikeet, *Lathamus discolor* Swift Parrot, *Daphoenositta chrysoptera* Varied Sittella and *Artamus cyanopterus* Dusky Woodswallow), and bats (*Pteropus poliocephalus* Grey-headed Flying-fox, *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat, *Mormopterus norfolkensis* Eastern Freetail-bat, *Miniopterus orianae oceanensis* Eastern Bent-wing Bat, *Miniopterus australis* Little Bentwing-bat, *Myotis macropus* Southern Myotis, *Scoteanax rueppellii* Greater Broad-nosed Bat, *Falsistrellus tasmaniensis* Eastern False Pipistrelle).

A number of recommendations were made regarding mitigation of impact, and included rehabilitation of that part of the riparian zone of Second Ponds Creek that occurred on site.
The proposed construction of industrial units was determined not to pose a significant adverse impact on any matters of import.

Soil Landscapes of the Penrith 1:100,000 sheet (Bannerman and Hazelton 1990) and Soil Landscapes of the Penrith 1:100,000 Sheet Map (Hazelton et al. 1989) and Soil and Land Resources of the Hawkesbury-Nepean Catchment (DECC 2008)

The Blacktown soil landscape is shown as occupying the upper half of the subject site with the Gymea soil landscape along the riparian zone (Hazelton et al. 1989). An extract of this map is shown at Figure 4a. However, later and more detailed mapping by DECC (2008) shows the situation as being more complex. The site is shown as almost wholly within Blacktown soil landscape, with the Gymea soil landscape only grazing the north eastern corner, with South Creek

soil landscape occupying a large central portion of Second Ponds Creek to the south. An extract of this mapping is shown in Figure 4b.

Blacktown soil landscape is a residual landscape on gently undulating rises on Wianamatta-Ashfield Group shales. Local relief occurs to 30 metres, with slopes of usually less than 5%. The landscape also contains broad rounded crests and ridges with gently inclined slopes. This soil landscape occurs extensively on the Cumberland Lowlands in areas such as Blacktown, Mount Druitt, Glossodia and Leppington. Its vegetation is predominantly cleared eucalypt woodland and tall open forest. It is almost completely cleared of its natural vegetation of open woodland dominated by *Eucalyptus tereticornis* Forest Red Gum, *Eucalyptus crebra* Narrow-leaved Ironbark, *Eucalyptus moluccana* Grey Box and *Corymbia maculata* Spotted Gum.

Limitations on this soil landscape include the moderately reactive, highly plastic subsoil, low fertility and poor drainage.

Gymea soil landscape is an erosional soil landscape comprised of undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief occurs to 80 metres, with slopes of usually less than 25%. This soil landscape also contains broad convex crests, moderately inclined side slopes with wide benches, localised rocky outcrop on low broken scarps. This soil landscape occurs extensively throughout the Blue Mountains Plateau and on the Woronora Plateau. Its vegetation is predominantly cleared dry sclerophyll forest and eucalypt forest. Its natural vegetation is mainly dominated by *Eucalyptus gummifera* Red Bloodwood, *Eucalyptus eximia* Yellow Bloodwood, *Eucalyptus haemastoma* Scribbly Gum and *Banksia serrata* Old Man Banksia.

Limitations on this soil landscape include localised steep slopes, high soil erosion hazard, rocky outcrops, shallow highly permeable soil and extremely low fertility.

South Creek is an alluvial soil landscape on Quaternary Alluvium (alluvium, shale, sand and silt) on the Cumberland Plain. Local relief is low (0-10 metres), with slopes of 0-3%. It is an active fluvial area with active stream bank erosion and deposition, particularly where the riparian vegetation has been removed. The original vegetation has been extensively cleared and in western Sydney is typically made up of *Eucalyptus amplifolia* Cabbage Gum, *Eucalyptus tereticornis* Forest Red Gum and *Angophora floribunda* Rough-barked Apple in the upper stratum with some *Eucalyptus moluccana* Grey Box and *Angophora subvelutina* Broad-leaved Apple. The lower layers are usually dominated by *Acacia parramattensis* Parramatta Wattle, *Casuarina glauca* Swamp Oak and *Melaleuca linariifolia* Flax-leaved Paperbark in the lower tree stratum. *Bursaria spinosa* Blackthorn dominates the shrub layer and dense ground covers are abundant. *Rubus* sp aff. Blackberry is a common exotic weed.

The Native Vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities (Tozer 2003)* and *Native Vegetation of the Cumberland Plain (NSW NPWS 2002) and Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010)

These bodies of work are the result of a large and complex mapping program funded by the Department of Environment and Conservation / Office of Environment and Heritage. Tozer's original paper (2003) is an updated version of the previous mapping released by the National

Parks and Wildlife Service (2002) and details rules to apply in defining vegetation communities on the Cumberland Plain. The 2010 paper is a synthesis of vegetation mapping from Sydney south to the Victorian border.

All of the maps agree in showing native vegetation restricted to a narrow band along Second Ponds Creek in the vicinity of the subject site. They also agree in its classification, although they use different names.

Immediately adjacent to the subject site, Tozer (2003) and NPWS (2002) name this vegetation as Map Unit 2 Shale Sandstone Transition Forest (high sandstone influence) and in Tozer et al. (2010) it is referred to as Map Unit p146 Sydney Hinterland Transition Woodland. The former is recognised as the critically endangered ecological community Shale Sandstone Transition Forest.

To the south of the subject site, Tozer (2003) and NPWS (2002) name this vegetation as Map Unit 11 Alluvial Woodland and in Tozer et al. (2010) it is referred to as Map Unit FoWp33 Cumberland River Flat Forest. Both of these map units are recognised as the endangered ecological community River-flat Eucalypt Forest.

Vegetation Cover of Baulkham Hills Shire (Baulkham Hills Shire Council 2008) and Natural Asset Mapping for Baulkham Hills Shire Council Plant Communities in Baulkham Hills Shire (Lembit and Burcher 2001)

The mapping survey of the natural vegetation in Baulkham Hills Shire Council classified the vegetation along Second Ponds Creek from Withers Road north as Cumberland Plain Woodland, with Sydney Coastal River-Flat Forest to the south. Both are endangered ecological communities.

3.2 Desktop Preliminary Investigations

The following desktop investigations were carried out:

1. Colour aerial photographs were interpreted to delineate preliminary vegetation community boundaries and areas of disturbance on site.
2. A search of the EPBC Act (1999) database using the Protected Matters Search Tool on the website of the Department of the Environment and Energy (www.environment.gov.au/erin/ert/epbc/index.html) was completed. The search area was confined to a 10 kilometre radius of the site. This identified species of conservation significance under the EPBC Act (1999) that may require habitat assessment or targeted survey.
3. The online component of Bionet, the Atlas of NSW Wildlife (http://www.bionet.nsw.gov.au/) was interrogated for an area within 10 kilometres of the site. This search provided records of species of threatened flora and fauna within the locality.
4. PlantNet, the online database of the National Herbarium of NSW at the Royal Botanic Gardens was interrogated (http://plantnet.rbgsyd.nsw.gov.au/floraonline.htm) for rare or threatened species that have been recorded in the locality.
5. Broad-scale vegetation mapping were reviewed to provide baseline vegetation and habitat information.

3.3 Threatened species

Results from the Protected Matters Search Tool and the BioNet Atlas of NSW Wildlife database searches revealed a number of *EPBC Act* and *BC Act* listed species that require consideration as part of this assessment (see Tables 1 and 2 in Appendix 1 for habitat analyses).

Of those species, it is considered likely that at least the following species may occur within the local area and use the habitats of the subject site on occasion:

- *Meridolum corneovirens* Cumberland Plain Land Snail
- *Glossopsitta pusilla* Little Lorikeet
- *Artamus cyanopterus* Dusky Woodswallow
- *Daphoenositta chrysoptera* Varied Sittella
- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Miniopterus australis* Little Bentwing-bat
- *Miniopterus orianae oceanensis* Eastern Bent-wing Bat
- *Mormopterus norfolkensis* Eastern Freetail-bat
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Scoteanax rueppellii* Greater Broad-nosed Bat

3.4 Site Investigations

Site investigations were undertaken on the 6th and 16th July 2015, 24th June 2016, 21st August 2017, 12th September 2017 and 17th October 2017, and included the identification of vegetation type and structure, confirmation of the distribution of trees and assessment of potential habitats for threatened species of flora and fauna.

3.5 Biodiversity of the Site and Surrounds

The full list of species recorded on and near the site are provided in Tables 3 (flora) and 4 (fauna) in Appendix 1.

The site is floristically and structurally simple as a result of its land use history. Of the 62 flora species observed on site and in immediately adjacent lands, over half (34) are exotic. Moreover, many are serious weeds, being Weeds of National Significance or, prior to the repeal of the Noxious Weeds Act, listed Noxious Weeds.

The natural vegetation of the site and surrounds has been variously depicted as Cumberland Plain Woodland**,** Shale Sandstone Transition Forest and Alluvial Woodland. This ambiguity has arisen from the harsh land use history, the generally poor condition and dominance of exotic species in the remnant and regrowth vegetation and the local abiotic factors that determine vegetation type.

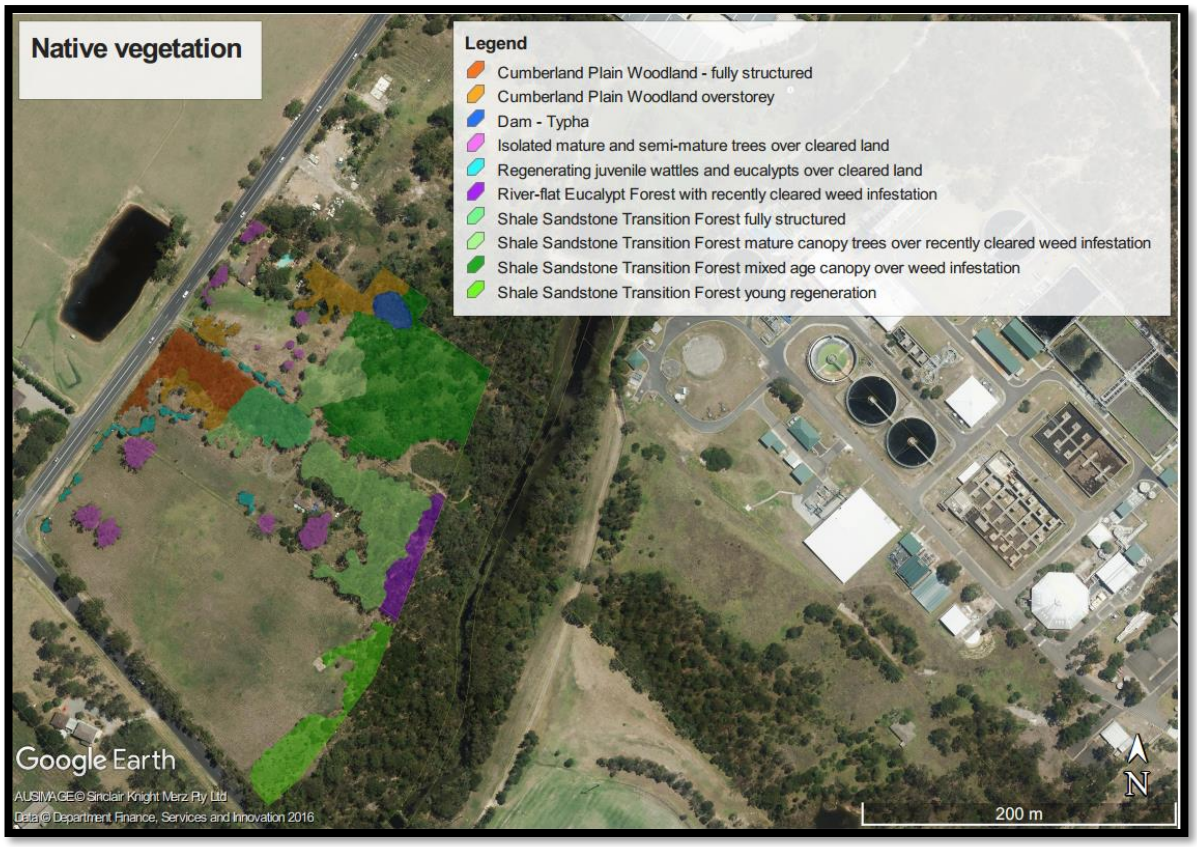

Figure 6: Native vegetation types of the subject lots.

Figure 7: Native vegetation types of number 332 Annangrove Road.

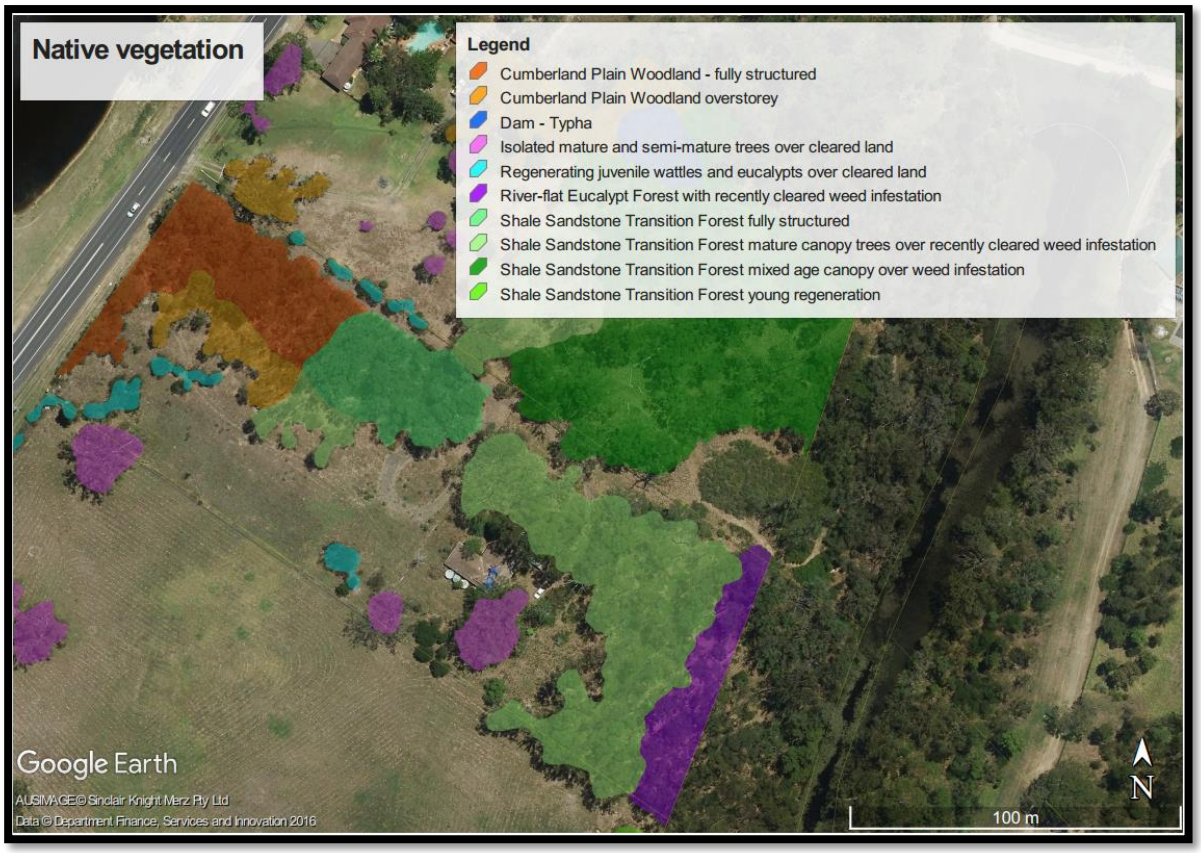

Figure 8: Native vegetation types of number 330 Annangrove Road.

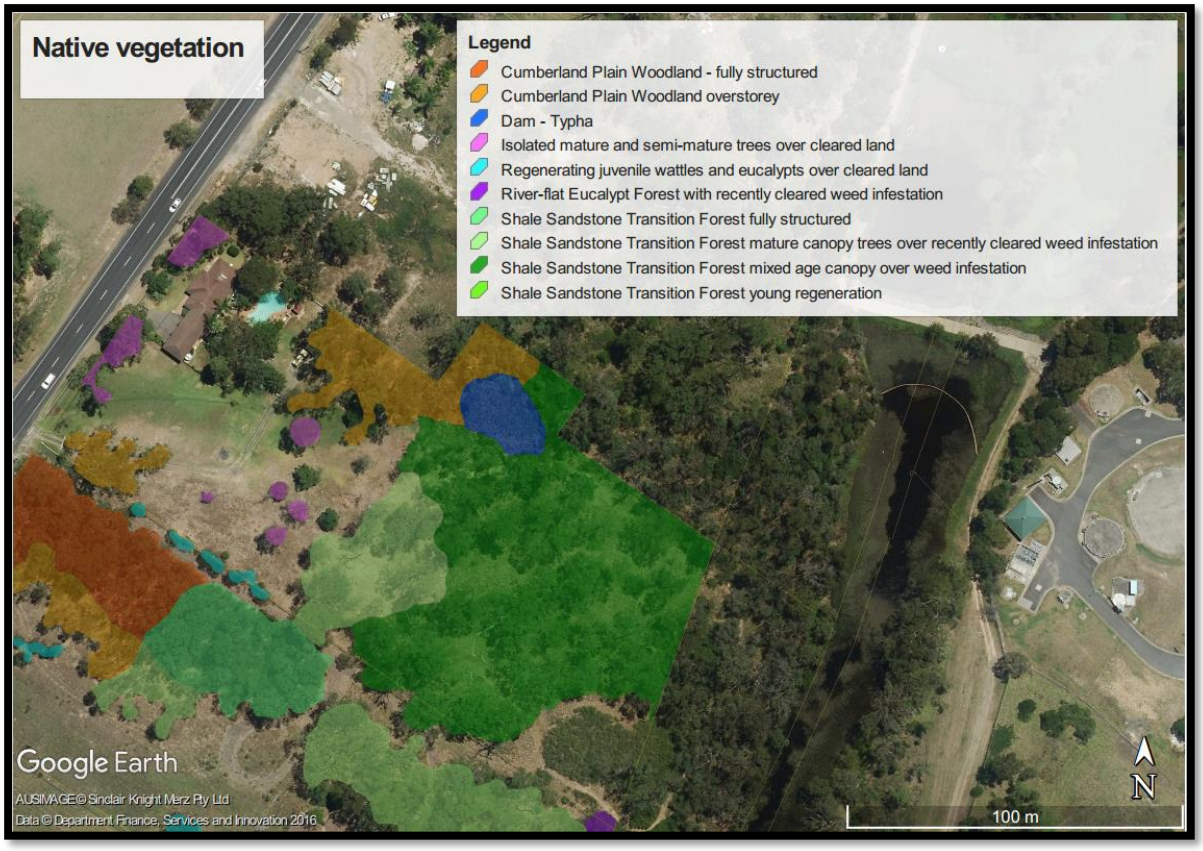

Figure 9: Native vegetation types of number 330 Annangrove Road.

The soil landscape mapping indicates that this area is a junction of at three soil landscapes: Blacktown, Gymea and South Creek. These are formed by three different processes, respectively residual, erosional and alluvial. Their underlying geologies are different as are their topographic positions and exposure. Thus, it is unsurprising that the vegetation types in such a transitional area are difficult to determine.

Notwithstanding these difficulties, the extent of the native vegetation polygons as mapped during the site investigations are shown in Figure 5. The vegetation types, their structure and condition are further detailed in Figures 6 to 9.

Cumberland Plain Woodland was determined according to the distribution of its main canopy determinants, being *Eucalyptus moluccana* Grey Box, *Eucalyptus crebra* Ironbark, and *Eucalyptus tereticornis* Forest Red Gum. The absence of *Eucalyptus moluccana* Grey Box and *Eucalyptus crebra* Ironbark was used to indicate the Shale Sandstone Transition Forest and a combination of the presence of *Eucalyptus amplifolia* Cabbage Gum and topographic position were used to determine the distribution of River-flat Eucalypt Forest.

All three vegetation communities are listed endangered ecological communities.

The total area occupied by native vegetation is 23,361 square metres, made up of the following vegetation zones:

1. Cumberland Plain Woodland, fully structured – 1,798 square metres
2. Cumberland Plain Woodland canopy over cleared land – 2,055 square metres
3. Dam, occupied by *Typha* sp. – 435 square metres
4. Isolated mature / semi-mature trees over cleared land – 1,509 square metres
5. Isolated juvenile eucalypts and wattles over cleared land – 504 square metres
6. River-flat Eucalypt Forest canopy trees over recently cleared weed infestations – 1,043 square metres
7. Shale Sandstone Transition Forest, fully structured – 1,362 square metres
8. Shale Sandstone Transition Forest, canopy trees over recently cleared weed infestations – 5,414 square metres
9. Shale Sandstone Transition Forest, mixed age canopy over weeds – 6,602 square metres
10. Shale Sandstone Transition Forest, young regeneration – 2,639 square metres

The faunal assemblage on and near the site is relatively diverse, being a direct result of the presence of a large and well-connected corridor of bushland along Second Ponds Creek. However, the majority of the site itself provides relatively depauperate fauna habitat, being overwhelmingly dominated by exotic grassland with relatively young trees, few hollows, little understorey and little coarse woody debris.

4 IMPACT, AMELIORATION AND OFFSETTING

It is no longer just good environmental practice to avoid impacts in the first instance, to minimise and ameliorate in the second instance and then to offset or compensate for residual, unavoidable impacts; these practices are now mandated within the *BC Act* when applying the BAM.

As the proposal is only at the concept stage, there is some degree of flexibility in the design. However, there are also some absolute requirements for a development of this type, including its scale and presentation to Annangrove Road. Therefore, the proposed area for retention and revegetation of bushland is restricted to approximately 5,000 square metres in area, and located at the rear of the site.

Such a configuration will deliver a superior conservation outcome, being contiguous with the substantial area of retained bushland in the riparian corridor associated with Second Ponds Creek.

The bushland to be retained is comprised of "Shale Sandstone Transition Forest with a mixed canopy over weed infestation". Therefore its retention provides an opportunity to improve its condition by conservation management under and Approved Management Plan.

The retained area at the rear also includes a cleared and weedy patch, and so this too provides an opportunity to improve its condition with planting of fully structured locally-native vegetation.

Mitigation of impact may also be provided by landscaping with species that occur naturally in the vegetation communities to be impacted.

Any loss of hollows can be offset by the installation of appropriate nest boxes. However, only two hollow-bearing trees were observed as the majority of the trees are relatively young regrowth. The proposal provides an opportunity to enrich the habitat for hollow-dependant species by the installation of more nest boxes and salvaged hollows. Other important fauna habitat features may also be enhanced, such as the placement of coarse woody debris.

Fauna habitats in general will be improved by the control of serious weeds that occur on site, including the transformer weeds Lantana, Small-leaved Privet, African Olive, and Green Cestrum. Removal and control of serious environmental weed species will partially address several Key Threatening Processes:

- Invasion and establishment of exotic vines and scramblers;
- Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata;*
- Invasion, establishment and spread of *Lantana camara;* and
- Invasion of native plant communities by exotic perennial grasses.

As there is potential habitat for *Meridolum corneovirens* Cumberland Plain Land Snail and Pommerhelix duralensis Dural Woodland Snail on site, it is recommended that immediate pre-clearing surveys are undertaken in likely habitat (particularly under the mature remnant trees) and an approved relocation protocol implemented if animals are found.

To ensure the proposal does not impact on the trees to remain in adjacent land, all Tree Protection controls as detailed by Australian Standard 4970 Protection of Trees on Development Sites are to be implemented. These may include trunk armouring, protective fencing, and prohibition of parking machinery and vehicles and stockpiling within the appropriate Tree Protection Zones.

In accordance with the BAM, offsetting of residual unavoidable impacts will be required.

A notional analysis has been undertaken using the Biodiversity Offsets Tool within the BAM. The data input were based on benchmarks for the Plant Community Types (PCTs) that represent the vegetation to be removed from within the conceptual footprint. The impacted Plant Community Types (PCTs) are:

- PCT 849 Grey Box-Forest Red Gum grassy woodland flats of the Cumberland Plain, Sydney Basin Bioregion; and
- PCT 835 Forest Red Gum-Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

Per this hypothetical analysis, the areas to be removed will require the offsetting of 9 ecosystem credits of PCT 849, and 26 ecosystem credits of PCT 835.

The tool also determined the necessity to offset 33 species credits for *Pteropus poliocephalus* Grey-headed Flying-fox.

Once an offset package has been determined, vetted and agreed to, the proponent may purchase the necessary credits or pay the Biodiversity Conservation Trust to source suitable credits on their behalf. Such credits have been readily traded in the past.

5 CONCLUSIONS AND RECOMMENDATIONS

This Preliminary Ecological Assessment has considered the likely impacts of the concept plan of the development of a bulky goods retail outlet and ancillary enterprises at 328 to 332 Annangrove Road, Rouse Hill in The Hills Local Government Area.

The site is highly modified, with a long history of clearing and rural land uses. More than half of the site is made up of cleared exotic grassland, gardens and weed infestations. The native vegetation is generally young regrowth and dominated by serious weeds. Nevertheless, the native vegetation is representative of two state-listed Critically Endangered Communities (Cumberland Plain Woodland, and Shale Sandstone Transition Forest) and an endangered ecological community (River-flat Eucalypt Forest). The vegetation patches are probably too disturbed and isolated to represent the equivalent Commonwealth entities.

The new state legislative landscape prescribed by the *Biodiversity Conservation Act 2016* requires the ecological impact of such a proposal to be addressed by the use of the Biodiversity Assessment Method. This dictates that after a development footprint has been designed to avoid and minimise impacts, then residual unavoidable impacts must be offset.

A hypothetical preliminary calculation determined that the design concept would ultimately require the offsetting of 35 ecosystem credits (for Plant Community Types 849 and 835), and 33 species credits (for *Pteropus poliocephalus* Grey-headed Flying-fox). Such credits are likely to be available for purchase and retirement.

It is therefore concluded that the proposed development can be facilitated by the application of the Biodiversity Assessment Method.

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APPENDIX 1

FLORA AND FAUNA DATA

Table 1: Threatened flora species recorded within 10 kilometres of the subject site. Source: BioNet, Atlas of NSW Wildlife, 2017.

