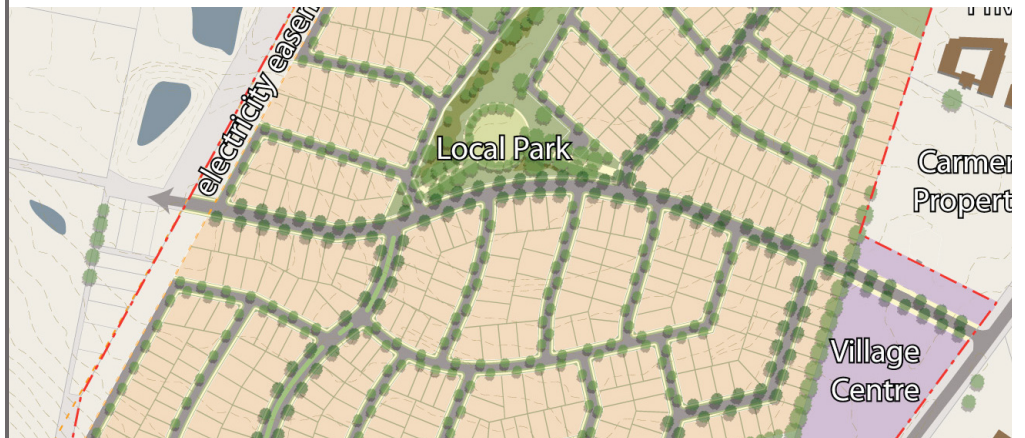




Appendix 6

Transport and Accessibility Impact Assessment

Colston Budd Hunt & Kafes Pty Ltd

STATE PROPERTY AUTHORITY

TRANSPORT AND ACCESSIBILITY
IMPACT ASSESSMENT FOR
PROPOSED DEVELOPMENT,
SOUTH ORANGE

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SUMMARY

1. The findings of the following transport and impact assessment for the proposed South Orange development are summarised through the following sections:-
 - existing transport environment;
 - proposed transport environment;
 - concept plan;
 - conclusion.

Existing Transport Environment

2. The site is located some 3.5km south of the Orange town centre. Land uses in the vicinity of the site include existing agricultural research facilities, Orange Bloomfield Hospital, the TAFE, the proposed private hospital and supporting facilities.
 3. The road network in the vicinity of the site includes Forest Road, Peisley Street, Huntley Road, Sharp Road and Anson Street. Forest Road (MR245) is located adjacent to the eastern boundary of the site and provides the main north-south road through South Orange.
 4. Forest Road provides access to amongst other things the adjacent TAFE facility, Bloomfield Hospital, Golf Course and Orange Agricultural Institute. Peisley Street (MR245) combines with Forest Road to provide the main north-south connection to the Orange town centre and a railway overpass of the Orange to Broken Hill railway line.
 5. Sharp Road is located to the north of the site and provides an east-west traffic route between Forest Road and Anson Street. Sharp Road combines with Anson Street to provide an alternative town centre access road and a through connection to areas in
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North and West Orange. Huntley Road provides access to the Orange industrial area and saleyards located on the eastern side of the Main Western railway line.

6. Summer Street and Peisley Street carried some 800 to 1150 vehicles per hour two-way during the morning peak hour periods and some 1000 to 1550 vehicles per hour two-way during the afternoon peak hour period. Forest Road carried some 350 to 650 vehicles per hour in the peak periods. Huntley Road carried some 400 to 550 vehicles and Sharp Road carried some 250 to 400 vehicles per hour two-way. These roads and their intersections are currently operating at satisfactory levels of traffic service.
7. The Orange Structure Plan indicates a number of proposed roadworks to service the future development of South Orange including:-
 - proposed southern distributor road from Forest Road to intersect with extension of Woodward Street to the west. The intersection of southern distributor road and Forest Road will be controlled by a roundabout;
 - continuation of the southern distributor roads across to Pinnacle Road and beyond;
 - upgrading of Woodward Street from Racecourse Road to the proposed southern distributor road.
8. Regarding public transport services, the nearest bus service is located to the north of the site, at the intersection of Forest Road and Tynan Street. Bus route 534 provides a convenient bus service between the town centre and Warrendine. This service is located some 2km north of the site.

