ARCADIS Design & Consultancy for natural and built assets

HUNTLEE NEW TOWN

STAGE 2

Traffic and Transport Impact Assessment

Incorporating Hyder

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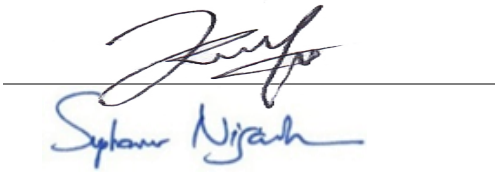
Stage 2, Traffic and Transport Impact Assessment

Author	Mikhael Wong	
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REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	25 Sept 2023	Traffic and Transport Impact Assessment Draft for clients review and comments	KN, MW	MR
B	1 Nov 2023	Draft Final Report	KN	MR
C	27 Nov 2023	Draft Final Report updates	KN	MR
D	30 Nov 2023	Draft Final Report with executive summary	KN	MR
E	5 Dec 2023	Final Report with updates	MW	MR
F	8 Dec 2023	Final Report with updates	MW	MR
G	21 June 2024	Final Report with updates	MW	MR

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Executive summary

Huntlee P/L commissioned Arcadis to prepare a Traffic Impact Assessment (TIA) to accompany the Stage 2 State Significant Development Application to be submitted to the NSW Department of Planning and Environment (DPE). The Stage 2 development application proposes a concept masterplan for the Stage 2 area including up to approximately 5,000 additional lots, and the detailed development of approximately 1,750 lots within Village 2 Centre and South Area, west of the Huntlee Stage 1 development. Future detailed Development Applications and Traffic Impact Assessments will be required for the concept areas.

The Huntlee Stage 1 Development Consent was granted in 2013 and the project commenced construction in 2014. Hyder Consulting (now Arcadis) prepared a traffic modelling report as part of the Stage 1 DA (Hyder, 2012) and have also recently prepared an updated modelling report as part of Stage 1 DA Modification 21 (Arcadis, 2023).

The 2013 traffic modelling report was used to identify road network upgrades required as part of the Stage 1 development. These upgrades were included as part of the development consent conditions and many of the required upgrades have now been completed. The original report assumed that the Stage 1 development would be completed by 2020, which has not been realised as the project is largely driven by market demand. More recent traffic modelling undertaken to support the subject SSDA has been prepared on the basis of discussion and advice from Transport for NSW, and assumes a 10 year development horizon. This is considered a more realistic timeframe for the progression of the development of the site, as well as acknowledging that attempting to predict outcomes beyond a 10 year horizon is problematic.

The Arcadis Stage 1 DA Mod 21 report reviewed the yield changes proposed to Stage 1 and included updated traffic survey information to review the impacts of the total revised Stage 1 development yield on the road network with background traffic growth to 2032. This report found that the upgrades as recommended within the original TIA (Hyder Consulting, 2012) remained capable of absorbing the increase in traffic movements expected from the modification, beyond an additional upgrade of widening the northern leg approach to the Bridge Street/Wine Country Drive/Tollbar Avenue roundabout to two lanes. It indicated that the Mod 21 increases would not intensify traffic generation or create impacts on intersections from the additional approximate 490 new dwellings within the Town Centre, which was always envisaged to provide residential development.

The Traffic Impact Assessment for Huntlee Stage 2 considers a 10 year development horizon as requested in TfNSW's SEARs response. This proposed development horizon covers the period of 2026 to 2036 and therefore overlaps with the latest Stage 1 traffic modelling (Arcadis, 2023). In order to consider the impacts of Stage 2 on the road network, the subject TIA has included components of the Stage 1 development which have been approved but not yet constructed, as only 900 homes were occupied within Stage 1 at the time of the modelling/counts. Not including the Stage 1 development areas which are still to be delivered or occupied would mask the impacts of the Stage 2 development on the road network.

The Stage 2 DA traffic modelling undertaken therefore includes the following key parameters;

- Updated traffic counts on the existing road network.
- Traffic generation of the Stage 1 development yield which had not been occupied at the time of the traffic counts. At the time of completing the updated traffic counts, 900 homes and 1Ha of commercial GFA were occupied out of the approved 2631 dwellings and 14.3Ha commercial GFA.
- Traffic generation of the expected Stage 2 development yield over a 10 year horizon, (2026-2036), comprises approximately 2369 dwellings and 5.7Ha commercial/mixed use GFA. This covers the entire Stage 2 detailed area (Villages 2 Central and South areas) as well as a portion of the Stage 2 concept area relating to the balance of the development of town centre within the existing Stage 1 Town Centre area, and the part located within Village 3, to the south of the existing Stage 1 Town Centre area.
- Background traffic growth on the road network at a rate advised by TfNSW.
- Modelling parameters and trip distribution/generation assumptions as agreed with TfNSW.

- The total of the Stage 1 and 2 development yield assessed over the 10 year horizon is 5,000 residential dwellings and 20Ha GFA of commercial/mixed use development. This comprises the balance of the Stage 1 dwellings (approximately 1,750 of the approved 2,631) and commercial / mixed use GFA (approximately 13.3ha of the 14.3ha) yet to be delivered as part of the existing Stage 1 approval, and approximately 2,369 dwellings and 3.9Ha of commercial/mixed use development across the Stage 2 area. Development within the concept areas of the subject Stage 2 proposal would be subject to a separate traffic assessment process prior to being able to realise this development potential.
- The overall Huntlee development proposes approximately 7,500 residential dwellings and 28.7ha of mixed use/commercial GFA, with this cumulative impact considered as part of the broader traffic considerations for the development.

A summary of the key findings and recommendations of this TIA are summarised below;

- Upgrades to the Wine Country Drive/Tollbar/Bridge St roundabout and Hunter Expressway Interchange are required to be completed as detailed in the report prior to the Huntlee Stage 2 development yield reaching 2,369 dwellings and 14.3Ha commercial/mixed use GFA.
- Future TIA's will be required for additional development yield in excess of 5,000 residential dwellings and 20Ha GFA commercial/mixed use development.
- Future TIAs will be required to support the future applications required for the balance of the development considered by this TIA which sit within the concept areas of Stage 2.
- Updated TIA's will be prepared in consultation with TfNSW.
- The road upgrades expected to be required as part of future TIA's for concept areas have been outlined in the report and concept sketches provided as part of the separate Northrop DA Infrastructure package. The final configurations of these future upgrades will be dependent on final development yields/timing and future traffic modelling/TIA's assessed by TfNSW.

Given the scale of the Huntlee development and timeframe over which it is being developed, it is recommended that updates to traffic counts and the modelling are prepared at the mid point of the assessed 10 year time horizon, being 2031. Should additional detailed development applications for the Huntlee project be submitted prior to this time, this would address this requirement.

1 Introduction

1.1 Report purpose

This Traffic and Transport Impact Assessment Report (TIA) supports an Environmental Impact Statement and State Significant Development Application (SSDA) that seeks consent for the Huntlee New Town Stage 2 development, comprising the concept development for the Stage 2 sites including Villages 2 and 3, land off Old North Road and the Town Centre North area, and the detailed development for the central and southern areas of Village 2. The proposal represents the next phase of an extensive planning, assessment and consultation process completed to date for the development of the Huntlee New Town site.

The overall purpose of this report is to identify and assess the traffic and transport issues related to the Stage 2 proposal.

During the course of undertaking traffic assessment, relevant documents of the proposal have been reviewed and the potential traffic impact on the road network has been assessed. The study provides recommendations on the potential upgrading works which would be required to support the Stage 2 proposal.

This TIA report has been prepared addressing traffic, transport and accessibility requirements outlined in Planning Secretary's Environmental Assessment Requirements (SEARs) for the Huntlee New Town – Stage 2 (SSD-70748466).

1.2 The site

The subject site forms a large component of the 1,622 hectare Huntlee New Town, situated to the south of Branxton in the Hunter Valley. It is located approximately 20km north of Cessnock, 23km south-east of Singleton, and 55km north-west of Newcastle.

The subject Site comprises a number of allotments located in both Cessnock and Singleton Local Government Areas (LGAs). It has a combined area of approximately 541.71ha, is irregular in shape and is generally extended to the west and south of the approved Huntlee Town Centre. The site is bound to the west by the Black Creek and floodplain. An aerial photo of the site is provided in Figure 1-1.

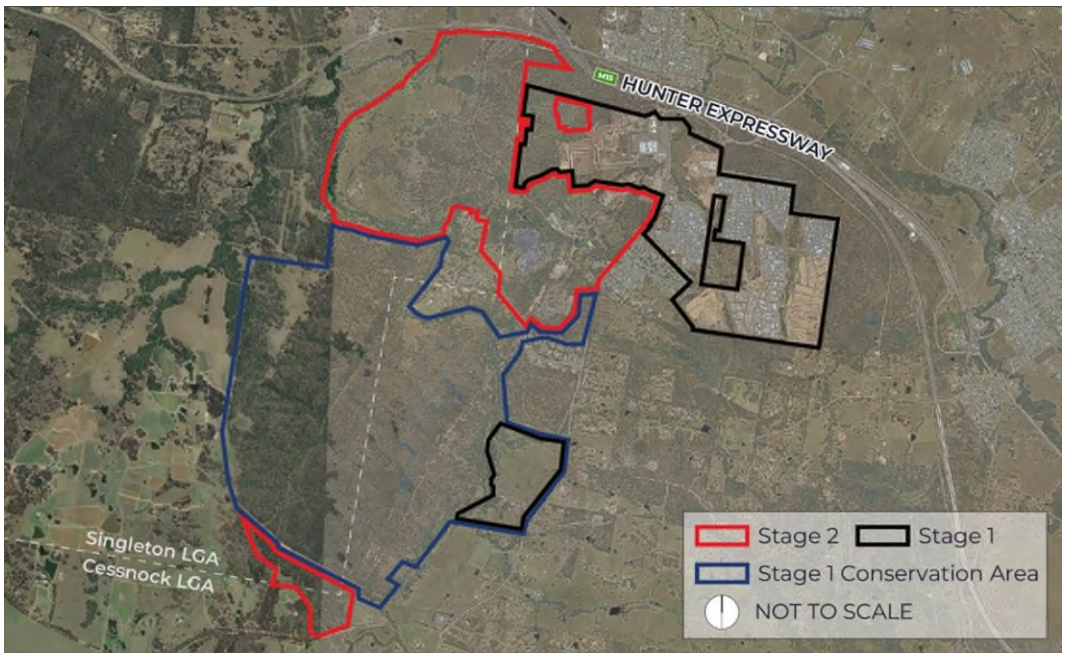


Figure 1-1 Site aerial

Source: Nearmap and Ethos Urban

1.3 Stage 2 proposal

Specifically, this SSDA proposes the following works for the Huntlee New Town:

- A Concept Master plan for the Stage 2 site, comprising:
  - Overall Stage 2 development footprint, including:
    - The remaining Town Centre North area,
    - Villages 2 and 3, and
    - A large lot residential area located to the south of the site on Old North Road;
  - Proposed land use and development yield, including the provision for residential subdivision of approximately 5,000 lots;
  - Associated new road network and required upgrades to existing network;
  - Site-wide open space and riparian areas;
- Detailed development of Village 2 Central and South and eastern connection to the Town Centre, comprising:
  - Demolition and clearing of existing built form structures;
  - Clearing of existing vegetation within proposed development footprints;
  - Open space, recreation, community and riparian areas;
  - Construction of road and access infrastructure;
  - Bulk earthworks;
  - Stormwater and drainage works;
  - Utilities and services, including
    - Sewer and potable water reticulation;
    - Electricity and communications infrastructure;
  - Subdivision to facilitate approximately 1,750 lots across the Village 2 Central and South areas and Town Centre development lots, comprising approximately 1,730 residential lots, eight (8) medium density superlots, two (2) commercial/mixed use lots and open space areas; and
  - Select clearing and grading to establish temporary Asset Protection Zones where development interfaces with the Concept Master plan area.

1.4 Technical documents

The following is an overview of technical advice documents submitted to Transport for NSW (TfNSW) as part of the Stage 2 consultation process including:

- *Technical Advice No 1 – Traffic scoping paper, prepared by Arcadis, 19 July 2022*. Technical Advice No 1 was prepared to document the traffic scope of work for Stage 2 DA. Traffic scoping was accepted by TfNSW on 27 July 2022.
- *Huntlee New Town, Modification 21 (MOD 21), Traffic Impact Assessment, prepared by Arcadis, September 2022.* The Sept 2022 MOD 21 TIA report provides traffic impact assessment to support the development application of the proposed Modification 21 (MOD 21) proposal within the Huntlee Town Centre.
- *Update traffic impact assessment (TIA) for Modification 21 (MOD 21), prepared by Arcadis, 16 June 2023.* The June 2023 MOD 21 TIA report provides additional traffic modelling and assessment undertaken to address TfNSW comments. MOD 21 TIA was accepted by TfNSW on 29 August 2023.
- *Technical Advice No 2 – Traffic assumption paper for Stage 2 DA for full development, prepared by Arcadis, 23 May 2023*. Technical Advice No 2 was prepared to document the traffic assumptions

proposed for the Huntlee Stage 2 proposal. Traffic assumption for Stage 2 was accepted by TfNSW on 13 June 2023.

Appendix C includes relevant emails correspondence with TfNSW.

1.5 Huntlee full development

Figure 1-2 shows the location of the Stage 2 Concept and Detailed areas, in the context of the surrounding development.

For traffic modelling purposes, cumulative impact from the full Huntlee development was considered. The complete Huntlee development proposes to provide about 7,500 residential dwellings and up to 28.7 hectare (ha) gross floor area (GFA) of mixed use / commercial development.

Table 1-1 shows the proposed full Huntlee development.

Table 1-1 Full Huntlee development

Development type / location	Development capacity	
Residential Development		
Village 1 (existing Stage 1 currently under development)	2,023	dwellings
Village 2	2,407	dwellings
Village 3	1,421	dwellings
Town Centre (includes Stage 1)	1,500	dwellings
Large lot area – Wine Country Drive (Stage 1)	95	dwellings
Large lot area – Old North Road	40	dwellings
Total Residential	**7,500**	**Dwellings**
Mixed Use / Commercial		
Mixed use / commercial	24.2	ha GFA
Retail	1.0	ha GFA
Aged Care	0.9	ha GFA
Education	2.4	ha GFA
Infrastructure	0.2	ha GFA
Total – Mixed use / commercial / retails	**28.7**	**ha GFA**

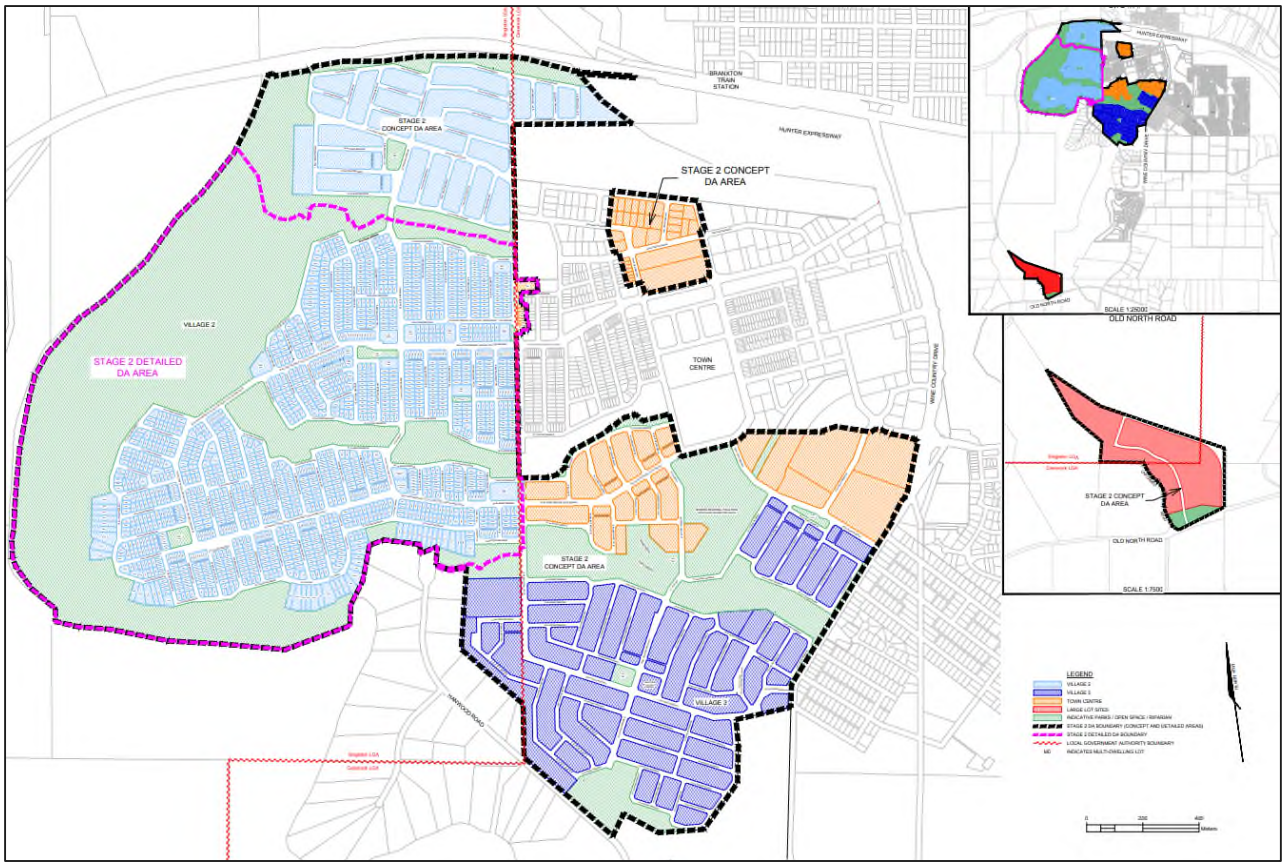


Figure 1-2 Proposed Concept and Detailed Area layout

Source: Daly Smith

Note: refer to Subdivision Plans for higher resolution plan

1.6 Development access strategy

Figure 1-3 shows the proposed access points for Huntlee site. Eight access points to the development area will be ultimately provided to Wine Country Drive and Hunter Expressway (Hex) Link Road including:

- Wine Country Drive / Bridge Street / Tollbar Avenue (A-1) provides access to town and Village 2 and connecting the site with Branxton via Bridge Street and Hunter Expressway via Hex Link Road. Currently operating as a four way 2 lane roundabout, upgraded as part of Huntlee Stage 1
- A left in / left out access on Wine Country Drive at Winepress Road (A-2) provides alternative access to Town Centre, constructed as part of Huntlee Stage 1
- Wine Country Drive / Empire Street (A-3) provides access to the town centre and Village 2. Currently operating as a signalised intersection, constructed as part of Huntlee Stage 1
- Wine Country Drive / Splitters Road left in / left out access (A-4) provides alternative access point into Town Centre, constructed as part of Huntlee Stage 1
- Wine Country Drive / Triton Boulevard / Bakehouse Road (A-5) provides primary access to Village 1 and alternative access to town centre and Village 2, four way signalised intersection constructed as part of Huntlee Stage 1
- Hex Link Road / Kesterton Rise (A-6) provides alternative access to Village 1 via Hex Link Road, constructed as part of Huntlee Stage 1
- Proposed left in / left out access intersection (A-7) on Wine Country Drive south of Bakehouse Road providing alternative access to Town Centre
- Proposed future Village 3 access (A-8), three way signalised intersection to provide access into Village 3 (part of future impact assessment).