Family	Species	Status BCAct (2016)	Status EPBC Act (1999)	Habitat requirements	Likelihood to occur
Apocynaceae	*Marsdenia viridiflora* subsp. *viridiflora*	EPop	-	Grows in vine thickets and open shale woodland.	Low due to land use history
Asteraceae	*Olearia cordata*	V	V	Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges.	Low
Dilleniaceae	*Hibbertia superans*	E	-	Occurs on sandstone ridgetops often near the shale/sandstone boundary open woodland and heathland. Appears to prefer open disturbed areas, such as edges of tracks.	Low
Elaeocarpaceae	*Tetratheca glandulosa*	V	-	Occurs in shale-sandstone transition habitat on shallow soils associated with Lucas Heights, Gymea, Lambert and Faulconbridge soil landscapes. Usually found on ridgetops to mid slopes in heath, scrub, woodland to open forest.	Low
Ericaceae	*Epacris purpurascens* var. *purpurascens*	V	-	Found in a range of habitat types, most of which have a strong shale soil influence, from Dural to Avon Dam. Found in scrub on periodically poorly-drained clay soil. Associated species include *Melaleuca thymifolia, Melaleuca decora.*	Low
Ericaceae	*Leucopogon fletcheri* subsp. *fletcheri*	E	-	Occurs in dry eucalypt woodland / shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs. Restricted to north-western Sydney between St Albans and Annangrove.	Low
Fabaceae	*Dillwynia tenuifolia*	V, EPop	-	In western Sydney, occurs in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. At Yengo, reported from disturbed escarpment woodland on Narrabeen sandstone.	Low
Fabaceae	*Pultenaea parviflora*	E	V	Endemic to Cumberland Plain, particularly in Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays; also where these meet Castlereagh Scribbly Gum Woodland. *E. fibrosa* usually dominant canopy species.	Low
Malvaceae	*Lasiopetalum joyceae*	V	V	Restricted on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. Occurs in heath on sandstone.	Low
Mimosaceae	*Acacia bynoeana*	E	V	Occurs in heath or dry sclerophyll forest on sandy soils. Prefers open, sometimes disturbed sites and recent burnt patches. Associated with overstorey species *Corymbia gummifera, Eucalyptus haemastoma* and *E. parramattensis* subsp. *parramattensis.*	Low
Mimosaceae	*Acacia gordonii*	E	E	Grows in dry sclerophyll forest and heath, amongst or within rock platforms on sandstone outcrops. Known from lower Blue Mountains (Bilpin to Faulconbridge) and also the Glenorie district.	Low
Mimosaceae	*Acacia pubescens*	V	V	Occurs on alluviums, shales and at the intergrade between shales and sandstones on the Cumberland Plain	Low due to land use history
Myrtaceae	*Callistemon linearifolius*	V	-	Grows in dry sclerophyll forest on the coast and adjacent ranges. Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River.	Low
Myrtaceae	*Darwinia biflora*	V	V	Occurs in scrub-heath on sandstone or in the understorey of woodland/open forest on shale capped ridges intergraded with Hawkesbury sandstone.	Low

Family	Species	Status BCAct (2016)	Status EPBC Act (1999)	Habitat requirements	Likelihood to occur
Myrtaceae	*Eucalyptus nicholii*	V	V	Associated with overstorey species *Eucalyptus haemastoma, Corymbia gummifera* and/or *E. squamosa.* Grows in dry grassy or sclerophyll woodland, on shallow infertile soils, mainly on granite, shales or slates. Widely planted as a garden/streetscape tree, but rare in the wild. Confined to the New England Tablelands.	Low
Myrtaceae	*Eucalyptus* sp. 'Cattai'	E	-	Occurs on flat ridge tops. Associated soils are laterised clays over sandstone.	Low
Myrtaceae	*Melaleuca deanei*	V	V	Grows in heath on sandstone. Occurs in two distinct areas: Ku-ring-gai/Berowra and Holsworthy/Wedderburn.	Low
Myrtaceae	*Micromyrtus minutiflora*	E	V	Restricted to the general area between Richmond and Penrith and grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Low due to land use history
Myrtaceae	*Syzygium paniculatum*	E	V	Occurs in littoral or riverside gallery rainforests.	Low
Orchidaceae	*Pterostylis saxicola*	E	E	Grows in shallow soil over sandstone sheets, often near streams. Known from Picnic Point to Picton area.	Low
Proteaceae	*Grevillea juniperina* subsp. *juniperina*	V	-	Grows on reddish clay-sandy soils derived from Wianamatta Shale and Tertiary alluvium, typically with lateritic gravels. Known from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Low due to land use history
Proteaceae	*Grevillea parviflora* subsp. *supplicans*	E		Occurs in heathy woodland on skeletal sandy soils over massive sandstones associated with Lucas Heights and Faulconbridge soil landscapes. It may have an affinity with disturbance margins and is restricted to the north-west of Sydney.	Low
Proteaceae	*Persoonia hirsuta* subsp. *hirsuta*	E	E	Occurs in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Low
Rhamnaceae	*Pomaderris brunnea*	E	V	Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria.	Low
Rutaceae	*Zieria involucrata*	E	V	Only one record from the broader study area, which may have been misidentified as it is a difficult group to distinguish species. Occurs primarily on Hawkesbury Sandstone, also on Narrabeen Group sandstone and Quaternary alluvium. Found in sheltered forests on mid to lower slopes and valleys. It has a disjunct population north and west of Sydney.	Low
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*	V	V	Mostly confined to northern Sydney- Maroota; formerly south to Parramatta River and Port Jackson region; population persists along Northmead Gully. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes in woodlands.	Low due to land use history
Thymelaeaceae	*Pimelea spicata*	E	E	Occurs in two disjunct areas, the Cumberland Plain (Narellan, Marayong, Prospect Reservoir) and the Illawarra (Lansdowne to Shellharbour to northern Kiama) on well-structured clay soils.	Low due to land use history

Table 2: Threatened fauna species recorded within 10 kilometres of the subject site. Source: BioNet, Atlas of NSW Wildlife 2017.

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
Invertebrates	*Meridolum corneovirens* Cumberland Plain Land Snail	E	-	Primarily in Cumberland Plain Woodland, a grassy open woodland with occasional dense patches of shrubs. Lives under bark, leaves and logs, or shelters in loose soil around grass clumps or under rubbish. Can dig several centimetres into soil to escape drought.	Over 165 records from within the broader study area. Moderate to high likelihood to occur in riparian vegetation in adjacent land.
Invertebrates	Pommerhelix duralensis *Dural land Snail*	E	E	A shale-influenced habitat specialist occurring along the fringes of the Cumberland plain on shale sandstone transitional landscapes. Requires leaf litter and coarse woody debris.	Low
Amphibian	*Heleioporus australiacus* Giant Burrowing Frog	V	V	Found in heath, woodland and open forest with sandy soils. Critical habitat includes fish-free pools with sandy soils nearby. Emerges to feed/breed after rain; travels hundreds of metres to creeks to breed.	Low
Amphibian	*Litoria aurea* Green and Golden Bell Frog	E	V	Inhabits marshes, dams and stream-sides.	Potential breeding and foraging habitat in adjacent riparian habitat. However, the only recent records in the broader study area are of juveniles in the Riverstone area due dispersal from a local breeding program in Oxford Street Riverstone. Although this species can travel many kilometres, this population source is separated from the site by major barriers such as wide roads, hostile habitat and high densities of predators in otherwise suitable habitat. The likelihood of occurrence on site is therefore low.
Amphibian	*Pseudophryne australis* Red-crowned Toadlet	V	-	Restricted to heads of periodically wet drainage lines below sandstone ridges that often have shale caps. Needs rocks and dense vegetation or litter for shelter.	Low
Bird	*Actitis hypoleucos* Common Sandpiper	-	M	Found on muddy edges or rocky shores of coastal or inland wetlands, saline or fresh. Breeds in Eurasia and part of the population overwinters in Australia.	Low
Bird	*Anthochaera phrygia* Regent Honeyeater	CritE	E	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Occasionally non-breeding flocks forage in Swamp Mahogany and Spotted Gum forests on central and north coast and rarely on the south coast	Low
Bird	*Apus pacificus* Fork-tailed Swift	-	M	Almost exclusively aerial, flying over most habitat types. Arrive from Siberia in spring and depart in	Low

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
				autumn. Feed on edge of low pressure systems. Threats to this species in Australia are negligible.	
Bird	*Ardea ibis* Cattle Egret	-	M	Widespread, common and expanding. Occurs in grasslands, wooded lands and wetlands. Most commonly found foraging with livestock. Roosts in trees in or near lakes and swamps. Breeds in colonies in wooded swamps.	Low
Bird	*Artamus cyanopterus* Dusky Woodswallow	V	-	Mostly inhabits dry, open eucalypt forests and woodlands, with an open understorey and fallen woody debris. Also found in farmland, usually at the edges of bushland. Primarily eats invertebrates, captured above the canopy, over water or under the canopy over leaf litter and dead timber. Also occasionally takes nectar, fruit and seed. Nest is an open, cup-shape, of twigs, grass, fibrous rootlets and casuarina needles. Nest sites vary, but generally in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post.	There are over 115 records of this species from the broader study area, with the most recent being 2016. However, the vast majority are from large tracts of bushland, such as Scheyville NP. Nevertheless, it has a high likelihood to forage on the subject site, due to its proximity to the reserved riparian corridor.
Bird	*Botaurus poiciloptilus* Australasian Bittern	E	E	Favours permanent freshwater wetlands.	Low
Bird	*Calidris acuminata* Sharp-tailed Sandpiper	-	M	Summer migrant to Australia from the Arctic. Prefers grassy edges of shallow inland freshwater wetlands. Found also on sewage farms, flooded fields, mudflats, mangroves, beaches and rocky shores.	Low
Bird	*Calidris ferruginea* Curlew Sandpiper	E	M	Breeds in Siberia and migrates to Australia in warmer months. Forages in shallow water of intertidal mudflats of sheltered coasts. Roosts on beaches, spits/islets, saltmarsh or on rocky shore.	Low
Bird	*Calidris melanotos* Pectoral Sandpiper	-	M	Widespread but scattered. Found east of the Great Dividing Range.	Low
Bird	*Calidris ruficollis* Red-necked Stint	-	M	Tidal mudflats, saltmarsh, sandspits, sandy or shell-grit beaches, shallow margins of salt or freshwater lakes often far inland, sewage farms. Winters in southern hemisphere.	Low
Bird	*Calidris subminuta* Long-toed Stint	-	M	A very small sandpiper found where water bodies occur.	Low
Bird	*Callocephalon fimbriatum* Gang-gang Cockatoo	V,EPop	-	In summer, generally found in montane forests and woodlands; in winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Breeds in large and old	Low

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
				hollow-bearing trees in forest.	
Bird	*Calyptorhynchus lathami* Glossy Black-Cockatoo	V	-	Breeds in large hollow-bearing trees in forest and forages on Allocasuarina species.	Low
Bird	*Chlidonias leucopterus* White-winged Tern	-	M	A non-breeding migrant to Australia, inhabits fresh brackish or saline wetlands.	Low
Bird	*Circus assimilis* Spotted Harrier	V	-	Found in tropical and temperate open wooded country, particularly in arid and semi-arid areas. Partly nomadic, in response to local conditions. Hunts low over the ground, favoured prey are ground birds; will also take mice, rats, rabbits and lizards.	Low
Bird	*Climacteris picumnus victoriae* Brown Treecreeper	V	-	Mainly inhabits woodlands dominated by rough-barked eucalypts (e.g. stringybarks), usually with an open grassy understorey	Low
Bird	*Cthonicola sagittata* Speckled Warbler	V	-	Occurs on tablelands and rarely on the coast in large tracts (>100 hectares) of grassy eucalypt woodlands.	Low
Bird	*Daphoenositta chrysoptera* Varied Sittella	V	-	Found in eucalypt woodlands and forests, preferring rough-barked trees or mature trees with hollows or dead branches.	There are 75 records of this species from the broader study area, with the closest being from bushland near Box Hill to the north in 2006. Moderate to high likelihood to occur in adjacent riparian vegetation with occasional foraging forays into subject site.
Bird	*Ephippiorhynchus asiaticus* Black-necked Stork	E	-	Inhabits permanent freshwater wetlands	Low
Bird	*Epthianura albifrons* White-fronted Chat	V,EPop	-	On coast, found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas.	Low
Bird	*Falco subniger* Black Falcon	V	-	Found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. Roosts in trees at night and often on power poles by day. Prey includes birds, small mammals, insects, reptiles and sometimes carrion.	Low
Bird	*Gallinago hardwickii* Latham's Snipe	-	M	Non-breeding migrant to Australia in the warmer months. Found in dense cover in any vegetation around wetlands, also saltmarsh and creek edges when migrating.	Low
Bird	*Glossopsitta pusilla* Little Lorikeet	V	-	Mostly in dry open eucalypt forests and woodlands. Feeds on tree nectar and pollen, particularly profusely-flowering eucalypts, but also melaleucas and mistletoes and mistletoe fruit. Nomadic, movements probably related to food availability.	Moderate to high likelihood to occur in adjacent riparian vegetation with occasional foraging forays into subject site. There are 23 records from the broader study area, the closest being from within 1 kilometre of the site in 2007.

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
Bird	*Grantiella picta* Painted Honeyeater	V	-	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low
Bird	*Haliaeetus leucogaster* White-bellied Sea-eagle	-	M	Most commonly seen foraging over water bodies or near coastal waters; will occasionally forage over open country for carrion. Highly mobile and travels long distances. Nests and roosts high in trees in well-timbered country.	Low
Bird	*Hieraaetus morphnoides* Little Eagle	V	-	Seen over woodland and forested lands and open country, extending into the arid zone; tends to avoid rainforest and heavy forest. Nest in mature living trees in open woodland or tree-lined watercourses; rarely in isolated trees.	Low
Bird	*Hirundapus caudacutus* White-throated Needletail	-	M	Non-breeding population migrates from Asia in spring and departs autumn along either side of Great Dividing Range. Most of its time spent feeding on the wing, high along storm fronts. Roosts infrequently in terrestrial habitats and terrestrial habitat largely irrelevant.	Low
Bird	*Hirundo rustica* Barn Swallow	-	M	Found in coastal low lands often near water in tropical areas of Australia.	Low
Bird	*Hydroprogne caspia* Caspian Tern	-	M	Large waters generally, fresh or salt lakes, larger rivers, reservoirs, estuaries, tidal mudflats, beaches, shallow coastal waters.	Low
Bird	*Irediparra gallinacea* Comb-crested Jacana	V	-	Inhabits permanent wetlands with a good surface cover of floating vegetation, especially water-lilies.	Low
Bird	*Ixobrychus flavicollis* Black Bittern	V	-	Occurs in freshwater and estuarine wetlands.	Low
Bird	*Lathamus discolor* Swift Parrot	E	E	Occurs on mainland between March and October where eucalypts are flowering profusely or where there are abundant lerp infestations.	Low
Bird	*Limosa lapponica* Bar-tailed Godwit	-	M	Tidal mudflats, estuaries, sewage farms; occasionally on shallow river-margins, brackish or salty inland lakes, flooded pastures, airfields. Needs soft sand / mud. Winters in southern hemisphere.	Low
Bird	*Limosa limosa* Black-tailed Godwit	V	-	Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats along coast.	Low
Bird	*Lophochroa leadbeateri*	V	-	Inhabits a wide range of treed and treeless across the	Low

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
	Major Mitchell's Cockatoo			arid and semi-arid inland habitats, always within easy reach of water. Records from coastal locations likely to be aviary escapes.	
Bird	*Lophoictinia isura* Square-tailed Kite	V	-	Found in timbered habitats with a particular preference for timbered watercourses	Low
Bird	*Melanodryas cucullata cucullata* Hooded Robin	V	-	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	Low
Bird	*Melithreptus gularis gularis* Black-chinned Honeyeater	V	-	Found on ranges and west of Divide, except in Richmond Valley. Occurs in only the largest patches of woodland.	Low
Bird	*Merops ornatus* Rainbow Bee-eater	-	M	Occurs in many habitats where there are open areas for foraging, well-placed perches to from which to forage, a water source and breeding habitat such as sandy creek banks.	Low
Bird	*Neophema pulchella* Turquoise Parrot	V	E	Inhabits woodlands adjoining clearings, timbered ridges and creeks in farmland. Forages on ground feeding on grass seed or low vegetation.	Low
Bird	*Ninox connivens* Barking Owl	V	-	Occurs in eucalypt woodland, open forest, swamp woodlands and timbered watercourses. Occasionally uses dense vegetation for roosting. Breeds in hollows in large old trees.	Low
Bird	*Ninox strenua* Powerful Owl	V	-	Usually roosts in dense vegetation and hunts for arboreal mammals across large home range	Low
Bird	*Numenius minutus* Little Curlew	-	M	Breeds in Siberia, non-breeding migrant to Australia. Widespread in northern part Australia and disperses to inland and coastal wetlands in response to the wet season.	Low
Bird	*Oxyura australis* Blue-billed Duck	V	-	Inhabits large permanent wetlands and swamps	Low
Bird	*Petroica boodang* Scarlet Robin	V	-	Occurs in open forests and woodlands. During winter, will visit more open habitats such as grasslands, farmland and urban parks and gardens but abundant logs and coarse woody debris are important structural components of its habitat.	Low
Bird	*Petroica phoenicea* Flame Robin	V	-	Summer breeding habitat: moist eucalypt forest and woodland; winter: dry open lowland woodland / forest. Prefers clearings or forests with open grassy understorey and some shrubs; also pastures. Forages from low perches on ground or in the air.	Low
Bird	*Petroica rodinogaster* Pink Robin	V	-	Inhabits rainforest and tall eucalypt forest, particularly in densely vegetated gullies. Found in	Low

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
				Tas, uplands of E Vic and far SE NSW. Disperses into more open habitats in winter, regularly as far as the ACT, sometimes as far north as the central coast.	
Bird	*Philomachus pugnax* Ruff	-	M	Found in fresh brackish of saline wetlands.	Low
Bird	*Plegadis falcinellus* Glossy Ibis	-	M	Frequents swamps and lakes throughout much of the Australian mainland. Breeds in colonies with other waterbirds; nests in trees or shrubs growing in water.	Low
Bird	*Pluvialis fulva* Pacific Golden Plover	-	M	Widespread in non-breeding season in coastal Australasia, Melanesia and Polynesia. Usually in coastal habitats (beaches, mudflats, sandflats, mangroves, saltmarsh, seagrass), though occasionally in inland wetlands.	Low
Bird	*Pluvialis squatarola* Grey Plover	-	M		Low
Bird	*Polytelis swainsonii* Superb Parrot	V	-	Inhabits grassy box woodland throughout eastern inland NSW. Nest in small colonies, often with more than one nest in a single tree and breed between Sept and Jan. Coastal records likely to be aviary escapes.	Low
Bird	*Rostratula australis* Australian Painted Snipe	E	V,M	Usually found in shallow inland freshwater or brackish, permanent or temporary wetlands. Nests on the ground amongst tall reed-like vegetation near water. Feeds near the water's edge and on mudflats. Eats invertebrates (e.g. insects and worms) and seeds.	Low
Bird	*Stictonetta naevosa* Freckled Duck	V	-	Inhabits permanent freshwater swamps and creeks.	Low
Bird	*Tringa glareola* Wood Sandpiper	-	M	Found east of the Great Dividing Range in swamps, wetlands. Lakes and billabongs.	Low
Bird	*Tringa nebularia* Common Greenshank	-	M	Breeds in the Palaearctic. In Australia over summer, on coast and inland, in estuaries, mudflats, mangrove swamps and lagoons.	Low
Bird	*Tringa stagnatilis* Marsh Sandpiper	-	M	Summer migrant, in Australia from August to April. Commonly seen in fresh or brackish wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	Low
Bird	*Tryngites subruficollis* Buff-breasted Sandpiper	-	M	Migratory species from the arctic.	Low
Bird	*Tyto novaehollandiae*	V	-	Occurs in forests, but often hunts along forest edges	Low

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
	Masked Owl			such as roadsides.	
Bird	*Tyto tenebricosa* Sooty Owl	V	-	Occurs in rainforest and moist eucalypt forests. Forages on arboreal mammals.	Low
Mammal	*Chalinolobus dwyeri* Large-eared Pied Bat	V	V	Roosts in caves and found mainly in areas with extensive cliffs and caves. Generally rare with a very patchy distribution in NSW. Found in well-timbered areas containing gullies.	Low
Mammal	*Dasyurus maculatus* Spotted-tailed Quoll	V	E	Occurs in a number of forest habitats but requires large areas of relatively intact forest	Low
Mammal	*Petauroides volans* Greater Glider	-	V	Occurs in a number of forest habitats but requires large areas of relatively intact forest	Low
Mammal	*Petaurus australis* Yellow-bellied Glider	V	-	Favours tall mature eucalypt forest in areas with high rainfall and nutrient rich soils.	Low
Mammal	*Petaurus norfolcensis* Squirrel Glider	V	-	Inhabits old growth Box, box-ironbark woodlands west of the Great dividing Range and Blackbutt-Bloodwood with heath understorey in coastal areas.	Low
Mammal	*Phascolarctos cinereus* Koala	V	V	Inhabits eucalypt woodlands and forests.	Low
Mammal	*Pteropus poliocephalus* Grey-Headed Flying-fox	V	V	Foraging habitat in flowering eucalypts, particularly winter-flowering species; camps in dense wet forest or rainforest gullies.	Potential foraging habitat on and near the site. Over 80 records from the broader study area, the closest being within 1 kilometre of the site in 2004. High likelihood to occur.
Mammal	*Falsistrellus tasmaniensis* Eastern False Pipistrelle	V	-	Absent from small remnant patches. Prefers continuous tall wet forests (trees >20m tall, dense u/storey) where they forage along tracks, creeks, rivers. Roosts in colonies (3-80 individuals) usually in hollows and changes roosts daily. Home range >100ha.	Marginal potential foraging habitat on and adjacent to the site. There are 37 records of this species within the broader study area, the closest being within 1 kilometre in 1999. Moderate to high likelihood to occur.
Mammal	*Miniopterus australis* Little Bentwing-bat	V	-	Roosts in caves and forages beneath tree canopies.	There are 22 records of this species within the broader study area, the closest being within 1 kilometre in 2006. Potential foraging habitat on and near the site. High likelihood to occur.
Mammal	*Miniopterus orianae oceanensis* Eastern Bent-wing Bat	V	-	Roosts in caves and forages above tree canopies	Potential foraging habitat above the site and adjacent vegetation. Over 90 records in the broader study area, the most recent being in 2011 and the closest within 1 kilometre of the site in 1997. High likelihood to occur.
Mammal	*Mormopterus norfolkensis*	V	-	Occur in dry sclerophyll forest and woodland, roost	Potential habitat on and near the site.

Fauna Group	Species	Status BC Act (2016)	Status EPBC Act (1999)	Habitat Requirements	Likelihood to occur
	Eastern Freetail-bat			in hollows and man-made structures.	Over 75 records of this species across the broader study area, the nearest being less than 1 kilometre away in 2007. High likelihood to occur.
Mammal	*Myotis macropus* Large-footed Myotis	V	-	Forages over large bodies of water and roosts in hollows or under old wooden bridges up to 10 km from foraging habitat.	Low Potential foraging habitat on and near the site.
Mammal	*Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat	V	-	Roosts in tree hollows, buildings or terrestrial burrows in treeless areas. Forages high over forest canopy for insects.	Thirteen records in the broader study area with the nearest record within 1 kilometre of the subject site in 2004. High likelihood to occur.
Mammal	*Scoteanax rueppellii* Greater Broad-nosed Bat	V	-	Found in a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though most commonly found in tall wet forest. Roosts in tree hollows and forages over creeks and other corridors in forest.	Potential foraging habitat on and near the site. Thirty records of this species across the broader study area, the closest to the site being within 1 kilometre in 2016. High likelihood to occur.
Mammal	*Vespadelus troughtoni* Eastern Cave Bat	V	-	Found in a variety of woodland / forest habitats, but roosts in caves and sandstone overhangs. Forages near roost sites.	Only one record from broader study area. No roosting habitat nearby. Low likelihood to occur.

Table 3: Flora species observed on and adjacent to the site during this and previous survey. Exotic species indicated by an asterisk. WONS = Weed of National Significance (Department of the Environment 2014).

Family	Scientific Name	Common Name
Apiaceae	*Centella asiatica*	Swamp Pennywort
Asparagaceae	*Asparagus aethiopicus** WONS	Asparagus Fern
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Coreopsis lanceolata**	-
Asteraceae	*Hypochaeris glabra**	Smooth Catsear
Asteraceae	*Hypochaeris radicata**	Flatweed
Asteraceae	*Senecio madagascariensis** WONS	Fireweed
Asteraceae	*Sonchus oleraceus**	Common Sowthistle
Commelinaceae	*Commelina cyanea*	Native Wandering Jew
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Ericaceae	*Lissanthe strigosa*	Peach Heath
Fabaceae	*Glycine clandestina*	Twining Glycine
Fabaceae	*Pultenaea microphylla*	
Fabaceae	*Trifolium repens**	White Clover
Fabaceae	*Vicia sativa* subsp. *niger **	Narrow-leaf Vetch
Juncaceae	*Juncus usitatus*	Common Rush
Lomandraceae	*Lomandra glauca* subsp. *glauca*	-
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Mimosaceae	*Acacia decurrens*	Black Wattle
Mimosaceae	*Acacia parramattensis*	Sydney Green Wattle
Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum
Myrtaceae	*Eucalyptus moluccana*	Grey Box
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Oleaceae	*Ligustrum sinense** N4	Small-leaved Privet
Oleaceae	*Olea europaea* subsp. *cuspidata** N4	African Olive
Oxalidaceae	*Oxalis corniculata**	Yellow Wood Sorrel
Pittosporaceae	*Bursaria spinosa* var. *spinosa*	Blackthorn
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Plantaginaceae	*Plantago lanceolata**	Ribwort
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Aristida vagans*	Three-awn Speargrass
Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass
Poaceae	*Avena sativa**	Oats
Poaceae	*Axonopus fissifolius**	Narrow-leaved Carpet Grass
Poaceae	*Bromus catharticus**	Prairie Grass

Family	Scientific Name	Common Name
Poaceae	*Chloris gayana**	Rhodes Grass
Poaceae	*Chloris virgata**	Feathertop Rhodes Grass
Poaceae	*Cynodon dactylon*	Couch
Poaceae	*Digitaria parviflora* (probably)	-
Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Poaceae	*Eragrostis curvula**	African Lovegrass
Poaceae	*Lachnagrostis filiformis*	Blown Grass
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Pennisetum clandestinum**	Kikuyu
Poaceae	*Poa annua**	Winter Grass
Poaceae	*Rytidosperma tenuior*	Wallaby Grass
Poaceae	*Setaria parviflora**	Slender Pigeon Grass
Polygonaceae	*Persicaria decipiens*	Slender Knotweed
Polygonaceae	*Rumex brownii*	Swamp Dock
Polygonaceae	*Rumex conglomeratus**	Clustered Dock
Polygonaceae	*Rumex crispus**	Curled Dock
Rosaceae	*Rubus fruticosis* sp. agg.*[N4, WONS]	Blackberry
Solanaceae	*Solanum nigrum**	Black Nightshade
Urticaceae	*Parietaria judaica**	Pellitory
Verbenaceae	*Lantana camara**[WONS]	Lantana
Verbenaceae	*Verbena bonariensis**	Purpletop

Table 4: Fauna species observed on and adjacent to the site during this and previous survey on site, and in previous surveys at number 314 Annangrove Road in 2007 and 338-340 Annangrove Road in 2013. Threatened species indicated in bold.

Fauna Group	Scientific Name	Common Name	Type of Record
Amphibian	*Litoria fallax*	Eastern Dwarf Tree Frog	Heard nearby at #338-340 during previous survey
Amphibian	*Crinia signifera*	Common Eastern Froglet	Heard nearby at #338-340 during previous survey
Reptile	*Physignathus lesueurii*	Eastern Water Dragon	Observed nearby in Second Ponds Ck riparian corridor
Reptile	*Eulamprus quoyii*	Eastern Water Skink	Observed nearby in Second Ponds Ck riparian corridor
Reptile	*Lampropholis delicata*	Garden Skink	Observed
Reptile	*Saproscincus mustelina*	Weasel Skink	Observed nearby
Reptile	*Pseudechis porphyriacus*	Red-Bellied Black Snake	Observed nearby at #338-340 during previous survey
Bird	*Phalacrocorax melanoleucos*	Little Pied Cormorant	Observed nearby in Second Ponds Ck riparian corridor
Bird	*Anas supercilliosa*	Pacific Black Duck	Observed nearby
Bird	*Aythya australis*	Hardhead	Observed nearby at #338-340 during previous survey
Bird	*Chenonetta jubata*	Australian Wood Duck	Observed nearby at #338-340 during previous survey
Bird	*Elanus axillaris*	Black-shouldered Kite	Observed nearby at #338-340 during previous survey
Bird	*Fulica atra*	Eurasian Coot	Observed nearby at #338-340 during previous survey
Bird	*Gallinula tenebrosa*	Dusky Moorhen	Observed nearby in Second Ponds Ck riparian corridor
Bird	*Vanellus miles*	Masked Lapwing	Heard nearby at #338-340 during previous survey
Bird	*Columba livia**	Feral Pigeon	Observed nearby at #338-340 during previous survey
Bird	*Streptopelia chinensis**	Spotted Dove	Observed
Bird	*Cacatua galerita*	Sulphur-crested Cockatoo	Observed
Bird	*Glossopsitta concinna*	Musk Lorikeet	Observed nearby in Second Ponds Ck riparian corridor
Bird	***Glossopsitta pusilla***	**Little Lorikeet**	**Observed nearby at #314 during previous survey**
Bird	*Trichoglossus haematodus*	Rainbow Lorikeet	Observed
Bird	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	Heard nearby at #314 during previous survey
Bird	*Alcedo azurea*	Azure Kingfisher	Observed nearby at #338-340 during previous survey
Bird	*Dacelo novaeguineae*	Laughing Kookaburra	Heard nearby at #338-340 during previous survey

Fauna Group	Scientific Name	Common Name	Type of Record
Bird	*Hirundo neoxena*	Welcome Swallow	Observed nearby at #338-340 during previous survey
Bird	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Observed nearby at #338-340 during previous survey
Bird	*Pycnonotus jocosus*	Red-whiskered Bulbul	Heard nearby at #338-340 during previous survey
Bird	*Rhipidura fuliginosa*	Grey Fantail	Observed nearby at #314 during previous survey
Bird	*Rhipidura leucophrys*	Willie Wagtail	Observed nearby at #314 during previous survey
Bird	*Colluricincla harmonica*	Grey Shrike-thrush	Observed nearby at #314 during previous survey
Bird	*Eopsaltria australis*	Eastern Yellow Robin	Observed nearby at #314 during previous survey
Bird	*Psophodes olivaceus*	Eastern Whipbird	Observed nearby in Second Ponds Ck riparian corridor
Bird	*Malurus lamberti*	Variegated Fairy-wren	Observed nearby at #338-340 during previous survey
Bird	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	Observed nearby at #314 during previous survey
Bird	*Acanthiza pusilla*	Brown Thornbill	Observed nearby at #314 during previous survey
Bird	*Smicrornis brevirostris*	Weebill	Observed nearby at #314 during previous survey
Bird	*Cormobates leucophaeus*	White-throated Treecreeper	Observed nearby at #314 during previous survey
Bird	*Turdus merula**	Eurasian Blackbird	Heard nearby at #338-340 during previous survey
Bird	*Acanthorhynchus tenuirostris*	Eastern Spinebill	Observed nearby at #314 during previous survey
Bird	*Anthochaera carunculata*	Red Wattlebird	Observed
Bird	*Lichenostomus melanops*	Yellow-tufted Honeyeater	Observed nearby at #314 during previous survey
Bird	*Lichenostomus penicillatus*	White-plumed Honeyeater	Observed nearby at #314 during previous survey
Bird	*Manorina melanocephala*	Noisy Miner	Observed
Bird	*Meliphaga lewinii*	Lewin's Honeyeater	Observed nearby at #314 during previous survey
Bird	*Pardalotus punctatus*	Spotted Pardalote	Heard nearby at #314 during previous survey
Bird	*Pardalotus striatus*	Striated Pardalote	Observed nearby at tree hollow in Second Ponds Ck riparian corridor
Bird	*Neochmia temporalis*	Red-browed Finch	Observed nearby at #314 during previous survey
Bird	*Taeniopygia bichenovii*	Double-barred Finch	Observed nearby at #314 during previous survey
Bird	*Taeniopygia guttata*	Zebra Finch	Observed nearby at #314 during previous survey
Bird	*Acridotheres tristis**	Common Myna	Observed nearby at #338-340 during previous survey

Fauna Group	Scientific Name	Common Name	Type of Record
Bird	*Grallina cyanoleuca*	Australian Magpie-Lark	Heard nearby at #338-340 during previous survey
Bird	*Gymnorhina tibicen*	Australian Magpie	Observed nearby at #338-340 during previous survey
Bird	*Strepera graculina*	Pied Currawong	Observed
Bird	*Corvus coronoides*	Australian Raven	Observed
Mammal	***Mormopterus norfolkensis***	**Eastern Freetail-bat**	**Call recorded definite nearby at #338-340 and #314 during previous surveys**
Mammal	*Mormopterus* sp. 2	Freetail-bat	Possible call recorded nearby at #314 during previous survey
Mammal	*Nyctophilus timoriensis* (South-eastern form)	Eastern Long-eared Bat	Possible call recorded nearby at #314 during previous survey
Mammal	***Miniopterus schreibersii oceanensis***	**Eastern Bent-wing Bat**	**Possible call recorded nearby at #314 during previous survey**
Mammal	***Miniopterus australis***	**Little Bentwing-bat**	**Call recorded definite nearby at #338-340 during previous survey**
Mammal	*Chalinolobus gouldii*	Gould's Wattled Bat	Possible call recorded nearby at #314 during previous survey
Mammal	*Vespadelus pumilus*	Eastern Forest Bat	Possible call recorded nearby at #314 during previous survey
Mammal	*Rattus rattus**	Black Rat	Hair sample nearby at #314 during previous survey
Mammal	*Oryctolagus cuniculus**	Rabbit	Diggings and hair in scat. Also observed nearby at #314 during previous survey
Mammal	*Vulpes vulpes**	European Red Fox	Scats nearby at #338-340 during previous survey
Mammal	*Canis familiaris**	Dog	Observed

in association with:
Gennaoui Consulting

ABAX Contracting Pty Ltd

Bulky Goods Planning Proposal
Annangrove Road

Planning Proposal

October 2017

TDG Ref: 14969rep01 - rev03.docx

ABAX Contracting Pty Ltd

Bulky Goods Planning Proposal
Annangrove Road

Planning Proposal

Quality Assurance Statement

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Reviewed by:

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Status: Traffic Assessment

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Table of Contents

1. Introduction

1.1 Background

Traffic Design Group 'TDG' Ltd in association with Gennaoui Consulting was commissioned to assess the proposed parking and traffic implications of the proposed Bulky goods retails stores development at Annangrove Road, Rouse Hill.