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9. The proposed development has been designed to allow future expanded bus service within Orange to access the site. These bus services would provide a good level of public transport to surrounding development in the area (including the Orange Base Hospital redevelopment currently under construction, the Orange Private Hospital and the proposed development).

Consultation with Authorities

10. The Direct General's requirements are set down in Chapter 1 of the following report. The following matters were also raised in discussions with the Roads and Traffic Authority and with Orange City Council:

- proposed seagull treatment on Forest Road;
- assessment of the cumulative impact of the proposed development and the public and private hospitals;
- proposed roadworks in the vicinity of the site, including the southern distributor road;
- an assessment of traffic volumes likely to be generated through intersections along Forest Road and Peisley Street to the north of the site.

11. The DGR's and RTA/Council matters are addressed in Chapter 3 of the following report, and are summarised below.

Proposed Transport Environment

12. The public transport strategy will be provided in accordance with the following design objectives:-
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- enable access for integrated bus routes which achieve a high proportion of dwellings within 400 metres of a bus stop;
 - improve the choice of travel and reduce dependence solely on cars for travel purposes;
 - improve accessibility to employment and services by walking, cycling and public transport;
 - moderate the growth in the demand for travel and the distances travelled, especially by car; and
 - support the efficient and viable operation of public transport services;
15. The pedestrian and cycle network through the proposed residential subdivision will be based on the following principles:-
- provide convenient access and connections to local shops, parks, amenities and community areas, both within and external to the site;
 - provide convenient access to future adjacent residential areas located to the west;
 - integrate the pedestrian and cycle network with open space areas; and
 - provide adequate on-road and off-road cycle facilities.
16. Vehicular access to the development is proposed to be provided via a new seagull intersection on Forest Road. The intersection will be located some 450 metres south of the proposed traffic signal controlled intersection, which will provide access
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to the Orange Base Hospital (eastern side) and Orange Private Hospital (western side). A second possible access will be provided to link into future residential development to the west.

17. The seagull controlled intersection is considered appropriate and will be designed in accordance with the Australian Standards and Austroads design requirements.
18. The proposed South Orange development will generate some 480 to 560 additional vehicles per hour, two way during morning and afternoon peak periods. Residents of the development will be able to use the proposed shopping centre as well as work or visit the nearby hospital.
19. In association with the proposed development and prior to the construction of the southern distributor road, it is proposed to upgrade the intersections of Forest Road with Huntley Road and Sharp Road. The proposed intersection upgrading will incorporate the widening of Forest Road to provide two northbound and two southbound traffic lanes on approach to the intersections.
20. The traffic assessment found that the proposed development will have minimal impact on the operation of the surrounding road network and its intersections, including the proposed access arrangements to the development, the signalised intersection of Forest Road with the approved hospital developments and the proposed intersection improvements at Forest Road/Huntley Road and Forest Road/Sharp Road. The surrounding road network and its intersections will be able to cater for the additional traffic at satisfactory traffic levels of service.