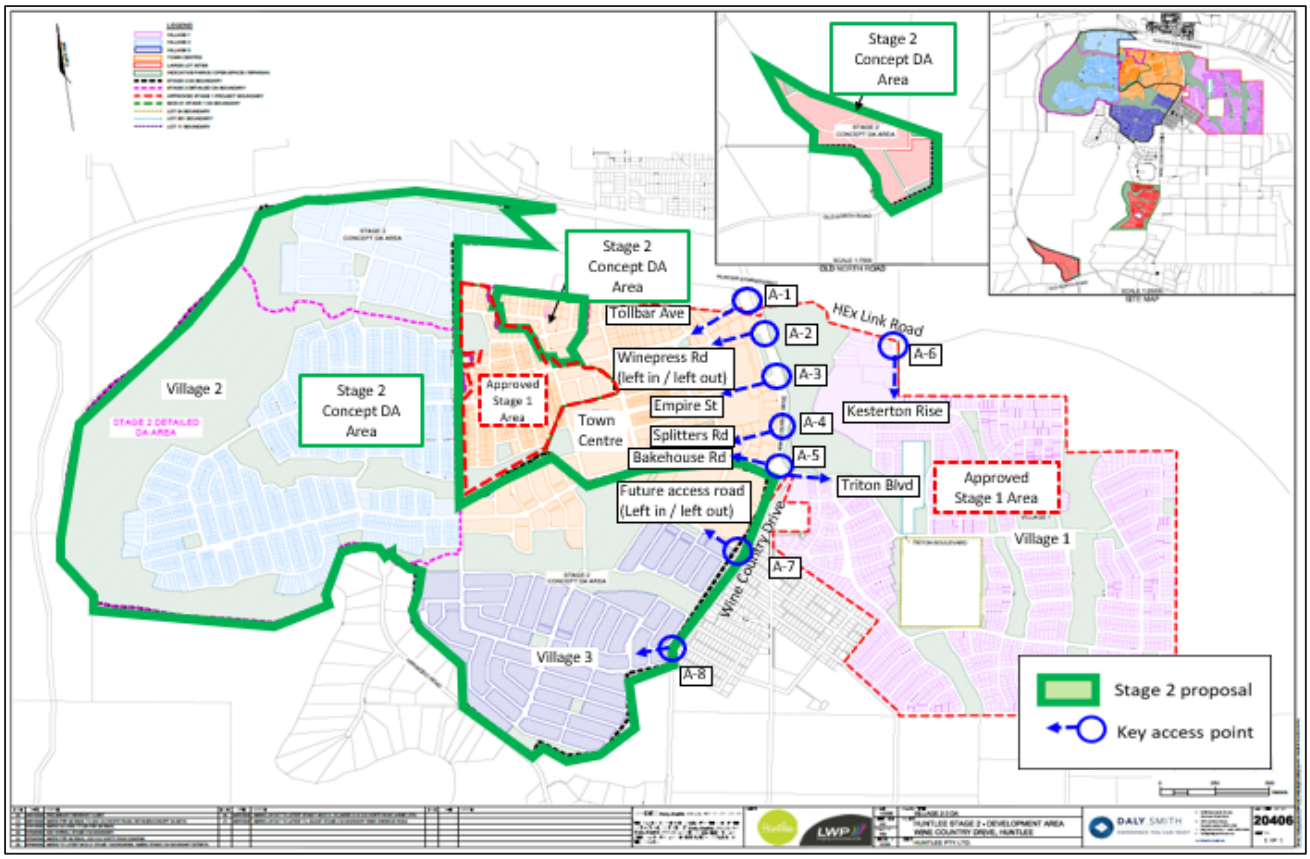


Figure 1-3 Proposed access for Stage 2

1.7 SEARs traffic requirements

This assessment's focus is on the traffic and transport part of the Director-General's Requirements (DGRs), as detailed in Table 1-2.

Table 1-2 Traffic and transport DGRs

Director General's Requirements	Where addressed
The EIS must include a Traffic and Transport Impact Assessment prepared by suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and RTA Guide to Traffic Generating Developments that includes, but is not limited to the following:	
• an analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements	**Section 2** documents the existing transport conditions.
• details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearances), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-up zone(s) and bus bays (if applicable), and provisions for servicing and loading/unloading	**Section 1.6** documents the proposed access strategy. **Section 2.4** documents the existing public transport facilities. **Section 2.5** documents existing parking facilities.
• consideration of the traffic impacts on existing and proposed intersections, in particular, intersections with Wine Country Drive. Traffic impacts should be assessed on the assumption of the completion of Huntlee New Town Stage 1 (MP 10_0137 as modified)	**Section 2.10** documents the existing intersection level of service. **Section 4.4** documents forecast traffic increase at key intersections in 2036. **Section 5.2** shows intersection level of service in 2036.
• analysis of the impacts of the proposed development (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling) and peak movements during events (if relevant), identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict) and any cumulative impact from surrounding approved developments	**Section 4.4** documents forecast traffic increase by development at five intersections in 2036. **Section 5.2** shows intersection level of service in 2036. **Appendix B** documented predicted AM and PM peak one hour turning volumes with 5000 dwellings and 20 ha GFA development traffic in 2036.
• measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with relevant standards	**Section 5.1 and 5.3** documents proposed intersection upgrades.
• explanation and justification of all inputs informing the proposed mitigation measures and conclusions	**Section 5** documents mitigation measure.
• measures to promote sustainable travel choices for residents and employees such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel Plan	Green Travel Plan has been prepared by **Swan Project Advisory** as a separate Report.
• address matters raised by Transport for NSW – The TIA should be tailored to the scope of the proposed development and include, but not necessarily be limited to, consideration of the following;	

Director General's Requirements	Where addressed
– A map of the surrounding road network identifying the site access, nearby accesses, intersections and transport related facilities.	**Section 1.6** documents access strategy. **Section 2.4** documents the existing public transport facilities. **Section 2.5** documents existing parking facilities. **Section 2.6** documents existing pedestrian and cycle facilities.
– Comparative / sensitivity analysis with the original Huntlee Town Centre modelling undertaken by Hyder Consulting.	**Section 3.4.4** documents comparison of trip generations with previous July 2012 PPR report prepared by Hyder Consulting.
– The total impact of existing and proposed development on the road network with consideration for a 10 year horizon. This should include – Identify Annual Average Daily Traffic (AADT) volumes with percentage heavy vehicles along the transport route/s and diagrammatically demonstrate AM and PM peak hour movements at key intersections.	**Section 4.4** documents forecast traffic increase at key intersections in 2036. **Appendix B** documented predicted AM and PM peak one hour turning volumes with 5000 dwellings and 20 ha GFA development traffic in 2036.
– Background traffic data from published sources and/or recent survey data. The source of data and any assumptions are to be clearly explained and justified, including the growth rate applied to the future horizon. Due to the impact of COVID-19 on travel patterns, traffic counts undertaken at this time may not be representative of normal volumes. Alternative approaches to understanding the impact of COVID-19 on traffic patterns should be discussed with TfNSW.	**Appendix A** documents 2022 AM and PM peak one hour volumes sourced from traffic survey undertaken on 21 July 2022 (outside the school holiday). **Section 4.4** documents future background traffic growth assumptions estimated using the TfNSW' Sydney Traffic Forecasting Model (STFM, version 2022).
– The volume and distribution of existing and proposed trips to be generated by the construction, operational and decommission phases of the development. This should identify the maximum daily and hourly demands generated by the development, particularly where they coincide with the network peak hour	**Section 3.4.2** documents peak hour trip generation from development. **Section 3.5** documents trip distribution development generated traffic.
– The type and frequency of design vehicles accessing the development site.	**Appendix B** documented predicted AM and PM peak one hour turning volumes with 5000 dwellings and 20 ha GFA development traffic in 2036.
– Details of the road geometry and alignment along the identified transport route/s, including existing formations, crossings, intersection treatments and any identified hazards. This should include; – An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for intersections along the identified transport route/s, identifying the existence of the minimum basic turn treatments and addressing the need for any warranted higher order treatments.	This has been included in the Subdivision and Civil Design report prepared by **Northrop Engineers**.
– Swept path analysis demonstrating the largest design vehicle entering and leaving the development, and moving in each direction through intersections along the proposed transport route/s.	This has been included in Subdivision and Civil Design report prepared by **Northrop Engineers.**
– Capacity analysis using SIDRA or other relevant application, to identify an acceptable Level of Service (LOS) at intersections with the classified (State) road/s, and where relevant, analysis of any other intersections along the proposed transport route/s.	**Section 2.10** documents the existing intersection level of service **Section 5.2** shows intersection level of service in 2036.

Director General's Requirements	Where addressed
– A review of crash data along the identified transport route/s for the most recent 5 year reporting period and an assessment of road safety along the proposed transport route/s considering the safe systems principles adopted under Future Transport 2056	**Section 2.8** documents existing crash data
– Strategic (2D) design drawings of all proposed road works and the site access demonstrating scope, estimated cost and constructability of works required to mitigate the impacts of the development on road safety, traffic efficiency and the integrity of transport infrastructure. Works must be appropriately designed for the existing posted speed limit.	**Section 5.1 and 5.3** documents proposed intersection upgrade layouts. This has been further included in Infrastructure report prepared by **Northrop Engineers.**
– Details of measures to address impacts and/or provide connections for public transport services and active transport modes, such as, public and school bus services, walking and cycling.	Public and active transport have been covered by **Swan Project Advisory** report.
– Details of measures to ameliorate the impacts of road traffic noise, dust, and/or glare Generated along the proposed transport route/s.	This has been included in Noise and Vibration report prepared by **SLR Consulting**.
– Details of any Traffic Management Plan (TMP) proposed to address the construction and operation phases of the proposed development. The TMP should be prepared and implemented in accordance with Australian Standard 1742.3 and the Work Health and Safety Regulation 2017. It is recommended that any TMP include, but not necessarily limited to, the following; – A map of the primary transport route/s highlighting critical locations. – An induction process for vehicle operators and regular toolbox meetings. – Procedures for travel through residential areas, school zones and/or bus route/s. – Any proposed temporary measures such a Traffic Guidance Scheme (TGS) – A Driver Code of Conduct for heavy vehicle operators. – A complaint resolution and disciplinary procedure.	**Sections 7.1** documents construction and operation management. This has been further included in Infrastructure report prepared by **Northrop Engineers.**

1.8 Report structure

The report is structured as follows:

- Section 1 provides an overview of the proposed development site, development yield and access arrangement
- Section 2 documents existing traffic and transport conditions
- Section 3 provides traffic modelling assumptions including background traffic growth on the Wine Country Drive, trip generation and trip distribution for the proposal
- Section 4 documents the traffic impact assessment of the proposal
- Section 5 documents proposed network improvements
- Section 6 documents future assessment for the remaining Huntlee Development areas
- Section 7 documents management and mitigation measures
- Section 8 documents conclusions from traffic modelling and assessment.

2 Existing conditions

This section outlines the existing traffic and transport conditions in the study area.

2.1 Traffic modelling area

The traffic modelling study area for Stage 2 proposal includes the Wine Country Drive section between Bridge Street and Triton Boulevard and the Hunter Expressway (Hex) Link Road between Branxton interchange and Wine Country Drive. Figure 2-1 shows the traffic modelling study area for the Stage 2 proposal, noting that the Stage 2 Concept DA area itself extends further to the west (shown as green area in Figure 2-1).

The modelling study area includes the following seven intersections:

- Wine Country Drive / Bridge Street / Tollbar Avenue (A-1)
- Wine Country Drive / Winepress Road (A-2)
- Wine Country Drive / Empire Street (A-3)
- Wine Country Drive / Splitters Road (A-4)
- Wine Country Drive / Triton Boulevard / Bakehouse Road (A-5) recently been upgraded into a signalised four-way intersection with Bakehouse Road as the fourth western leg and completed April 2023
- The Hunter Expressway (Hex) Branxton interchange (A-11)
- Kesterton Rise / HEX Link Road (A-6) which was recently completed as a left in / left out intersection in May 2023.

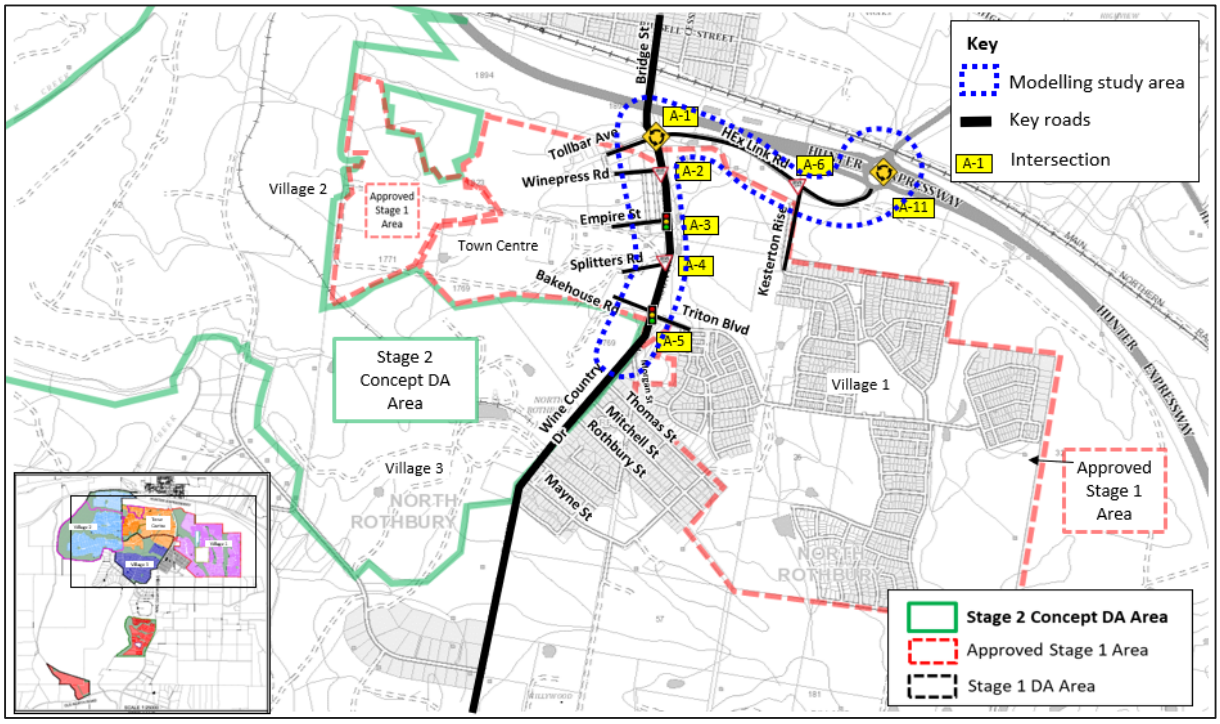


Figure 2-1 Traffic modelling study area

2.2 Existing land use

Figure 2-2 below shows the land use within and surrounding the site based on the current land zoning control under Singleton Local Environmental Plan 2011 (LEP 2011).

The site is zoned for R1 (General Residential), R2 (Low Density Residential) primary within Village 1, Village 2 and Village 3and B4 (Mixed use) located in the town centre and along Wine Contre Drive.

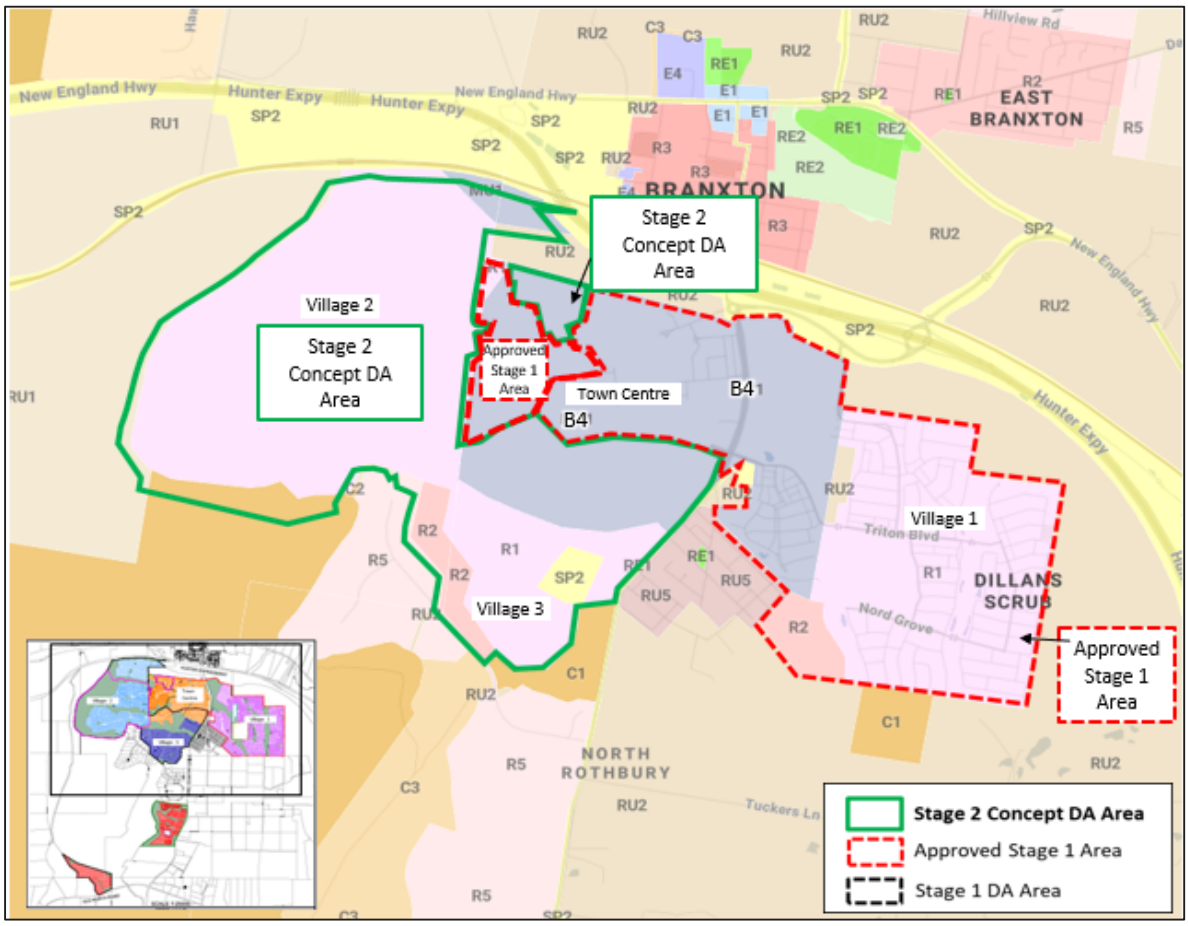


Figure 2-2 Huntlee Land use zones (Source: Mecone Mosaic)

Figure 2-3 below shows the current site as of August 2023 sourced from Nearmap. Huntlee has an existing Development Approval for Stage 1 (shown in red dotted line in Figure 2-3) which will ultimately comprise 2,631 dwellings and 14.3 Ha GFA of retail / commercial / mixed use development. This development has been progressing since 2014 and currently there are approximately 900 homes occupied within the Stage 1 residential area east of Wine Country Drive and 1 Ha GFA of commercial / retail in the Town Centre.