ABAX Contracting have 3 vacant lots (Property Number. 328, 330 and 332) and are planning to develop the vacant land use of approximately 60,700m^2 to a bulky goods retail stores at Annangrove Road, Rouse Hill.

It is understood that a planning proposal will be lodged with The Hills Shire Council.

1.2 Site Location

The subject site is located at Annangrove Road, Rouse Hill (See Figure 1-1).

Figure 1-1: Site location

1.3 Study Approach

This report summarises the findings, conclusions and recommendations with respect to the parking requirements and traffic impacts of the proposed redevelopment.

2. Existing Traffic Conditions

2.1 Road network

Windsor Road is a regional road that runs in a north-south direction between Parramatta and Windsor. This road has been progressively upgraded over recent times to accommodate the broader requirements of the North-West Growth Centre, with additional through lanes and significant intersection upgrades. In vicinity of the site, it has currently a four lane divided carriageway

Annangrove Road is a two-way two-lane sealed road with formed shoulders on both sides. The centreline and edge lines are marked throughout its length. The speed limit is 70 km/h. Annangrove Road forms an intersection with Windsor Road on its south end with slip lanes linked to the eastbound lanes of Windsor Road.

Withers Road currently provides a collector role for existing residential and industrial sites south of Annangrove Road.

2.2 Public Transport

Bus Services
Bus stops are located fronting the subject site along Annangrove Road and on Windsor Road. These bus routes include:

- Route 641 - Rouse Hill Town Centre to Dural.
- Route 608 - Windsor to Rouse Hill.
- Route 746 – Riverstone to Box Hill and Rouse Hill.

These bus routes connect to the wider bus network (see Figure 2-1) which includes bus routes 661 (Riverstone to Windsor via McGraths Hill and Vineyard), 662 (Oakville and Maraylya to Riverstone) and T75 (Riverstone and Rouse Hill to Blacktown).

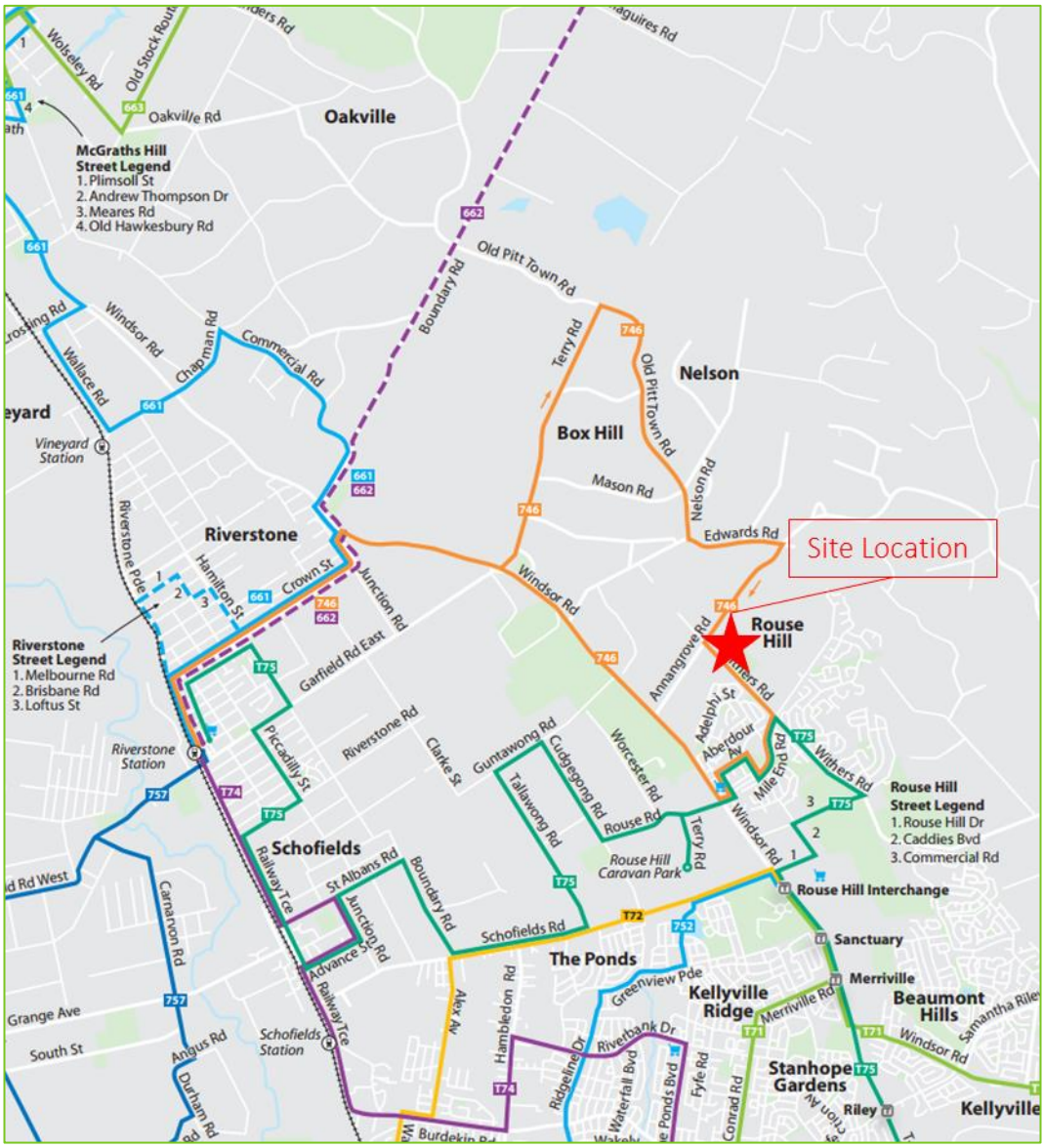


Figure 2-1: Bus Network Map[1]

The '2011 Box Hill and Box Hill Industrial Precincts – Transport and Access Study prepared by GHD' specifies that the future the Site is expected to be served by high frequency services between the Rouse Hill Transport Interchange (RHTI) and the Box Hill Precinct via Withers Road directly past the Site and by additional services via the existing Annangrove Road corridor.

Sydney Metro

In addition to the existing public transport, following the completion of the new Sydney Metro Northwest Light Rail system. A Light Rail 'Rouse Hill' Station is currently under construction adjacent to Windsor Road (see Figure 2-2).

[1] Source: Busways Website (https://www.busways.com.au/sites/default/files/network_maps/R1TimetableNetworkMap280517.pdf)

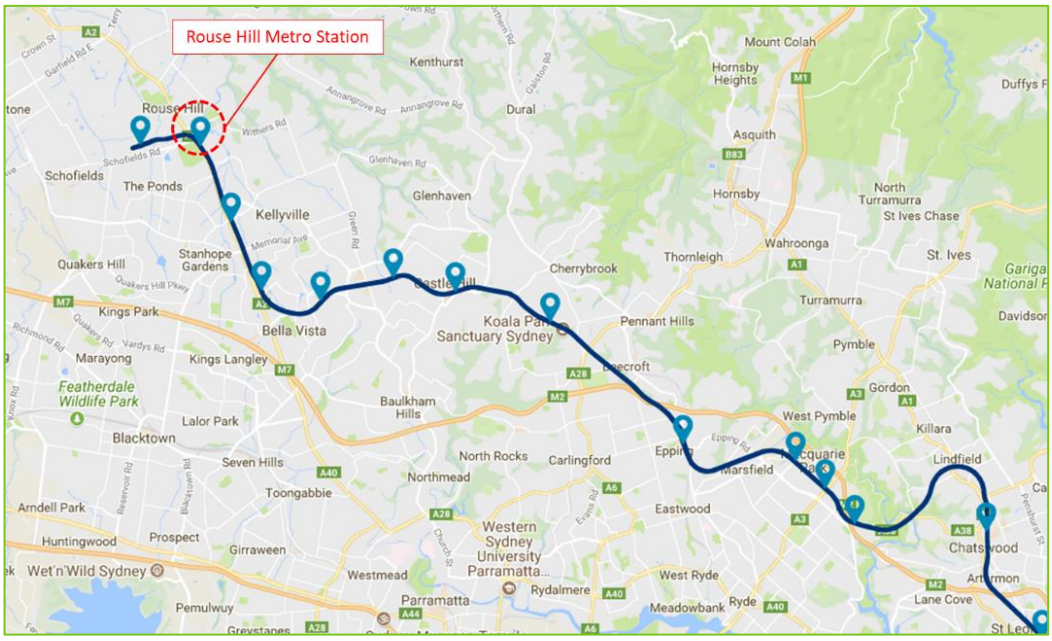


Figure 2-2: Sydney Metro Light Rail[2]

2.3 Road Planning

Council has provided ABAX Contracting with a preliminary intersection design of Annangrove Road, The Water Lane and Withers Road which provides significant additional approach infrastructure to that detailed in the '*Box Hill North Transport and Access Impact Assessment*'.

The preliminary design for the intersection of Annangrove Road, The Water Lane and Withers Road is presented in Figure 2-3.

Figure 2-3: Concept Design of Annangrove Road, Withers Road and The Water Lane Intersection[3]

[2] Source: Sydney Metro Website (https://www.sydneymetro.info/station/rouse-hill-station)
[3] Source: Anton Reisch Consulting Traffic Impact Assessment July 2017

2.4 Operation of Existing Road System

2.4.1 Traffic Surveys

Traffic surveys for light and heavy vehicles were carried out on Saturday 16th September 2017 between 10.00 am and 1.00 pm, and on Wednesday 20th September 2017 from 7.00 am to 9.00 am and 4.00 pm to 6.00 pm at the Annangrove Road, The Water Lane and Withers Road intersection.

The peak hour traffic results are summarised in Table 2-1 and Table 2-2 (details of the traffic surveys are presented in Appendix B).

Table 2-1: Annangrove Road, The Water Lane and Withers Road intersection survey results (weekday peak period)

Approach	Annangrove Rd				Withers Rd				Annangrove Rd				The Water Ln				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
8:00 to 9:00	388	35	0	**423**	309	21	0	**330**	383	24	0	**407**	1	0	0	**1**	**1,161**
16:00 to 17:00	368	19	0	**387**	372	13	0	**385**	445	17	2	**464**	0	0	0	**0**	**1,236**

Table 2-2: Annangrove Road, The Water Lane and Withers Road intersection survey results (weekend peak period)

Approach	Annangrove Rd				Withers Rd				Annangrove Rd				The Water Ln				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
11:15 to 12:15	299	8	0	**307**	324	2	1	**327**	370	10	0	**380**	1	0	0	**1**	**1,015**

2.4.2 Operation of Existing Intersection

The concepts of intersection capacity and Level of Service, as defined in the Guidelines published by the RTA (2002), are described in Appendix C together with criteria for their assessment. The assessment of the Level of Service of traffic signals is based on the evaluation of the average delay (seconds/vehicle) of vehicles on all approaches. The assessment of the Level of Service of roundabouts and signed controlled intersections is based on the average delay (seconds/vehicle) of the critical movement.

The existing intersection configuration of Annangrove Road, The Water Lane and Withers Road is shown in Figure 2-4. The intersection is currently controlled by 'Stop Signs' on Withers Road and The Water Lane.

Figure 2-4: Existing intersection configuration of Annangrove Road, The Water Lane and Withers Road

Table 2-3 gives a summary of the SIDRA results for the current volumes applied to the existing intersection configuration under sign controlled. The SIDRA outputs included in Appendix D.

Table 2-3: SIDRA Outputs for Annangrove Road, The Water Lane and Withers RoadI Intersection

Scenario	Degree of Saturation (%)	Average Delay (secs)	Level of Service (LoS)
Morning Peak Period	68.2%	25.9	B
Evening Peak Period	91.5%	44.3	D
Weekend Peak Period	52.2%	17.5	B

The current intersection configuration of Annangrove Road, The Water Lane and Withers Road is operating at a good Level of Service (LoS) "B" in the morning peak, but worsening to a poor but acceptable LoS "D" during the evening peak period. The weekend peak period operates at a good Level of Service B.

The results indicate that the current intersection configuration has some spare capacity for future traffic demands. It is understood that Council is planning to upgrade the Annangrove Road, The Water Lane and Withers Road with signalised traffic signals in the future, as detailed in Section 2.3.

3. Proposed Development

3.1 Development Profile

ABAX Contracting Pty Ltd is proposing to proceed with a development of the site to provide approximately 60,700m^2 GFA of bulky good retail stores.

Access to the site are proposed via driveways on Annangrove Road and Withers Road, with a separate access for heavy vehicles on Withers Road (see Figure 3-1).

The proposed driveway locations will be more than 200 metres from the intersection of Annangrove Road, The Water Lane and Withers Road.

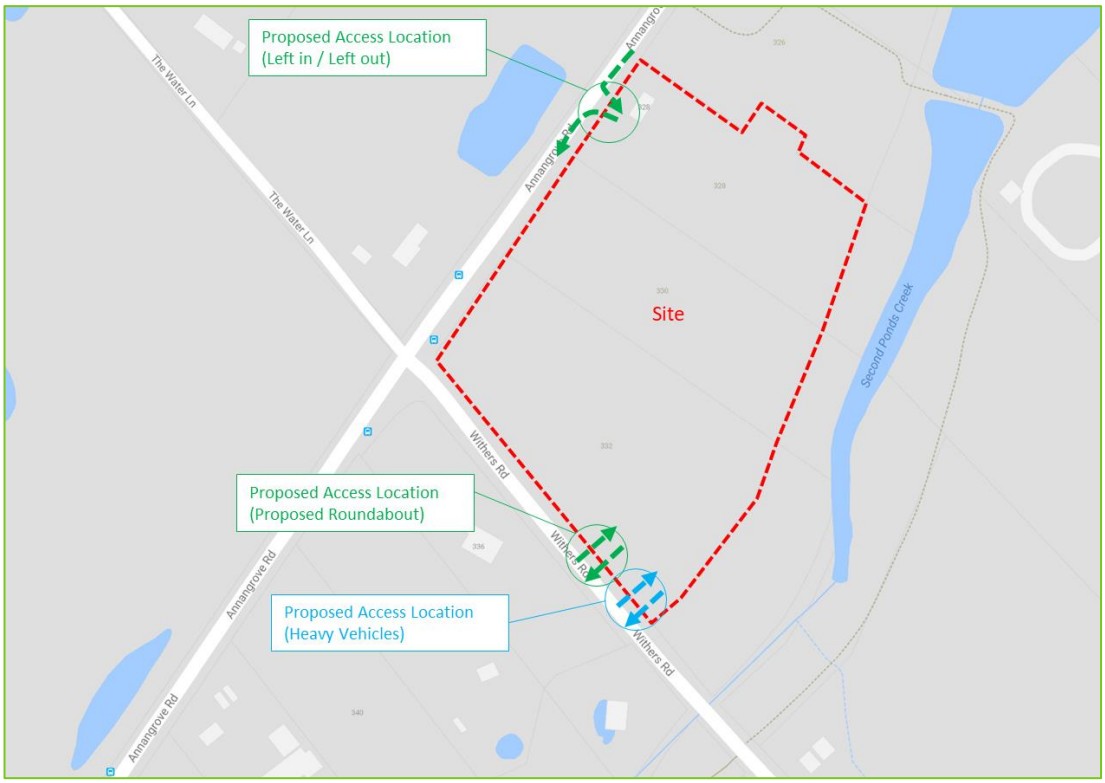


Figure 3-1: Proposed Access Locations

All movements in and out the Withers Road access will be permitted. To facilitate and minimise conflict with through traffic, a roundabout is proposed at this location.

3.2 Car Parking Requirements

3.2.1 Council's Car Parking Requirements

Councils car parking requirements for this type of development are identified in '*The Hills Development Control Plan (DCP) – Part C Section 1 – Parking*' and is presented in Table 3-1.

Table 3-1: Council Minimum Car Parking Provisions

Land Use	Required Minimum Provisions
Bulky Goods Premises (60,700m^2 GFA)	1 space per 40m^2 of GFA

Applying Councils car parking rate to the Bulky goods premises of 60,700m^2 GFA results in a requirement for 1,517 car parking spaces.

3.3 Car Park and Access Layout

The car park layout and driveway access will be designed in accordance with the following standards:

- Australian Standards (AS 2890).
- Councils Development Control Plan.
- RTA Guide to Traffic Generating Developments Section 6 Access and Parking Area Design.

3.4 Service Vehicles

The proposed service vehicle access will be left in and left out. Service vehicles that are heading westbound will enter the site by manoeuvring a U-turn at the proposed roundabout on Withers Road before entering the site.

The proposed service vehicle arrangements are considered adequate to meet the needs of the proposed development.

4. Traffic Impact of Proposed Development

4.1 Trip Generation and Distribution of Proposed Development

4.1.1 Trip Generation of the Proposed development

The RMS Technical Direction (TD 2013 4a): Guide to Traffic Generating Development Update traffic survey specifies land use traffic generation rate for the proposed development is shown in Table 4-1.

Table 4-1: RMS Trip Generation Rate

Land Use	RMS Traffic Generation Rates
	Peak hour vehicle trips
Bulky goods retail stores (60,700m^2 GFA)	**Weekday -** 2.7 vehicles per 100m^2 of GFA*
	Weekend - 3.9 vehicles per 100m^2 of GFA

*Note: * The morning site peak hour during weekdays does not generally coincide with the network peak hour. For the morning peak hour assessment, a 1.3 vehicle per 100m^2 of GFA has been applied.*

Table 4-2 presents the traffic generation from the RMS traffic generations rates applied.

Table 4-2: Traffic Generation for the Proposed Development

Land Use	Peak hour Traffic Rates	Peak hour vehicle trips
Bulky goods retail stores (60,700m^2 GFA)	**Weekday (morning peak)** 1.3 vehicles per 100m^2 of GFA	789 vehicle trips
	Weekday (evening peak) 2.7 vehicles per 100m^2 of GFA	1,639 vehicle trips
	Weekend 3.9 vehicles per 100m^2 of GFA	2,367 vehicle trips

4.1.2 Traffic Distribution

The following distribution adopted for traffic to and from the proposed development was derived from traffic projection at the intersection of Annangrove Road with Withers Road in the GHD (2011) report:

- 13% of inbound and outbound vehicular traffic will come from Annangrove Road (north).
- 7% of inbound and outbound vehicular traffic will come from Annangrove Road (south).
- 40% of inbound and outbound vehicular traffic will come from Withers Road.
- 40% of inbound and outbound vehicular traffic will come from The Water Lane.

The traffic generation has been assigned to the road network according to the following principles for 'Bulky Goods Retail Stores':

- 70% arrival / 30% departure split for outbound and inbound traffic movements for the morning peak period.
- 50% arrival / 50% departure split for outbound and inbound traffic movements for the evening peak period.
- 50% arrival / 50% departure split for outbound and inbound traffic movements during the weekend peak period.

The traffic distribution and traffic generation of the proposed development is presented in Figure 4-1 to Figure 4-3.

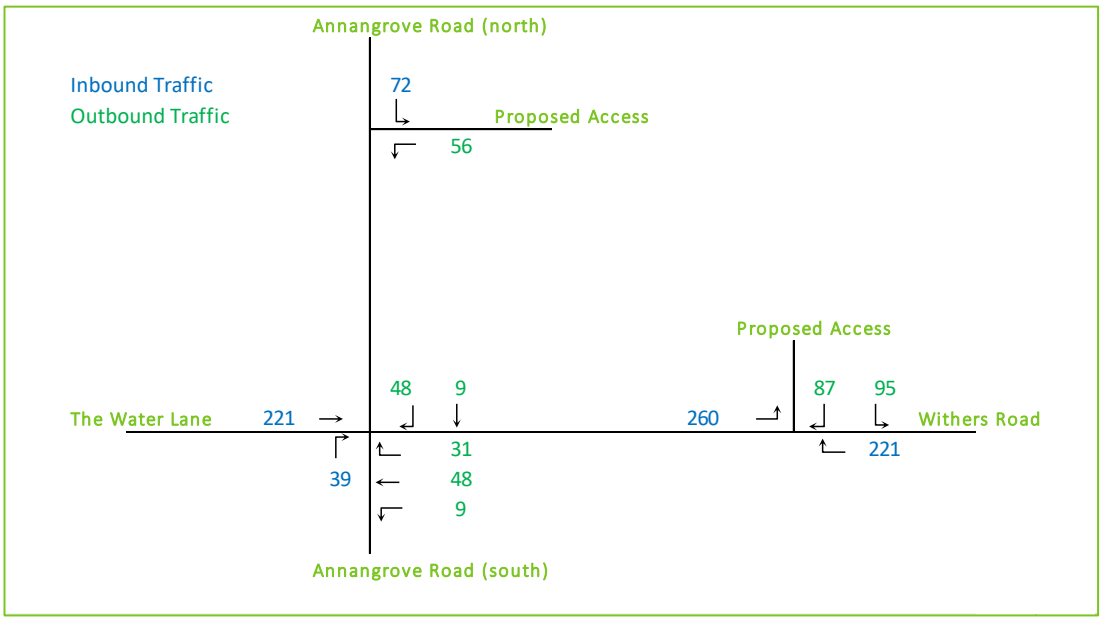


Figure 4-1: Traffic Generation of the Proposed Development (Morning Peak)

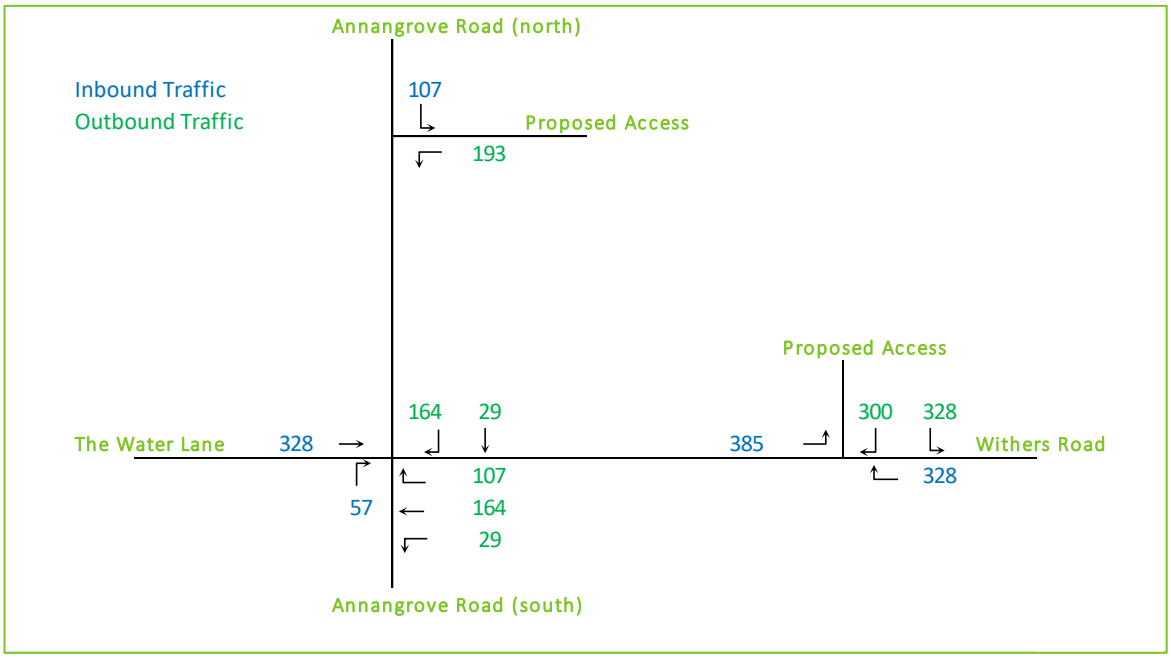


Figure 4-2: Traffic Generation of the Proposed Development (Evening Peak)

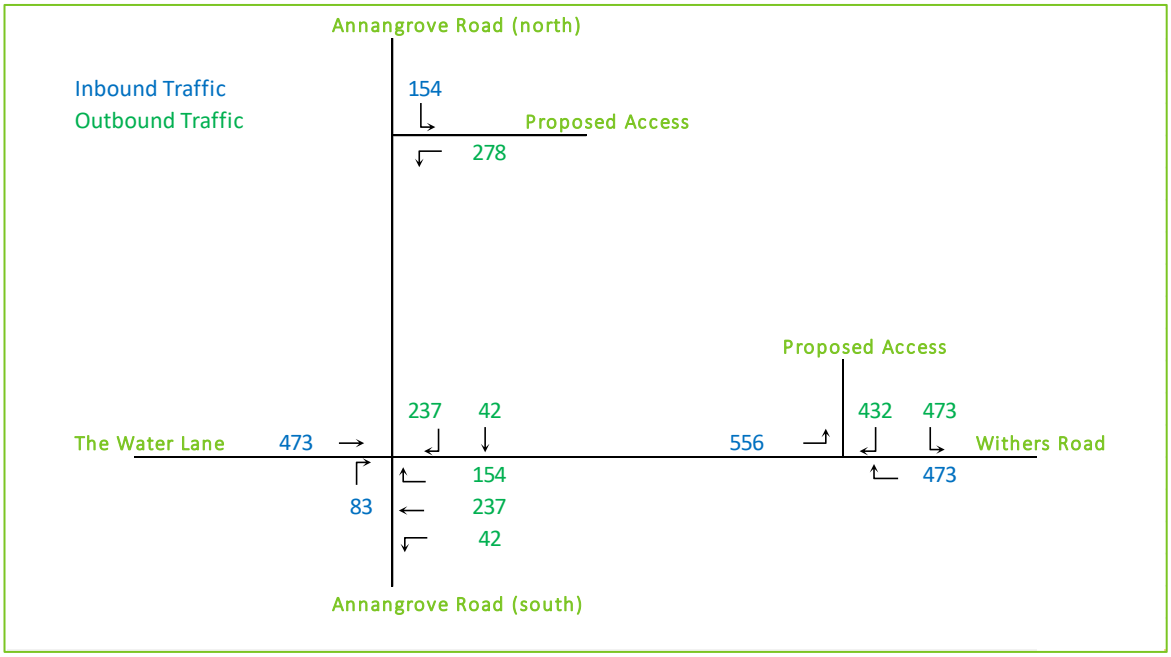


Figure 4-3: Traffic Generation of the Proposed Development (Weekend Peak)

4.2 Impact of Proposed Development

4.2.1 Impact on Annangrove Road, The Water Lane and Withers Road Intersection

For this assessment, it has been assumed that traffic signals will be installed at the intersections of Annangrove Road, The Water Lane and Withers Road.