Concept Plan

21. The public transport strategy for the proposed development has been developed to integrate bus services through the site with public transport in the surrounding areas.
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- The main internal collector road passing through the site will be designed to cater for bus services. Pedestrian/cycle paths will be provided within the road reserve and through open space areas, linking to Forest Road and to future residential areas to the west of the site.
22. Parking will be provided in accordance with Council's parking code and RTA guidelines for residential development. Specific provisions will be determined at the time of development applications. For the retail centre, parking will also be provided in accordance with Council's parking code and RTA guidelines.
23. The internal road network will incorporate a logical hierarchy of road functions and appropriate design to prioritise and facilitate pedestrian and cycle activity. Roads within the site will be designed to promote a movement system that gives appropriate priority to walking, cycling, public transport and private car. Roads will be designed to cater for emergency vehicles, buses and service vehicles.
24. The internal circulation roads within the proposed development will be based on Council's Geometric Road Design Guide, with roads within the residential development based on two levels of streets (access streets and collector streets). On access streets the residential environment dominates. Traffic speeds and volumes are low and pedestrian/cycle movements encouraged. Vehicle speeds should, as far as possible, be controlled by street length, parked cars, landscaping design, built form and activity along the frontage. Bicycles are generally provided for on-street.
25. Collector streets collect traffic from access streets and generally carry higher traffic flows. A good level of residential amenity and safety is maintained by restricting traffic volumes and traffic speeds. Vehicle speeds on collector streets should be controlled by street alignment, parked cars, street lengths, intersection design and built form. Bicycles will be provided for in a mix of on-street and off-street facilities.
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Conclusion

26. Our transport and accessibility impact assessment has concluded that:-

- i) the proposed development will have minimal impact on the operation of the surrounding road network and its intersections, including the proposed access to the development, the signalised intersection with the approved hospital developments and the proposed intersection improvements at Forest Road/Huntley Road and Forest Road/Sharp Road. The surrounding road network and its intersections will be able to cater for the additional traffic at satisfactory traffic levels of service;
- ii) the proposed development would increase residential and employment densities and would therefore strengthen the demand for future expanded bus services through the area. This is consistent with government policy objectives to reduce private car travel and encourage public transport use;
- iii) parking provision will be provided in accordance with Council's code and RTA guidelines;
- iv) access arrangements and internal circulation roads will be provided in accordance with Australian Standards and Council's Geometric Road Design Guide;
- v) the director-general's requirements and RTA/Council matters raised during the consultation process have been addressed.

I. INTRODUCTION

- I.1 Colston Budd Hunt & Kafes Pty Ltd has been commissioned by State Property Authority to prepare the transport and accessibility impact assessment for the proposed residential development in South Orange. The site is located on the western side of Forest Road, some 3.5km south of the Orange town centre, as shown on Figure 1.
- I.2 The site forms part of land owned by the NSW Department of Primary Industries, which includes the Orange Agricultural Institute. The site is located on Forest Road and has been the subject of a State Significant Site investigation. The site has been rezoned to allow the development of land for urban residential and ancillary uses.
- I.3 It is proposed to retain part of the existing research station on a portion of the site and develop the remainder of the site for residential and ancillary uses. The proposed development is for subdivision of the site, with a concept plan for some 550 residential lots and a retail facility of some 3,500m². In addition, the northern parcel of the site could incorporate a development equivalent to a further 50 to 70 residential lots.
- I.4 The Director – Generals Environmental Assessment Requirements for the Concept Plan include:

“Transport & Accessibility Impacts – Including:

- provide a Transport & Accessibility Impact Assessment prepared in accordance with the RTA’s ‘Guide to Traffic Generating Developments’ and making reference to the ‘NSW Planning Guidelines for Walking and Cycling’ and the*

‘Integrating Land Use and Transport policy package’, considering the following issues:

- *adequacy of access arrangements to surrounding areas and consideration of the impacts on access for neighbouring sites;*
- *traffic generation including daily and peak traffic movements likely to be generated by the project and cumulatively at various stages of the development (taking into consideration the traffic likely to be generated from proposed and approved developments and predicted future growth); the impact on the safety and capacity of the surrounding road network and nearby intersections; and the need and provision of upgrade, road improvement works, or funding;*
- *road design, in accordance with Australian Standards, and demonstrating how the road layout design supports safe and efficient bus access in accordance with the ‘NSWTI Metropolitan Servicing Guidelines’;*
- *car parking (note: the Department supports reduced parking provision, if adequate public transport is available to access the site);*
- *measures to promote sustainable means of transport including public transport usage, pedestrian and bicycle linkages both within the site and to key destinations, and the potential for implementing a location specific sustainable travel plan;*
- *demonstrate how users of the development will be able to make travel choices that support the achievement of relevant State Plan targets;*