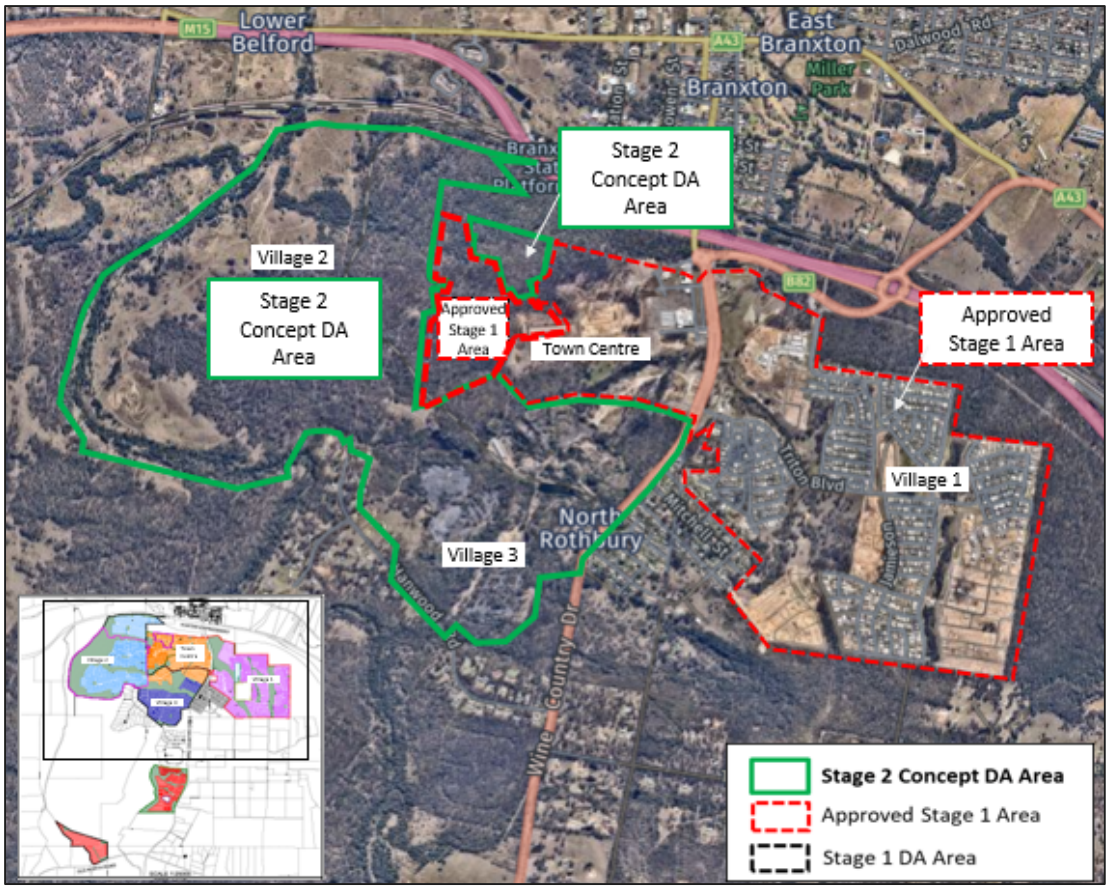


Figure 2-3 Existing development (source Nearmap as of August 2023)

2.3 Road and speed environment

The road hierarchy for the study area is sourced from NSW Road Network Classifications and as approved via the Stage 1 development. TfNSW in cooperation with local Councils, defines the administrative road hierarchy.

Wine Country Drive between Hunter Expressway and Triton Boulevard are classified as State Roads, while the other roads within the study area are classified as Local Roads.

The posted speed limit on Wine Country Drive within the study area varies between 50 to 80km/h depending on the location.

Figure 2-4 shows the posted speed limits within the study area.

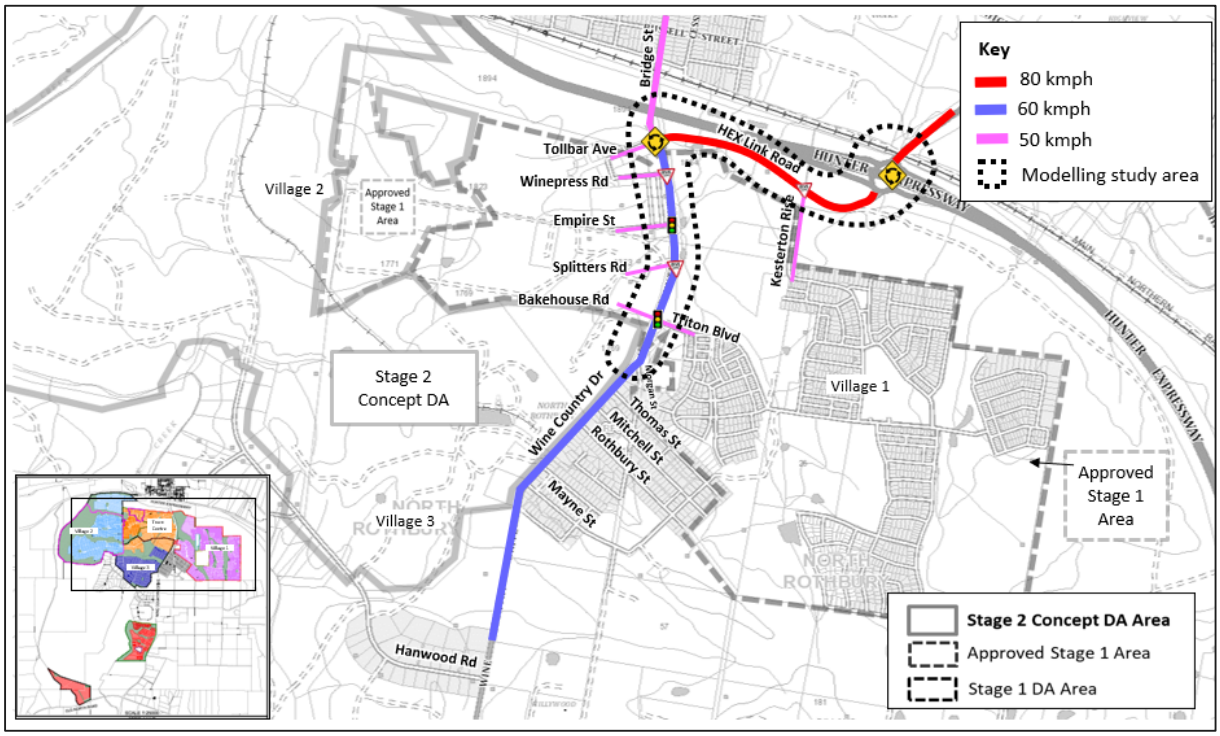


Figure 2-4 Posted speed limits within the study area

2.4 Public transport

The study area is currently serviced by a bus route 179 (North Rothbury to Green Hills Shopping Centre via Maitland) providing connections between North Rothbury and Maitland. This service operates with low frequency of one bus every 40 minutes to 1 hour during AM and PM peak hour.

Currently, there a number of bus stops provided for the Huntlee development site including seven bus stops along Triton Boulevard (servicing Village 1). However, there is one bus stops provided along Wine Country Drive between Bridge Street and Triton Boulevard (servicing the town centre). Signalised pedestrian crossings are provided on Wine Country Drive at Empire Street and Triton Boulevard intersections.

Within the study area's vicinity, Branxton Railway Station serves as a crucial link, offering connections to Telarah, Newcastle, Muswellbrook, and Maitland.

Figure 2-5 shows the existing public transport facilities within the study area.

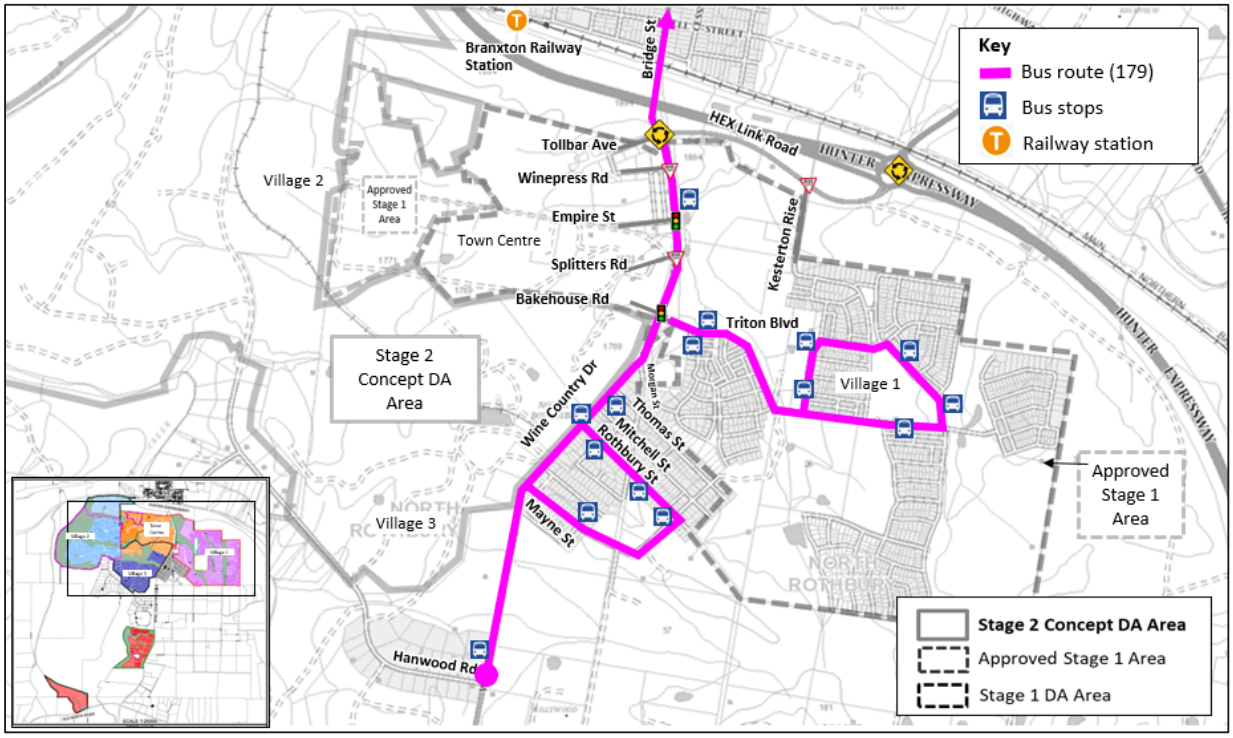


Figure 2-5 Existing public transport facilities

2.5 Parking

On-street parking is not available on Wine Country Drive within the study area. The Huntlee Town Centre includes a large at grade car park within the shopping centre precinct which is owned and operated by Coles. In addition, local roads within the vicinity of site provide ample of on-street parking facilities. Any future commercial development within the Town Centre will need to prepare its own traffic and parking study to ensure sufficient on site parking is provided.

2.6 Active transport

Active transport initiative has been prepared separately and documented in *Green Travel Plan, prepared by Swan Projects Advisory*.

2.7 Heavy vehicles

Wine Country Drive through the study area is a designated B-double route (up to 25 metres) and 4.6-metre-high vehicle route. Figure 2-6 shows freight routes within and surrounding the study area sourced from TfNSW Restricted Access Vehicle (RAV).

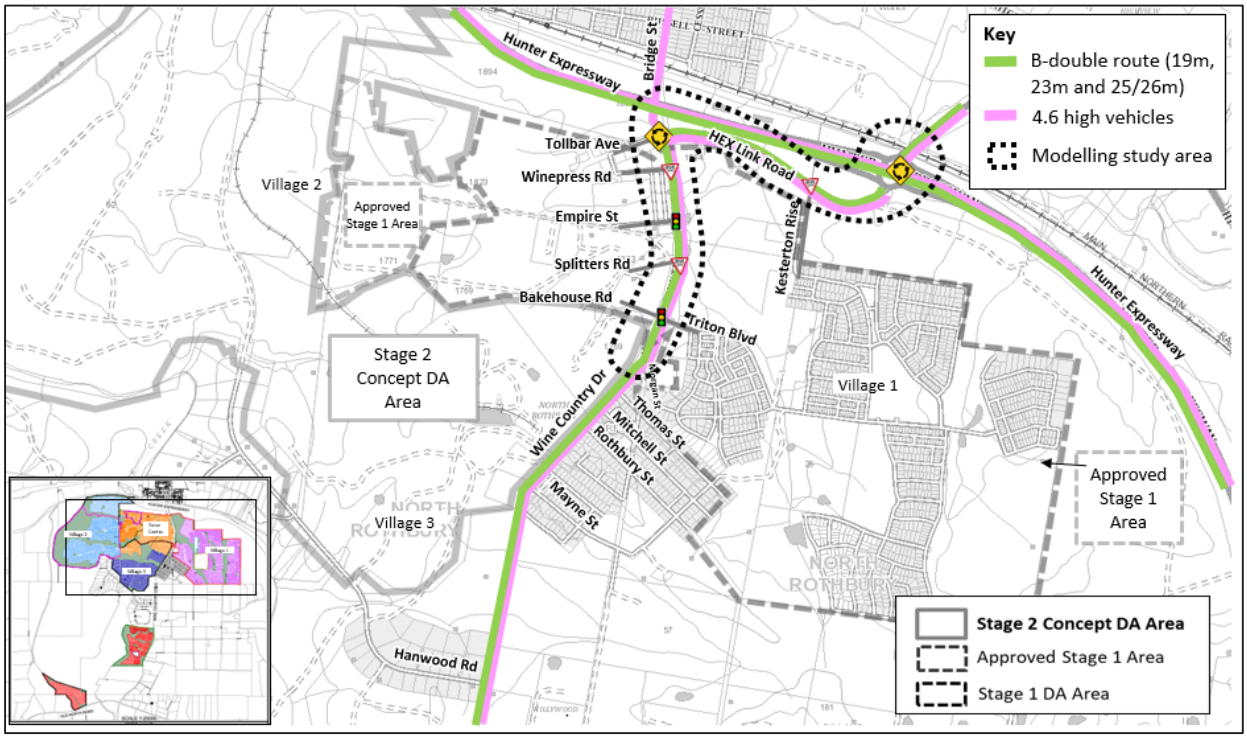


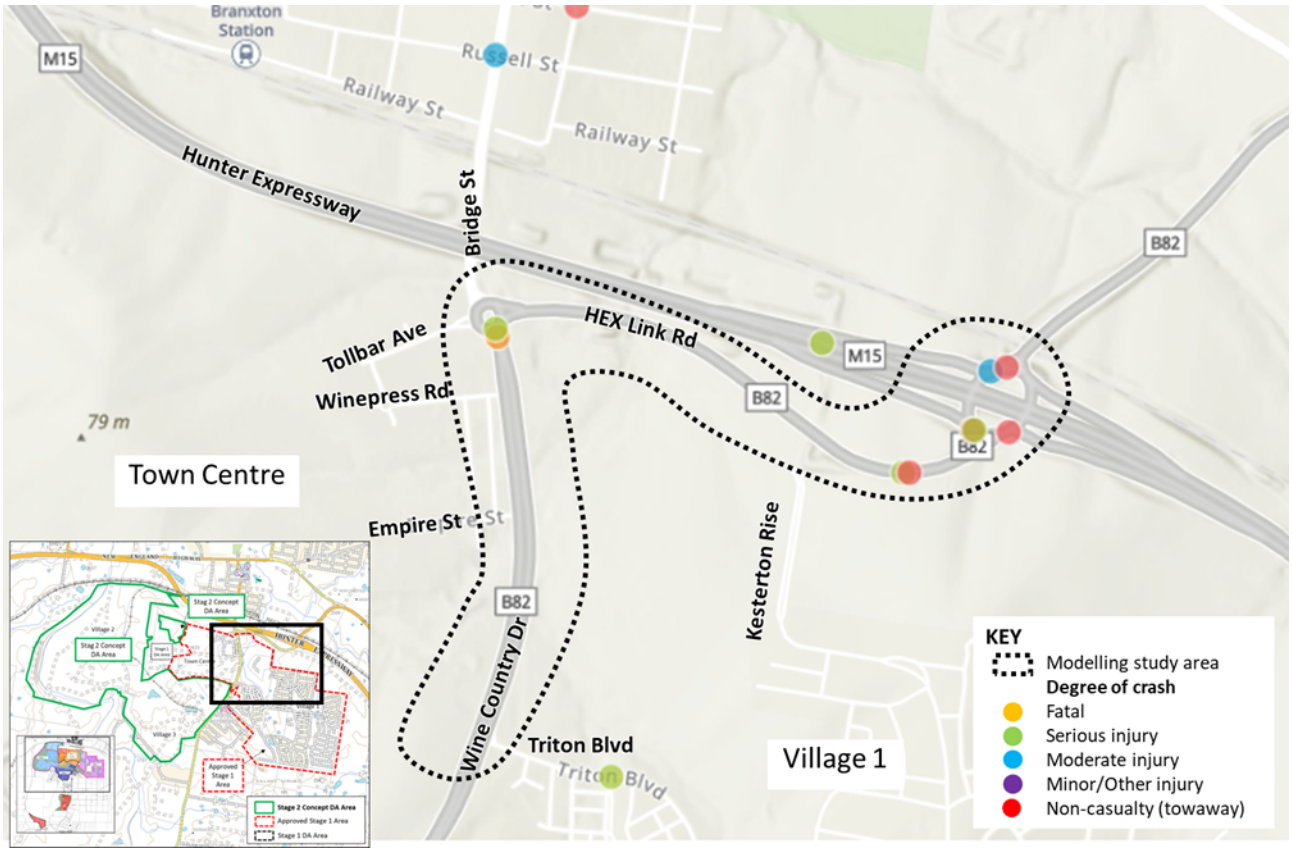
Figure 2-6 Designated route for heavy vehicles

2.8 Existing crashes

The crash data on the Wine Country Drive section between Bridge Street and Triton Boulevard and the Hunter Expressway (Hex) Link Road between Branxton interchange and Wine Country Drive were sourced from TfNSW Centre of Road Safety website.

The data shows that during the last five years between 2017 and 2021, nine crashes were recorded on Wine Country Drive and Hunter Expressway Link Road between Triton Boulevard and Hunter Expressway. It is noted, on 11 June 2023, a severe bus crash occurred at the M15 / Wine Country Drive interchange near Greta. Ten people were killed and another twenty-five were taken to hospital.