An analysis of this intersection was also carried out using the SIDRA intersection modelling. The SIDRA results of this analysis are summarised in Table 4-3 (further details provided in Appendix D).

Table 4-3: Operation of Annangrove Road, The Water Lane and Withers Road Intersection with Development (Signal Control)

Scenario	Degree of Saturation (%)	Average Delay (secs)	Level of Service (LoS)
Morning Peak Period	85.6%	26.2	B
Evening Peak Period	86.1%	36.9	C
Weekend Peak Period	93.0%	35.9	C

The proposed traffic signals (as detailed in Section 2.3) at the intersection of Annangrove Road, The Water Lane and Withers Road would continue to operate at a satisfactory Level of Service B and C for the morning, evening and weekend peak periods.

4.2.2 Assessment of proposed Roundabout on Withers Road

For this assessment, it has been assumed that a roundabout will be installed at the intersection of Withers Road and the proposed car park access.

The SIDRA results of this analysis are summarised in Table 4-4 (further details provided in Appendix D).

Table 4-4: Operation of Proposed Roundabout on Withers Road Intersection with Development

Scenario	Degree of Saturation (%)	Average Delay (secs)	Level of Service (LoS)
Morning Peak Period	47.5%	10.6	A
Evening Peak Period	67.2%	12.4	A
Weekend Peak Period	93.8%	26.7	B

The proposed roundabout at the intersection Withers Road and proposed Carpark Access would operate at a satisfactory Level of Service A and B for the morning, evening and weekend peak periods.

5. Conclusions

5.1 Development Access

The proposed access location is on Annangrove Road (left in and left out access) and Withers Road. The proposed access will be more than 220 metres from the intersection of Annangrove Road, The Water Lane and Withers Road.

A separate heavy vehicle access will be located adjacent the proposed car park access on Withers Road.

The proposed access location is considered acceptable for the development.

5.2 Car Parking

The proposed car parking supply for the site will be consistent with Council parking requirements. The proposed car parking layout will be designed to comply with Australian Standards and Council Development Control Plan requirements.

5.3 Traffic Impact

The proposed development of the site will generate 789 and 1,639 additional vehicle trips for the morning and evening peak periods, respectively. The weekend peak periods will generate 2,367 vehicle trips.
Assessment of the proposed development indicates that the development will not have a significant impact on the road network with the provisions of traffic signals at the intersections of Annangrove Road, The Water Lane and Withers Road.

5.4 Conclusion

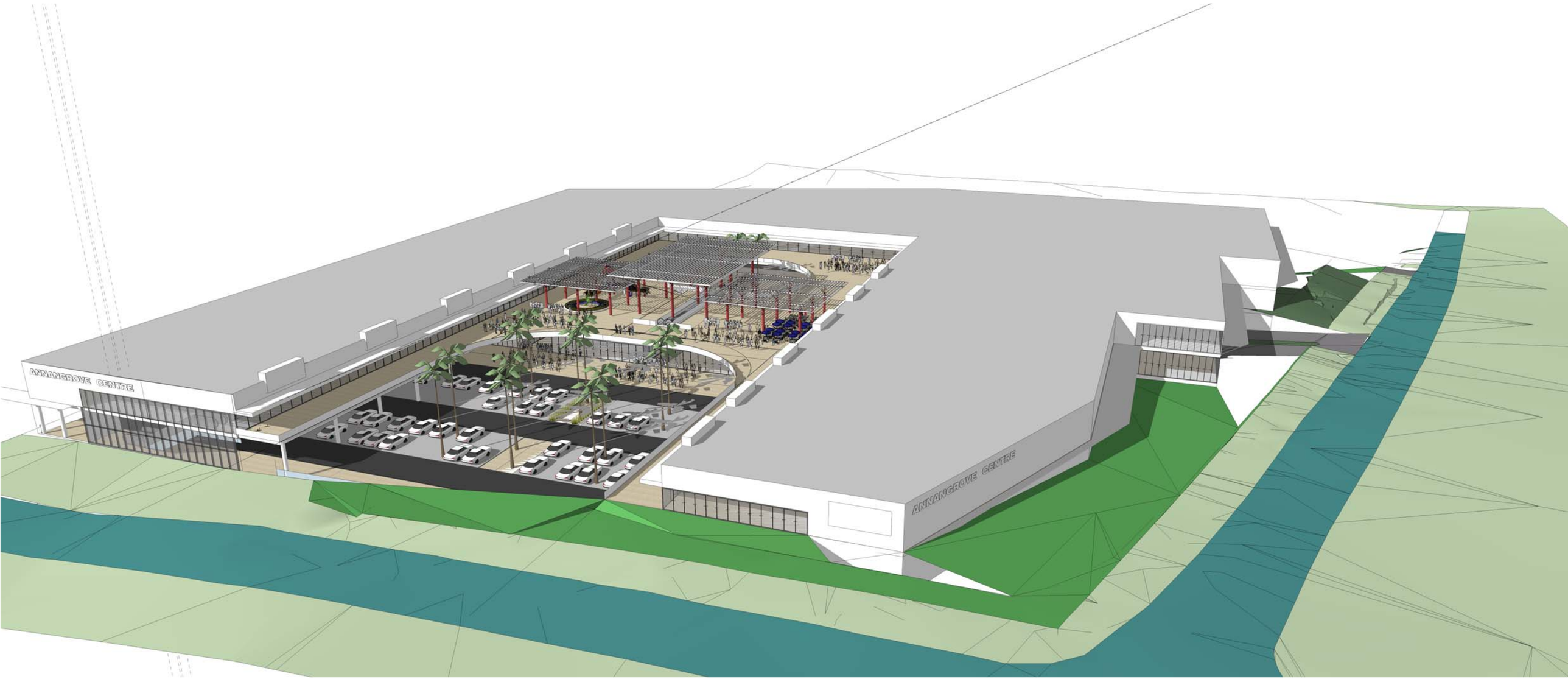
Based on the above assessment, there is no traffic engineering reason why the relevant approval should not be granted.

6. References

- Baulkham Hills Council (2012) “Development Control Plan No 12 Parking”. September.
- RTA Guide to Traffic Generating Development Versions 2.2 October 2002.
- RMS Technical Direction: TDT 2013/04a: Guide to Traffic Generating Developments – Updated Traffic Surveys.
- Anton Reisch Consulting Pty Ltd. – 332 Annangrove Road, Rouse Hill (Mixed Use Development Proposal) Traffic Impact Assessment July 2017.
- GHD – Box Hill and Box Hill Industrial Precincts Transport and Access Study February 2011.

Appendix A

Proposed Site Plans



CONCEPT IMAGE 1

LEFFLER SIMES ARCHITECTS

CONCEPT IMAGE 2

LEFFLER SIMES ARCHITECTS

CONCEPT IMAGE 3

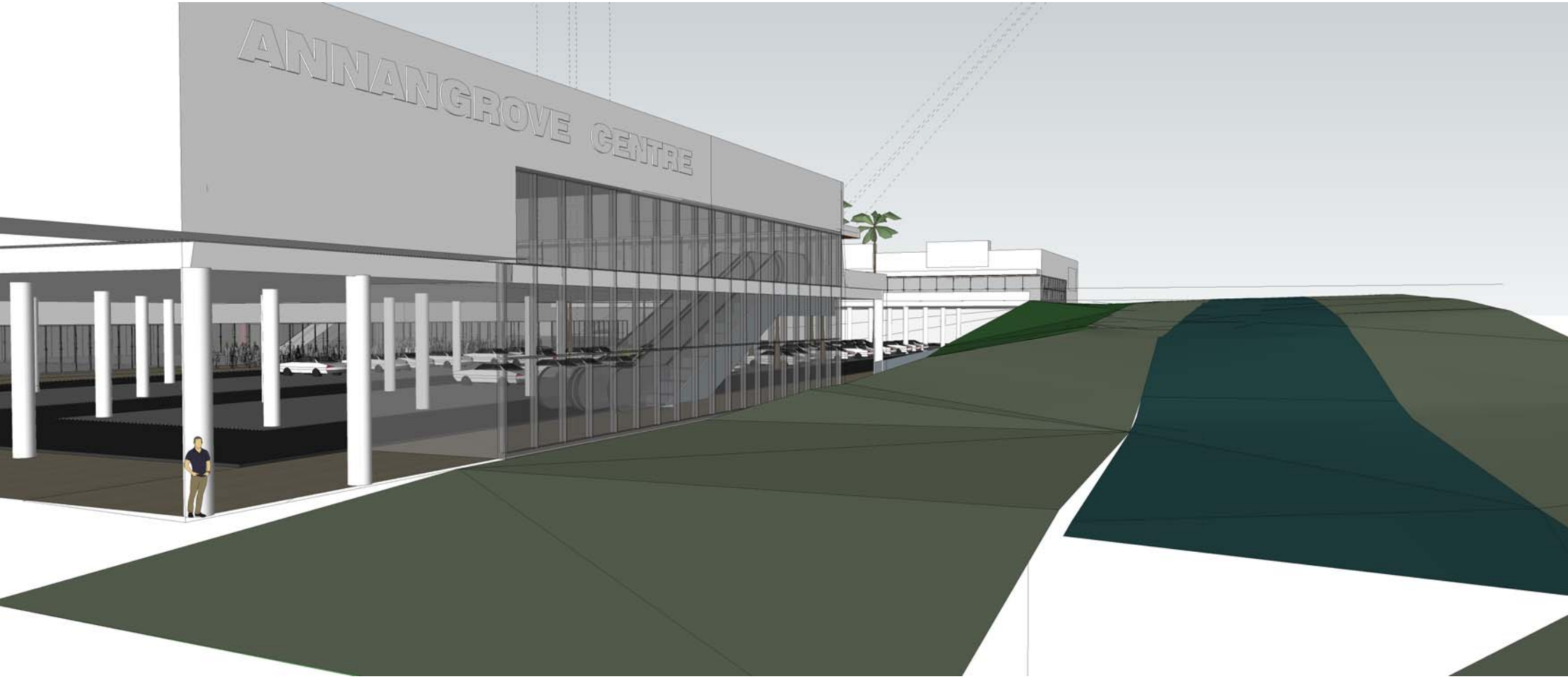
LEFFLER SIMES ARCHITECTS

CONCEPY IMAGE 4

LEFFLER SIMES ARCHITECTS

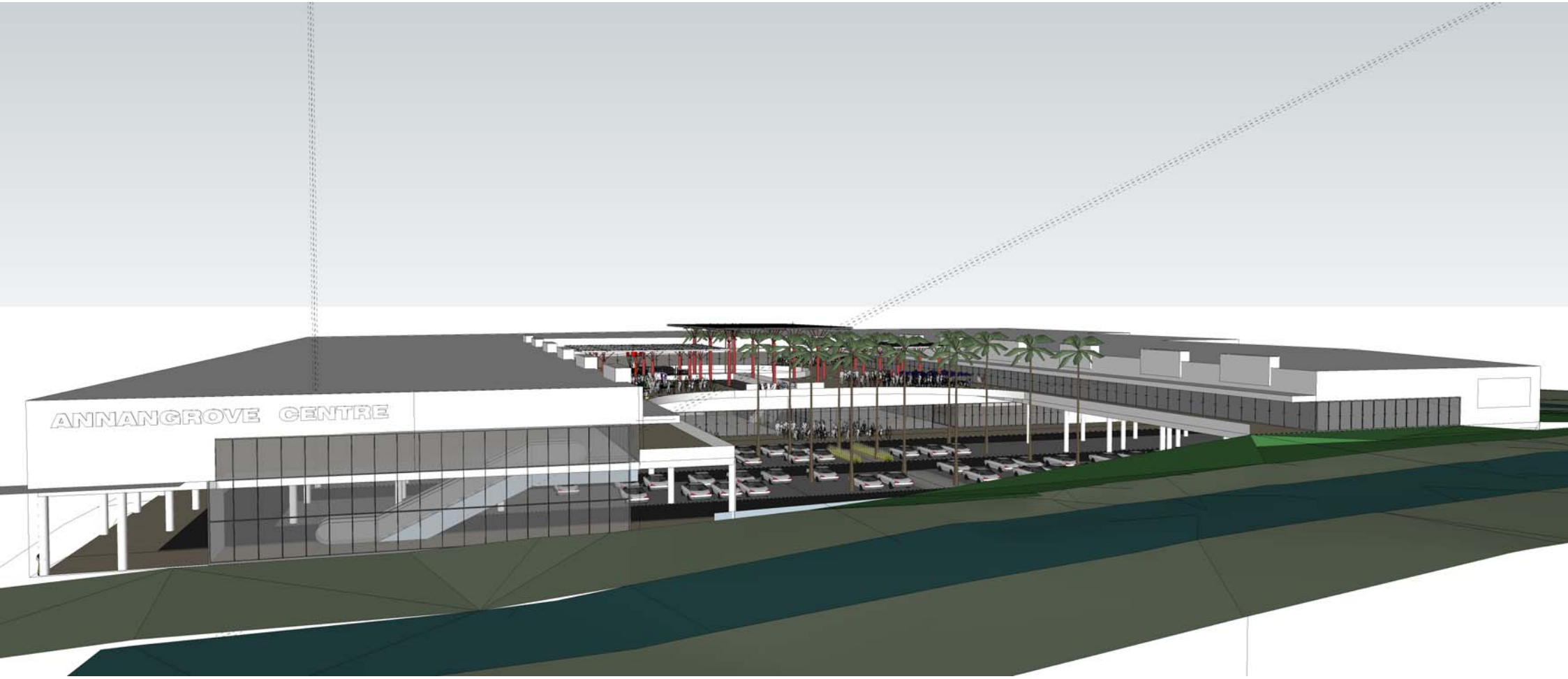
CONCEPT IMAGE 5

LEFFLER SIMES ARCHITECTS



CONCEPT IMAGE 6

LEFFLER SIMES ARCHITECTS



CONCEPT IMAGE 7

LEFFLER SIMES ARCHITECTS

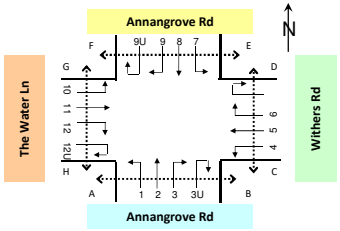
CONCEPT IMAGE 8

LEFFLER SIMES ARCHITECTS

Appendix B

Existing Traffic Surveys

Job No.	: N3583
Client	: TDG
Suburb	: Withers Road IC
Location	: 1. Annangrove Rd / Withers Rd / The Water Ln
Day/Date	: Sat, 16th September 2017
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data



MATRIX Traffic and Transport Data

	Class 1	Class 2	Class 3
Classifications	Lights	Heavies	Cyclists

Approach	Annangrove Rd																Withers Rd											
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
10:00 to 10:15	0	0	0	**0**	54	2	0	**56**	24	0	0	**24**	0	0	0	**0**	37	0	0	**37**	0	0	0	**0**	26	2	0	**28**
10:15 to 10:30	0	0	0	**0**	37	3	0	**40**	25	1	0	**26**	0	0	0	**0**	43	0	0	**43**	0	0	0	**0**	38	1	0	**39**
10:30 to 10:45	0	0	0	**0**	55	2	0	**57**	23	0	0	**23**	0	0	0	**0**	35	0	0	**35**	0	0	0	**0**	26	0	0	**26**
10:45 to 11:00	0	0	0	**0**	51	2	0	**53**	32	1	0	**33**	0	0	0	**0**	30	0	0	**30**	0	0	0	**0**	32	0	0	**32**
11:00 to 11:15	0	0	0	**0**	53	3	0	**56**	30	0	0	**30**	0	0	0	**0**	35	0	0	**35**	0	0	0	**0**	36	1	0	**37**
11:15 to 11:30	0	0	0	**0**	54	4	0	**58**	34	0	0	**34**	0	0	0	**0**	42	1	0	**43**	0	0	1	**1**	37	0	0	**37**
11:30 to 11:45	0	0	0	**0**	38	1	0	**39**	30	0	0	**30**	0	0	0	**0**	40	0	0	**40**	0	0	0	**0**	41	1	0	**42**
11:45 to 12:00	0	0	0	**0**	46	1	0	**47**	33	0	0	**33**	0	0	0	**0**	41	0	0	**41**	0	0	0	**0**	40	0	0	**40**
12:00 to 12:15	0	0	0	**0**	40	2	0	**42**	24	0	0	**24**	0	0	0	**0**	52	0	0	**52**	0	0	0	**0**	31	0	0	**31**
12:15 to 12:30	0	0	0	**0**	45	1	0	**46**	32	2	0	**34**	0	0	0	**0**	31	1	0	**32**	0	0	0	**0**	41	1	0	**42**
12:30 to 12:45	0	0	0	**0**	44	2	0	**46**	31	0	0	**31**	0	0	0	**0**	24	1	0	**25**	0	0	0	**0**	39	0	0	**39**
12:45 to 13:00	0	0	0	**0**	33	1	1	**35**	30	1	0	**31**	0	0	0	**0**	36	2	0	**38**	0	0	0	**0**	44	2	0	**46**
Total	**0**	**0**	**0**	**0**	**550**	**24**	**1**	**575**	**348**	**5**	**0**	**353**	**0**	**0**	**0**	**0**	**446**	**5**	**0**	**451**	**0**	**0**	**1**	**1**	**431**	**8**	**0**	**439**

Approach	Annangrove Rd																The Water Ln												Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)														
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	E	F	G	H	Total
10:00 to 10:15	40	0	0	**40**	59	3	0	**62**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:15 to 10:30	41	0	0	**41**	68	4	0	**72**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:30 to 10:45	45	0	0	**45**	64	2	0	**66**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:45 to 11:00	28	1	0	**29**	57	3	0	**60**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
11:00 to 11:15	35	0	0	**35**	44	1	0	**45**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
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11:45 to 12:00	36	1	0	**37**	46	1	0	**47**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
12:00 to 12:15	39	0	0	**39**	70	2	0	**72**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
12:15 to 12:30	31	0	0	**31**	65	0	0	**65**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
12:30 to 12:45	34	1	1	**36**	52	1	0	**53**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
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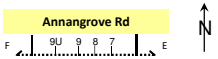
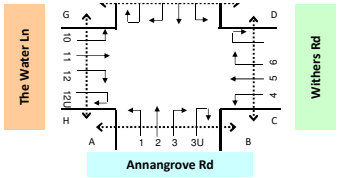
Total	**408**	**5**	**2**	**415**	**703**	**24**	**0**	**727**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Job No. : N3583



Client : TDG
Suburb : Withers Road IC
Location : 1. Annangrove Rd / Withers Rd / The Water Ln

Day/Date : Sat, 16th September 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



MATRIX Traffic and Transport Data

Approach	Annangrove Rd																Withers Rd											
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
10:00 to 11:00	0	0	0	**0**	197	9	0	**206**	104	2	0	**106**	0	0	0	**0**	145	0	0	**145**	0	0	0	**0**	122	3	0	**125**	0	0	0	**0**
10:15 to 11:15	0	0	0	**0**	196	10	0	**206**	110	2	0	**112**	0	0	0	**0**	143	0	0	**143**	0	0	0	**0**	132	2	0	**134**	0	0	0	**0**
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10:45 to 11:45	0	0	0	**0**	196	10	0	**206**	126	1	0	**127**	0	0	0	**0**	147	1	0	**148**	0	0	1	**1**	146	2	0	**148**	0	0	0	**0**
11:00 to 12:00	0	0	0	**0**	191	9	0	**200**	127	0	0	**127**	0	0	0	**0**	158	1	0	**159**	0	0	1	**1**	154	2	0	**156**	0	0	0	**0**
11:15 to 12:15	0	0	0	**0**	178	8	0	**186**	121	0	0	**121**	0	0	0	**0**	175	1	0	**176**	0	0	1	**1**	149	1	0	**150**	0	0	0	**0**
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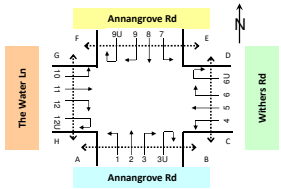
12:00 to 13:00	0	0	0	**0**	162	6	1	**169**	117	3	0	**120**	0	0	0	**0**	143	4	0	**147**	0	0	0	**0**	155	3	0	**158**	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**550**	**24**	**1**	**575**	**348**	**5**	**0**	**353**	**0**	**0**	**0**	**0**	**446**	**5**	**0**	**451**	**0**	**0**	**1**	**1**	**431**	**8**	**0**	**439**	**0**	**0**	**0**	**0**

Approach	Annangrove Rd																The Water Ln												Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)													
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	E	F	G	H	Total
10:00 to 11:00	154	1	0	**155**	248	12	0	**260**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:15 to 11:15	149	1	0	**150**	233	10	0	**243**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:30 to 11:30	132	1	0	**133**	226	9	0	**235**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
10:45 to 11:45	122	3	0	**125**	220	8	0	**228**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
11:00 to 12:00	130	3	0	**133**	209	6	0	**215**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
11:15 to 12:15	134	3	0	**137**	235	7	0	**242**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
11:30 to 12:30	141	3	0	**144**	239	4	0	**243**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
11:45 to 12:45	140	2	1	**143**	233	4	0	**237**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
12:00 to 13:00	124	1	2	**127**	246	6	0	**252**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
Total	**408**	**5**	**2**	**415**	**703**	**24**	**0**	**727**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Job No.	: N3583
Client	: TDG
Suburb	: Withers Road IC
Location	: 1. Annangrove Rd / Withers Rd / The Water Ln
Day/Date	: Wed, 20th September 2017
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data

Classifications	**Class 1**	**Class 2**	**Class 3**
	Lights	Heavies	Cyclists



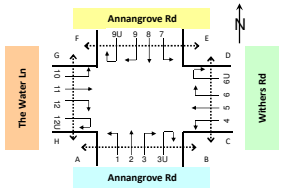
MATRIX Traffic and Transport Data

Approach	**Annangrove Rd**																**Withers Rd**															
Direction	**Direction 1 (Left Turn)**				**Direction 2 (Through)**				**Direction 3 (Right Turn)**				**Direction 3U (U Turn)**				**Direction 4 (Left Turn)**				**Direction 5 (Through)**				**Direction 6 (Right Turn)**				**Direction 6U (U Turn)**			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 7:15	0	0	0	**0**	50	6	0	**56**	19	1	0	**20**	0	0	0	**0**	26	1	0	**27**	0	0	0	**0**	26	1	0	**27**	0	0	0	**0**
7:15 to 7:30	0	0	0	**0**	48	3	0	**51**	20	0	0	**20**	0	0	0	**0**	40	1	0	**41**	0	0	0	**0**	18	2	0	**20**	0	0	0	**0**
7:30 to 7:45	0	0	0	**0**	40	7	0	**47**	25	2	0	**27**	0	0	0	**0**	41	1	0	**42**	0	0	0	**0**	29	2	0	**31**	0	0	0	**0**
7:45 to 8:00	0	0	0	**0**	78	6	0	**84**	25	1	0	**26**	0	0	0	**0**	37	1	0	**38**	1	0	0	**1**	35	2	0	**37**	0	0	0	**0**
8:00 to 8:15	0	0	0	**0**	73	5	0	**78**	38	2	0	**40**	0	0	0	**0**	32	2	0	**34**	0	0	0	**0**	37	4	0	**41**	0	0	0	**0**
8:15 to 8:30	0	0	0	**0**	73	7	0	**80**	40	4	0	**44**	0	0	0	**0**	44	5	0	**49**	0	0	0	**0**	47	3	0	**50**	0	0	0	**0**
8:30 to 8:45	0	0	0	**0**	46	5	0	**51**	37	1	0	**38**	0	0	0	**0**	32	0	0	**32**	0	0	0	**0**	43	3	0	**46**	0	0	0	**0**
8:45 to 9:00	0	0	0	**0**	66	10	0	**76**	15	1	0	**16**	0	0	0	**0**	26	2	0	**28**	0	0	0	**0**	48	2	0	**50**	0	0	0	**0**
AM Totals	**0**	**0**	**0**	**0**	**474**	**49**	**0**	**523**	**219**	**12**	**0**	**231**	**0**	**0**	**0**	**0**	**278**	**13**	**0**	**291**	**1**	**0**	**0**	**1**	**283**	**19**	**0**	**302**	**0**	**0**	**0**	**0**
16:00 to 16:15	0	0	0	**0**	54	5	0	**59**	34	1	0	**35**	0	0	0	**0**	38	1	0	**39**	0	0	0	**0**	57	3	0	**60**	0	0	0	**0**
16:15 to 16:30	0	0	0	**0**	66	1	0	**67**	35	1	0	**36**	0	0	0	**0**	35	3	0	**38**	2	0	0	**2**	69	4	0	**73**	0	0	0	**0**
16:30 to 16:45	0	0	0	**0**	51	6	0	**57**	31	1	0	**32**	0	0	0	**0**	32	0	0	**32**	0	0	0	**0**	51	0	0	**51**	0	0	0	**0**
16:45 to 17:00	0	0	0	**0**	58	4	0	**62**	39	0	0	**39**	0	0	0	**0**	25	1	0	**26**	0	0	0	**0**	63	1	0	**64**	0	0	0	**0**
17:00 to 17:15	0	0	0	**0**	59	1	0	**60**	38	0	0	**38**	0	0	0	**0**	31	0	0	**31**	0	0	0	**0**	55	2	0	**57**	0	0	0	**0**
17:15 to 17:30	0	0	0	**0**	58	4	0	**62**	42	0	0	**42**	0	0	0	**0**	30	0	0	**30**	0	0	0	**0**	44	0	0	**44**	0	0	0	**0**
17:30 to 17:45	0	0	0	**0**	47	2	0	**49**	44	0	0	**44**	0	0	0	**0**	34	0	0	**34**	1	0	0	**1**	51	0	0	**51**	0	0	0	**0**
17:45 to 18:00	1	0	0	**1**	53	2	0	**55**	30	0	0	**30**	0	0	0	**0**	32	0	0	**32**	0	0	0	**0**	46	0	0	**46**	0	0	0	**0**
PM Totals	**1**	**0**	**0**	**1**	**446**	**25**	**0**	**471**	**293**	**3**	**0**	**296**	**0**	**0**	**0**	**0**	**257**	**5**	**0**	**262**	**3**	**0**	**0**	**3**	**436**	**10**	**0**	**446**	**0**	**0**	**0**	**0**

Approach	**Annangrove Rd**																**The Water Ln**																**Crossing Pedestrians**								
Direction	**Direction 7 (Left Turn)**				**Direction 8 (Through)**				**Direction 9 (Right Turn)**				**Direction 9U (U Turn)**				**Direction 10 (Left Turn)**				**Direction 11 (Through)**				**Direction 12 (Right Turn)**				**Direction 12U (U Turn)**												
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	E	F	G	H	Total
7:00 to 7:15	23	1	0	**24**	40	4	0	**44**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:15 to 7:30	25	0	0	**25**	54	4	0	**58**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:30 to 7:45	27	2	0	**29**	46	6	0	**52**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:45 to 8:00	29	3	0	**32**	62	3	0	**65**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:00 to 8:15	37	2	0	**39**	45	6	0	**51**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:15 to 8:30	47	0	0	**47**	50	6	0	**56**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:30 to 8:45	43	0	0	**43**	42	7	0	**49**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:45 to 9:00	47	0	0	**47**	72	3	0	**75**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
AM Totals	**278**	**8**	**0**	**286**	**411**	**39**	**0**	**450**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 to 16:15	45	0	0	**45**	58	9	0	**67**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:15 to 16:30	49	1	0	**50**	60	2	0	**62**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:30 to 16:45	40	0	0	**40**	75	2	0	**77**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:45 to 17:00	39	0	0	**39**	79	3	2	**84**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:00 to 17:15	32	1	0	**33**	69	5	0	**74**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:15 to 17:30	50	1	0	**51**	69	6	0	**75**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:30 to 17:45	42	1	0	**43**	88	1	0	**89**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:45 to 18:00	41	1	0	**42**	76	5	0	**81**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
PM Totals	**338**	**5**	**0**	**343**	**574**	**33**	**2**	**609**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Job No. : N3583
Client : TDG
Suburb : Withers Road IC
Location : 1. Annangrove Rd / Withers Rd / The Water Ln

Day/Date : Wed, 20th September 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



MATRIX Traffic and Transport Data

Approach	Annangrove Rd																Withers Rd															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total
7:00 to 8:00	0	0	0	**0**	216	22	0	**238**	89	4	0	**93**	0	0	0	**0**	144	4	0	**148**	1	0	0	**1**	108	7	0	**115**	0	0	0	**0**
7:15 to 8:15	0	0	0	**0**	239	21	0	**260**	108	5	0	**113**	0	0	0	**0**	150	5	0	**155**	1	0	0	**1**	119	10	0	**129**	0	0	0	**0**
7:30 to 8:30	0	0	0	**0**	264	25	0	**289**	128	9	0	**137**	0	0	0	**0**	154	9	0	**163**	1	0	0	**1**	148	11	0	**159**	0	0	0	**0**
7:45 to 8:45	0	0	0	**0**	270	23	0	**293**	140	8	0	**148**	0	0	0	**0**	145	8	0	**153**	1	0	0	**1**	162	12	0	**174**	0	0	0	**0**
8:00 to 9:00	0	0	0	**0**	258	27	0	**285**	130	8	0	**138**	0	0	0	**0**	134	9	0	**143**	0	0	0	**0**	175	12	0	**187**	0	0	0	**0**
AM Totals	**0**	**0**	**0**	**0**	**474**	**49**	**0**	**523**	**219**	**12**	**0**	**231**	**0**	**0**	**0**	**0**	**278**	**13**	**0**	**291**	**1**	**0**	**0**	**1**	**283**	**19**	**0**	**302**	**0**	**0**	**0**	**0**
16:00 to 17:00	0	0	0	**0**	229	16	0	**245**	139	3	0	**142**	0	0	0	**0**	130	5	0	**135**	2	0	0	**2**	240	8	0	**248**	0	0	0	**0**
16:15 to 17:15	0	0	0	**0**	234	12	0	**246**	143	2	0	**145**	0	0	0	**0**	123	4	0	**127**	2	0	0	**2**	238	7	0	**245**	0	0	0	**0**
16:30 to 17:30	0	0	0	**0**	226	15	0	**241**	150	1	0	**151**	0	0	0	**0**	118	1	0	**119**	0	0	0	**0**	213	3	0	**216**	0	0	0	**0**
16:45 to 17:45	0	0	0	**0**	222	11	0	**233**	163	0	0	**163**	0	0	0	**0**	120	1	0	**121**	1	0	0	**1**	213	3	0	**216**	0	0	0	**0**
17:00 to 18:00	1	0	0	**1**	217	9	0	**226**	154	0	0	**154**	0	0	0	**0**	127	0	0	**127**	1	0	0	**1**	196	2	0	**198**	0	0	0	**0**
PM Totals	**1**	**0**	**0**	**1**	**446**	**25**	**0**	**471**	**293**	**3**	**0**	**296**	**0**	**0**	**0**	**0**	**257**	**5**	**0**	**262**	**3**	**0**	**0**	**3**	**436**	**10**	**0**	**446**	**0**	**0**	**0**	**0**

Approach	Annangrove Rd																The Water Ln																Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	A	B	C	D	E	F	G	H	Total
7:00 to 8:00	104	6	0	**110**	202	17	0	**219**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:15 to 8:15	118	7	0	**125**	207	19	0	**226**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:30 to 8:30	140	7	0	**147**	203	21	0	**224**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:45 to 8:45	156	5	0	**161**	199	22	0	**221**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:00 to 9:00	174	2	0	**176**	209	22	0	**231**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
AM Totals	**278**	**8**	**0**	**286**	**411**	**39**	**0**	**450**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:00 to 17:00	173	1	0	**174**	272	16	2	**290**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:15 to 17:15	160	2	0	**162**	283	12	2	**297**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:30 to 17:30	161	2	0	**163**	292	16	2	**310**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:45 to 17:45	163	3	0	**166**	305	15	2	**322**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:00 to 18:00	165	4	0	**169**	302	17	0	**319**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	1	0	0	**1**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
PM Totals	**338**	**5**	**0**	**343**	**574**	**33**	**2**	**609**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Appendix C

Guidelines for Evaluation of Intersection Capacity

The RTA has included in the "Guide to Traffic Generating Developments" (Dec 1993, Issue 2) a section on the assessment of intersections. The assessment of the Level of Service of an intersection is based on the evaluation of the following Measures of Effectiveness:

(a) Average delay (seconds/veh) (all forms of control)
(b) Delay to critical movement (seconds/veh) (all forms of control)
(c) Degree of saturation (traffic signals and roundabouts)
(d) Cycle length (traffic signals)

INTANAL was used to calculate the relevant intersection parameters. INTANAL is software which allows comparisons between different forms of intersection control and different forms of intersection configurations to be readily evaluated. That is at each intersection the priority control, roundabout and signal control options will be examined to determine the most efficient form of control.

The best indicator of the Level of Service at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (with Stop and Give Way signs or operating under the T-junction rule) the critical movement for Level of Service assessment should be that with the highest average delay.

With traffic signals, delays per approach tend to be equalised, subject to any over-riding requirements of signal co-ordination as well as to variations within individual movements. With roundabouts and priority - control intersections, the critical criterion for assessment is the movement with the highest delay per vehicle. With this type of control the volume balance might be such that some movements suffer high levels of delay while other movements have minimal delay. An overall average delay for the intersection of 25 seconds might not be satisfactory if the average delay on one movement is 60 seconds.

The average delay for Level of Service E should be no more than 70 seconds. The accepted maximum practical cycle length for traffic signals under saturated conditions is 120 - 140 seconds. Under these conditions 120 seconds is near maximum for two and three phase intersections and 140 seconds near maximum for more complex phase designs. Drivers and pedestrians expect cycle lengths of these magnitudes and their inherent delays in peak hours. A cycle length of 140 seconds for an intersection which is almost saturated has an average vehicle delay of about 70 seconds, although this can vary. If the average vehicle delay is more than 70 seconds, the intersection is assumed to be at Level of Service F.

Table C1 sets out average delays for different levels of service. There is no consistent correlation between definitions of levels of service for road links as defined elsewhere in this section, and the ranges set out in Table C1. In assigning a Level of Service, the average delay to the motoring public needs to be considered keeping in mind the location of the intersection. For example, drivers in inner-urban areas of Sydney have a higher tolerance of delay than drivers in country areas. Table C1 provides a recommended baseline for assessment.

Level of Service	Average Delay per Vehicle (seconds/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 - 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, required other control mode

Table C1: Level of Service Criteria for Intersections

The figures in Table C1 are intended as a guide only. Any particular assessment should take into account site-specific factors including maximum queue lengths (and their effect on lane blocking), the influence of nearby intersections and the sensitivity of the location to delays. In many situations, a comparison of the current and future average delay provides a better appreciation of the impact of a proposal, and not simply the change in the Level of Service.

The intersection degree of saturation (DS) can also be used to measure the performance of isolated intersections. At intersections controlled by traffic signals, both queue length and delays increase rapidly as DS approaches 1.0. An upper limit of 0.9 is appropriate. When DS exceeds 0.8 - 0.85, overflow queues start to become a problem. Satisfactory intersection operation is generally achieved with a DS of about 0.7 - 0.8. (Note that these figures are based on isolated signalised intersections with cycle lengths of 120 seconds. In co-ordinated signal systems DS might be actively maximised at key intersections). Although in some situations additional traffic does not alter the Level of Service, particularly where the Level of Service is E or F, additional capacity may still be required. This is particularly appropriate for service level F, where small increases in flow can cause disproportionately greater increases in delay. In this situation, it is advisable to consider means of control to maintain the existing level of absolute delay. Suggested criteria for the evaluation of the capacity of signalised intersections based on the Degree of Saturation are summarised in Table C2.

Level of Service	Optimum Cycle Length (Seconds) (Co)	Volume/Saturation Y	Intersection Degree Of Saturation X
A/B - Very good operation	< 90	< 0.70	< 0.80
C - Satisfactory	90-120	0.70-0.80	0.80-0.85
D - Poor but manageable	120-140	0.80-0.85	0.85-0.90
E/F - Bad, extra capacity required	>140	>0.85	> 0.90

Table C2: Criteria for Evaluating Capacity Of Signalised Intersections*

** Source: Roads & Traffic Authority (2002)*

Appendix D

SIDRA Analysis Results

MOVEMENT SUMMARY

Site: 101 [AM Base Weekday - Annangrove Road]

Annangrove Road and Withers Road intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annangrove Road											
1	L2	1	0.0	0.296	8.7	LOS A	1.5	11.0	0.41	0.24	58.8
2	T1	300	9.5	0.296	1.3	LOS A	1.5	11.0	0.41	0.24	65.1
3	R2	145	5.8	0.296	8.7	LOS A	1.5	11.0	0.41	0.24	58.2
Approach		446	8.3	0.296	3.7	NA	1.5	11.0	0.41	0.24	62.6
East: Withers Road											
4	L2	151	6.3	0.140	9.5	LOS A	0.6	4.3	0.38	0.89	52.5
5	T1	1	0.0	0.682	22.8	LOS B	3.4	25.1	0.84	1.22	41.9
6	R2	197	6.4	0.682	25.9	LOS B	3.4	25.1	0.84	1.22	42.5
Approach		348	6.3	0.682	18.8	LOS B	3.4	25.1	0.64	1.08	46.3
North: Annangrove Road											
7	L2	185	1.1	0.234	6.4	LOS A	0.0	0.1	0.00	0.27	59.7
8	T1	243	9.5	0.234	0.0	LOS A	0.0	0.1	0.00	0.27	66.3
9	R2	1	0.0	0.234	7.5	LOS A	0.0	0.1	0.00	0.27	59.1
Approach		429	5.9	0.234	2.8	NA	0.0	0.1	0.00	0.27	63.3
West: The Water Lane											
10	L2	1	0.0	0.007	9.3	LOS A	0.0	0.2	0.55	0.87	51.1
11	T1	1	0.0	0.007	15.0	LOS B	0.0	0.2	0.55	0.87	48.6
12	R2	1	0.0	0.007	15.9	LOS B	0.0	0.2	0.55	0.87	50.8
Approach		3	0.0	0.007	13.4	LOS A	0.0	0.2	0.55	0.87	50.1
All Vehicles		1227	6.9	0.682	7.7	NA	3.4	25.1	0.33	0.49	57.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM Base Weekday - Annangrove Road]

Annangrove Road and Withers Road intersection
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annangrove Road											
1	L2	1	0.0	0.279	9.0	LOS A	1.5	10.7	0.45	0.28	58.3
2	T1	258	6.5	0.279	1.6	LOS A	1.5	10.7	0.45	0.28	64.5
3	R2	149	2.1	0.279	8.9	LOS A	1.5	10.7	0.45	0.28	57.9
Approach		408	4.9	0.279	4.3	NA	1.5	10.7	0.45	0.28	61.9
East: Withers Road											
4	L2	142	3.7	0.139	9.7	LOS A	0.6	4.1	0.42	0.90	52.9
5	T1	2	0.0	0.915	41.6	LOS C	8.2	58.8	0.90	1.69	34.6
6	R2	261	3.2	0.915	44.3	LOS D	8.2	58.8	0.90	1.69	35.3
Approach		405	3.4	0.915	32.2	LOS C	8.2	58.8	0.73	1.41	40.0
North: Annangrove Road											
7	L2	183	0.6	0.261	6.4	LOS A	0.0	0.1	0.00	0.24	60.2
8	T1	303	5.6	0.261	0.0	LOS A	0.0	0.1	0.00	0.24	66.8
9	R2	1	0.0	0.261	7.3	LOS A	0.0	0.1	0.00	0.24	59.5
Approach		487	3.7	0.261	2.4	NA	0.0	0.1	0.00	0.24	64.1
West: The Water Lane											
10	L2	1	0.0	0.007	9.0	LOS A	0.0	0.2	0.53	0.88	51.1
11	T1	1	0.0	0.007	15.2	LOS B	0.0	0.2	0.53	0.88	48.6
12	R2	1	0.0	0.007	15.8	LOS B	0.0	0.2	0.53	0.88	50.7
Approach		3	0.0	0.007	13.3	LOS A	0.0	0.2	0.53	0.88	50.1
All Vehicles		1304	4.0	0.915	12.3	NA	8.2	58.8	0.37	0.62	53.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Saturday Base - Annangrove Road]

Annangrove Road and Withers Road intersection
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annangrove Road											
1	L2	1	0.0	0.210	8.1	LOS A	1.0	7.3	0.40	0.28	58.6
2	T1	196	4.3	0.210	1.1	LOS A	1.0	7.3	0.40	0.28	64.8
3	R2	127	0.0	0.210	7.9	LOS A	1.0	7.3	0.40	0.28	57.9
Approach		324	2.6	0.210	3.8	NA	1.0	7.3	0.40	0.28	61.9
East: Withers Road											
4	L2	185	0.6	0.522	11.4	LOS A	3.4	24.3	0.57	1.04	50.4
5	T1	1	0.0	0.522	16.0	LOS B	3.4	24.3	0.57	1.04	48.1
6	R2	158	0.7	0.522	17.5	LOS B	3.4	24.3	0.57	1.04	50.0
Approach		344	0.6	0.522	14.2	LOS A	3.4	24.3	0.57	1.04	50.2
North: Annangrove Road											
7	L2	144	2.2	0.213	6.4	LOS A	0.0	0.1	0.00	0.23	60.2
8	T1	255	2.9	0.213	0.0	LOS A	0.0	0.1	0.00	0.23	67.0
9	R2	1	0.0	0.213	6.9	LOS A	0.0	0.1	0.00	0.23	59.7
Approach		400	2.6	0.213	2.3	NA	0.0	0.1	0.00	0.23	64.4
West: The Water Lane											
10	L2	1	0.0	0.006	8.7	LOS A	0.0	0.1	0.45	0.87	52.1
11	T1	1	0.0	0.006	12.7	LOS A	0.0	0.1	0.45	0.87	49.5
12	R2	1	0.0	0.006	13.9	LOS A	0.0	0.1	0.45	0.87	51.7
Approach		3	0.0	0.006	11.8	LOS A	0.0	0.1	0.45	0.87	51.1
All Vehicles		1072	2.0	0.522	6.6	NA	3.4	24.3	0.31	0.51	58.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM Future - With Development]

Future
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annagrove Road											
1	L2	1	0.0	0.545	37.0	LOS C	4.3	32.5	0.96	0.79	39.3
2	T1	300	9.5	0.545	29.2	LOS C	4.3	32.8	0.97	0.78	40.6
3	R2	186	4.5	0.462	25.0	LOS B	4.6	33.5	0.91	0.79	41.8
Approach		487	7.6	0.545	27.6	LOS B	4.6	33.5	0.94	0.78	41.0
East: Withers Road											
4	L2	160	5.9	0.183	7.7	LOS A	1.1	8.3	0.37	0.65	52.4
5	T1	52	0.0	0.176	25.1	LOS B	1.4	9.7	0.91	0.68	42.6
6	R2	229	5.5	0.856	40.5	LOS C	7.9	58.2	1.00	1.02	35.5
Approach		441	5.0	0.856	26.8	LOS B	7.9	58.2	0.76	0.85	41.1
North: Annagrove Road											
7	L2	185	1.1	0.680	23.9	LOS B	6.0	43.5	0.95	0.83	43.4
8	T1	253	9.2	0.680	26.0	LOS B	6.0	43.5	0.98	0.86	41.6
9	R2	52	0.0	0.185	30.8	LOS C	1.4	9.7	0.91	0.73	39.3
Approach		489	5.2	0.680	25.7	LOS B	6.0	43.5	0.97	0.83	42.0
West: The Water Lane											
10	L2	103	0.0	0.476	23.9	LOS B	3.9	27.3	0.91	0.82	44.1
11	T1	234	0.0	0.476	23.2	LOS B	4.0	27.7	0.94	0.78	42.9
12	R2	57	0.0	0.204	30.9	LOS C	1.5	10.7	0.91	0.74	39.3
Approach		394	0.0	0.476	24.5	LOS B	4.0	27.7	0.93	0.79	42.6
All Vehicles		1812	4.6	0.856	26.2	LOS B	7.9	58.2	0.90	0.81	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		211	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [PM Future - With Development]

Future
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annagrove Road											
1	L2	1	0.0	0.461	48.1	LOS D	4.8	35.2	0.95	0.77	35.1
2	T1	258	6.5	0.461	38.6	LOS C	4.8	35.5	0.95	0.77	36.8
3	R2	209	1.5	0.563	37.1	LOS C	7.1	50.6	0.94	0.89	36.8
Approach		468	4.3	0.563	38.0	LOS C	7.1	50.6	0.95	0.82	36.8
East: Withers Road											
4	L2	173	3.0	0.460	19.5	LOS B	3.9	28.2	0.88	0.78	45.6
5	T1	175	0.0	0.460	30.0	LOS C	5.0	34.9	0.94	0.77	39.8
6	R2	374	2.3	0.861	46.0	LOS D	16.6	118.3	1.00	0.98	33.8
Approach		721	1.9	0.861	35.8	LOS C	16.6	118.3	0.96	0.88	37.5
North: Annagrove Road											
7	L2	184	0.6	0.800	31.8	LOS C	8.8	63.0	1.00	0.92	39.9
8	T1	334	5.0	0.800	36.4	LOS C	10.3	75.4	1.00	0.94	37.3
9	R2	174	0.0	0.576	40.3	LOS C	6.5	45.7	0.97	0.80	35.7
Approach		692	2.6	0.800	36.1	LOS C	10.3	75.4	0.99	0.90	37.5
West: The Water Lane											
10	L2	1	0.0	0.593	50.7	LOS D	6.9	48.1	0.98	0.81	34.3
11	T1	346	0.0	0.593	40.4	LOS C	6.9	48.1	0.98	0.80	36.1
12	R2	274	0.0	0.620	35.7	LOS C	9.8	68.7	0.95	0.83	37.3
Approach		621	0.0	0.620	38.4	LOS C	9.8	68.7	0.97	0.81	36.6
All Vehicles		2502	2.1	0.861	36.9	LOS C	16.6	118.3	0.97	0.86	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	34.3	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [Saturday Future - With Development]

Future
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Annagrove Road											
1	L2	1	0.0	0.330	42.9	LOS D	3.4	24.5	0.92	0.74	36.9
2	T1	196	4.3	0.330	33.4	LOS C	3.4	24.5	0.92	0.73	38.8
3	R2	215	0.0	0.521	30.5	LOS C	6.2	43.6	0.92	0.85	39.4
Approach		412	2.0	0.521	31.9	LOS C	6.2	43.6	0.92	0.79	39.1
East: Withers Road											
4	L2	229	0.5	0.612	18.6	LOS B	5.0	35.2	0.93	0.80	46.2
5	T1	251	0.0	0.612	26.7	LOS B	6.3	44.2	0.97	0.81	41.3
6	R2	320	0.3	0.930	53.5	LOS D	14.5	101.7	1.00	1.11	31.6
Approach		800	0.3	0.930	35.1	LOS C	14.5	101.7	0.97	0.93	37.8
North: Annagrove Road											
7	L2	144	2.2	0.718	25.8	LOS B	5.8	41.2	0.99	0.86	42.8
8	T1	299	2.5	0.718	29.6	LOS C	7.7	54.7	1.00	0.88	40.0
9	R2	251	0.0	0.858	44.9	LOS D	9.9	69.5	1.00	1.00	34.1
Approach		694	1.5	0.858	34.3	LOS C	9.9	69.5	1.00	0.92	38.2
West: The Water Lane											
10	L2	1	0.0	0.815	49.9	LOS D	9.5	66.7	1.00	0.98	34.5
11	T1	499	0.0	0.815	40.3	LOS C	9.5	66.7	1.00	0.97	36.2
12	R2	274	0.0	0.794	39.8	LOS C	10.1	70.5	1.00	0.93	35.9
Approach		774	0.0	0.815	40.1	LOS C	10.1	70.5	1.00	0.96	36.0
All Vehicles		2679	0.8	0.930	35.9	LOS C	14.5	101.7	0.98	0.91	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P2	East Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		211	29.3	LOS C			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [AM Future - With Development]

Withers Road and Access
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Withers Road											
5	T1	326	2.0	0.385	3.9	LOS A	2.9	20.5	0.33	0.50	53.4
6	R2	233	0.0	0.385	9.6	LOS A	2.9	20.5	0.33	0.50	55.4
Approach		559	1.2	0.385	6.3	LOS A	2.9	20.5	0.33	0.50	54.3
North: Site Access											
7	L2	100	0.0	0.171	4.9	LOS A	1.0	7.2	0.51	0.63	52.8
9	R2	92	0.0	0.171	10.6	LOS A	1.0	7.2	0.51	0.63	53.2
Approach		192	0.0	0.171	7.7	LOS A	1.0	7.2	0.51	0.63	53.0
West: Withers Road											
10	L2	274	0.0	0.475	4.9	LOS A	3.6	25.2	0.54	0.53	52.5
11	T1	321	2.0	0.475	4.9	LOS A	3.6	25.2	0.54	0.53	54.5
Approach		595	1.1	0.475	4.9	LOS A	3.6	25.2	0.54	0.53	53.6
All Vehicles		1345	1.0	0.475	5.9	LOS A	3.6	25.2	0.45	0.53	53.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM Future - With Development]

Withers Road and Access
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Withers Road											
5	T1	392	2.0	0.652	6.7	LOS A	7.1	50.0	0.79	0.75	50.7
6	R2	345	0.0	0.652	12.4	LOS A	7.1	50.0	0.79	0.75	53.2
Approach		737	1.1	0.652	9.4	LOS A	7.1	50.0	0.79	0.75	52.0
North: Site Access											
7	L2	345	0.0	0.599	6.2	LOS A	5.8	40.7	0.77	0.75	52.0
9	R2	316	0.0	0.599	11.9	LOS A	5.8	40.7	0.77	0.75	52.2
Approach		661	0.0	0.599	9.0	LOS A	5.8	40.7	0.77	0.75	52.1
West: Withers Road											
10	L2	405	0.0	0.672	7.3	LOS A	7.7	54.5	0.83	0.78	51.0
11	T1	331	2.0	0.672	7.4	LOS A	7.7	54.5	0.83	0.78	52.9
Approach		736	0.9	0.672	7.4	LOS A	7.7	54.5	0.83	0.78	51.8
All Vehicles		2134	0.7	0.672	8.5	LOS A	7.7	54.5	0.80	0.76	52.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Saturday Future - With Development]

Withers Road and Access
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Withers Road											
5	T1	342	2.0	0.873	16.6	LOS B	18.0	126.8	1.00	1.18	43.5
6	R2	498	0.0	0.873	22.2	LOS B	18.0	126.8	1.00	1.18	46.9
Approach		840	0.8	0.873	19.9	LOS B	18.0	126.8	1.00	1.18	45.7
North: Site Access											
7	L2	498	0.0	0.807	8.6	LOS A	13.5	94.4	0.96	0.83	50.7
9	R2	455	0.0	0.807	14.3	LOS A	13.5	94.4	0.96	0.83	50.4
Approach		953	0.0	0.807	11.3	LOS A	13.5	94.4	0.96	0.83	50.5
West: Withers Road											
10	L2	585	0.0	0.938	26.6	LOS B	26.2	184.2	1.00	1.45	38.1
11	T1	269	2.0	0.938	26.7	LOS B	26.2	184.2	1.00	1.45	39.1
Approach		855	0.6	0.938	26.6	LOS B	26.2	184.2	1.00	1.45	38.4
All Vehicles		2647	0.5	0.938	19.0	LOS B	26.2	184.2	0.98	1.14	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ECONOMIC NEEDS ASSESSMENT
~
PROPOSED BULKY GOODS CENTRE, ROUSE HILL

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This Report involves the making of future projections. Those projections are grounded upon the facts and matters contained in this Report. Some or all of those facts and matters comprise assumptions and/or representations upon which Leyshon Consulting Pty Ltd has relied but about which it has no knowledge of its own. By reason of this, Leyshon Consulting Pty Ltd cannot warrant or represent the correctness or accuracy of such assumptions and/or representations. It follows that, while the projections contained in this Report are made with care and judgment, Leyshon Consulting Pty Ltd cannot confirm, warrant or guarantee that actual results achieved will be consistent with the results projected by this Report.

EXECUTIVE SUMMARY

Introduction Section 1

This Report has been prepared for ABAX Contracting Pty Ltd by Leyshon Consulting Pty Ltd. The Report is intended to form part of a Planning Proposal to be lodged with The Hills Council (Council) in relation to a site located on the north-east corner of the intersection of Annangrove Grove Road and Withers Road, Rouse Hill.

The purpose of the Planning Proposal is to seek approval to alter the existing zoning of the site to permit the development of bulky goods premises.

Accordingly, the Report examines the need for a large format retail centre at Rouse Hill in the context of the demand for, and supply of, such floorspace throughout The Hills Local Government Area (LGA) and in the adjoining LGAs of Blacktown and Hawkesbury.

Context Section 2

Overview

The subject site (hereafter "the site") is located in the North West Priority Growth Area (NWPGA).

At present the site is on the edge of existing urban development at Rouse Hill. Development of a major new urban area at Box Hill immediately to the site's north-west has commenced, however. Over the longer term additional urban development will also occur in the Vineyard area which lies to the west of Box Hill.

To the south, substantial future residential development will occur in the areas around Riverstone and Marsden Park. To the east, urban development is well underway in the area known as North Kellyville.

The population of the NWPGA is forecast to increase by 250,000 people in the period up to 2056. At least 100,000 new residents are forecast to have settled in the area by 2026.

Urban release areas such as the NWPGA almost always generate an above average demand for bulky goods floorspace. The development of new houses and apartments inevitably gives rise to a substantial demand for furniture, furnishings and a variety of household equipment as new dwellings are initially occupied by families and individuals.

Centres Direction Policy

The last major review of planning policy as it affects retail/commercial centres in The Hills LGA was completed in 2009.

The Centres Direction document drew upon the results of analysis undertaken by consultants Hill PDA in a report to Council completed in 2008–namely the *Baulkham Hills Retail Floorspace and Demand Analysis, 2008*.

Hill PDA's retail analysis estimated that by 2031, 81,000m^2 of additional bulky goods floorspace would be required in The Hills LGA.

Subsequent to Hill PDA's report more recent population growth projections indicate that by 2031 The Hills LGA population will be about 15% greater than that forecast by Hill PDA in 2008.

Release Area Studies

As far as we are aware there are no publicly available studies which examine, from a regional perspective, the need for additional retail floorspace in the NWPGA. Some analysis has been conducted within parts of the NWPGA, however.

Box Hill

In 2011 Hill PDA identified that at full development (expected to be 2031) the resident population of Box Hill would generate annual available bulky goods-type retail spending of $119.8 million ($2009).

Hill PDA recommended a provision of only 3,556m^2 of bulky goods floorspace in the Box Hill area by 2031 notwithstanding a theoretical level of demand for some 27,700m^2 by that time.

The Indicative Layout Plan subsequently approved by the then Department of Planning for Box Hill **did not make any provision** for land zoned B5 Business Development–that is, the zoning typically used to accommodate bulky goods-type retailing.

Vineyard Stage 1

Consultants SGS prepared a report in 2016 which provided estimates of population and spending growth arising from the development of the first stage of Vineyard. The SGS report did not make any recommendations concerning the provision of land or floorspace to meet the demand for bulky goods retailing in the Vineyard Stage I release area.

Marsden Park

The approved Indicative Layout Plan for Marsden Park allocates some 40.0 hectares for bulky goods retailing under a B5 Business Development zoning.

A significant component of this land already has been developed and is occupied by retailers including Bunnings, Costco, IKEA, a former Woolworths Masters building and an integrated bulky goods centre known as Home Hub Marsden Park.

Existing Services Section 3

Overview

The largest concentration of bulky goods floorspace in the region surrounding Rouse Hill is located in the Castle Hill industrial area. An estimated 74,800m^2 of bulky goods-type floorspace Has been developed at Castle Hill of which 50,000m^2 is found in just one centre–namely the Home Hub Castle Hill.

Marsden Park contains an estimated 69,000m^2 of bulky goods-type floorspace. Major retailers in Marsden Park include IKEA, Bunnings and Costco albeit that Costco retails a wide range of food, clothing and general merchandise.

The IKEA and Costco stores at Marsden Park both would have trade areas extending well beyond the boundaries of NWPGA encompassing substantial parts of Blacktown, Penrith and Blue Mountains LGAs.

Some 16,500m^2 of bulky goods floorspace has been developed at McGraths Hill dominated by a Bunnings Warehouse together with Harvey Norman, BCF and Repco.

In 2013 a major 17,000m^2 bulky goods centre (Totally Home Bella Vista) located on Celebration Drive at Bella Vista was resumed by the state government to facilitate the development of a new station for the North-West Rail Line.

Proposed Centres

Council recently has approved the redevelopment of the former Masters store at Rouse Hill to be used for bulky goods retailing.

Planning approval also has been given for the development of land owned by the Sydney Parklands Trust at Eastern Creek for a major centre of some 52,800m^2 gross floor area (GFA) which could include a component of bulky goods retailing.

Demand Assessment Section 4

Trade Area

To provide a regional perspective on the demand for bulky goods floorspace a generalised trade area has been defined. This is likely to be larger than the actual trade area Which would apply should the proposed development be approved.

The trade area defined incorporates The Hills LGA, the northern part of Blacktown LGA and a substantial component of Hawkesbury LGA.

Population Growth

The trade area is experiencing a high rate of population increase with growth since 2006 of some 68,387 new residents.

Between 2016-36 the trade area population is projected to increase from 342,360 people in 2016 to 583,113 in 2036. This projection, if realised, means the trade area population will grow by +240,753 people between 2016-36. The trade area's average annual growth rate (AAGR) would therefore range between +2.71% and +2.83% during this time-frame.

Available Spending

Total available annual bulky goods expenditure generated in the trade area is forecast to increase from $782.3 million in 2016 to $1,622.1 million in 2036 ($2016).