Figure 2-7 shows the crash location and severity. More than 56 per cent of recorded crashes resulted in causalities. One fatal crash was recorded at Wine Country Drive / Bridge Street / Toolbar Avenue roundabout. Three crashes resulted in serious injury and one crash resulted in moderate injury. Four crashes were non-casualty (towaway).



Source : NSW Centre for Road Safety (recorded crashes between 2017 and 2021)

Figure 2-7 Crash recorded within the study area between 2017 and 2021

2.9 Traffic volumes

A traffic survey was undertaken on Thursday, 21 July 2022 (outside the school holiday) by Northern Transport Planning and Engineering Pty Ltd (NTPE). This included intersection turning movement counts and queue length counts at the following five intersections including:

- Wine Country Drive / Bridge Street / Tollbar Avenue
- Wine Country Drive / Winepress Road
- Wine Country Drive / Empire Street
- Wine Country Drive / Triton Boulevard / Bakehouse Road
- The Hunter Expressway (Hex) Branxton interchange.

Figure 2-8 shows traffic survey locations.

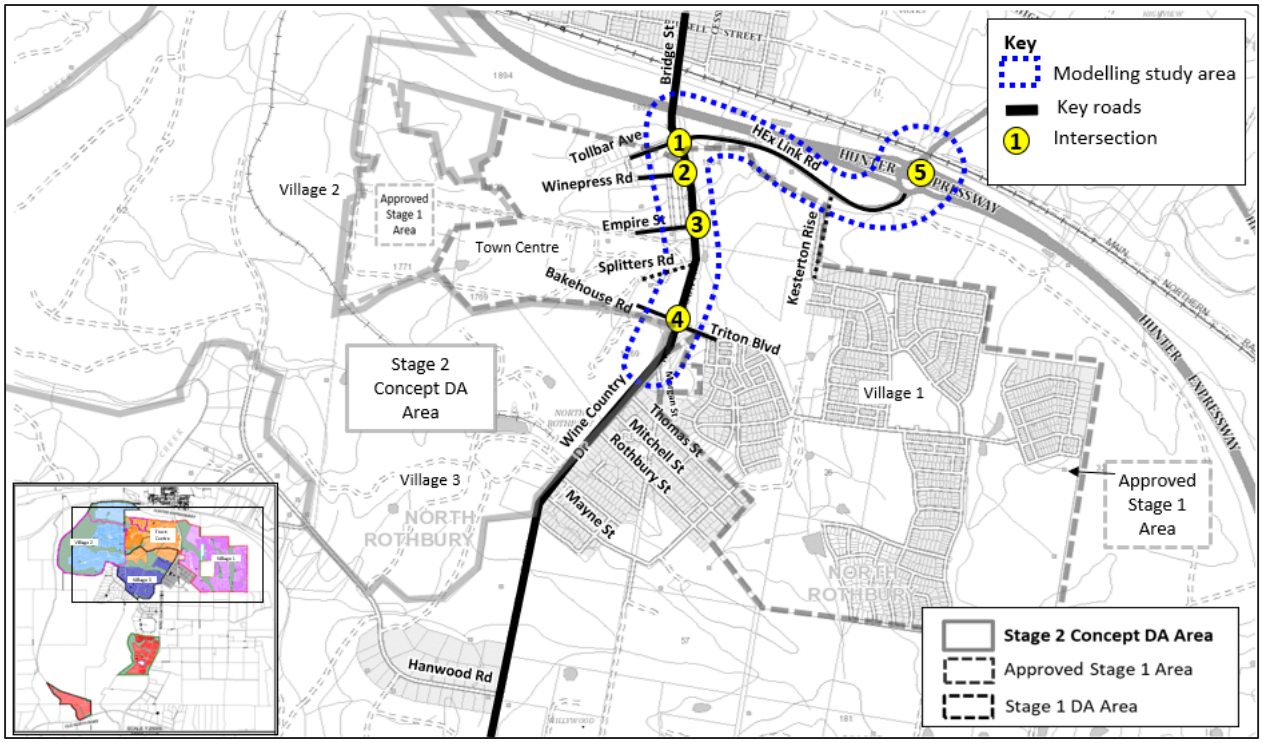


Figure 2-8 Traffic survey locations

The results from the intersection counts were analysed to identify the peak period across the study area network. The morning (AM) and afternoon (PM) peak one hour peak periods were determined to be 8am to 9am and 4.30pm to 5.30pm respectively.

Appendix A includes 2022 AM and PM peak one hour traffic volumes at surveyed locations.

The following points are noted from existing traffic volumes:

- In the morning peak, peak traffic movement is observed towards the north on Wine Country Drive. Wine Country Drive carried about 450 vehicles per hour in the northbound direction
- In the afternoon peak, peak traffic movement is observed towards south. Wine Country Drive carried about 560 vehicles per hour in the southbound direction
- Hex Link Road east of Wine Country Drive carried about 360 to 460 vehicles per hour.

2.10 Existing intersection level of service

The existing level of service of the following four key intersections in the study area was assessed using SIDRA software, including:

- Wine Country Drive / Bridge Street / Tollbar Avenue (A-1)
- Wine Country Drive / Empire Street (A-3)
- Wine Country Drive / Triton Boulevard / Bakehouse Road (A-5)
- The Hex Branxton interchange (A-11).

Table 2-1 below shows the TfNSW standard level of service (LoS) criteria for intersection operation.

Table 2-1 Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<15	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: TfNSW' Traffic Modelling Guidelines, Version 1.0, February 2013

The LoS is reported as per TfNSW's traffic modelling Guide. The Guide recommends that, for priority intersections such as a roundabout and sign-controlled intersections, the level of service value is determined by the critical movement with the highest delay. With these type of intersection controls (roundabout, Stop and Give Way sign controls), some movements may experience high levels of delay while other movements may experience minimal delay.

For a signalised intersection, the level of service criteria is related to the average intersection delay measured in seconds per vehicle.

Table 2-2 shows the existing level of service (LoS) for the four intersections for peak hour in 2022. At the time of undertaking traffic survey in July 2022, about 867 dwellings and 10,473 m^2 GFA were occupied at Huntlee site.

The existing base SIDRA model represents weekday AM peak hour from 8am to 9am and PM hour between 4.30pm and 5.30pm.

Table 2-2 Existing intersection level of service in 2022 AM and PM

ID	Intersection	Control	2022 existing			
			AM Peak		PM Peak	
			Delay (sec)	LoS	Delay (sec)	LoS
A-1	Wine Country Drive / Bridge Street / Tollbar Avenue	Single lane roundabout	15	B	18	B
A-3	Wine Country Drive / Empire Street	Traffic signal	8	A	10	A
A-5	Wine Country Drive / Triton Boulevard / Bakehouse Road	A new four-way traffic signal	33	C	31	C
A-11	The Hex Branxton interchange	Roundabout	14	A	14	A

Model file: 9. Modelling\SIDRA Existing 2022_FINAL\Huntlee Pre-development_2022.sip9

Currently these four intersections within the study area operate with level of service C or better in peak hours. The existing single-lane roundabout at Wine Country Drive / Bridge Street / Tollbar Avenue operates with level of service B.

The traffic signal on Wine Country Drive with Empire Street operates with level of service A. The four-way traffic signal with Triton Boulevard / Bakehouse Road operates with level of service C.

Currently the Hunter Expressway (Hex) Branxton interchange roundabout operates with level of service A.

3 Traffic modelling methodology and assumptions

Traffic modelling assumptions used in this report were consulted and agreed with TfNSW.

3.1 Modelling software

SIDRA Network software (version 9) was used to assess intersection performance.

3.2 Relevant guidelines

The following guidelines were referenced in carrying out this assessment:

- *TfNSW Traffic Modelling Guideline, version 1, February 2013*
- *TfNSW Technical Direction (TTD 2018/002) Traffic Signals in Microsimulation Modelling, November 2018*
- *Austroads Guide to Traffic Management Part 3: Transport Studies and Analysis Methods, edition 4.0, April 2020.*
- *TfNSW Guide to Traffic Generating Developments, Issue 2.2. October 2002*
- *TfNSW Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a), August 2013*
- *TfNSW Trip Generation Survey, Schools, Analysis Report prepared by GTA Consultant, August 2014.*

3.3 Base SIDRA model development

Figure 3-1 shows base SIDRA network model. The base SIDRA model was calibrated and validated for 2022 traffic conditions. The base SIDRA model was reviewed and accepted by TfNSW.

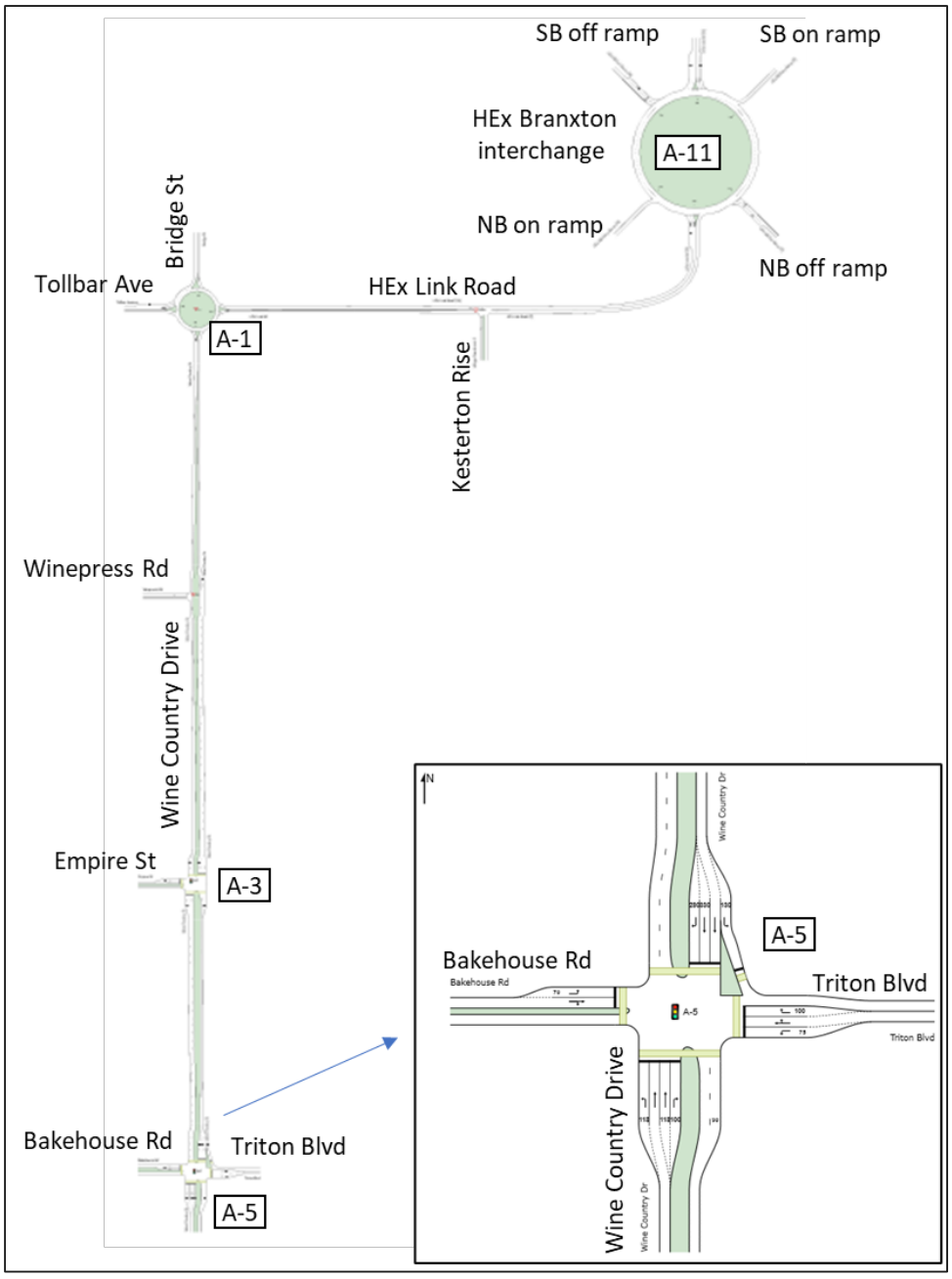


Figure 3-1 Base SIDRA network model

3.4 Traffic generation

This section documents traffic generation from full development which includes about 7,500 residential dwellings and 28.7ha gross floor area (GFA) of mixed use/commercial development. Traffic generation rates were consulted and agreed with TfNSW. This section also includes trip generation from Stage 2 Phase 1 and remining Stage 2.

3.4.1 Trip generation rates

Traffic generation from the residential development is estimated using TfNSW *Guide to Traffic Generating Developments, Issue 2.2. October 2002* and *TfNSW Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a), August 2013*.

- Trip generation for single dwellings is assumed to be 0.78 trips per dwelling in the AM peak hour and 0.71 trips per dwelling in the PM peak hour
- Trip generation for medium density dwellings is assumed to be 0.575 trips per dwelling in the AM and PM peak hour
- Trip generation for large lots is assumed to be 0.78 trips per dwelling in the AM peak hour and 0.71 trips per dwelling in the PM peak hour
- Trip generation for retirement villages is assumed to be 0.4 trips per dwelling in the AM and PM peak hour.

Trip generation for mixed use/commercial is sourced from *Assessment of Hunter Valley Business Park Trip Rates, prepared by AECOM, December 2017* and assumed to be 0.63 and 0.72 peak hour trips per 100m^2 of GFA.

Trip generation for retails is sourced from *TfNSW Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a), August 2013 and* assumed to be 3.7 and 6.2 peak hour trips per 100m^2 of GLFA[1].

Trip generation for aged care is sourced from TfNSW *Guide to Traffic Generating Developments, Issue 2.2. October 2002* and assumed to be 1.6 and 1.2 peak hour trips per 100m^2 of GFA.

For traffic modelling purposes, the analysis assumes one primary school and one secondary school to be developed. Each school is assumed to accommodate up to 500 students. The proposed schools are expected to cater for mostly local demands created by the Huntlee development and nearby suburbs. The analysis assumes about 50 per cent of school trips are local trips within the subdivision and about 50 per cent of school trips are expected to be from external suburbs.

The trip generation rate for the proposed primary school is estimated using TfNSW *Trip Generation Survey, Schools, Analysis Report prepared by GTA Consultant, August 2014*. The analysis adopted average regional trip rates.

Trip generation for infrastructure such as water treatment plant and electrical generating plant is assumed to generate about 5 vehicle trips per site in the AM and PM peak hour.

[1] GLFA range 10,000 to 20,000 m^2 GLFA. TfNSW guide provides trip rate for the PM peak. The AM peak trip rate is assumed to be 60% of PM peak trip rate.

Table 3-1 shows the trip generation rates for full development.

Table 3-1 Trip generation rates

Development	Type	Trip generation rates		
		AM peak	PM peak	Unit
Residential	Single dwelling	0.78	0.71	trips/dwelling
	Medium density	0.575	0.575	trips/dwelling
	Large lots	0.78	0.71	trips/dwelling
	Retirement	0.4	0.4	trips/dwelling
Mixed used /commercial / retails	Mixed use/commercial	0.63	0.72	trips/100m^2 GFA
	Aged care	1.6	1.2	trips/100m^2 GFA
	Retails	3.7	6.2	trips/100m^2 GLFA
	Primary school	1.23	1.01	trips per student
	Secondary school	0.35	0.24	trips per student
	Water treatment plants, electricity generating works	5	5	trips/hour/site

3.4.2 Full development generated trips

Table 3-2 shows peak hour trip generation from full development. Total generated trips from the full development are assumed to be discounted for the following two factors:

- ***Self-containment trips***. TfNSW guideline states about 25 per cent of trips are internal to the subdivision, involving local shopping, school and local social visits. It is expected that the Huntlee resident would benefit from a trend of containment within the locality. In line with TfNSW guideline, about 25 per cent of residential development generated trips are self-containment trips. The self-containment trips are discounted for residential development trips only.
- ***Change of base year***. In the July 2012 PPR Hyder Report[2], the base year was 2012. For Stage 2 DA, the base year has been updated to 2022 as per new traffic survey. At the time of undertaking traffic survey in July 2022, about 867 dwellings and 10,473 m^2 GFA were occupied. These occupied dwellings and GFA generated about 885 vehicle trips in AM peak hour and 965 vehicles trips in PM peak hour. These trips are discounted from full development trips.

[2] *Huntlee New Town, Stage 1 Preferred Project Report (PPR) Traffic Modelling* prepared by Hyder Consulting (currently rebranded as Arcadis Australia Pacific Pty Ltd) in July 2012

Table 3-2 Peak hour trip generation for full development

Development	Type	Yield	Unit	Trip generation (vehicles/hour)	
				AM peak	PM peak
Residential	Single dwelling	6,652	dwellings	5,190	4,720
	Medium density	498	dwellings	290	290
	Large lots	145	dwellings	110	100
	Retirement	205	dwellings	80	80
Total - Residential development		**7,500**	**dwellings**	**5,670**	**5,190**
Mixed used /commercial / retails	Mixed used/commercial	24.2	ha GFA	1,520	1,740
	Retails	1.0	ha GFA	280	470
	Age care	0.9	ha GFA	140	100
	Primary school	500	students	310	250
	Secondary school	500	students	90	60
	Water treatment plants and electricity generating works	3	sites	15	15
Total - Mixed used /commercial / retails		**28.7**	**ha GFA**	**2,355**	**2,635**
Total gross traffic generation				8,025	7,825
Discounted trips for self-containment (25% of residential trips)				(1,420)	(1,300)
Discounted trips from occupied dwellings and GFA				(885)	(965)
Total net traffic generation				**5,720**	**5,560**

The net traffic generation from the full Huntlee development is estimated to be about 5,720 vehicles trips in AM peak one hour and 5,560 vehicle trips in PM peak one hour.

It is assumed that 80 per cent of residential trips are outbound and 20 per cent are inbound in the AM peak hour. In the PM peak hour, it is assumed that 20 per cent of trips are outbound and 80 per cent of trips are inbound.

The directional trip distribution for mixed used/commercial and treatment plan is assumed to be 50 per cent inbound and 50 per cent inbound in both AM and PM peak hours.

3.4.3 Stage 2 trip generation

Table 3-3 shows further breakdown of peak hour trip generation from Stage 2 Phase 1 Modelling Area and remaining Stage 2 development.

Table 3-3 Peak hour trip generation for Stage 2 and full development

Development	Trip generation excluding self-containment (vehicles/hour)	
	AM	PM
Stage 2 Phase 1 Modelling Area excluding Stage 1 (2369 dwellings, 5.7ha GFA)	2,170	2,030
Balance of Stage 2 DA area (2500 dwellings, 8.7ha GFA)	2,855	2,625
Full development including Stage 1 DA area (7500 dwellings, 28.7ha GFA)	8,025	7,825

The Stage 2 Phase 1 Modelling Area will increase 2,170 trips in the morning peak hour and 2,030 trips in the afternoon peak hour. These additional trips will predominantly affect the road network and intersections identified in Figure 4-3 and Figure 4-4. The traffic generation from the balance of the Stage 2 development (2,500 dwellings and 8.7ha GFA) is estimated to be about 2,855 vehicles trips in AM peak one hour and 2,625 vehicle trips in PM peak one hour.

3.4.4 Comparison of trip generation with previous July 2012 PPR report

Table 3-4 shows peak hour trip generation for full development between previous (2012) and revised masterplan (2023). Trip generation for revised masterplan (2023) is estimated using updated trip rates (refer to Table 3-2). Trip generation for previous assumptions (2012) was sourced from July 2012 PPR Hyder report.

Table 3-4 Comparison of trip generation with previous July 2012 PPR Report

Development type	July 2012 PPR Hyder Report	Peak hour trip generation		Revised masterplan (2023)	Peak hour trip generation	
		AM	PM		AM	PM
Residential development	7,500 dwellings	6,000	6,000	7,500 dwellings	5,670	5,190
Mixed use/commercial/retail	48.4 ha GFA	3,300	4,600	28.7 ha GFA	2,355	2,635
Total gross traffic generation		**9,300**	**10,600**		**8,025**	**7,825**
Discounted trips for self-containment (25% of residential trips)		(1,500)	(1,500)		(1,420)	(1,300)
Discounted trips from occupied dwellings and GFA		n.a	n.a		(885)	(965)
Total net traffic generation		**7,800**	**9,100**		**5,720**	**5,560**

The revised masterplan (2023) proposes the same number of residential dwellings being 7,500 dwellings as per the July 2012 PPR Hyder report. The analysis shows that residential trips for the revised masterplan (2023) is lower than the July 2012 PPR Hyder report due to change in trip generation rates.

However, the revised masterplan (2023) also proposes to reduce gross floor area (GFA) of mixed use / commercial development from 48.4 ha in July 2012 PPR report to 28.7 ha (2023 master plan). The reduction in mixed use/commercial GFA included in the modelling is due to the use of a more realistic slower completion of commercial land take-up in the Town Centre as the Huntlee Project develops. Only around 1 Ha of GFA has been opened to date at Huntlee and therefore a reduced commercial / mixed use GFA estimate has been used in the updated modelling.

The total trip generation from the revised masterplan (2023) is lower than the previously estimated in July 2012 PPR Hyder report.

3.5 Trip distribution

Consistent with the approved Stage 1 trip distribution assumption, the following trip distribution is used for the Stage 2 proposal.

The following trip distribution is assumed (refer to Figure 3-2):

- About 11 per cent would travel toward the north via Bridge Street
- About 22 per cent would travel toward the south via Wine Country Drive.
- About 67 per cent would travel toward the east via Wine Country Drive / Hunter Expressway roundabout. Of that,
  - About 18 per cent would travel toward the New England Highway
  - About 38 per cent would travel toward the east via Hunter Expressway
  - About 11 per cent would travel toward the west via Hunter Expressway.

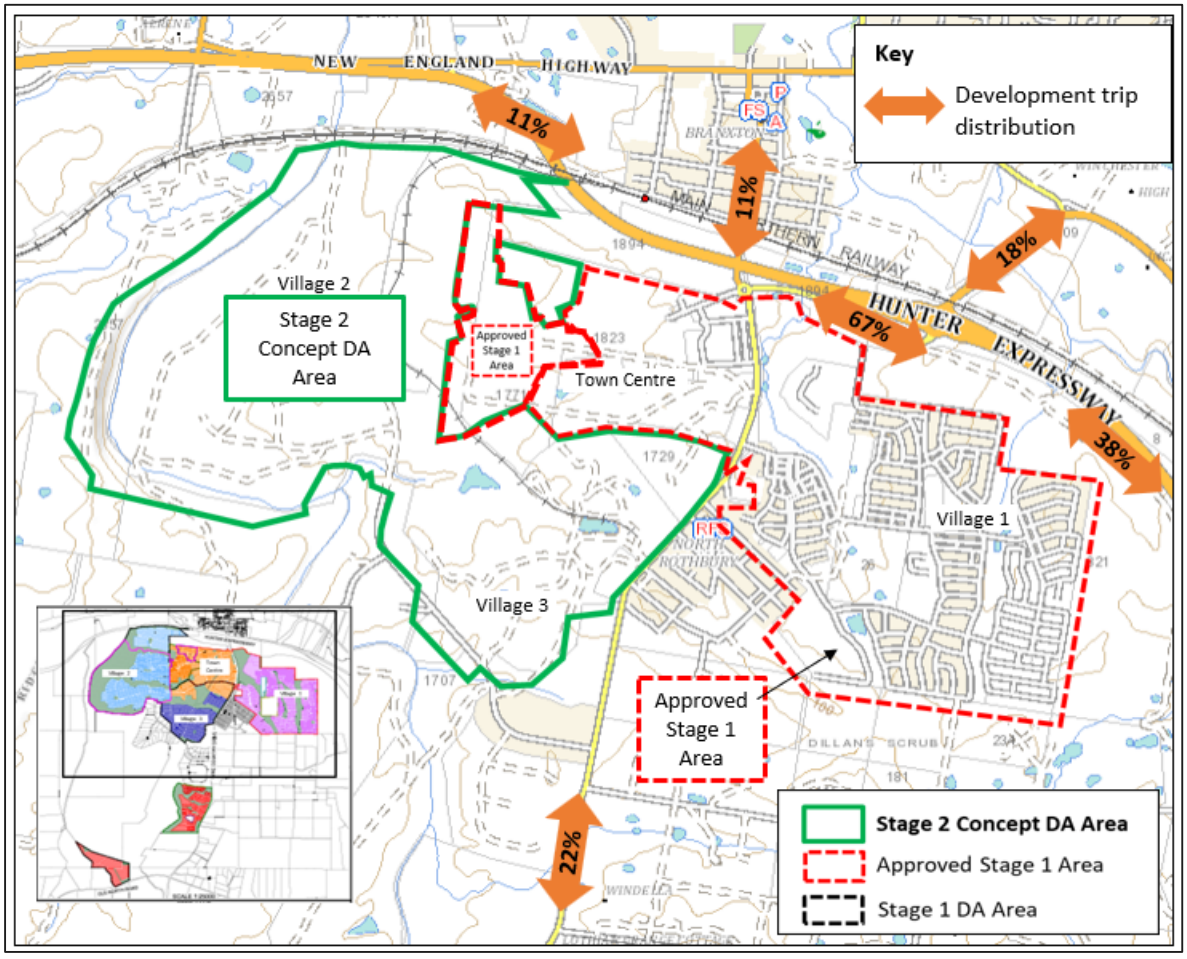


Figure 3-2 Trip distribution for Stage 2 proposal

4 Impact assessment of Huntlee Stage 2

The impact assessment for Huntlee Stage 2 has been split into two phases due to the size of the proposal and expected development rollout timeframe which is likely to extend beyond 15 years. Over this timeframe there will be potential changes in local background traffic conditions, transport mode changes, e.g. potential for increased passenger services to Branxton train and other behavioural changes in trip distributions and destinations. In addition, the development yield expectations within the concept areas of the Stage 2 approval area may change during this timeframe due to changes in market conditions, with a significant potential for changes in the markets expectation of lot sizes in the next 10-15 years.

This Sections 4 outlines the detailed impact assessment for the first phase of Huntlee Stage 2 (Stage 2- Phase 1), covering the detailed DA areas of Village 2 central and south, as well as an increase in the commercial GFA within the town centre. This aligns with the detailed development approval to be sought as part of the subject SSDA.

Section 5 outlines the proposed road upgrade requirements identified for the Stage 2-Phase 1.

Section 6 provides a high level assessment of potential future upgrade requirements and outlines key considerations to be included in the future traffic assessments.

4.1 Future background traffic growth

Traffic impact of Stage 2 Phase 1 was assessed for the future year in 2036 (10 year growth). The future background traffic growth was updated as per TfNSW direction assuming to be 1.0 per cent per annum between 2022 and 2036.

4.2 Future base case network / committed road upgrades

Road upgrades supporting the Huntlee development will be progressively delivered in conjunction with subdivision completion. In updated *Traffic Impact Assessment (TIA) for Modification 21 (MOD 21) report prepared by Arcadis on 16 June 2023*, it was found that the Stage 1 development required the following upgrades in order to ensure satisfactory performance of the road network (refer to Figure 4-1). These upgrading works would be progressively delivered by Huntlee and are assumed in the future base case SIDRA model in 2036 (refer to Figure 4-1):

- Wine Country Drive / Bridge Street / Tollbar Avenue roundabout (A-1) is proposed to be upgraded to dual circulating lanes. This upgrade is currently under construction
- HEx Link Road / Kesterton Rise (Village 1 North access) (A-6) intersection was constructed as left in/left out intersection in May 2023. The left in/left out access was an interim arrangement prior to upgrade to traffic signals. This intersection is proposed to be upgraded to traffic signals (to be constructed prior to subdivision certificate approval of 2,525 residential lots in Stage 1)
- The HEx Branxton interchange (A-11)is proposed to include a continuous left tun slip lane / ramp from the northbound off ramp onto HEx Link Road (to be constructed prior to subdivision certificate approval of 2,525 residential lots in Stage 1)
- The HEx Link Road is proposed to be upgraded to four lanes (two lanes in each direction) between Wine Country Drive and the HEx Branxton interchange (to be constructed prior to subdivision certificate approval of 2,525 residential lots in Stage 1).

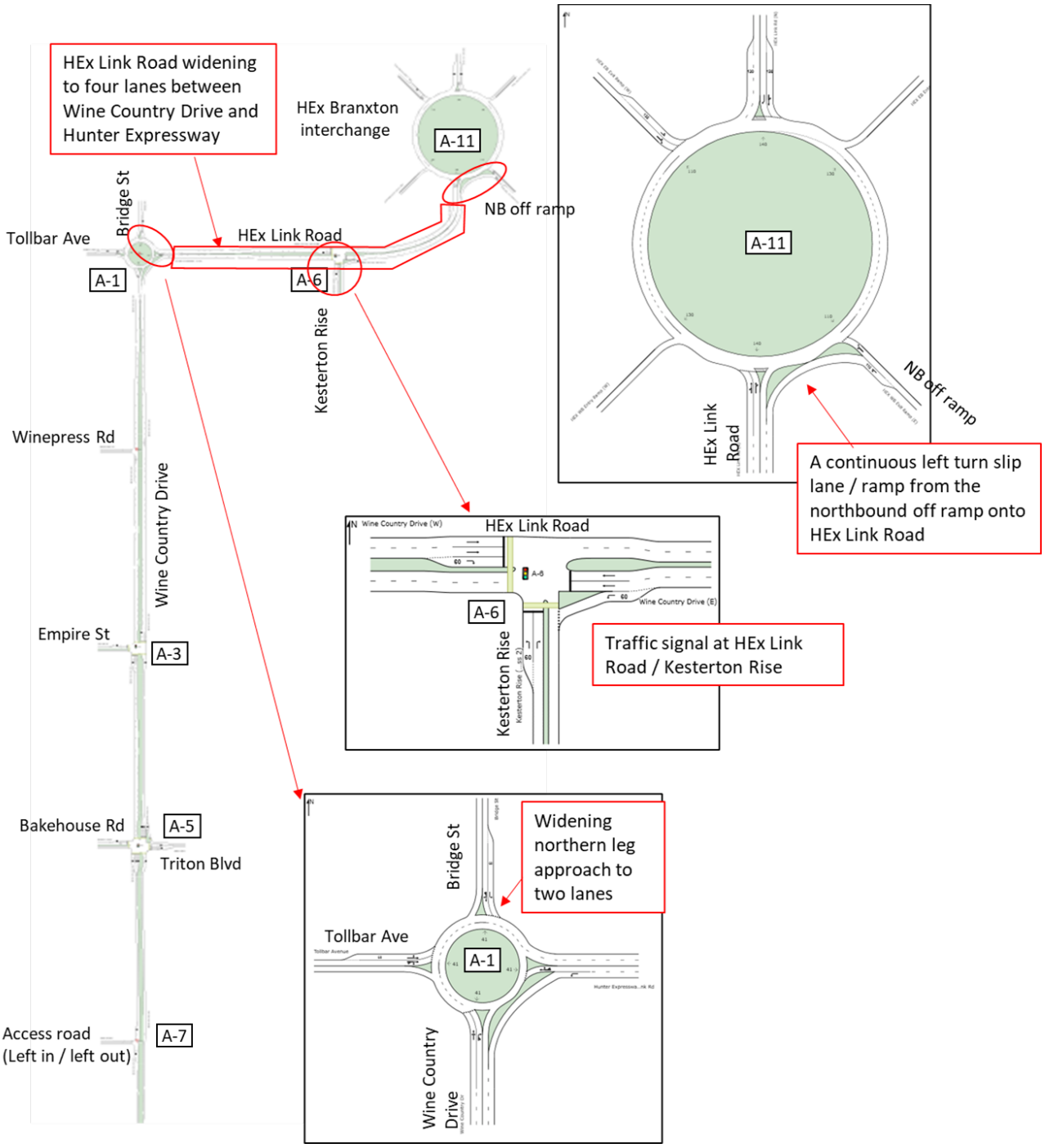


Figure 4-1 Future base case network / committed road upgrades

4.3 Stage 2-Phase 1 modelling area development thresholds

The impacts of the Stage 2-Phase 1 Modelling Area have been assessed on the road network. Figure 4-2 shows Stage 2-Phase 1 Modelling Area highlighted in yellow. The first phase assessment includes the entire Detailed DA area of Village 2, as well as some additional likely expansion areas of the Town Centre and northern portion of Village 3. This assessment of the first phase of Huntlee Stage 2 also includes all development approved as part of the Stage 1 DA to ensure that a sufficient cumulative impact assessment is carried out for the Huntlee Project. The Phase 1 modelling area is larger than the Detailed Stage 2 DA area to provide flexibility for future Stage 2 submission as well as potential Stage 1 DA modification, and ensure that a single traffic study for the Huntlee Project can be used moving forward rather than multiple documents across both Stage 1 and Stage 2 DA's.

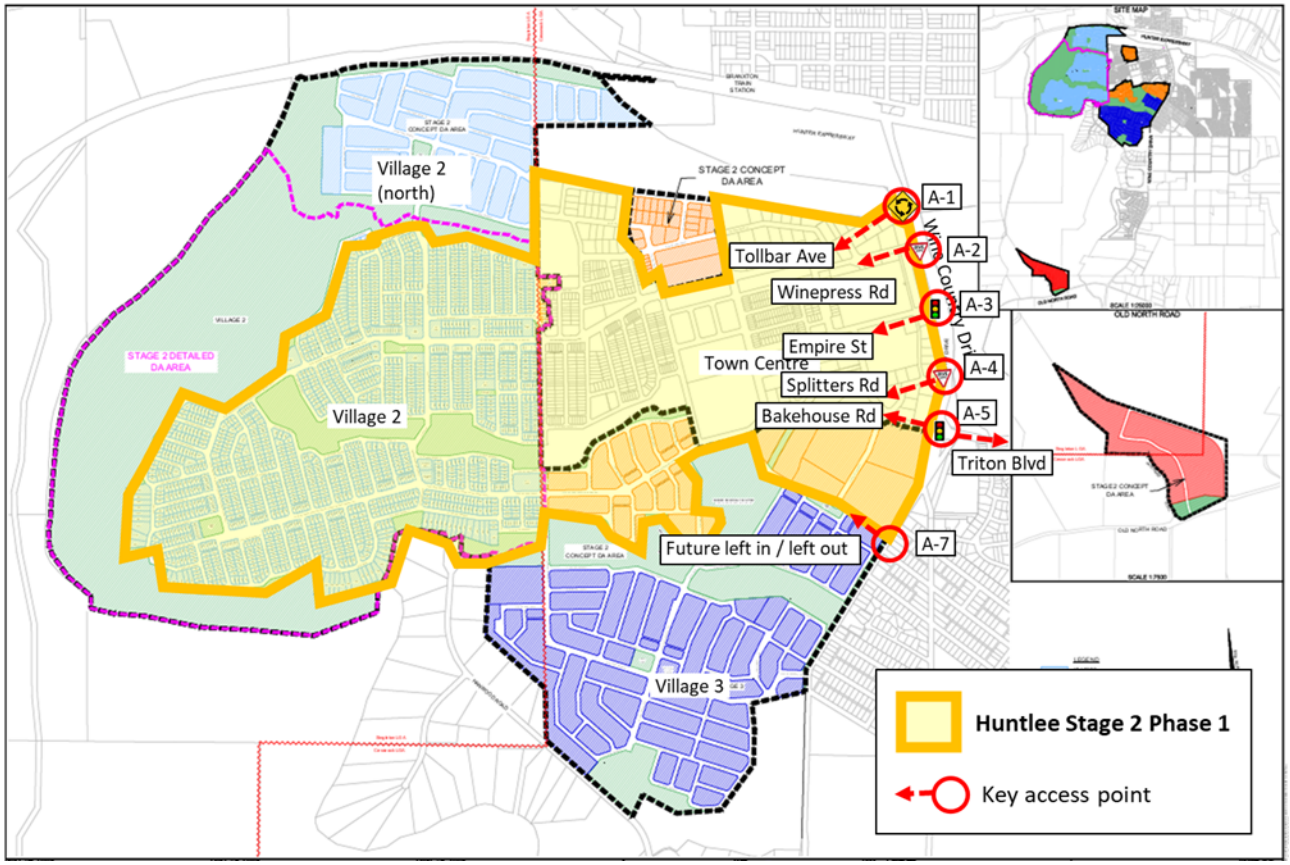


Figure 4-2 Huntlee Stage 2 development area

The Stage 2-Phase 1 includes about 5,000 residential dwellings and about 20 hectares (ha) gross floor area (GFA) of mixed use / commercial development could be developed including:

- About 4,906 dwellings of varying sizes in Villages 1, 2, 3 and Town Centre
- Large lot residential development of about 94 dwellings
- About 18.2 ha GFA of mixed use / commercial development in Town Centre
- About 725 m^2 GFA of mixed use area in Village 1
- About 16,000 m^2 GFA of education in Town Centre
- Infrastructure and facilities supporting the development.

Table 4-1 shows the development thresholds Stage 2-Phase 1.

Table 4-1 Development thresholds Stage 2-Phase 1

Development type / location	Development capacity	
Residential Development		
Village 1	2,023	Dwellings
Village 2	1,823	Dwellings
Village 3	300	Dwellings
Town Centre	760	Dwellings
Large lot area – Wine Country Drive	94	Dwellings
Total Residential	**5,000**	**Dwellings**
Mixed Use / Commercial		
Village 1 mixed use	725	m^2 GFA
Town Centre mixed use	171,925	m^2 GFA
Town Centre retail	10,000	m^2 GFA
Infrastructure	1,350	m^2 GFA
Education	16,000	m^2 GFA
Total Mixed Use / Commercial GFA	**200,000**	

Source: Huntlee Pty Ltd

4.3.1 Stage 2 Phase 1 Modelling Area generated trips

Table 4-2 shows peak hour trip generation from Stage 2 Phase 1 development.