This represents a real increase (inflation adjusted) of +$839.7 million in annual available bulky goods spending between 2016-36. In summary, bulky goods spending generated by trade area residents will more than double over the next 20 years.

E-Commerce

Since 2007 the share of retail sales being directed to online retailers has been increasing.

It is expected online spending will have a lesser impact in the bulky goods sector than will be the case for other sectors of retail activity in Australia. Discounting the level of demand for physical floorspace by 15% appears appropriate so as to allow for the future migration of bulky goods-type spending to electronic platforms.

Demand Estimates

The demand for physical bulky goods floorspace arising from spending by trade area residents if forecast to increase from approximately 185,800m² in 2016 to 282,500m² in 2036. This equates to demand for an additional +96,700m² between 2016-36.

The **net supply** of existing bulky goods floorspace in the trade area at present is estimated to be in the order of 158,250m². This suggests the Rouse Hill trade area already had a theoretical under-supply of bulky goods-type floorspace of some 27,551m² in 2016.

Demand Outlook – The Hills LGA

Forecast population growth in The Hills LGA alone between 2016-36 indicates there will demand for the provision of an additional +52,108m² of physical bulky goods floorspace between 2016-36.

Demand Summary

By 2021 there will be demand for another major large format/bulky goods development (or additional bulky goods floorspace) within the trade area of at least 52,000m².

By 2036, demand for one or two additional centres of similar scale will be required to accommodate the growth in demand outlined in this Report.

Conclusion Section 5

The analysis presented in this Report indicates that over the next two decades there will be a very significant increase in demand for additional bulky goods floorspace in the region surrounding Rouse Hill. From a regional perspective, in excess of 100,000m² of additional such floorspace could be required by 2036.

If the analysis is restricted to The Hills LGA alone, about 60,000m² of additional bulky goods-type floorspace will be needed to meet the level of demand over the next 20 years.

Rouse Hill

The subject site at Rouse Hill represents an efficient location on which to accommodate a substantial increase in bulky goods floorspace over the next one to two decades.

Potential Impact

It is unlikely the proposed development would have any significant impact on existing bulky goods centres/precincts in the region surrounding Rouse Hill.

The primary reason for this is the very substantial increase in demand for additional bulky goods floorspace which will emerge over the next 20 years. This will exceed substantially the size of the proposed development.

1 INTRODUCTION

1.1 Background

This Report has been prepared for ABAX Contracting Pty Ltd by Leyshon Consulting Pty Ltd. The Report is intended to form part of a Planning Proposal to be lodged with The Hills Council (Council) in relation to a site located on the north-east corner of the intersection of Annangrove Grove Road and Withers Road, Rouse Hill.

The subject site comprises some 6.0 hectares and is zoned B6 Enterprise Corridor under The Hills Local Environmental Plan 2012.

The purpose of the Planning Proposal is to seek approval to alter the existing zoning of the site to permit the development of bulky goods retailing.

This Report examines the need for a large format retail centre at Rouse Hill in the context of the demand for, and supply of, such floorspace throughout The Hills Local Government Area (LGA) and in the adjoining LGAs of Blacktown and Hawkesbury. In summary, the Report examines the regional demand and supply for additional bulky goods floorspace.

1.2 Proposed Development

We understand that a two level bulky goods shopping centre is proposed on the subject site containing approximately 60,000m^2 of retail floorspace.

The proposed development would also contain parking provision for some 1,500 vehicles.

1.3 Structure of Report

This Report is structured as follows:

1 **Introduction** – background to report

2 **Context** – historical research and urban development context

3 **Existing Services** – existing and proposed bulky goods development

4 **Demand Assessment** – population and spending growth and demand for additional floorspace

5 **Conclusion** – need for development on the subject site.

2 CONTEXT

2.1 Overview

Metropolitan Sydney has two areas in which there are major "greenfields" residential development. These are the south-western area of the city lying generally between Liverpool and Camden and the north-west part of the city which generally comprises a corridor running from Parklea west to Windsor. The latter is mostly included within what is formally known as the North-West Priority Growth Area (NWPGA). As indicated in FIGURE 2.1 the subject site is located centrally within the NWPGA.

At present the subject site is on the edge of existing urban development at Rouse Hill although development of a major new urban area at Box Hill immediately to its north-west has commenced. Over the longer term additional urban development will also occur in the Vineyard area which lies to the west of Box Hill.

To the south, substantial future residential development will occur in the areas around Riverstone and Marsden Park. To the east, urban development is well underway in the area known as North Kellyville.

As discussed later in this Report, the population of the NWPGA is forecast to increase by 250,000 people in the period up to 2056. In terms of just the next decade, at least 100,000 new residents will be added to this area according to the Department of Planning and Environment (DPE).

Population growth of this magnitude naturally will give rise to a substantial demand for a wide range of additional services including

FIG 2.1: Location of Site Within NWPGA

traditional retail floorspace (such as supermarkets and specialty shops) as well as so-called bulky goods floorspace which generally provides a wide range of 'homemaker' services such as furniture, floor coverings, electrical appliances, home decorations and related products.

As noted later in this Report, notwithstanding the potential for e-commerce to affect the demand for physical floorspace there will still be a demand for a substantial increase in so-called 'bricks and mortar' floorspace over at least the next 20 years in the region surrounding Rouse Hill.

Urban release areas such as the NWPGA almost always generate an above average demand for bulky goods floorspace. This arises from the fact that the development of new houses and apartments inevitably gives rise to a substantial demand for furnishings and a variety of household equipment as new dwellings are initially occupied by families and individuals.

2.2 Centres Direction Policy

The last major review of planning policy as it affects retail/commercial centres in The Hills Shire was completed in 2009. In June, 2009 Council adopted *"The Centres Direction"* document which was intended to provide an overall strategic context for the planning and management of the Shire's centres to 2031.

The strategies set out in *The Centres Direction* document drew upon the results of analysis undertaken by consultants Hill PDA in a report to Council completed in 2008 – *Baulkham Hills Retail Floorspace and Demand Analysis, 2008*.

The Hill PDA analysis was based on an assumption that the population of The Hills Shire would increase by approximately 100,000 people in the period to 2031. This was based on the assumption that 35,925 new dwellings would be provided in the period to 2031. Of this total, 11,100 dwellings were assumed to be developed in established areas of the LGA and approximately 24,800 in release areas (that is, 'greenfields' areas) including Kellyville, Rouse Hill, Balmoral Road, North Kellyville and Box Hill.

On the basis of the projected population growth, Hill PDA's retail analysis estimated that by 2031 additional retail floorspace would be required in The Hills Shire as follows:

- 60,500m^2 of supermarket retail space
- 55,000m^2 of department store space
- **81,000m^2 of bulky goods space**
- 143,000m^2 specialty retail.

We note that population growth to 2031 in The Hills LGA is now projected to be somewhat higher than that forecast by Hill PDA in 2008.

In 2008, the Australian Bureau of Statistics (ABS) estimated the resident population of The Hills LGA to be 141,230 persons. The DPE now projects that by 2031 The Hills LGA will have a population of 256,900 people based on its 2016 'medium series' projection. If realised, this represents an increase of +115,670 residents during the forecast period used by Hill PDA. This is broadly about 15% greater than the population growth assumptions which underpinned their estimates of floorspace demand–as noted above.

We note that *The Centres Direction* document concluded that:

> *"Additional land is not proposed to be rezoned for retail or commercial purposes in LEP 2010 as it is considered that sufficient land and opportunities are available within existing centres.*
> ...
> *For LEP 2016 and the period beyond, there may be a need for additional zoned land to cater for retail uses in the Shire. It is envisaged that a full review of floorspace will be undertaken at that time."*

Hill PDA in their 2008 report identified two existing major concentrations of bulky goods-type floorspace in The Hills LGA namely:

- **Castle Hill Light Industrial Area** – several developments focussed on Victoria Avenue; and

- **Norwest Business Park** – a major centre on Celebration Drive.

In 2013, the major 17,000m^2 bulky goods centre (Totally Home Bella Vista) on Celebration Drive at Norwest Business Park was resumed by the State Government and demolished to make way for a new railway station associated with the North West rail line.

We understand that in 2009 a proposal was put forward to rezone land at Rouse Hill to facilitate bulky goods development. A site of approximately 6.5 hectares fronting Commercial Road at Rouse Hill subsequently was rezoned B5 Business Development (which permits bulky goods development) and was partially developed to

accommodate a Masters hardware store. Woolworths closed its Masters operation in 2016.

We understand a Planning Proposal recently has been approved by Council to rezone part of the Commercial Road site (about 1.35 hectares) to facilitate residential uses.

Accordingly, it is fair to observe that the supply of bulky goods facilities in The Hills LGA relied upon by Hill PDA to meet future demand has been reduced since 2013.

2.3 Release Area Studies

As far as we are aware there are no publicly available studies which examine the need for additional retail floorspace in the NWPGA from a regional perspective. Some specific analyses have, however, been undertaken with respect to certain parts of the overall growth area and these are discussed below.

2.3.1 Box Hill

In 2011 Hill PDA prepared a report for the then Department of Planning (*Box Hill Retail and Employment Study*). That report examined the demand for retail floorspace arising from the development of the Box Hill area and made recommendations regarding provision of a town centre for Box Hill together with several other local centres.

The 2011 Hill PDA report identified that at full development (2031) the resident population of Box Hill would generate annual available bulky goods-type retail spending of $119.8 million ($2009). This volume of spending normally would support up to 27,700m^2 of bulky goods-type

floorspace according to the "target turnover levels" adopted by Hill PDA (Table 15, page 59 of their report refers). In their analysis, Hill PDA assumed bulky goods stores would have a "target turnover" of $4,324 per m^2 per annum ($2009).

Hill PDA estimated that only a small proportion (about 15%) of available bulky goods spending would be retained within the Box Hill area. On this basis they recommended the provision by 2031 of only 3,556m^2 of bulky goods floorspace in the Box Hill area itself compared with a theoretical level of demand for 27,700m^2 by that time.

Hill PDA did not make any specific recommendations about the area of land required to accommodate 3,556m^2 of bulky goods floorspace. They concluded that:

> *"…demand for bulky goods in Box Hill Town Centres* [sic] *itself is likely to be for those bulky goods retailers that sometimes occupy a "mini-major" shopfronts* [sic]*, for example a Retravision store or a non- national "mums and dads" furniture store."*

The Indicative Layout Plan subsequently approved by the Department for Box Hill **did not make any provision** for land zoned B5 Business Development which is typically used to accommodate bulky goods-type retailing.

2.3.2 Vineyard Stage I

A report was prepared for the DPE in November, 2016 by consultants SGS (*Economic and Employment Study for Vineyard Stage I*). The SGS report provides estimates of population and spending growth arising from the development of the first stage of Vineyard.

In their report, SGS also provided an overview of potential expenditure in 2036 ($2016) in the NWPGA as a whole. This projection of available expenditure was based on an estimated resident population of 200,000 in the NWPGA by 2036.

SGS estimated the volume of annual available expenditure generated across relevant bulky goods-type merchandise categories in the NWPGA in 2036 (Table 8, page 15 of the SGS report refers) would be as follows:

- furniture/whitegoods/manchester ... $291.6 million
- electronics ... $346.1 million
- hardware/gardening ... $171.1 million.

SGS did not make any recommendations concerning the provision of land or floorspace to meet the demand for bulky goods retailing in the Vineyard Stage I release area. The recommended provision of retail floorspace made by SGS for Vineyard Stage I relates to the provision of neighbourhood/local centres only.

2.3.3 Marsden Park

We have been unable to identify any report in the public realm which relates to, or examines the demand for bulky goods-type floorspace at Marsden Park.

That said, the approved Indicative Layout Plan for Marsden Park (FIGURE 2.2 refers) allocates some 40.0 hectares of land for bulky goods retailing under a B5 Business Development zoning.

A significant component of this land has already been developed and is occupied by retailers including Bunnings, Costco, IKEA, a former

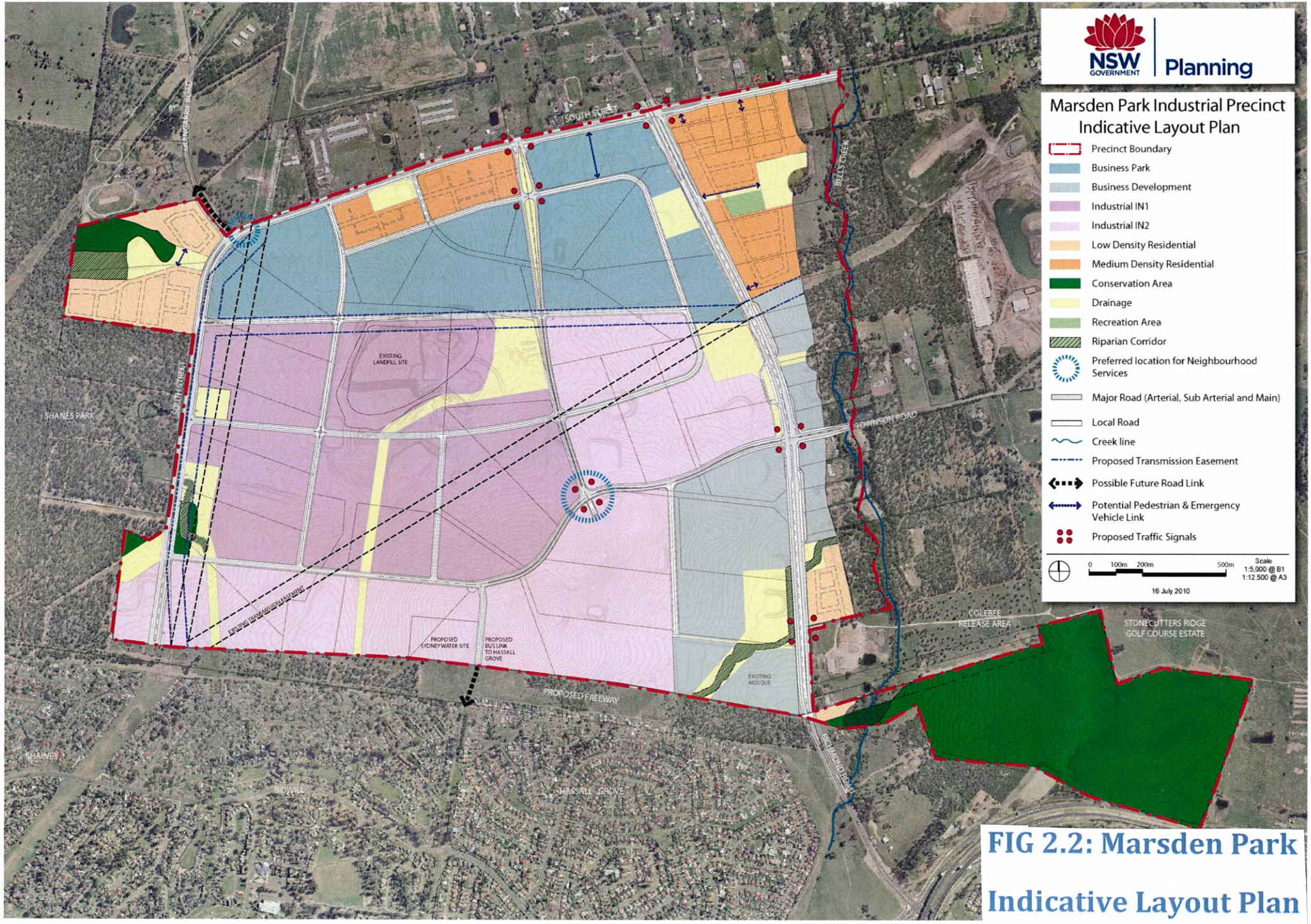


FIG 2.2: Marsden Park Indicative Layout Plan

Woolworths Masters building and an integrated bulky goods centre known as Home Hub Marsden Park.

At present there are some parcels of land on the northern side of Richmond Road which are zoned B5 Business Development which are either vacant or significantly under-developed. We estimate these vacant areas to be in the order of 8.5 hectares in total.

There is also a vacant site of approximately 2.35 hectares on the southern side of Richmond Road immediately to the south of Costco. We note that the adjacent mosque has a Business Development zoning and occupies a site of approximately 5.8 hectares. It seems unlikely this site will be redeveloped for bulky goods retailing given its cultural significance in this part of Sydney.

As indicated in FIGURE 2.2 the vacant or under-utilised sites on the northern side of Richmond Road are relatively small (generally less than two hectares per site) and thus not conducive to a major integrated bulky goods-type development of say 20,000 to 25,000m^2.

They may be suitable, however, for bulky goods-type retailers wishing to operate on a 'standalone' basis and it is possible over time that a form of bulky goods-strip retailing will emerge along this part of Richmond Road. There is a BP service station already operating in this area and a 'highway service centre'-type development under construction on an adjacent site.

3 EXISTING SERVICES

3.1 Overview

Historically, retailers of what are now known as bulky goods retailers were found in traditional retail centres. Although some retailers of such products remain in traditional retail centres, they are largely restricted to either a small component of the retail offer of department stores and discount department stores (DDSs) or some specialist retailers of homewares and electrical products.

The vast majority of retail floorspace devoted to the sale of bulky goods merchandise is now found in alternative locations in industrial/employment areas or in freestanding locations that have been set aside specifically to accommodate bulky goods retailing.

The largest concentration of bulky goods floorspace in the region surrounding Rouse Hill is located in the Castle Hill industrial area. This represents an example of a former industrial area which, in part, has been converted to bulky goods retailing.

As a consequence of the spread of residential settlement to the west and north-west, the Castle Hill area is steadily becoming less central to the population residing in The Hills LGA. This is leading to increasing travel times for shoppers in the Rouse Hill/Box Hill area wishing to shop at existing facilities in Castle Hill.

As discussed below, other lesser concentrations of bulky goods floorspace are found around Rouse Hill itself and at McGraths Hill in Hawkesbury LGA.

The major addition of such space in the region recently has been the development of a significant component of bulky goods and related space at Marsden Park as part of the so-called Sydney Business Park.

3.2 Existing Facilities

The characteristics of existing major bulky goods retail centres in the region surrounding Rouse Hill are summarised in TABLE 3.1.

TABLE 3.1
EXISTING MAJOR BULKY GOODS CENTRES and PRECINCTS – ROUSE HILL TRADE AREA, 2017

Centre/Type ...	Area (Sq.M.) (GLA)	Major Tenants
Castle Hill		
Home Hub	50,000	Harvey Norman, Domayne, JB Hi-Fi, Nick Scali, Officeworks, Freedom
Castle Hill Homemaker Centre	13,000	Fantastic Furniture, Rays Outdoors
Castle Hill – Other	15,000	Bunnings, Petbarn
Sub-Total	78,000	
McGraths Hill		
McGraths Hill Home	16,500	Bunnings, BCF, Harvey Norman
Marsden Park		
Home Hub	19,000	The Good guys, JB Hi-Fi, BCF, Snooze
IKEA	28,500	
Bunnings	13,700	
Costco	13,600	
Sub-Total	74,800	
Rouse Hill		
Various Locations	20,000	Bunnings, Rebel Sport, JB Hi-Fi, Hudsons
Sub-Total	20,000	
Total	189,300	

Sources: Macroplan Dimasi, 2017; Property Council of Australia, 2017; Vicinity Centre Website, 2017.

As indicated in TABLE 3.1, the Castle Hill area contains an estimated 74,800m^2 of bulky goods-type floorspace. Of this 50,000m^2 is found in just one centre–namely the Home Hub Castle Hill. This centre contains a number of major national chain retailers including Harvey Norman, Domayne, Officeworks, Nick Scali, The Good Guys, Freedom and Bunnings.

The Sydney Business Park at Marsden Park contains an estimated 69,000m^2 of bulky goods-type floorspace. Major retailers in the Park include IKEA, Bunnings and Costco. In our opinion, Costco is not a 'pure' bulky goods retailer in the sense the term is usually understood given it retails such a large component of clothing, footwear, accessories, groceries and food.

The Marsden Park area also contains an integrated centre known as Home Hub Marsden Park which alone contains 19,000m^2 and a vacant building constructed for the failed Woolworths Masters chain.

In our opinion, the IKEA and Costco stores at Marsden Park both would have trade areas extending well beyond the boundaries of NWPGA encompassing substantial parts of Blacktown, Penrith and Blue Mountains LGAs. This is particularly the case given that the nearest IKEA and Costco stores to Marsden Park are located at Rhodes and Auburn respectively.

Closer to the subject site there is some bulky goods-type retail floorspace in Rouse Hill itself including a Bunnings Warehouse and a number of retailers in the Rouse Hill Town Centre. We also understand Council has recently approved a development application for about 10,000m^2 for a number of retailers to operate out of the former Woolworths Masters site at Rouse Hill.

Located further to the west at McGraths Hill is some 16,500m^2 of bulky goods floorspace dominated by a Bunnings Warehouse together with Harvey Norman, BCF and Repco.

In Blacktown LGA significant components of bulky goods retailing include:

- Blacktown Megacentre ... 20,000m^2
- Homemaker Prospect ... 27,500m^2.

To the east, the nearest bulky goods retail facilities are found at North Parramatta. This area is estimated to contain some 18,000m^2 of bulky goods floorspace with a Bunnings Warehouse of 10,000m^2 accounting for the majority of this space.

3.3 Former Centre – Bella Vista

Until 2013 residents of the NWPGA also could shop at a major 17,000m^2 bulky goods centre (Totally Home Bella Vista) located on Celebration Drive at Bella Vista. As previously noted, this centre was resumed to facilitate the development of a new station for the North-West Rail Line.

The Totally Home Bella Vista centre operated very successfully and contained a number of prominent retailers including Freedom, Nick Scali, Clive Peters, Super Cheap Auto and the like.

3.4 Proposed Centres

We understand planning approval has been given for the development of land owned by the Sydney Parklands Trust at Eastern Creek for a centre of some 52,800m^2 gross floor area (GFA). The centre is to be developed on a 15.7 hectare site on the Great Western Highway between Rooty Hill Road South and the M7 motorway. The centre is mooted to contain both traditional retail facilities, including supermarkets, as well as a significant component of bulky goods retailing. It is reported that construction of the centre will commence in 2017 and will be developed in stages over a five year period.

It is likely that the centre at Eastern Creek will have a Main Trade Area (MTA) which encompasses Mount Druitt, South Blacktown, St Marys, St Clair and Erskine Park and most of Penrith LGA. It is to be expected the centre, once trading, will also attract some trade from the wider regional area given its proximity to the M7 and the M4 motorways.

4 DEMAND ASSESSMENT

4.1 Introduction

The purpose of this Section of the Report is to review the demand for bulky goods-type floorspace in the region surrounding Rouse Hill.

This task has necessitated the identification of a regional trade area, the preparation of population and spending forecasts for that trade area and the conversion of estimates of available spending into an estimate of the theoretical demand for bulky goods-type floorspace between 2016-36.

In undertaking this analysis account has been taken of the potential impact of online retail activity on the level of demand for the physical provision of bulky goods-type retail floorspace. from.

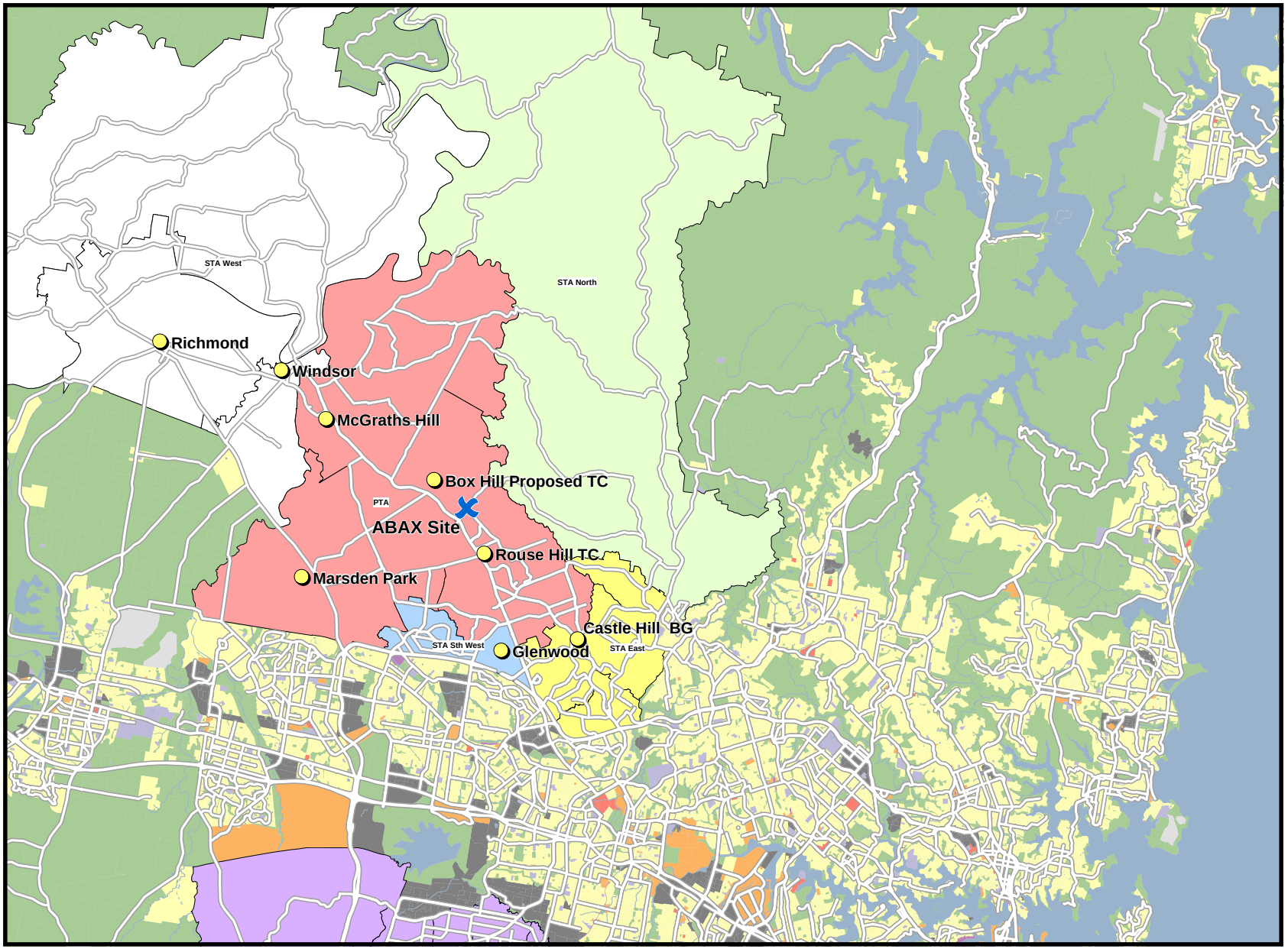
4.2 Trade Area

To provide a regional perspective on the demand for bulky goods floorspace we have defined a generalised trade area which, of necessity, is likely to be larger than the actual trade area of the proposed development.

The trade area defined incorporates The Hills LGA, the northern part of Blacktown LGA and a substantial component of Hawkesbury LGA. The trade area is depicted in FIGURE 4.1.

The Primary Trade Area (PTA) includes the following Statistical Area Level 2s (SA2s) as defined by the ABS:

Fig 4.1 Rouse Hill
Regional Trade Area



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Data Source:

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Print Date: 16 October 2017

- Rouse Hill – Beaumont Hills
- Pitt Town – McGraths Hill
- Riverstone – Marsden Park
- Parklea – Kellyville Ridge
- Kellyville.

A Secondary Trade Area East (STA East) has been defined which includes the following SA2s:

- Baulkham Hills (East)
- Baulkham Hills (West) – Bella Vista
- Castle Hill
- Cherrybrook
- Glenhaven.

An STA North has also been defined which is based on the following SA2, Dural – Kenthurst – Wisemans Ferry.

An STA South-West has been defined which includes the following SA2s:

- Glenwood
- Quakers Hill – Acacia Gardens.

Finally, an STA West is also identified in FIGURE 4.1. This is based largely in Hawkesbury LGA and includes the following SA2s namely:

- Richmond – Clarendon
- Windsor – Bligh Park
- Currajong Heights – Ebenezer.

4.3 Population Growth

4.3.1 LGA Growth

The trade area is experiencing a high rate of population growth. This growth is expected to continue for the foreseeable future as a consequence of both natural increase–in what is a young population by Australian standards–and as a result of the settlement of new residential areas.

TABLE 4.1
ESTIMATED RESIDENT POPULATION GROWTH – THE HILLS, BLACKTOWN and HAWKESBURY LGAs, 2011-16 (No. Persons)

LGA …	2011	2016[pr]	Increase 2011-16[pr] (No.)	AAG 2011-16 (%)
The Hills	147,779	162,539	14,760	1.92%
Blacktown	312,346	347,591	35,245	2.16%
Hawkesbury	64,353	66,136	1,783	0.55%
Total	524,478	576,266	51,788	1.90%

pr=provisional.
Source: ABS, 2016.

As indicated in TABLE 4.1, between 2011-16 the ABS estimated the resident population of the three relevant LGAs (The Hills, Blacktown and Hawkesbury) increased from 524,478 people in 2011 to 576,266 in 2016. This equates to an increase of +51,789 residents or an average annual growth rate (AAGR) of +1.90%.