Table 4-2 Peak hour trip generation for Stage 2 Phase 1 development

Development	Type	Yield	Unit	Trip generation (vehicles/hour)	
				AM peak	PM peak
Residential	Single dwelling	4,203	dwellings	3,280	2,980
	Medium density	498	dwellings	290	290
	Large lots	94	dwellings	70	70
	Retirement	205	dwellings	80	80
Total - Residential development		**5,000**	**dwellings**	**3,720**	**3,420**
Mixed used /commercial / retails	Mixed used/commercial	17.3	ha GFA	1,090	1,240
	Retails	1.0	ha GFA	280	470
	Primary school	120	students	70	60
	Water treatment plants and electricity generating works	2	sites	10	10
Total - Mixed used /commercial / retails		**20**	**ha GFA**	**1,450**	**1,780**
Total gross traffic generation				**5,170**	**5,200**

The traffic generation from the Stage 2 Phase 1 development is estimated to be about 5,170 vehicles trips in AM peak one hour and 5,200 vehicle trips in PM peak one hour.

Table 4-3 shows further breakdown on peak hour trip generation from Stage 2 Phase 1. Stage 1 development trip is shown separately in Table 4-3.

Table 4-3 Cumulative peak hour trip generation for Stage 2 Phase 1 Modelling Area

Development	Trip generation (vehicles/hour)	
	AM	PM
Stage 1 DA Area (2631 dwellings, 14.3ha GFA)	3,000	3,170
Stage 2 Phase 1 Modelling Area (2369 dwellings, 5.7ha GFA)	2,170	2,030
Total Cumulative Modelling Area (5000 dwellings, 20ha GFA)	5,170	5,200

The traffic generation from Stage 2 Phase 1 Modelling Area (2,369 dwellings and 5.7ha GFA) is estimated to be about 2,170 vehicles trips in AM peak one hour and 2,030 vehicle trips in PM peak one hour.

Figure 4-3 shows Stage 2 Phase 1 trips to the network in the AM peak.

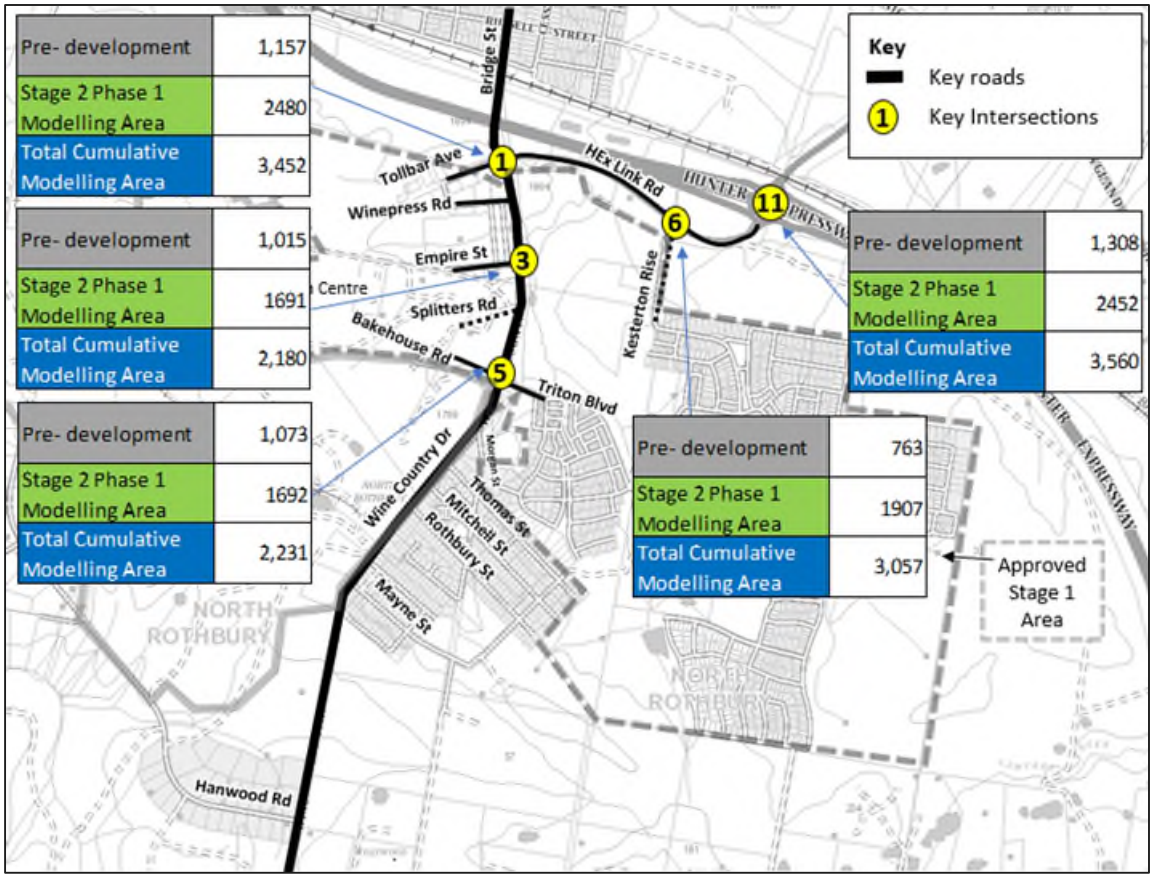


Figure 4-3 Huntlee Stage 2 Phase 1 and Total Cumulative modelled area forecast intersection volumes in AM peak

Figure 4-4 shows Stage 2 Phase 1 trips to the network in the PM peak.

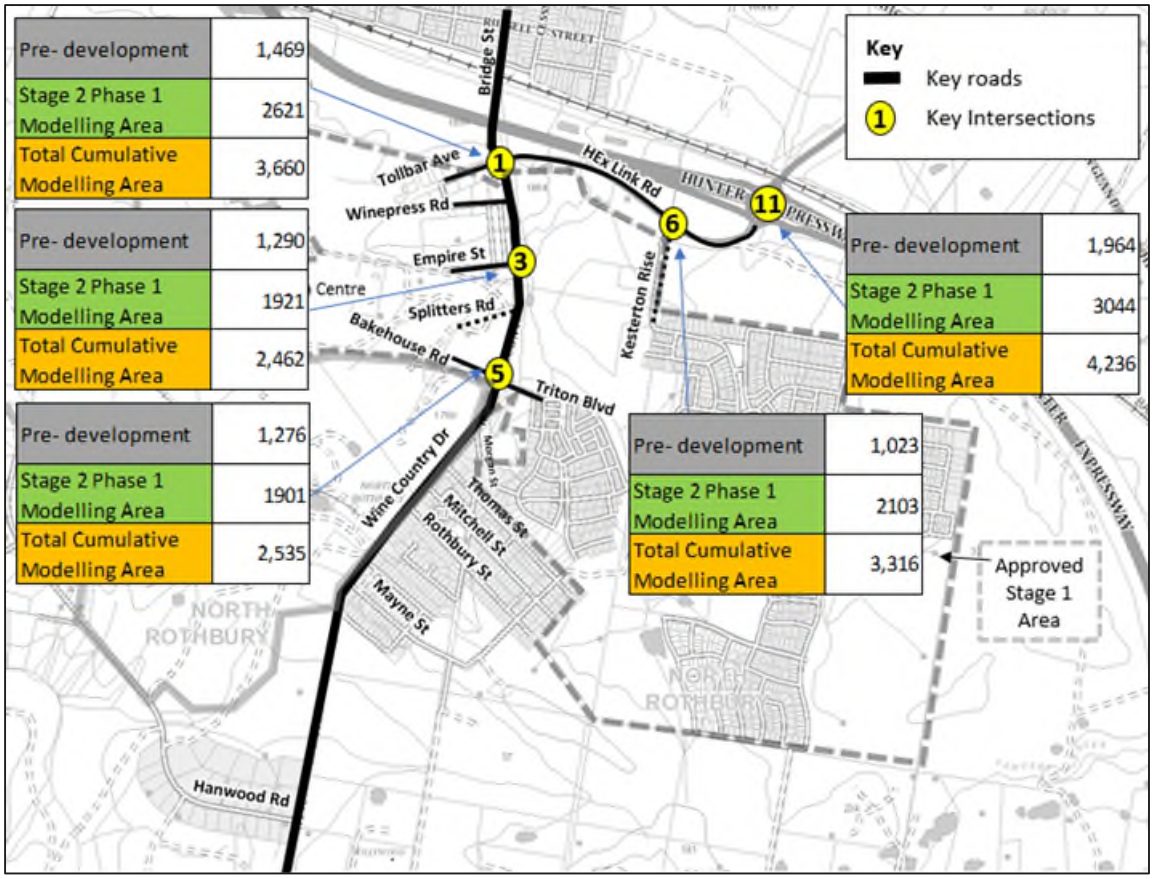


Figure 4-4 Huntlee Stage 2 Phase 1 and Total Cumulative modelled area forecast intersection volumes in PM peak

4.4 Forecast traffic volumes in 2036

Table 4-4 shows the predicted AM and PM peak hour traffic volumes at five assessed intersections in 2036 for pre (background growth alone) and post development (with Stage 2-Phase 1) traffic conditions.

Table 4-4 Peak hour intersection volumes in 2036 for pre and post development conditions

ID	Intersection	Pre-development (background growth only)		Post-development (with Stage 1 Phase 1)	
		AM peak	PM peak	AM peak	PM peak
A-1	Wine Country Drive / Bridge Street / Tollbar Avenue	1,157	1,469	3,452 (+198%)	3,660 (+149%)
A-3	Wine Country Drive / Empire Street	1,015	1,290	2,180 (+115%)	2,462 (+91%)
A-5	Wine Country Drive / Triton Boulevard	1,073	1,276	2,231 (+108%)	2,535 (+99%)
A-6	HEx Link Road / Kesterton Rise	763	1,023	3,057 (+301%)	3,316 (+224%)
A-11	The HEx Branxton interchange	1,308	1,964	3,560 (+172%)	4,236 (+116%)

Compared to the future background traffic growth of 1.0 per cent per annum in 2036, the Stage 2 Phase 1 would increase traffic volumes by 100 to 300 per cent depending on locations.

Appendix B includes predicted AM and PM peak one hour turning volumes with Stage 2 Phase 1 development traffic in 2036.

5 Proposed network improvements for Stage 2-Phase 1

5.1 Proposed infrastructure upgrades

The traffic modelling analysis indicates that development thresholds of 5,000 dwellings and 20ha GFA of mixed use / commercial development (Stage 2-Phase 1) would have impact on the road network.

Additional intersection upgrades are proposed for the following two sites:

- Wine Country Drive / Bridge Street / Tollbar Avenue (A-1)
- HEx Branxton interchange (A-11).

Table 5-1 shows the proposed intersection upgrades at Wine Country Drive / Bridge Street / Tollbar Avenue (A-1) and HEx Branxton interchange (A-11). Indicative upgrades are highlighted as yellow on Figure 5-1 to Figure 5-3.

Table 5-1 Proposed intersection upgrade for development thresholds of 5000 dwellings and 20 ha GFA (Stage 2, Phase 1)

ID	Intersection	Proposed upgrade for Stage 2 proposal	Indicative intersection upgrade
A-1	Wine Country Drive / Bridge Street / Tollbar Avenue	• a new traffic signals replacing the existing roundabout	Refer to Figure 5-1
A-11	The HEx Branxton interchange	• A new continuous left turn slip lane/ramp from HEx Link Road to the northbound on-ramp • Additional right turn lane from HEx Link Road to the southbound on-ramp • Widening of the roundabout circulating lanes to accommodate double right turn lanes from HEx Link Road to the southbound on-ramp • Additional exit lane (short lane) on the southbound on-ramp	Refer to Figure 5-2
A-7	New left in / left out intersection south of Bakehouse Road	• A new left in / left out access intersection on Wine Country Drive south of Bakehouse Road	Refer to Figure 5-3

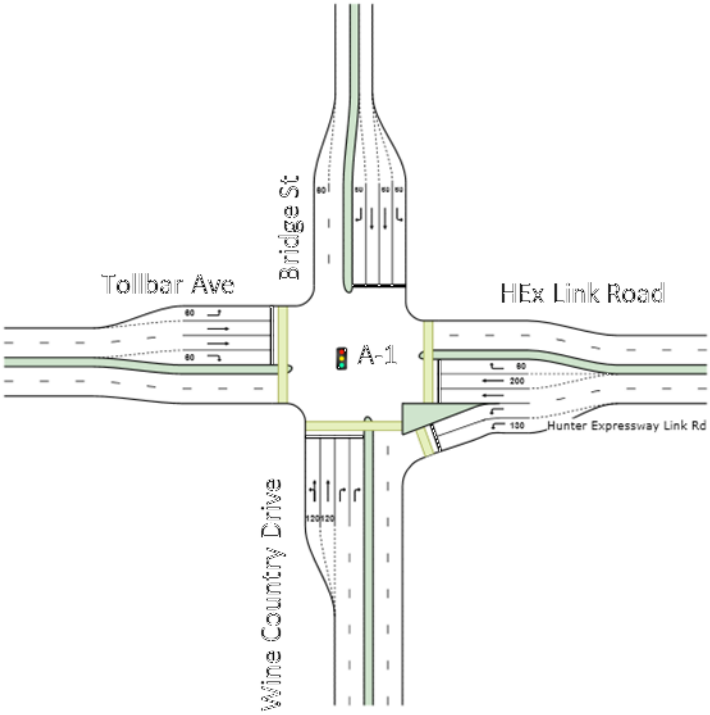


Figure 5-1 Proposed upgrade at Wine Country Drive / Bridge Street / Tollbar Avenue

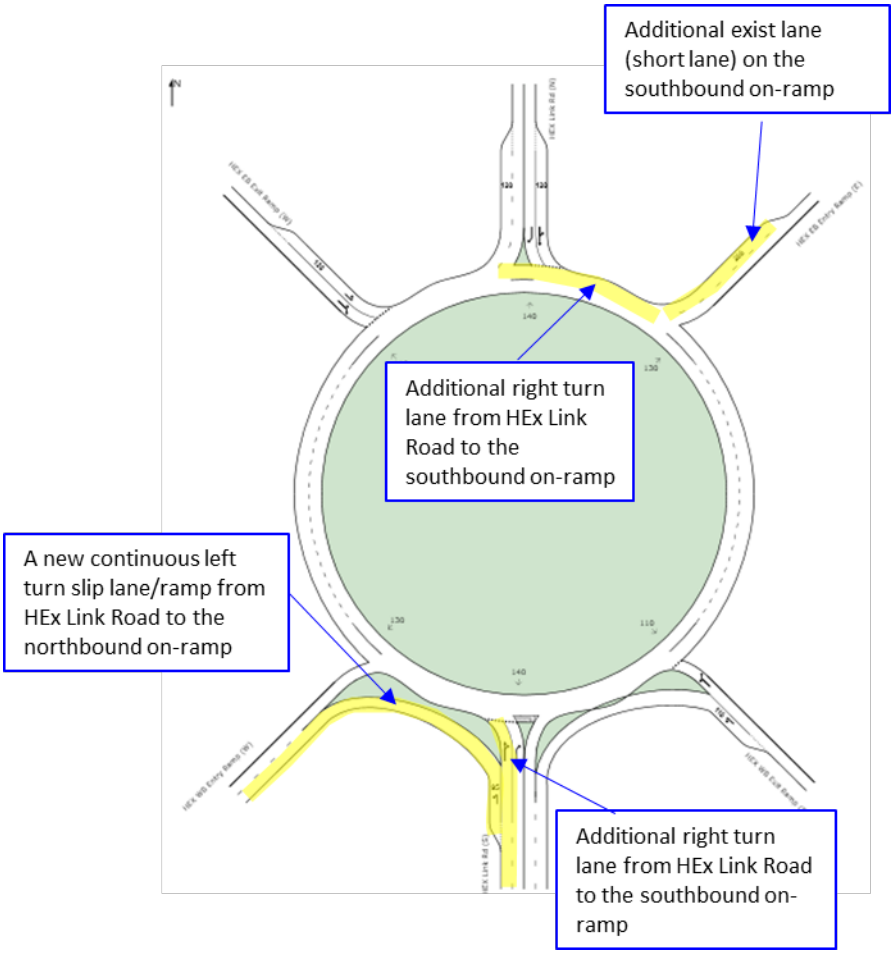


Figure 5-2 Proposed upgrade at The HEx Branxton interchange

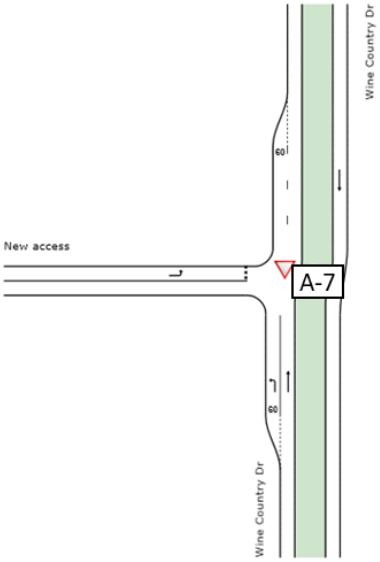


Figure 5-3 Proposed new left in / left out access on Wine Country Drive south of Bakehouse Road

5.2 Intersection level of service in 2036

Table 5-2 shows the level of service in 2036 for post-development (with Stage 2-Phase 1) traffic conditions.

Table 5-2 Predicted level of service in 2036 for Stage 2 Phase 1

ID	Intersection	Upgraded intersection	Development thresholds (5000 dwelling and 20 ha GFA)			
			AM Peak		PM Peak	
			Delay (sec)	LoS	Delay (sec)	LoS
A-1	Wine Country Drive / Bridge Street / Tollbar Avenue	New traffic signals	40	C	41	C
A-3	Wine Country Drive / Empire Street	Traffic signals	29	C	40	C
A-5	Wine Country Drive / Triton Boulevard / Bakehouse Road	Traffic signals	37	C	40	C
A-6	HEx Link Road / Kesterton Rise	New traffic signals	17	B	13	A
A-7	Left in / left out access south of Bakehouse Road	New left in / left out	6	A	7	A
A-11	The HEx Branxton interchange	Upgraded roundabout	20	B	63	E

Model file: 9. Modelling\Stage 2 Phase 1_Sep23\3. HEx RB upgrade\Huntlee_Stage 2 DA_Phase 1 (5000,20ha)_HEx RB upgrade.sip9

The A3, A-5 and A-6 intersections with Wine Country Drive and HEx Link Road would provide level of service A and C. The new traffic signals at Wine Country Drive / Bridge Street / Tollbar Avenue (A-1) would provide level of service C or better. The proposed upgrades at the HEx Branxton interchange (A-11) would provide level of service B and E in 2036.

In conclusion, the proposed upgrades at above two intersections (A-1 and A-11) are required to accommodate up to 5,000 dwellings and 20 ha GFA development.

5.3 Summary of development thresholds and proposed upgrades

The road and intersection upgrades supporting the Huntlee development would be delivered progressively. The following is a summary of Stage 1 and Stage 2 development thresholds and associated upgrades including:

- Stage 1 development thresholds: about 2,525 residential dwellings and 4.3ha GFA of mixed use / commercial developments. This was approved by TfNSW on 29 Aug 2023 as part of Stage1.
- Stage 2 Phase 1 development thresholds: about 5,000 residential dwellings and 20ha GFA of mixed use / commercial developments. This new threshold is proposed for Stage 2.

Figure 5-4 shows indicative locations of proposed upgrades and development thresholds for Stage 2.

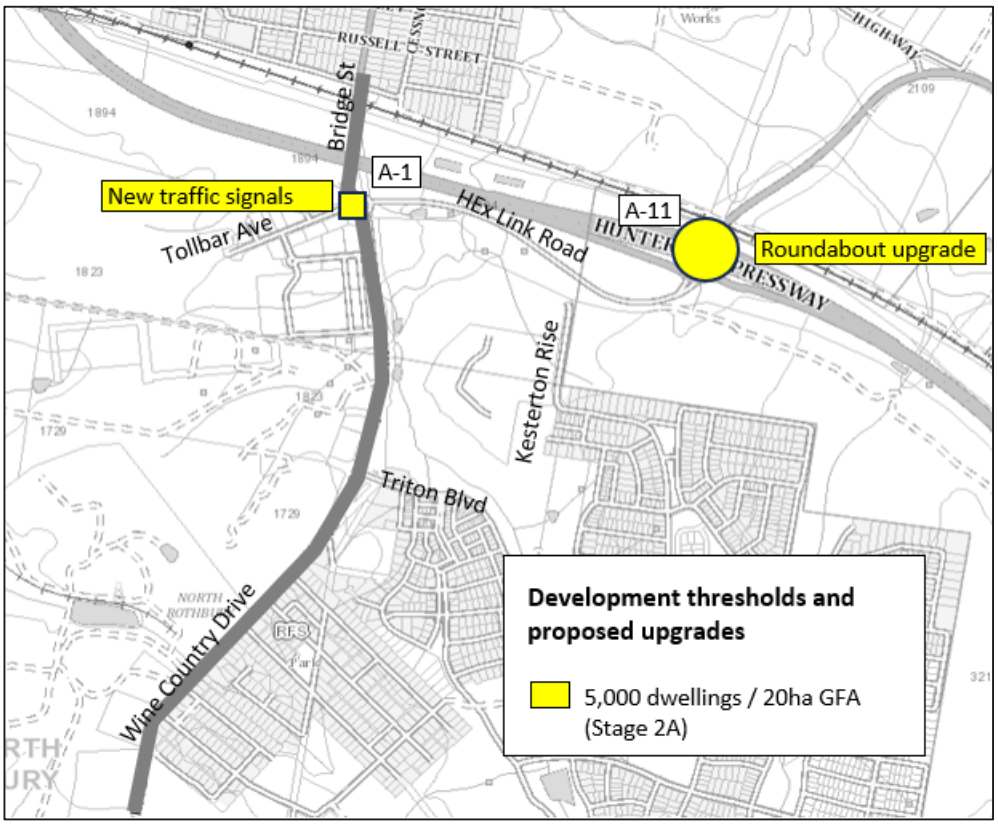
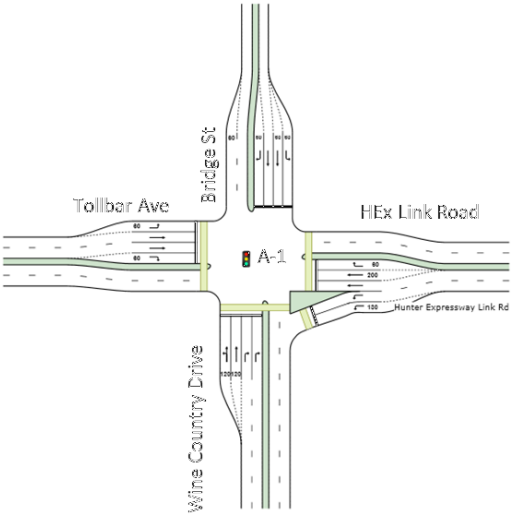
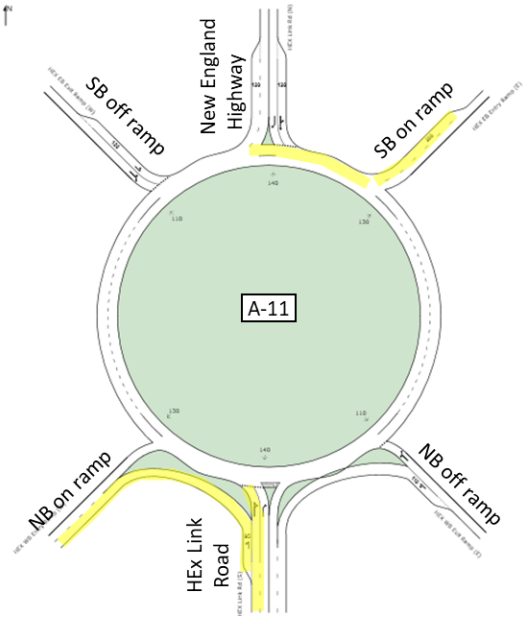


Figure 5-4 Upgrades proposed to support development thresholds for Stage 2

Table 5-3 shows proposed upgrades and indicative intersection layouts for Stage 2 development thresholds.

Table 5-3 Summary of development thresholds and proposed upgrades for Stage 2

Development stage	Development thresholds	Proposed upgrades	Indicative intersection layout
Stage 2-Phase 1	5,000 residential dwellings 20ha GFA of mixed use / commercial development This new threshold of 5,000 dwellings is proposed for Stage 2.	Wine Country Drive / Bridge Street / Tollbar Avenue roundabout (A-1) shall be upgraded to a new traffic signals	
		The HEx Branxton interchange (A−11) shall be upgraded to include: • A new continuous left turn slip lane/ramp from HEx Link Road to the northbound on-ramp • Additional right turn lane from HEx Link Road to the southbound on-ramp • Widening of the roundabout circulating lanes to accommodate double right turn lanes from HEx Link Road to the southbound on-ramp • Additional exit lane (short lane) on the southbound on-ramp	

6 Future assessment for the remaining Huntlee Development areas

This section provides a high-level assessment of potential future upgrade requirements and outlines key considerations to be included in the future traffic assessments of the remaining Huntlee Development areas.

6.1 Future traffic modelling

Figure 4-2 show the remaining Huntlee Development areas which include Village 3 and Village 2 north. The development of Village 3 and Village 2 north (refer to blue highlighted area in Figure 4-2) will require a future detailed DA application to be provided which will include further assessment of traffic related impacts. These future DA applications are likely to be at least 7+ years away from being prepared.

The future traffic assessment would review background growth as well as test operation of intersections constructed within Huntlee using traffic counts from the development area which will also allow refinement of assumptions made in relation to trip distributions and self-containment.

It is also expected that the future assessment will be able to review the expected commercial / mixed use GFA take up within Huntlee, which is difficult to predict and is likely to vary significantly depending on the final uses that occur on the mixed use land within the Town Centre.

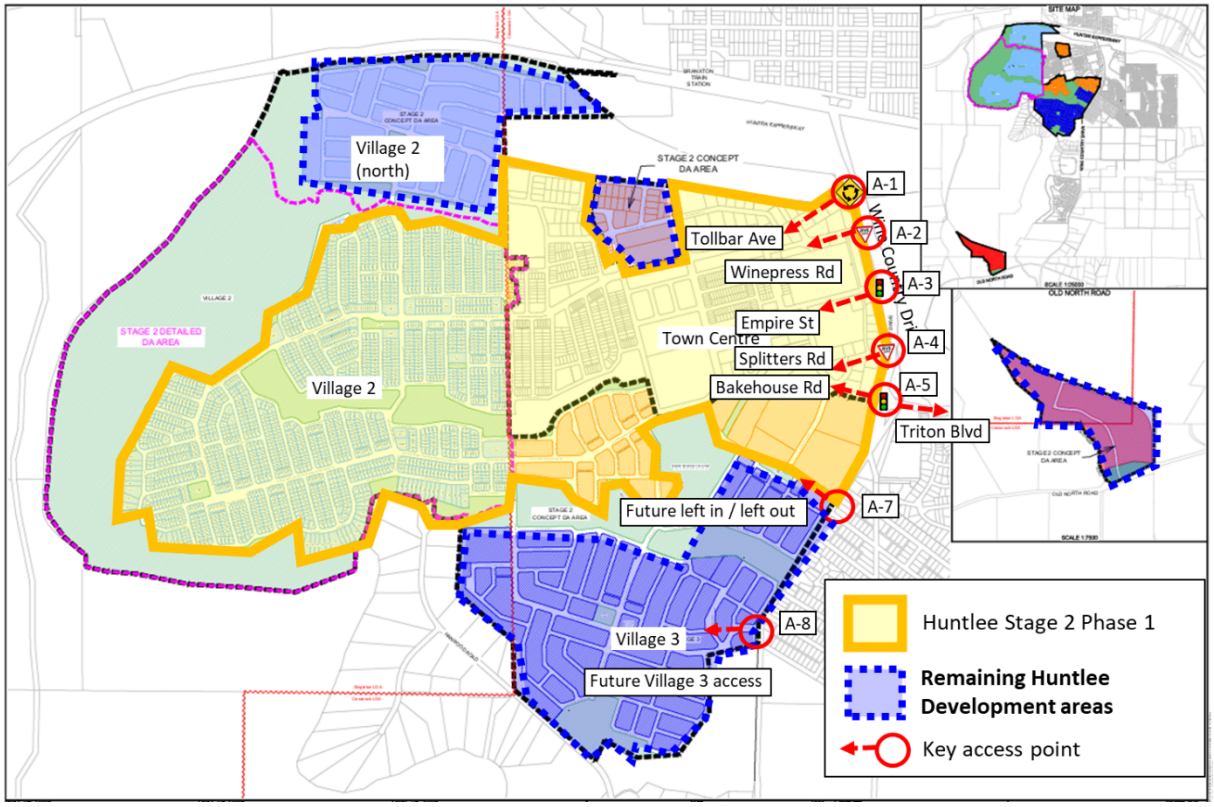


Figure 6-1 Remaining Huntlee Development areas

As outlined in Section 3.4.3, the balance of Stage 2 will add approximately 2,855 trips to the network in the AM peak and 2,625 trips in the PM peak. The expected impacts to the network are discussed in Section 6.2.

6.2 Expected additional road upgrades

Whilst the future traffic assessment will detail future road improvements for the remaining Huntlee Development areas, initial work has identified likely key items that will be part of the assessment as outlined below:

- Village 3 access intersection on Wine Country Drive (A-8) which is likely to be a signalised intersection. Initial assessment indicates new signals are expected to provide adequate traffic capacity. About 1400 and 2,500 peak hour trips are expected to use Village 3 access intersection. The level of service is expected to be B or C during peak hour.
- Wine Country Drive north and south from new Village 3 access is expected to support the forecast traffic volumes. The current lane configuration (one lane in each direction) on Wine Country Drive is expected to accommodate additional traffic, however, some local widening would be required at Village 3 intersection.
- Potential upgrade of Wine Country Drive / Empire Street (A-3) and Wine Country Drive / Triton Boulevard (A-5) intersections to add turning bay storage for key intersection approaches.
- Further upgrades to the HEX interchange (A-11).

Concept sketches of the likely intersection footprints have been included within Northrop Engineers Infrastructure report to ensure these are considered as part of the concept DA approval.

7 Management and mitigation measures

7.1 Construction

During construction traffic impact along Wine Country Drive is likely to increase depending on subdivision stages and locations. However, these impacts are expected to be minor and would not impact the operational performance of Wine Country Drive. The construction staging would maintain the existing traffic lane and accessibility on Wine Country Drive. Traffic management plans and construction staging would be progressively developed and refined during construction to facilitate the safe and efficient movement of traffic through and around the proposal area and to and from construction locations and ancillary facilities.

Measures to be implemented to manage potential traffic impacts during construction are:

- A Traffic Management Plan (TMP) will be prepared and implemented for traffic as part of the Construction Environmental Management Plan (CEMP) for the construction phase of the proposal. This will adhere to Traffic Control at Worksites, Technical Manual, Issue No. 6.1 March 2022 and QA Specification G10 Traffic Management. This will include details on:
  - Measures to maintain access to properties and local roads
  - Site specific traffic control measures to manage and regulate traffic movement
  - Requirement and methods to consult and inform the local community of impacts on the local road network
  - Measures to maintain pedestrian and cyclist access
  - Access to ancillary sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads
  - A response plan for any construction road traffic incident
  - Consideration of other developments which may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic
  - Monitoring, review, and amendment mechanisms.
- Traffic management plans would be prepared for the construction area and progressively updated as the works progress. The plans would be prepared and implemented by suitably qualified personnel
- Schedule partial and full road closures to avoid peak periods
- Undertake consultation with local and regional bus companies prior to and during construction
- Undertake consultation with emergency services prior to and during construction to confirm any diversions during construction and any operational road network changes
- Undertake consultation with property owners and occupiers regarding changes to access arrangements
- Undertake consultation with local Council regarding potential impacts to parking during the construction period.

8 Conclusions

This report documents the traffic and transport impact assessment (TIA) undertaken to support the Environmental Impact Statement (EIS) of the Huntlee New Town Stage 2 proposal.

Arcadis previously submitted a traffic report titled "*Huntlee New Town, Stage 1 Preferred Project Report (PPR) Traffic Modelling*" prepared by Hyder Consulting (currently rebranded as Arcadis Australia Pacific Pty Ltd) in July 2012 (herein referred to as 'July 2012 PPR Hyder Report'). The July 2012 Hyder Report for the Stage 1 Major Project provided traffic modelling on the assumption (at fully completed development) that there would be 7,500 residential dwellings. The July 2012 Arcadis Report found that in alignment with the planned road upgrades to the Wine Country Drive and associated intersection upgrades, the impacts of residential development in Huntlee were acceptable.

Notwithstanding the above, an updated traffic impact assessment has been undertaken to support the Stage 2 proposal. A new traffic survey was undertaken on Thursday, 21 July 2022 (outside the school holiday) to support updated traffic modelling. The updated traffic modelling has assumed the future year 2036 for its assessment.

A consultation process involving Transport for (TfNSW) constituted an important element of this updated Stage 2 modelling study. The traffic generation, distribution, future background traffic growth assumptions were in consultation with TfNSW and formed the basis of updated traffic modelling for Stage 2 proposal.

The Wine Country Drive and HEx Link Road will need to be upgraded progressively to cater for the forecast increase in traffic volumes which will result from both the Huntlee development (principally) and the general growth in passing traffic via Wine Country Drive. The regional network comprising Wine Country Drive (MR 220), Hunter Expressway Link Road (HEx Link Road) are expected to accommodate the greatest longer-term increase in traffic as a result of the Huntlee Stage 2.

Traffic impact assessment of the Huntlee Stage 2 has been split into two phase due to the size of the Project and expected development rollout timeframe. The first phase of Huntlee Stage 2 (Stage 2-Phase 1) covering the detailed DA areas of Village 2 central and south, as well as an increase in the commercial GFA within the town centre. The remaining Huntlee Development areas including Village 2 north and Village 3 are subjected to the future assessment for future detailed DA applications.

This report provides a detailed traffic impact assessment of the Stage 2-Phase 1 and a high-level recommendation the future traffic assessment of the remaining Huntlee Development areas.

8.1 Huntlee Stage 2-Phase 1

The Stage 2 phase 1 includes about 5,000 residential dwellings in Village 1, 2,3 and Town Centre and about 20 hectares (ha) gross floor area (GFA) of mixed use / commercial development in Town Centre. It was determined that road network upgrades would be required prior to the development achieved about 5,000 residential dwellings and about 20 ha GFA of mixed use / commercial development. These upgrades include:

- Wine Country Drive / Bridge Street / Tollbar Avenue roundabout (A-1) shall be upgraded to a new traffic signals prior to 5,000 residential dwellings and 20ha GFA of mixed use / commercial development.
- The HEx Branxton interchange (A−11) shall be further upgraded to include the followings prior to 5,000 residential dwellings and 20ha GFA of mixed use / commercial development:
  - A new continuous left turn slip lane/ramp from HEx Link Road to the northbound on-ramp
  - Additional right turn lane from HEx Link Road to the southbound on-ramp
  - Widening of the roundabout circulating lanes to accommodate double right turn lanes from HEx Link Road to the southbound on-ramp
  - Additional exit lane (short lane) on the southbound on-ramp.

8.2 Recommendations for future assessments

It is anticipated that the detailed DA applications for the remaining Huntlee Development areas are likely to be at least 7+ years. It is expected that Huntlee site will benefit from a trend of journey to work containment proposed within the site. It will be necessary to ensure that residents and employees can travel to and from the Huntlee facility sustainably and in a way that reduces growth in car use in the longer term.

The following key considerations are recommended to be included in the future traffic assessments of the remaining Huntlee Development areas:

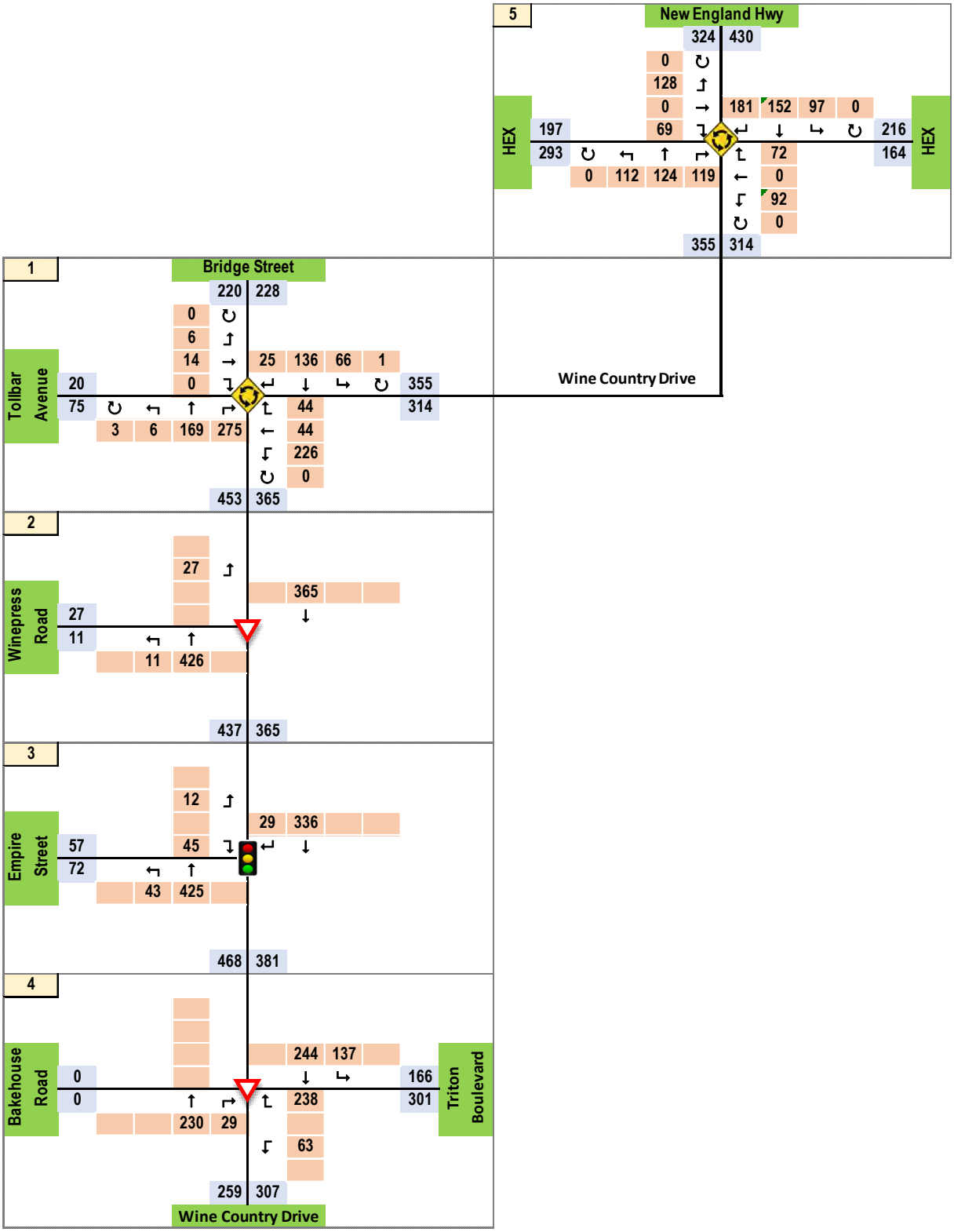
- Undertake new counts after development achieved 5,000 residential dwellings and 20ha GFA of mixed use / commercial target.
- Review background traffic growth.
- Review the development uptake rate particularly for commercial / mixed use GFA.