In 2016 the DPE released population projections for LGAs in New South Wales. The 'medium' series projections for the period 2016-36 for each of the three relevant LGAs are detailed in TABLE 4.2.

As indicated in TABLE 4.2, the population of the three LGAs is projected to increase from 582,400 people in 2016 to 897,400 in 2036–an increase of +315,000 residents or +54.1%. The DPE projects that during this period the three LGAs together will maintain an AAGR of around +2.2%.

TABLE 4.2
PROJECTED POPULATION GROWTH – THE HILLS, BLACKTOWN and HAWKESBURY LGAs, 2016-36 (No. Persons)

LGA …	2016	2026	2036	Growth 2016-36
The Hills	165,550	225,150	290,900	125,350
Blacktown	349,050	433,500	521,450	172,400
Hawkesbury	67,800	74,800	85,050	17,250
Total	582,400	733,450	897,400	315,000

Source: NSW Department of Environment & Planning, 2016.

4.3.2 Trade Area Growth

APPENDIX 1 to this Report provides data from the ABS on the estimated resident population of the SA2s which comprise the component parts of the trade area for the period 2006-16.

As indicated in APPENDIX 1, trade area population growth since 2006 has been as follows:

- 2006-16 ... +68,387 persons
- 2011-16 ... +37,501 persons.

In summary, since 2006 the trade area population has been growing at an average of +6,837 persons per year. Since 2011, population growth has accelerated with the average population increase between 2011-16 rising to +7,500 persons per annum. The AAGR for the trade area as a

whole since 2011 has been +2.34%. Trade area population growth rate has been accelerating in recent years; in the most recent year (2015-16) for instance, it was estimated by the ABS to be +2.82% per annum.

The AAGR for the PTA (where most of new residential settlement is occurring) has been +5.32% per annum between 2011-16 and an estimated +6.46% in the most recent year 2015-16.

We have prepared a population forecast for the trade area to 2036. This projection is set out in TABLE 4.3. In preparing this projection we have had regard to the population projections prepared by the DPE for the relevant LGAs, preliminary data release from the 2016 Census and estimates of likely dwelling yield from the urban release areas which comprise the NWPGA. The estimated dwelling yield for the relevant release areas are projected by the DPE to be as follows:

- Marsden Park ... 10,300 dwellings
- Marsden Park North ... 4,000
- Colebee ... 1,000
- Schofields ... 2,950
- Riverstone ... 9,000
- Riverstone East ... 3,500
- Cudgeong Road Station ... 4,400
- North Kellyville ... 4,500
- Box Hill ... 9,600
- Vineyard ... 7,400.

(Source: Department of Planning and Environment).

TABLE 4.3
PROJECTED RESIDENT POPULATION – ROUSE HILL TRADE AREA, 2016-36 (No. Persons)

Trade Area Sector …	2016	2021	2026	2031	2036	Change 2016-36
PTA	113,161	146,492	188,750	240,898	297,336	184,175
STA West	53,799	56,800	59,840	63,520	69,500	15,701
STA South-West	44,541	47,983	51,692	57,072	58,500	13,959
STA East	108,794	117,202	123,181	128,185	131,422	22,628
STA North	22,065	23,075	24,125	25,155	26,355	4,290
Total	342,360	391,552	447,588	514,830	583,113	240,753
% AAG	n.a.	2.72%	2.71%	2.83%	2.52%	

Errors due to rounding.
Source: ABS Census, 2016 and Leyshon Consulting Estimates, August 2017.

As indicated in TABLE 4.3 we project the trade area population will increase from 342,360 persons in 2016 to 583,113 in 2036. This projection, if realised, means the trade area population will grow by +240,753 people between 2016-36. The AAGR for the trade area as a whole will therefore range between +2.71% and +2.83% during this time-frame.

In the PTA, growth of +184,175 persons is projected during the period 2016-36. That is, 76.4% of the total population increase in the trade area between 2016-36 will occur in the PTA which directly surrounds the subject site.

4.4 Available Spending

Taking into account the population projection for the trade area set out in TABLE 4.3, estimates have been prepared of annual available bulky goods-type retail spending generated by residents of the defined trade area to 2036.

Only certain types of retail spending have been included under the bulky goods expenditure categories. These categories of expenditure have been derived from the ABS *Household Expenditure Survey 2009-10* (latest available) and include the following product types:

Core Bulky Goods

- furniture
- floor coverings
- household appliances
- Audio visual equipment and parts

Ancillary Bulky Goods

- household furnishings
- computers and associated products
- camping equipment
- motor vehicle parts and accessories

Hardware

- selected hardware and gardening products

Renovation Products

- home renovation and improvement products.

We have utilised preliminary data from the 2016 Census to calculate average annual household income levels in the trade area in 2016. These estimates have been used in conjunction with other ABS data, such as changes in average household income levels between 2010-16 and data from the *2009-10 Household Expenditure Survey*, to determine average trade area household spending levels on bulky goods in 2016.

In relation average annual household income, we estimate (based on preliminary 2016 Census data) that in 2016 the average annual household income in the trade area was $120,393 per household ($2016). This compares to an average annual household income for the Greater Sydney Region of $104,240 per household in 2016. In summary, the average household income level in the trade area as a whole in 2016 was some +16% higher than for Greater Sydney as a whole.

Based on preliminary ABS 2016 Census data, average annual household income levels in 2016 within various parts of the trade area were as follows:

- PTA ... $129,061
- STA West ... $95,928
- STA South West ... $120,836
- STA East ... $123,847
- STA North ... $123,814.

APPENDIX 2 provides an estimate of total available bulky goods-type spending in the trade area in 2016, 2021, 2026, 2031 and 2036. The estimates of expenditure contain an implicit assumption of +1% per annum real (that is, inflation-adjusted) growth in household spending during the period 2016-36.

As summarised in TABLE 4.4, total available trade area annual bulky goods expenditure is forecast to increase from $782.3 million in 2016 to $1,622.1 million in 2036 ($2016).

TABLE 4.4
SUMMARY of CHANGE in ANNUAL AVAILABLE BULKY GOODS SPENDING – ROUSE HILL TRADE AREA, 2016-36 ($2016; $ Mil. per annum)

Category ...	2016	2021	2026	2031	2036	Change 2016-36
Core Bulky Goods	$354.0	$425.5	$510.9	$617.2	$734.5	$380.5
Ancillary Bulky Goods	$247.5	$297.7	$357.7	$432.3	$514.5	$267.0
Hardware Products	$113.5	$136.3	$163.5	$197.4	$234.9	$121.4
Repairs/ Renovation Materials	$67.3	$80.6	$96.5	$116.3	$138.2	$70.9
Total Annual Available Bulky Goods Spending	$782.3	$940.1	$1,128.6	$1,363.2	$1,622.1	$839.8

Errors due to rounding.
Source: APPENDIX 2, Leyshon Consulting Pty Ltd, August 2017.

This represents a real increase of +$839.7 million in annual available bulky goods spending (in real terms) between 2016-36. In summary, bulky goods spending by trade area residents will more than double over the next 20 years. This, in turn, inevitably will give rise to substantial demand for **additional bulky goods floorspace** both within the trade area and, potentially, beyond the trade area.

4.5 Estimating Floorspace Demand

Until relatively recently, projecting the demand for actual retail floorspace was a comparatively straightforward undertaking.

Essentially, the accepted methodology was to divide the total pool of available retail spending by an appropriate average retail sales rate (that is, $ per m^2 per annum). This calculation would yield a theoretical demand for physical floorspace.

This approach was particularly appropriate in relation to assessing the demand for traditional retail floorspace given there was a reasonable amount of information on the average sales rates achieved by supermarkets, department stores, specialty stores and, in particular, average sales rates achieved by various types of centres.

Data on average sales rates being achieved in the bulky goods sector have, however, always been less readily available. The primary reason for this is that many bulky goods centres do not collect turnover information from their tenants.

4.5.1 Impact of E-Commerce

Since 2007 it has become apparent that the share of retail sales being directed to online retailers has been increasing. For example, in the United States the US Department of Commerce has estimated the share of US retail spending captured by e-commerce has risen from approximately 3.5% of total sales at the beginning of 2008 to 8.9% of sales in the second quarter of 2017 (Source: *US Department of Commerce – Quarterly Retail E-Commerce Sales 2nd Quarter 2017*).

In the second quarter of 2017, whereas total retail sales in the United States grew at +4.1% per annum, e-commerce sales grew at +16.2% during the same period.

Relatively high rates of annual growth in e-commerce or online sales also have been recorded in some European countries with estimates of growth in 2015-16 of +11.5% in the United Kingdom, +16.4% in Germany ,+13.8% in France and +19.2% in Spain (Source: *Online Retailing: Britain, Europe, US and Canada 2017* Centre for Retail Research website).

Clearly, the pace of growth in e-commerce sales is outstripping that of the traditional retail sector (at least in the United States). It is reasonable to assume that the share of total retail sales captured by e-commerce operators will continue to rise in the foreseeable future.

The National Australia Bank (NAB) has estimated the recent growth rate in Australia for e-commerce or online sales to have been +10.5% per annum for the year to December, 2016 (Source: NAB Online Retail Sales Index, In-Depth Report – December 2016).

The NAB report further estimated that in the year to December, 2016 online sales captured approximately 7.1% of total retail spending by Australian residents.

It is also clear from a number of reports that online retailing is concentrated among certain product types. Surveys of shoppers both in Australia and overseas indicate that the most commonly purchased items from online platforms are as follows:

- clothing shoes and accessories
- electronics – particularly mobile phones, tablets, portable computers
- beauty and personal care items
- books, music and movies
- flowers and gifts
- groceries
- fast food
- homewares.

It does not appear that online retailing has yet made substantial inroads into the sale of furniture, floor coverings, lighting, tiles, bathroom fittings, large electronic devices such as televisions and large white goods (fridges, washing machines, dishwashers and the like).

There are also mixed opinions as to where this could all end in terms of the total market share likely to be captured by online sales' platforms. One US projection suggests that by 2020 online sales in the United States could represent 25% of total retail sales (Source: *US Online Retail Forecast – Omni-channel Retailing Challenged by its Success*, FTI Consulting Inc, 2016). Other forecasters suggest that all retailers will need to become what are known as "omni-channel retailers" that is having both a physical presence in 'bricks and mortar' stores as well as a significant online sales capability.

On balance, we consider online spending will have a lesser impact in the bulky goods sector than it will for other sectors of retailing activity in Australia. Based on the current state of knowledge we consider that at most a discount of 15% should be applied by 2036 to the demand for physical floorspace to allow for the migration of bulky goods-type spending to electronic platforms.

4.5.2 Demand Estimates

Taking the above into account, TABLE 4.5 provides our estimates of the potential growth in demand for physical floorspace to accommodate bulky goods activities arising from spending by trade area residents during the period 2016-36. This, in turn, underpins the estimated increase in demand for bulky goods floorspace in the trade area between 2016-36 (TABLE 4.5 refers).

In preparing this estimate we have assumed the proportion of resident-generated bulky goods spending directed to internet or e-commerce platforms increases from 5% in 2016 to 15% by 2036.

We have estimated the demand for physical floorspace based on an assumed average sales rate of $4,000 per m^2 per annum increasing at +1% per annum in real terms to 2036. By 2036 the average sales rate therefore would be some $4,881 per m^2 per annum.

We have adopted an average initial sales rate of $4,000 per m^2 per annum in 2016 following industry discussions which indicate that the average sales rates of retailers in modern bulky goods centres range between a low of $1,500 per m^2 per annum for certain furniture retailers up to a high of $10,000 per m^2 per annum for retailers with a large component of electronics in their offer.

TABLE 4.5
ESTIMATED DEMAND for BULKY GOODS FLOORSPACE – ROUSE HILL TRADE AREA, 2016-36

Category ...	2016	2021	2026	2031	2036	Change 2016-36
Total Available Bulky Goods Spending ($ Mil. p.a.)	$782.3	$940.1	$1,128.7	$1,363.2	$1,622.1	$839.8
Total Available Bulky Goods Spending Adjusted for Online Sales ($ Mil. p.a.)	$743.2	$874.3	$1,015.8	$1,186.0	$1,376.8	$635.6
Share of Net Available Bulky Goods Spending to Physical Stores (%)	95%	93%	90%	87%	85%	n.a.
Average Sales Rate ($ per m^2 p.a.)	$4,000	$4,204	$4,418	$4,644	$4,881	n.a.
Demand for Physical Floorspace (m^2)	185,801	207,958	229,901	255,381	282,497	96,696
Cumulative Increase in Bulky Goods Floorspace Demand (m^2)	n.a.	22,157	44,100	69,580	96,696	n.a.
Existing Bulky Goods Floorspace Supply (m^2)	158,250	158,250	158,250	158,250	158,250	n.a.
Existing/Projected Bulky Goods Floorspace Shortfall (m^2)	27,551	49,708	71,651	97,131	124,247	n.a.

Note: Errors due to rounding.
Source: APPENDIX 2, Leyshon Consulting Pty Ltd, August 2017.

As indicated in TABLE 4.5, we estimate the demand for the provision of physical bulky goods floorspace arising from spending by trade area residents will increase from approximately 185,800m² in 2016 to 282,500m² in 2036–hence growth of some +96,700m² during this period. As noted above, this estimate excludes bulky goods-type expenditure directed to internet or e-commerce platforms.

The cumulative increase in demand for additional bulky goods-type floorspace within the trade area between 2016-36 is estimated to be as follows:

- 2016- 21 ...+ 22,157m²
- 2021-26 ...+ 44,100m²
- 2026-31 ...+ 69,580m²
- 2031-36 ...+ 96,696m².

We have also estimated whether the trade area has an under- or over-supply of bulky goods-type floorspace at present. Preparing this estimate has not been a straightforward task, however. The reason being that there are some retailers located in bulky goods precincts/centres who sell products which cannot be regarded as bulky goods-type merchandise. Furthermore, there are some retailers within the trade area who attract substantial sales which originate from spending by shoppers living outside the trade area. A significant amount of space within the trade area is also occupied by Bunnings whose stores attract a substantial component of so-called 'trade' sales. These issues are discussed in more detail below.

At present, we estimate the trade area contains approximately some 189,300m² of space in bulky goods centres and precincts–namely:

- Castle Hill ... 78,000m²
- Marsden Park ... 74,800m²
- McGraths Hill ... 16,500m²
- Rouse Hill ... 20,000m².

We estimate that a further 5,000m² of bulky goods-type floorspace is contained in stores located in traditional–that is, non-bulky goods–shopping centres in the trade area.

In summary, we consider the supply of bulky goods-type floorspace in the trade area in 2016 was likely to have been in the order of 194,300m².

In relation to these estimates, we note that included within the Marsden Park precinct are Costco (13,600m²) and IKEA (28,500m²). We estimate that the actual bulky goods floorspace component of the Costco store is approximately 5,000m² with the balance devoted to the retailing of food, clothing, footwear, groceries et cetera. Accordingly, we consider that the stock of bulky goods floorspace in the trade area should be reduced by 8,600 m² to take account of the nature of the Costco store.

In our opinion the IKEA store would have a very significant regional trade area. This is particularly so given that the nearest IKEA store is located at Rhodes. We consider at least 50% of the sales of the store are likely to be due to spending by shoppers who reside outside the trade area. That is, at least 14,250m² of the existing floorspace of IKEA at Marsden Park relates to demand generated from outside the trade area. This should be deducted from the estimated stock of space set out above.

Also noteworthy is that four Bunnings Warehouse stores are located in the trade area at Castle Hill, Marsden Park, McGraths Hill and Rouse Hill providing approximately 48,000m² in total.

Based on our experience in undertaking analysis in relation to Bunnings stores we consider 25% to 30% of their sales relate to the so-called 'trade' sector–that is, spending at Bunnings stores by tradespeople

rather than consumers. This expenditure is not accounted for in the estimates of available expenditure discussed above. Accordingly, in our view, it would be relevant and appropriate to discount the existing stock of floorspace by approximately 13,200m^2 (equivalent to 27.5% of sales) to provide a more accurate representation of the demand generated by trade area residents' spending.

If the above are taken into account, approximately 36,050m^2 should be deducted from the existing supply of floorspace in the trade area (194,300^2) to determine in net terms the amount of floorspace supported by trade area residents' spending.

Accordingly, based on the assumptions outlined above we estimate the **net supply** of existing bulky goods floorspace in the trade area supported by trade area residents' expenditure at present would be in the order of some 158,250m^2. As indicated in TABLE 4.5, this suggests the Rouse Hill trade area had a theoretical existing under-supply of bulky goods-type floorspace of about 27,551m^2 in 2016.

Obviously this analysis is theoretical to the extent that it does not take account of spending by trade area residents being directed to centres located outside the trade area or (with the exception of IKEA) spending originating from outside of the trade area but being captured by bulky goods retailers within the trade area.

Nevertheless, the analysis does suggest that broadly by 2021 there will be a demand for about 49,708m^2 of bulky goods floorspace in the trade area comprised of growth in demand between 2016-21 of +22,157m^2 plus an existing shortfall of bulky goods floorspace of approximately 27,551m^2.

TABLE 4.5 also sets out the potential cumulative net under-supply of bulky goods floorspace in the trade area–assuming no new space were to be added by 2036.

As indicated in TABLE 4.5, by 2036 the net under-supply would in theory reach 124,247m². In reality this is a highly unlikely outcome as it is inevitable that market forces will lead to an increase in floorspace supply in the period under consideration.

4.6 Demand Outlook – The Hills LGA

As previously noted, the demand and supply analysis discussed above relates to a relatively wide regional trade area. We have also examined the demand for bulky goods floorspace assuming the analysis was restricted to the boundaries of The Hills LGA alone.

TABLE 4.6 is based on the 'medium' series population projection prepared by the DPE in 2016. This projects that the population of The Hills LGA will increase from 165,550 in 2016 to 290,900 people in 2036–an increase of +125,350 residents.

As indicated in TABLE 4.6, we estimate the demand for physical bulky goods floorspace will increase from 91,061m² in 2016 to 143,168m² in 2036–an increase of +52,108m². This analysis is based on the same assumptions as set out above and adopted in our regional analysis. In particular, it also assumes that by 2036 15% of available bulky goods spending by The Hills LGA residents will be directed to e-commerce platforms.

In summary, assuming that bulky goods centres in The Hills LGA attract no sales from outside the LGA, and that all expenditure by The Hills

LGA residents is retained, a need for at least +52,108m² of additional bulky goods floorspace to be provided by 2036.

Taking into account that bulky goods centres also contain non-bulky goods floorspace such as food-related tenancies, gymnasiums, automotive services et cetera we consider that a provision of at least 60,000m² of additional space ultimately will be required by 2036.

TABLE 4.6
ESTIMATED DEMAND for BULKY GOODS FLOORSPACE – THE HILLS LGA, 2016-36

Category …	2016	2021	2026	2031	2036	Change 2016-36
Population (No. Persons)	165,550	187,650	225,150	256,900	290,900	125,350
Average Per Capita Bulky Goods Expenditure ($ per annum)	$2,316	$2,434	$2,558	$2,688	$2,826	n.a.
Total Available Bulky Goods Spending ($ Mil. p.a.)	$383.4	$456.7	$575.9	$690.5	$822.1	$438.7
Total Available Bulky Goods Spending Adjusted for Online Sales ($ Mil. p.a.)	$364.2	$424.8	$518.3	$600.8	$698.8	$334.5
Share of Net Available Bulky Goods Spending to Physical Stores (%)	95%	93%	90%	87%	85%	n.a.
Average Sales Rate ($ per m² p.a.)	$4,000	$4,204	$4,418	$4,644	$4,881	n.a.
Demand for Physical Floorspace (m²)	91,061	101,038	117,312	129,370	143,168	52,108
Cumulative Increase in Bulky Goods Floorspace Demand (m²)	n.a.	9,977	26,251	38,309	52,108	n.a.

Note: Errors due to rounding.
Source: Leyshon Consulting Pty Ltd, August 2017.

4.7 Demand Summary

The conclusion we draw from the analysis set out above is that by 2021 there will be demand for another large format retail centre (or additional bulky goods floorspace) within the trade area of at least 52,000m² taking into account the fact that such centres also contain a

component of non-bulky goods floorspace such as food tenancies, gymnasiums, child-care centres and the like.

By 2036, meanwhile, there will be demand for one or two additional centres of similar scale to accommodate the growth in demand outlined in this Report.

5 CONCLUSION

5.1 Overview

The analysis presented in this Report indicates there will be a very significant increase in demand for additional bulky goods floorspace over the next 20 years in the region surrounding Rouse Hill. From a regional perspective, in excess of 100,000m^2 of additional floorspace could be required by 2036.

If the analysis is restricted to The Hills LGA specifically, about 60,000m^2 of additional floorspace will be needed to accommodate bulky goods floorspace demand over the next 20 years.

5.2 Locational Options

The majority of demand for bulky goods floorspace in the trade area in general, and The Hills LGA in particular, is now met by centres and precincts specifically zoned and designed to accommodate such bulky goods/large format retailing. In our view, this will continue to be the case in the future as well.

A very limited component of demand for additional bulky goods floorspace may also be met by the planned B1 Local and B2 Neighbourhood centres in areas such as Box Hill, Vineyard and North Kellyville. As noted earlier in this Report, however, it does not appear the proposed traditional centres in these areas have been planned to accommodate any significant component of bulky goods/large format retailing.

In any event, small local and neighbourhood-scale centres are inappropriate for bulky goods/large format retailing given their generally limited scale and their role in the retail hierarchy.

Accordingly, the majority of the demand for additional bulky goods-type floorspace identified in this Report will need to be accommodated in areas specifically zoned and intended for bulky goods/large format retailing.

In terms of existing zoned land that is intended for bulky goods development (B5 Business Development) there are limited locations within the defined regional trade area which could meet this need. These locations include:

- Castle Hill
- Marsden Park
- McGraths Hill.

We have excluded from consideration existing zoned land at Rouse Hill (Commercial Road) on the basis the land which was rezoned to accommodate the Woolworths Masters development at Rouse Hill will be occupied by retailers, owned by Home Consortium members, who have acquired this particular Masters site–such as Anaconda, Spotlight and Chemist Warehouse.

In any event, it is our opinion the Commercial Road site is compromised, in terms of the possible future expansion of bulky goods retailing, by the existing R2 residential area on its western boundary and the approved R4 higher density residential zone on its northern boundary.

5.2.1 Castle Hill

We are aware that a B5 zoning applies to land fronting Victoria Avenue, Castle Hill. Not all of this land has been developed for bulky goods, however, with some large sites particularly at the southern end being occupied by major automotive dealerships.

We consider that further significant redevelopment of property fronting Victoria Avenue, Castle Hill for additional bulky goods retailing is unlikely given that most major (and minor) bulky goods operators in Australia are already represented at Castle Hill including Domayne, Harvey Norman, Freedom, JB Hi-Fi, Bunnings, Officeworks, Nick Scali et cetera.

Furthermore, it is not 'a given' in an economic sense that redeveloping land currently used for major automotive dealerships would be more economic if it were used for bulky goods retailing. That said, it is possible this situation may change if the car sales industry currently located at Castle Hill were to decide to relocate further westward to areas such as Marsden Park.

In any event, Castle Hill is no longer central to the main location of future population growth in the trade area in general and in The Hills LGA in particular. Even if there were demand for further bulky goods development at Castle Hill, it would be less convenient to the population now settling in the area than would the provision of floorspace on sites further to the west of Castle Hill such as Rouse Hill.

5.2.2 Marsden Park

As discussed in this Report, capacity remains for additional bulky goods development at Marsden Park. In particular there is some 8.5 hectares of land contained in a number of parcels on the northern side of Richmond Road which may be redeveloped for bulky goods-type retailing at some future time. The individual sites which comprise the bulk of this land are relatively small, however, and thus would not be suitable for the development of another major bulky goods centre in addition to the existing development on the southern side of Richmond Road.

The only other possible site at Marsden Park comprises some 2.35 hectares of land immediately to the east of Costco and adjacent to the existing mosque. This potential development site would, at most, accommodate about 9,000 to 11,500m^2 of bulky goods floorspace together with surface car-parking.

5.2.3 McGraths Hill

A vacant site of 3.5 hectares exists within an area zoned B5 Business Development immediately to the east of Bunnings fronting Old Windsor Road at McGraths Hill. The site theoretically could accommodate in the order of 15,000 to 16,000m^2 of bulky goods floorspace if redeveloped.

In a strategic sense, however, McGraths Hill is located to the west of the main focus of population settlement in the NWPGA. Therefore it would be an inefficient location for future development to serve population growth in areas such as Box Hill, Riverstone, Kellyville North and the Cudgeong Road area.

5.2.4 Rouse Hill

On balance, our analysis indicates the subject site at Rouse Hill represents an efficient location on which to accommodate a substantial increase in bulky goods floorspace over the next one to two decades.

The site is located on Annangrove Road which is already a major conduit for traffic in the area. In particular its location at the intersection of Annangrove and Withers Roads means it would provide a high degree of accessibility for residents of Rouse Hill to the east and Box Hill/Vineyard to the west.

The site is located within an area which has been designated for employment uses. While employment-generating activities have been slow to emerge along Annangrove Road since it was rezoned for this purpose, a bulky goods development on the subject site is likely to provide a catalyst for further investment in the area.

The site also achieves what are considered to be important development objectives as far as bulky goods centres are concerned–namely those of ease pf accessibility and visibility to passing traffic.

The site does not abut residential areas and therefore will not generate the potential for land-use conflict between a major bulky goods retail operation and the need to maintain a high standard of residential amenity.

Finally, the Rouse Hill site provides an opportunity to address an already substantial and growing need for additional bulky goods floorspace in the Rouse Hill area over the next 20 years and in an area which is designated for employment uses.

5.3 Potential Impact of Proposed Development

We consider it is premature to undertake any detailed form of impact analysis of the proposed development on the subject site. This is particularly so given that the nature and quality of future tenants is completely unknown at this point of time.

In general terms, however, it is unlikely the proposed development would have any significant impact on existing bulky goods centres/precincts in the region surrounding Rouse Hill.

The primary reason for this is the very substantial growth in demand for additional bulky goods floorspace which will occur over the next 20 years–as identified in Section 4 of this Report. The extent of this growth is so substantial that any large-scale bulky goods development undertaken on the Rouse Hill site should be able to be introduced to the market without resulting in any unacceptable impact on the **current** trading levels and viability of existing bulky goods precinct/centres.

Assuming that any significant bulky goods project was approved on the Rouse Hill site it would be unlikely to commence trading until 2021. Hence existing retail centres/precincts at Castle Hill, Marsden Park and McGraths Hill would experience another four years of sustained growth in sales/turnover before being affected by the proposed development. Moreover, by 2021 it is likely these existing bulky goods/centres precincts will be trading at above average levels due to lack of competition and strong annual growth in available spending in the surrounding catchment.

In summary, it is highly unlikely the proposed development would alter either the viability or long-term performance of any existing bulky goods centre/precinct in the region surrounding Rouse Hill.

APPENDIX 1

APPENDIX 1: Estimated Resident Population Selected SA2s - 2006-2016

		ERP at 30 June												
		2006	2007	2008	2009	2010	2011	2012r	2013r	2014r	2015r	2016p	2011-16	2011-16
SA2	Name	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.
PTA														
1301	Pitt Town - McGraths Hill	8,859	8,877	8,946	9,037	9,148	9,294	9,395	9,494	9,582	9,698	9,805	946	511
1302	Rouse Hill - Beaumont Hills	16,425	16,926	17,494	18,043	18,335	18,741	19,179	19,636	20,233	21,050	22,479	6,054	3,738
1312	Riverstone - Marsden Park	11,276	11,212	11,273	11,408	11,578	11,665	11,734	11,856	12,051	13,346	16,492	5,216	4,827
1310	Parklea - Kellyville Ridge	11,498	14,022	15,924	18,070	20,830	23,031	25,625	29,017	31,748	33,505	34,204	22,706	11,173
1295	Kellyville	21,656	22,674	23,469	23,916	24,114	24,500	25,286	26,112	27,327	28,699	30,181	8,525	5,681
	Sub Total	69,714	73,711	77,106	80,474	84,005	87,231	91,219	96,115	100,941	106,298	113,161	43,447	25,930
STA East													-	
1290	Baulkham Hills (East)	20,659	20,666	20,972	21,506	21,965	22,188	22,455	22,804	23,360	23,733	24,340	3,681	2,152
1291	Baulkham Hills (West) - Bella Vista	18,136	18,195	18,578	19,065	19,308	19,488	19,756	20,018	20,371	20,858	21,221	3,085	1,733
1292	Castle Hill	26,005	26,418	27,174	28,103	28,545	28,747	29,064	29,537	29,875	30,212	30,577	4,572	1,830
1293	Cherrybrook	25,024	25,159	25,301	25,455	25,505	25,531	25,671	25,837	25,840	25,973	26,056	1,032	525
1294	Glenhaven	5,643	5,759	5,954	5,994	6,009	6,063	6,233	6,376	6,385	6,486	6,600	957	537
	Sub Total	95,467	96,197	97,979	100,123	101,332	102,017	103,179	104,572	105,831	107,262	108,794	13,327	6,777
STA North													-	
1297	Dural - Kenthurst - Wisemans Ferry	20,097	20,115	20,367	20,645	20,831	21,062	21,202	21,435	21,650	21,918	22,065	1,968	1,003
STA South West													-	
1309	Glenwood	14,276	14,743	15,166	15,545	15,829	15,926	16,214	16,264	16,455	16,626	16,760	2,484	834
1311	Quakers Hill - Acacia Gardens	24,679	25,206	25,807	26,242	26,592	26,738	26,882	27,043	27,295	27,566	27,781	3,102	1,043
	Sub Total	38,955	39,949	40,973	41,787	42,421	42,664	43,096	43,307	43,750	44,192	44,541	5,586	1,877
STA West													-	
1466	Richmond - Clarendon	13,296	13,476	13,697	13,774	13,820	13,875	13,976	14,117	14,145	14,238	14,319	1,023	444
1467	Windsor - Bligh Park	15,482	15,621	15,828	15,874	15,940	15,978	16,093	16,189	16,276	16,447	16,586	1,104	608
1299	Bilpin - Colo - St Albans	2,543	2,538	2,569	2,623	2,675	2,716	2,707	2,717	2,727	2,760	2,797	254	81
1300	Kurrajong Heights - Ebenezer	21,216	21,378	21,614	21,928	22,046	22,113	22,146	22,226	22,359	22,613	22,894	1,678	781
	Sub Total	52,537	53,013	53,708	54,199	54,481	54,682	54,922	55,249	55,507	56,058	56,596	4,059	1,914
													-	
Total		276,770	282,985	290,133	297,228	303,070	307,656	313,618	320,678	327,679	335,728	345,157	68,387	37,501

Notes

r= revised

p=Preliiminary

Source: ABS

APPENDIX 2

APPENDIX 2

TABLE 2A: Estimated Available Bulky Goods Spending - Rouse Hill BG Trade Area, 2016	PTA	STA WEST	STA SOUTH WEST	STA EAST	STA NORTH EAST	TOTAL TA
Population 2016	113,161	53,799	44,541	108,794	22,065	342,360
Average Spending ($2016)	10,841	10,969	9,979	11,398	10,909	10,930
Total Retail Spend ($m) ($2016)	1,226.8	590.1	444.5	1,240.1	240.7	3,742.1
Spending by Category						
Core Bulky Goods						
0701 Furniture and floor coverings	51.1	22.8	18.5	51.7	10.0	154.2
0703 Household appliances	30.1	14.3	10.9	30.4	5.9	91.6
110101 Audio-visual equipment and parts	35.5	17.0	12.9	35.9	7.0	108.1
TOTAL CORE BULKY GOODS	*116.7*	*54.2*	*42.3*	*118.0*	*22.9*	*354.0*
Ancillary Bulky Goods						
0702 Blankets, household linen and household furnishings	27.3	11.0	9.9	27.6	5.4	81.1
0704 Glassware, tableware, cutlery and household utensils	11.9	5.7	4.3	12.0	2.3	36.2
110102 Home computer equipment (including pre-packaged software)	18.6	9.1	6.7	18.8	3.7	56.9
1101051001 Camping equipment	1.7	0.7	0.6	1.7	0.3	5.0
100105 Motor vehicle parts and accessories purchased separately	22.7	10.1	8.2	22.9	4.4	68.4
TOTAL ANCILLARY BULKY GOODS	*82.1*	*36.5*	*29.8*	*83.0*	*16.1*	*247.6*
Hardware						
0705010101 Lawnmowers (including electric)	0.8	0.4	0.3	0.8	0.2	2.5
0705010201 Gardening tools	1.9	0.9	0.7	1.9	0.4	5.6
0705010301 Other hand and power tools	6.4	3.2	2.3	6.4	1.2	19.5
0705019999 Tools and other household durables nec	9.3	4.4	3.4	9.4	1.8	28.4
0801010101 Nails, screws and other fasteners	0.6	0.3	0.2	0.6	0.1	1.7
0801010601 Trees, shrubs and plants	4.3	2.1	1.5	4.3	0.8	13.0
0801010701 Other gardening products	4.6	2.0	1.7	4.6	0.9	13.8
0801010801 Swimming pool chemicals	1.7	1.1	0.6	1.8	0.3	5.6
0801019999 Household non-durables nec	7.5	4.0	2.7	7.6	1.5	23.4
TOTAL HARDWARE	*37.0*	*18.3*	*13.4*	*37.4*	*7.3*	*113.5*
Home Renovations/Improvement						
010106 Repairs and maintenance (materials only)	21.3	12.6	7.7	21.5	4.2	67.3
Total Bulky Goods ($m)($2016)	**257.1**	**121.6**	**93.2**	**259.9**	**50.5**	**782.3**

TABLE 2B: Estimated Available Bulky Goods Spending - Rouse Hill BG Trade Area, 2021	PTA	STA WEST	STA SOUTH WEST	STA EAST	STA NORTH EAST	TOTAL TA
Population 2021	146,492	56,800	47,983	117,202	23,075	391,552
Average Spending ($2016)	11,394	11,528	10,488	11,980	11,465	11,482
Total Retail Spend ($m) ($2016)	1,669.1	654.8	503.3	1,404.1	264.6	4,495.8
Spending by Category						
Core Bulky Goods						
0701 Furniture and floor coverings	69.6	25.3	21.0	58.5	11.0	185.4
0703 Household appliances	40.9	15.9	12.3	34.4	6.5	110.1
110101 Audio-visual equipment and parts	48.3	18.9	14.6	40.6	7.7	129.9
TOTAL CORE BULKY GOODS	*158.8*	*60.1*	*47.9*	*133.6*	*25.2*	*425.5*
Ancillary Bulky Goods						
0702 Blankets, household linen and household furnishings	37.1	12.2	11.2	31.2	5.9	97.6
0704 Glassware, tableware, cutlery and household utensils	16.2	6.3	4.9	13.6	2.6	43.5
110102 Home computer equipment (including pre-packaged software)	25.3	10.1	7.6	21.3	4.0	68.4
1101051001 Camping equipment	2.3	0.8	0.7	1.9	0.4	6.0
100105 Motor vehicle parts and accessories purchased separately	30.9	11.2	9.3	26.0	4.9	82.2
TOTAL ANCILLARY BULKY GOODS	*111.8*	*40.5*	*33.7*	*94.0*	*17.7*	*297.7*
Hardware						
0705010101 Lawnmowers (including electric)	1.1	0.5	0.3	0.9	0.2	3.0
0705010201 Gardening tools	2.5	0.9	0.8	2.1	0.4	6.8
0705010301 Other hand and power tools	8.7	3.5	2.6	7.3	1.4	23.5
0705019999 Tools and other household durables nec	12.7	4.9	3.8	10.7	2.0	34.1
0801010101 Nails, screws and other fasteners	0.8	0.3	0.2	0.7	0.1	2.1
0801010601 Trees, shrubs and plants	5.8	2.3	1.7	4.9	0.9	15.6
0801010701 Other gardening products	6.2	2.2	1.9	5.2	1.0	16.5
0801010801 Swimming pool chemicals	2.4	1.2	0.7	2.0	0.4	6.7
0801019999 Household non-durables nec	10.3	4.4	3.1	8.6	1.6	28.0
TOTAL HARDWARE	*50.4*	*20.3*	*15.2*	*42.4*	*8.0*	*136.3*
Home Renovations/Improvement						
010106 Repairs and maintenance (materials only)	28.9	14.0	8.7	24.3	4.6	80.6
Total Bulky Goods ($m)($2016)	**349.9**	**135.0**	**105.5**	**294.3**	**55.5**	**940.1**

TABLE 2C: Estimated Available Bulky Goods Spending - Rouse Hill BG Trade Area, 2026	PTA	STA WEST	STA SOUTH WEST	STA EAST	STA NORTH EAST	TOTAL TA
Population 2026	188,750	59,840	51,692	123,181	24,125	447,587
Average Spending ($2016)	11,975	12,116	11,023	12,591	12,050	12,058
Total Retail Spend ($m) ($2016)	2,260.3	725.0	569.8	1,551.0	290.7	5,396.8
Spending by Category						
Core Bulky Goods						
0701 Furniture and floor coverings	94.2	28.0	23.8	64.7	12.1	222.8
0703 Household appliances	55.4	17.6	14.0	38.0	7.1	132.2
110101 Audio-visual equipment and parts	65.4	20.9	16.5	44.8	8.4	156.0
TOTAL CORE BULKY GOODS	*215.0*	*66.6*	*54.2*	*147.5*	*27.7*	*510.9*
Ancillary Bulky Goods						
0702 Blankets, household linen and household furnishings	50.3	13.5	12.7	34.5	6.5	117.4
0704 Glassware, tableware, cutlery and household utensils	21.9	7.0	5.5	15.0	2.8	52.2
110102 Home computer equipment (including pre-packaged software)	34.3	11.1	8.7	23.5	4.4	82.1
1101051001 Camping equipment	3.1	0.8	0.8	2.1	0.4	7.3
100105 Motor vehicle parts and accessories purchased separately	41.8	12.4	10.5	28.7	5.4	98.8
TOTAL ANCILLARY BULKY GOODS	*151.3*	*44.9*	*38.2*	*103.9*	*19.5*	*357.7*
Hardware						
0705010101 Lawnmowers (including electric)	1.5	0.5	0.4	1.0	0.2	3.6
0705010201 Gardening tools	3.4	1.1	0.9	2.3	0.4	8.1
0705010301 Other hand and power tools	11.7	3.9	3.0	8.1	1.5	28.1
0705019999 Tools and other household durables nec	17.2	5.4	4.3	11.8	2.2	40.9
0801010101 Nails, screws and other fasteners	1.1	0.3	0.3	0.7	0.1	2.5
0801010601 Trees, shrubs and plants	7.8	2.5	2.0	5.4	1.0	18.7
0801010701 Other gardening products	8.4	2.5	2.1	5.8	1.1	19.9
0801010801 Swimming pool chemicals	3.2	1.4	0.8	2.2	0.4	8.0
0801019999 Household non-durables nec	13.9	4.9	3.5	9.5	1.8	33.6
TOTAL HARDWARE	*68.2*	*22.5*	*17.2*	*46.8*	*8.8*	*163.5*
Home Renovations/Improvement						
010106 Repairs and maintenance (materials only)	39.2	15.5	9.9	26.9	5.0	96.5
Total Bulky Goods ($m)($2016)	**473.8**	**149.4**	**119.4**	**325.1**	**60.9**	**1128.7**

TABLE 2D: Estimated Available Bulky Goods Spending - Rouse Hill BG Trade Area, 2031	PTA	STA WEST	STA SOUTH WEST	STA EAST	STA NORTH EAST	TOTAL TA
Population 2031	240,898	63,520	57,072	128,185	25,155	514,830
Average Spending ($2016)	12,586	12,734	11,586	13,233	12,665	2,085
Total Retail Spend ($m) ($2016)	3,031.9	808.9	661.2	1,696.3	318.6	6,516.9
Spending by Category						
Core Bulky Goods						
0701 Furniture and floor coverings	126.4	31.3	27.6	70.7	13.3	269.2
0703 Household appliances	74.3	19.7	16.2	41.6	7.8	159.6
110101 Audio-visual equipment and parts	87.7	23.3	19.1	49.1	9.2	188.4
TOTAL CORE BULKY GOODS	*288.4*	*74.2*	*62.9*	*161.4*	*30.3*	*617.2*
Ancillary Bulky Goods						
0702 Blankets, household linen and household furnishings	67.4	15.1	14.7	37.7	7.1	142.0
0704 Glassware, tableware, cutlery and household utensils	29.4	7.8	6.4	16.4	3.1	63.1
110102 Home computer equipment (including pre-packaged software)	46.0	12.4	10.0	25.8	4.8	99.1
1101051001 Camping equipment	4.2	0.9	0.9	2.3	0.4	8.8
100105 Motor vehicle parts and accessories purchased separately	56.0	13.8	12.2	31.4	5.9	119.4
TOTAL ANCILLARY BULKY GOODS	*203.0*	*50.1*	*44.3*	*113.6*	*21.3*	*432.3*
Hardware						
0705010101 Lawnmowers (including electric)	2.0	0.6	0.4	1.1	0.2	4.3
0705010201 Gardening tools	4.6	1.2	1.0	2.6	0.5	9.8
0705010301 Other hand and power tools	15.7	4.3	3.4	8.8	1.7	34.0
0705019999 Tools and other household durables nec	23.1	6.0	5.0	12.9	2.4	49.4
0801010101 Nails, screws and other fasteners	1.4	0.4	0.3	0.8	0.1	3.0
0801010601 Trees, shrubs and plants	10.5	2.8	2.3	5.9	1.1	22.6
0801010701 Other gardening products	11.3	2.8	2.5	6.3	1.2	24.0
0801010801 Swimming pool chemicals	4.3	1.5	0.9	2.4	0.5	9.6
0801019999 Household non-durables nec	18.6	5.5	4.1	10.4	2.0	40.5
TOTAL HARDWARE	*91.5*	*25.1*	*20.0*	*51.2*	*9.6*	*197.4*
Home Renovations/Improvement						
010106 Repairs and maintenance (materials only)	52.6	17.3	11.5	29.4	5.5	116.3
Total Bulky Goods ($m)($2016)	**635.5**	**166.7**	**138.6**	**355.6**	**66.8**	**1363.2**

TABLE 2E: Estimated Available Bulky Goods Spending - Rouse Hill BG Trade Area, 2036	PTA	STA WEST	STA SOUTH WEST	STA EAST	STA NORTH EAST	TOTAL TA
Population 2036	297,336	69,500	58,500	131,422	26,355	583,114
Average Spending ($2016)	13,228	13,384	12,177	13,908	13,311	13,298
Total Retail Spend ($m) ($2016)	3,933.1	930.2	712.3	1,827.9	350.8	7,754.3
Spending by Category						
Core Bulky Goods						
0701 Furniture and floor coverings	164.0	36.0	29.7	76.2	14.6	320.5
0703 Household appliances	96.4	22.6	17.5	44.8	8.6	189.9
110101 Audio-visual equipment and parts	113.7	26.8	20.6	52.9	10.1	224.1
TOTAL CORE BULKY GOODS	*374.1*	*85.4*	*67.8*	*173.9*	*33.4*	*734.5*
Ancillary Bulky Goods						
0702 Blankets, household linen and household furnishings	87.4	17.3	15.8	40.6	7.8	169.0
0704 Glassware, tableware, cutlery and household utensils	38.1	9.0	6.9	17.7	3.4	75.1
110102 Home computer equipment (including pre-packaged software)	59.7	14.3	10.8	27.7	5.3	117.9
1101051001 Camping equipment	5.4	1.1	1.0	2.5	0.5	10.5
100105 Motor vehicle parts and accessories purchased separately	72.7	15.9	13.2	33.8	6.5	142.1
TOTAL ANCILLARY BULKY GOODS	*263.4*	*57.6*	*47.7*	*122.4*	*23.5*	*514.5*
Hardware						
0705010101 Lawnmowers (including electric)	2.6	0.7	0.5	1.2	0.2	5.2
0705010201 Gardening tools	6.0	1.3	1.1	2.8	0.5	11.7
0705010301 Other hand and power tools	20.4	5.0	3.7	9.5	1.8	40.4
0705019999 Tools and other household durables nec	29.9	6.9	5.4	13.9	2.7	58.8
0801010101 Nails, screws and other fasteners	1.8	0.4	0.3	0.9	0.2	3.6
0801010601 Trees, shrubs and plants	13.6	3.3	2.5	6.3	1.2	26.9
0801010701 Other gardening products	14.6	3.2	2.7	6.8	1.3	28.6
0801010801 Swimming pool chemicals	5.6	1.7	1.0	2.6	0.5	11.4
0801019999 Household non-durables nec	24.2	6.3	4.4	11.2	2.2	48.2
TOTAL HARDWARE	*118.8*	*28.8*	*21.5*	*55.2*	*10.6*	*234.9*
Home Renovations/Improvement						
010106 Repairs and maintenance (materials only)	68.2	19.9	12.3	31.7	6.1	138.2
Total Bulky Goods ($m)($2016)	**824.4**	**191.7**	**149.3**	**383.1**	**73.5**	**1622.1**

Source: Leyshon Consulting Estimates, September 2017

25 August 2017

Michael Winnem
C/-Abax Contracting Pty Ltd
PO Box 215
Girraween NSW 2146

Dear Michael,

Rouse Hill Large Format Retail tenant possibilities

This letter accompanies our Market Review for the catchment which would be served by large format retailers (LFRers) which could trade from 332 Annangrove Road, Rouse Hill.

The key Primary sector is relatively small – with a population of 31,394 at June 2017 – but it is a very good growth story (i.e. averaging 4.9% per annum growth between 2017 and 2030). Local demographics are also favourable, with above average household incomes and LFR spend per capita rates across the catchment. This is unusual in outer capital city growth areas in Australia.

By way of comparison, another emerging market in Narellan/Gregory Hills has a current Primary population of about 80,000 and a Secondary population of about 65,000 (i.e. total population 0f 145,000). The Rouse Hill market will be similar in size within 5-6 years.

We would suggest that the leasing campaign should focus on national retailers with relatively large networks not represented at Rouse Hill but generally prepared to operate in the outer suburban growth markets in Australia's capital cities. The target retailers cannot be already located in Rouse Hill.

On this basis, target retailers should include:

Auto

- Supercheap Auto
- Autobarn
- Repco

Pet supplies

- Petbarn

Deep End Services Pty Ltd
ABN 60 301724 090

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South Yarra VIC 3141

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Electrical

- The Good Guys

Furniture

- Harvey Norman
- Fantastic Furniture

Bedding

- Forty Winks
- Snooze
- Sleeping Giant

Homewares

- Beacon Lighting
- Adairs

Office supplies

- Officeworks

Coverings

- Carpet Call

Recreational

- BCF
- Toys R Us

Whilst outside of the retail sectors, we would suggest that the site would also be ideally located for a gym operator and possibly a children's play centre, particularly with the good supply of parking.

We trust this is of assistance but please call to discuss if required.

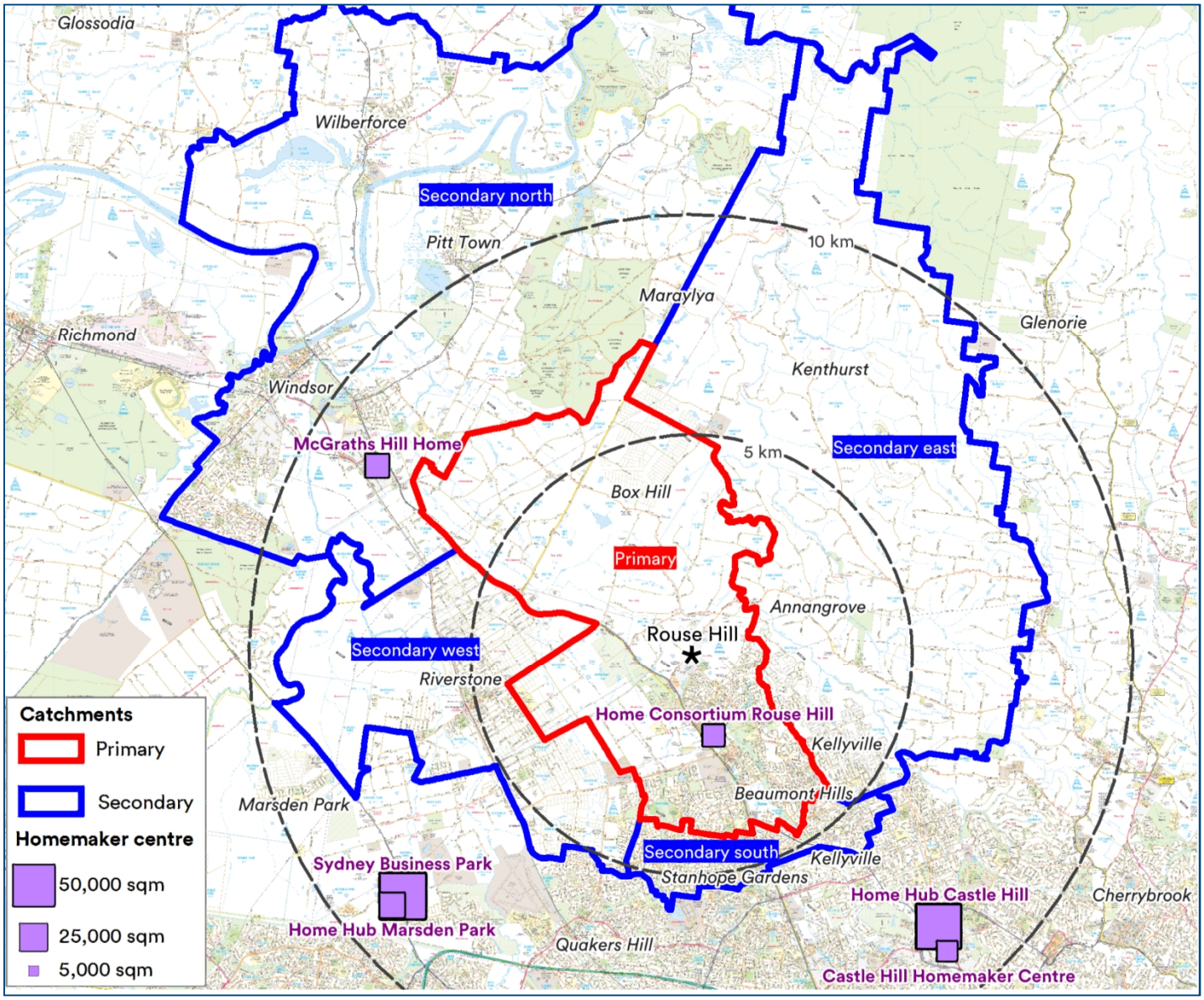
Kind regards

Justin Ganly

Justin Ganly
Managing Director

Rouse Hill

LFR catchment area definition



Source: Deep End Services; MapInfo

Source: Deep End Services; Nearmap

- The subject site at 332 Annangrove Road in Rouse Hill is located 45 km north-west of the Sydney CBD.
- The proposed development is to comprise approximately 30,000 sqm of Large Format Retail ("LFR") floorspace.
- 850 car spaces are to be provided, representing a very good ratio of 2.8 spaces per 100 sqm of floorspace.
- The subject site is located in close proximity to other existing retail facilities, such as Bunnings, Home Consortium Rouse Hill (i.e. the former Masters tenancy) and Rouse Hill Town Centre.
- The catchment area served by large format retailers which could operate within the centre's showrooms comprises a primary and four secondary sectors as shown above and with market characteristics discussed on the next page.

Rouse Hill

Catchment area characteristics

Population

Catchment sector	2011	2017	2020	2025	2030	2017-30
	Persons					(%/pa)
Primary	24,376	31,394	35,693	45,377	58,741	4.9%
Secondary north	24,693	26,451	27,376	28,656	29,711	0.9%
Secondary east	6,898	10,410	11,829	14,124	16,310	3.5%
Secondary south	20,139	26,831	27,774	28,822	29,457	0.7%
Secondary west	8,103	14,684	22,130	36,079	49,593	9.8%
Total	84,209	109,770	124,802	153,058	183,812	4.0%
Total catchment growth per annum						
Number	-	4,260	5,011	5,651	6,151	-
%	-	4.5%	4.4%	4.2%	3.7%	4.0%

Source: Deep End Services; ABS; Forecast id; NSW Dept of Planning & Environment

Demographic Profile (2016 Census)

Demographic characteristic	Total catchment	Sydney	Index
Usual resident population	101,894	4,823,991	-
Total private dwellings [5]	33,172	1,855,731	-
- % unoccupied	5%	7%	0.66
Average household size [5][7]	3.24	2.78	1.16
Age group			
0-9	17%	13%	1.31
10-19	15%	12%	1.27
20-34	19%	23%	0.84
35-49	24%	21%	1.16
50-64	15%	17%	0.90
65+	9%	14%	0.64
Average age	33.7	37.6	0.90
Annual household income [1][3][5]			
<$33,800	9%	17%	0.53
$33,800 - $78,200	21%	27%	0.76
$78,200 - $130,300	27%	25%	1.10
$130,300 - $182,400	21%	14%	1.52
>$182,400	22%	18%	1.25
Average household income	$130,984	$110,026	1.19
Country of birth [1]			
Australia	72%	61%	1.18
India	5%	3%	1.71
England	3%	3%	0.89
Other	20%	33%	0.62
Occupied private dwelling tenure [1][4][5][6]			
Fully owned	24%	30%	0.78
Being purchased	53%	34%	1.54
Rented	23%	35%	0.66
Dwelling type [1][4][7]			
Separate house	86%	57%	1.50
Townhouse/semi-detached	12%	14%	0.87
Apartment	2%	28%	0.06
Household composition [4][5]			
Couples with children	55%	38%	1.44
Couples without children	21%	24%	0.85
One parent family	11%	11%	0.95
Lone person	12%	22%	0.56
Group	2%	5%	0.36
Motor vehicle ownership per dwelling [1][5]			
None	2%	11%	0.21
One	23%	38%	0.60
Two	46%	34%	1.36
Three or more	28%	16%	1.74

[1] Excludes not stated
[2] 15 years and over and excludes not stated
[3] Excludes inadequately described and/or partially stated
[4] Excludes other
[5] Occupied private dwellings
[6] Includes visitor only households
[7] Excludes visitor only households

Source: Deep End Services; Australian Bureau of Statistics

LFR Spend Per Capita (2016/17)

Spending category	Total catchment	Sydney	Index
Automotive Parts & Accessories	$512	$412	1.24
Floor Coverings	$120	$100	1.21
Curtains & Blinds	$72	$58	1.24
Sub-total Coverings	*$192*	*$157*	*1.22*
Electrical Appliances	$370	$355	1.04
Electrical Communications	$47	$49	0.96
Electrical Entertainment	$606	$686	0.88
Electrical Media	$201	$207	0.97
Sub-total Electrical	*$1,224*	*$1,297*	*0.94*
Bedroom furniture	$186	$170	1.10
Other furniture	$313	$286	1.10
Sub-total Furniture	*$499*	*$455*	*1.10*
Hardware & Garden	$961	$702	1.37
Home Décor	$128	$146	0.88
Manchester	$97	$99	0.98
Tableware & Kitchenware	$105	$105	1.00
Sub-total Homewares	*$330*	*$350*	*0.94*
Other Large Format Retail	$446	$422	1.06
Total catchment	$4,165	$3,796	1.10

Source: Deep End Services; ABS; Market Data Systems; Deloitte Access Economics

LFR Market Size by Category

Spending category	2011	2017	2020	2025	2030	2017-30
	Total catchment ($m)					(%/pa)
Automotive Parts & Accessories	34.9	56.2	60.2	69.6	79.5	2.7%
Floor Coverings	7.6	13.2	16.1	21.3	28.4	6.1%
Curtains & Blinds	4.6	7.9	9.6	12.7	16.9	6.1%
Sub-total Coverings	*12.2*	*21.1*	*25.7*	*34.0*	*45.3*	6.1%
Electrical Appliances	31.3	40.6	49.9	64.9	85.3	5.9%
Electrical Communications	3.2	5.2	5.6	6.5	7.5	2.9%
Electrical Entertainment	41.2	66.5	71.2	82.5	94.3	2.7%
Electrical Media	13.7	22.1	23.7	27.5	31.4	2.7%
Sub-total Electrical	*89.4*	*134.4*	*150.4*	*181.4*	*218.4*	3.8%
Bedroom Furniture	11.9	20.4	24.9	32.9	43.9	6.0%
Other Furniture	20.0	34.4	41.9	55.4	73.7	6.0%
Sub-total Furniture	*31.9*	*54.8*	*66.8*	*88.3*	*117.6*	6.0%
Hardware & Garden	61.3	105.5	124.4	172.6	237.2	6.4%
Home Décor	8.2	14.1	17.2	22.7	30.3	6.1%
Manchester	6.2	10.6	13.1	17.4	23.3	6.2%
Tableware & Kitchenware	6.7	11.5	14.1	18.6	24.8	6.1%
Sub-total Homewares	*21.0*	*36.2*	*44.3*	*58.8*	*78.3*	6.1%
Other Large Format Retail	33.2	49.0	54.0	64.5	76.3	3.5%
Total catchment	283.9	457.2	525.7	669.3	852.7	4.9%
Average change (%/pa)	-	8.3%	4.8%	4.9%	5.0%	-

Source: Deep End Services; ABS; Market Data Systems; Deloitte Access Economics

LFR Market Size by Catchment Sector

Catchment sector	2011	2017	2020	2025	2030	2017-30
	Total LFR ($m)					(%/pa)
Primary	88.6	141.0	163.7	218.8	302.8	6.1%
Secondary north	73.4	96.9	101.8	111.2	122.3	1.8%
Secondary east	25.1	46.9	54.3	67.9	83.5	4.5%
Secondary south	74.5	122.5	129.6	141.4	154.6	1.8%
Total catchment	283.9	457.2	525.7	669.3	852.7	4.9%
Average change (%/pa)	-	8.3%	4.8%	4.9%	5.0%	-

Source: Deep End Services; ABS; Market Data Systems; Deloitte Access Economics