Whilst the future traffic assessment will identify future road improvements for the remaining Huntlee Development areas. An initial work has identified likely key items that will be part of the assessment as outlined below:

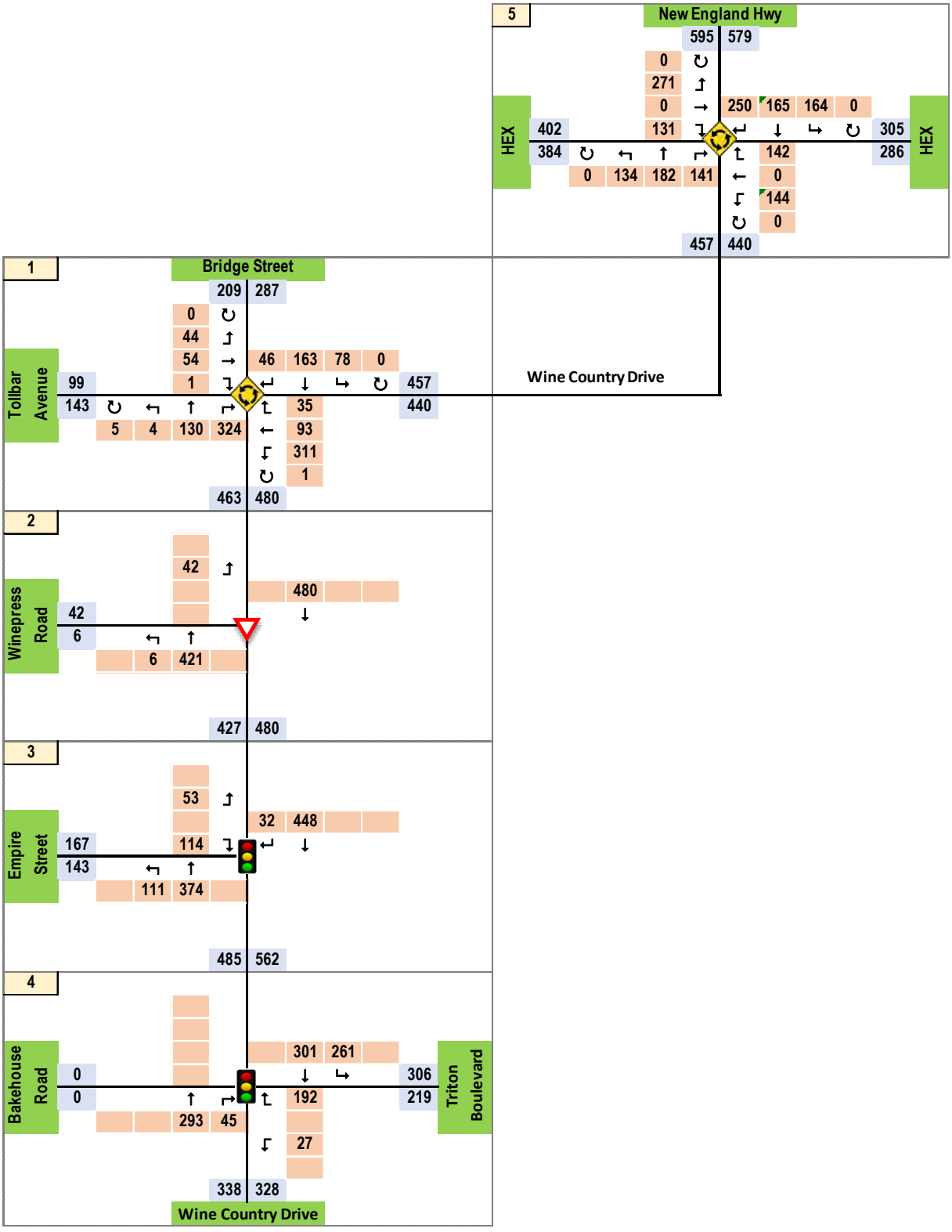
- Village 3 access intersection on Wine Country Drive (A-8) which is likely to be a signalised intersection.
- Potential upgrade of Wine Country Drive / Empire Street (A-3) and Wine Country Drive / Triton Boulevard (A-5) intersections to increase turning bay storage for key intersection approaches.
- Further upgrades to the HEX interchange (A-11).

APPENDIX A 2022 AM and PM peak one hour traffic volumes at surveyed locations

Traffic volumes for 2022 AM peak one hour (8am to 9am)

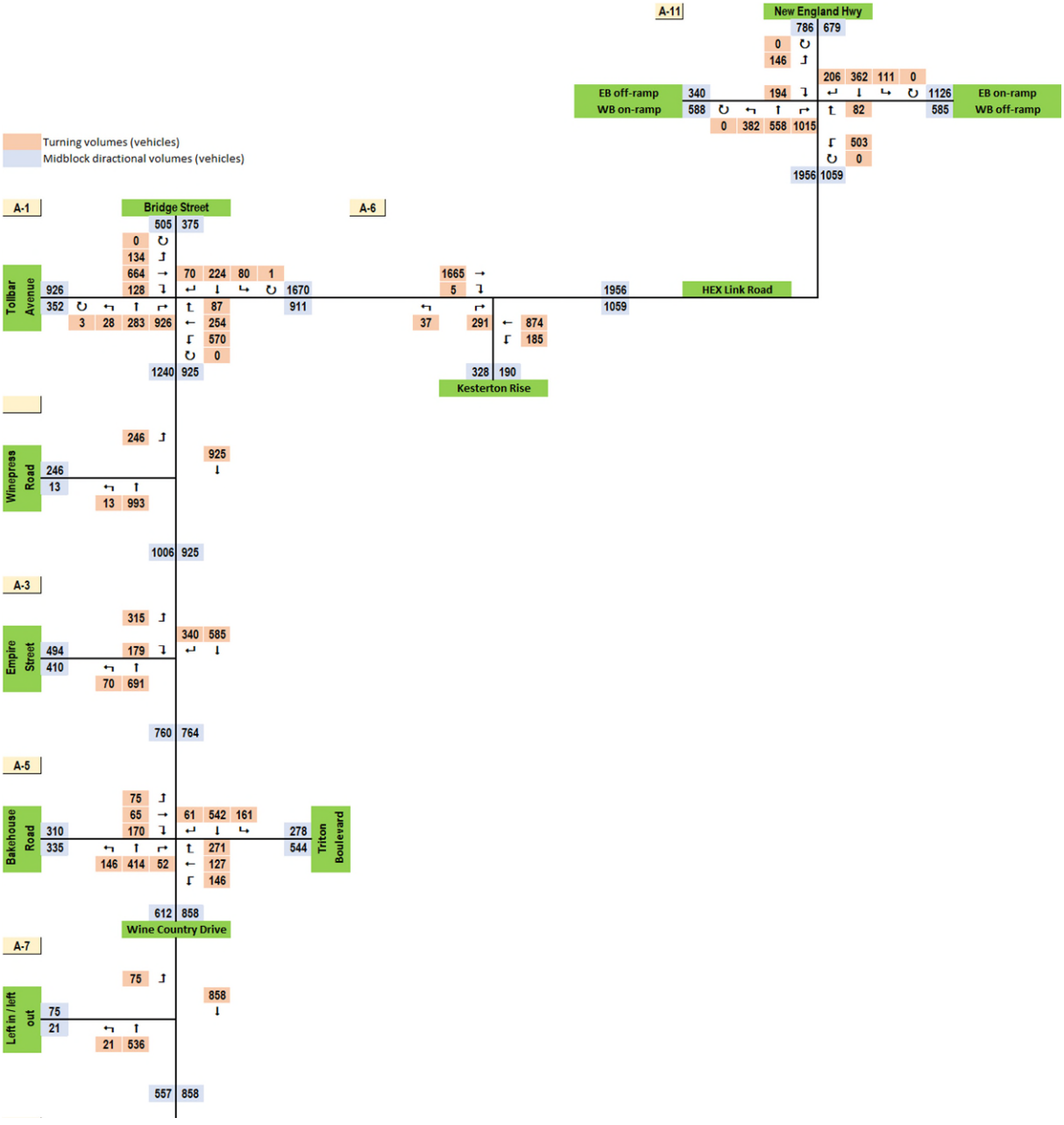


Traffic volumes for 2022 PM peak one hour (4.30pm to 5.30pm)

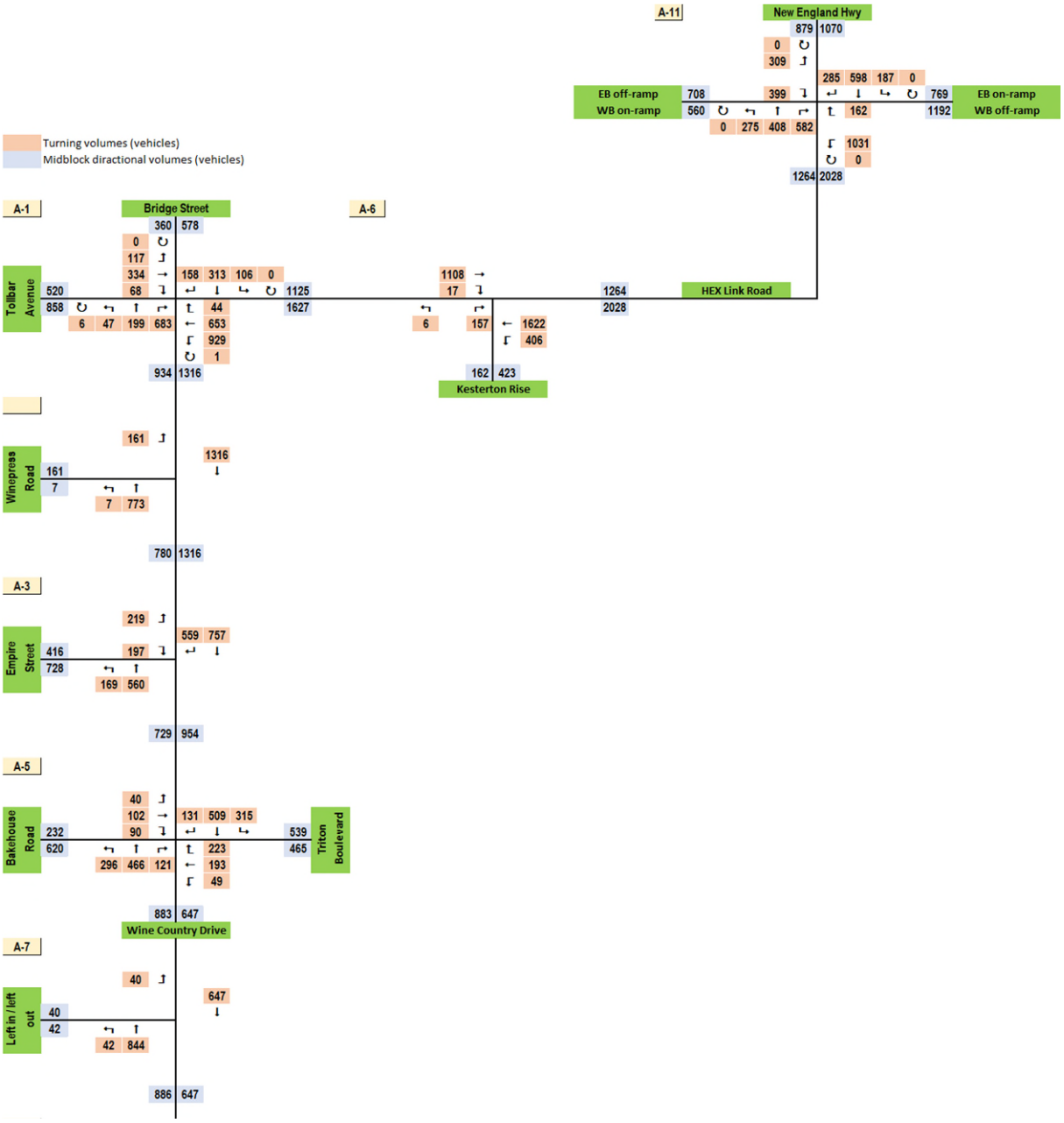


APPENDIX B Predicted AM and PM peak one hour turning volumes with 5000 dwellings and 20 ha GFA development (Stage 2, Phase1) traffic in 2036

Predicted traffic volumes in 2036 AM peak (8am to 9am) volumes with 5000 dwellings and 20 ha GFA development (Stage 2, Phase1)



Predicted traffic volumes in 2036 PM peak one hour (4.30pm to 5.30pm) volumes with 5000 dwellings and 20 ha GFA development (Stage 2, Phase1)



File: 10. Reports\14. Stage 2 TIA\FINAL Turn diagram for Stage 2 TIA\Huntlee Stage 2 Turning volumes AM&PM_2036 (5000,20ha).xlsx

APPENDIX C TfNSW relevant emails correspondence

TfNSW acceptance on Technical Advice No 1 – Traffic scoping paper, prepared by Arcadis, 27 July 2022

From: Masa Kimura <Masa.Kimura@transport.nsw.gov.au>
Sent: Wednesday, July 27, 2022 9:43 AM
To: Rahman, Mukit <Mukit.Rahman@arcadis.com>
Cc: Glenn Swan <GSwan@lwpproperty.com.au>
Subject: Pre-DA Meeting - Huntlee Stage 2

Hi Mukit,

Thanks for the submitted information post our MS Teams meeting on 6/7/2022.

As requested, the following information is provided to enable you to progress the TIA.

- STFM data attached
- Attached traffic count locations and times are acceptable. Please extend the time period for the counts if schools are located close by.
- Attached Scoping Paper is acceptable.
- As mentioned at the meeting, Property comments would be sought internally. The site is affected by a road proposal that seems to be associated with the existing Wine Country Drive / Triton Boulevard intersection. Please ensure that the physical and legal access for TfNSW owned residue adjoining at Lot 146 DP1233016 is maintained. Further assessment of the impacts upon this residue land will be considered as part of the future DA.
- A review of MP 10_0137 (MOD 17) notes some upgrades to Wine Country Drive are identified for Stage 2.

Apologies for the delayed response.

Masa Kimura
Development Services Case Officer
Regional and Outer Metropolitan
Development Services
Transport for NSW

T 1300 207 783 **M** 0407 707 999 **E** masa.kimura@transport.nsw.gov.au

transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
Locked Bag 2030, Newcastle NSW 2302

Working days Monday to Friday, 8:00am – 3:30pm

TfNSW acceptance on Technical Advice No 2 – Traffic assumption paper for Stage 2 DA for full development, prepared by Arcadis, 13 June 2023

From: Masa Kimura <Masa.Kimura@transport.nsw.gov.au>
Sent: Tuesday, June 13, 2023 9:24 AM
To: Rahman, Mukit <Mukit.Rahman@arcadis.com>
Subject: RE: Pre-DA Meeting - Huntlee Stage 2_ Traffic assumption paper

Hi Mukit,

Thanks for reaching out to TfNSW regarding your submitted Traffic Assumptions paper (attached).

TfNSW has reviewed the submission and is satisfied with the assumptions put forward.

The following comments are provided in advancing the TIA:

- Clearly identify the differences between the original Hyder and subject TIA.
- Does the surrounding road network have capacity to cater for the increased traffic generation? Do any upgrades to the State Road network identified as part of the ultimate Huntlee development need to be brought forward?
- Detail the number of vehicle classes (car, truck, bus, taxi pedestrian and cyclist) to be used
- Are there any connections between the network and train station?
- Consideration of number of pedestrians and cyclists on network during peak times
- Public transport and frequency
- Parking in and around town centres. Are there any additional traffic restrictions needed?

Regards,

Masa Kimura
Development Services Case Officer
Regional and Outer Metropolitan
Development Services
Transport for NSW

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Locked Bag 2030, Newcastle NSW 2302

Working days Monday to Friday, 8:00am – 3:30pm

TfNSW acceptance on MOD-21 traffic modelling and lot thresholds trigger by Arcadis, 29 Aug 2023

Transport for NSW

29 August 2023

File No: NTH22/00065/15
Your Ref: MP10_0137-Mod-21

Department of Planning & Environment
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Chris Eldred - christopher.eldred@planning.nsw.gov.au

RE: Response to Submissions – MP10_0137-Mod-21 - Advice on RTS - Huntlee New Town Stage 1 - Wine Country Drive Huntlee

I refer to the abovementioned S4.55 modification re-referred to Transport for NSW (TfNSW) on 17 August 2023 for revised comment.

TfNSW has reviewed the submission and supporting documentation, including the RFI Letter by Ethos Urban dated 17/8/2023, and provides the following comments to assist the Department:

- Intersection A-11 – TfNSW is satisfied with the removal of the identified bullet points, as these are triggered as part the ultimate development of Huntlee. TfNSW also supports the increased lot threshold trigger of 2525 dwellings (currently 1900).

- Intersection A-6 (part condition E7a) ix) – The Applicant's preference for traffic control signals instead of a roundabout is noted. TfNSW will require the submission of the referenced SIDRA model (Stage 2), detailed traffic signal warrants and the strategic design to demonstrate that any signals are fit for purpose. More details on the assessment criteria can be found here.

  TfNSW will undertake an Agreement in Principle (AIP) process to inform progression of the works under the Works Authorisation Deed (WAD). TfNSW is happy for this process to occur separately to the current S4.55 approval.

Should you require further information please contact Masa Kimura, Development Services Case Officer, on 1300 207 783 or 0407 707 999 or by emailing development.north@transport.nsw.gov.au.

Yours faithfully

Liz Smith
Manager Development Services
North Region | Community & Place
Regional & Outer Metropolitan