- *describe the existing pedestrian and cycle movements within the vicinity of the site and determine the adequacy of the proposal to meet the likely future demand for increased public transport and pedestrian and cycle access; and*
- *provide an assessment of the implications of the proposed development for non-car travel modes (including walking and cycling, and the provision and cost of public transport and supporting infrastructure)."*

1.5 This report has been prepared to address the Director General's Requirements. The report forms part of a concept plan application to the Department of Planning and has been prepared under Part 3A of the Environmental Planning and Assessment Act 1979. Our assessment is set down through the following chapters:-

- Chapter 2 – describing existing transport environment; and
- Chapter 3 – setting down the transport and accessibility impact assessment for the proposed development.

2 EXISTING TRANSPORT ENVIRONMENT

Site Location and Road Network

- 2.1 The site of the proposed development forms part of land owned by the NSW Department of Primary Industries, which includes the Orange Agricultural Institute. The site is located on Forest Road and forms part of the southern urban growth strategy for Orange.
- 2.2 The site is located some 3.5km south of the Orange town centre. Land uses in the vicinity of the site include existing agricultural research facilities, Orange Bloomfield Hospital, the TAFE, the proposed private hospital and supporting facilities. Construction has commenced on the Orange Base Hospital and Health Campus, located adjacent to the Bloomfield Hospital on the eastern side of Forest Road. Away from Forest Road, the land is predominantly undeveloped mixed farming and agricultural land.
- 2.3 The Orange to Broken Hill railway line is located to the north of the site. This railway line connects to the Main Western railway line which passes through Orange in a north-south direction. Several roads in the vicinity of the site cross these railway lines either by a rail overpass or a level crossing. The main rail crossing in the vicinity of the site is via the Forest Road and Peisley Street railway overpass.
- 2.4 The road network in the vicinity of the site includes Forest Road, Peisley Street, Huntley Road, Sharp Road and Anson Street. Forest Road (MR245) is located adjacent to the eastern boundary of the site and provides the main north-south road through South Orange. Adjacent to the site it provides an undivided rural road with one traffic lane in each direction. North of Sharp Road, it provides a 13

metre carriageway (kerb to kerb) with one traffic lane and one parking lane in each direction, clear of intersections.

- 2.5 Forest Road provides access to the adjacent TAFE facility, Bloomfield Hospital, Golf Course and Orange Agricultural Institute. Forest Road intersects with Sharp Road and Huntley Road at a staggered T-junction, with central concrete median separation on all legs of the intersection.
- 2.6 Peisley Street (MR245) combines with Forest Road to provide the main north-south connection to the Orange town centre and a railway overpass of the Orange to Broken Hill railway line. It generally provides an undivided road with one traffic lane and one parking lane in each direction, clear of intersections. The intersections of Peisley Street with Franklin Road and Summer Street are controlled by traffic signals.
- 2.7 Sharp Road is located to the north of the site and provides an east-west traffic route between Forest Road and Anson Street. Sharp Road combines with Anson Street to provide an alternative town centre access road and a through connection to areas in North and West Orange. Sharp Road and Anson Street generally provide two-way carriageways with one traffic lane in each direction and kerbside parking permitted clear of intersections. Sharp Road has a sweeping right angled intersection with Anson Street. West of Anson Street, Sharp Road is a 'No Through Road'.
- 2.8 Huntley Road provides access to the Orange industrial area and saleyards located on the eastern side of the Main Western railway line. It intersects with Ash Street at a level crossing on the eastern side of Sir Jack Brabham sports ground. Huntley Road provides an undivided road with one traffic lane and one parking lane in each direction, clear of intersections.

Traffic Flows

2.9 Traffic generated by the proposed development will have its greatest effects during weekday morning and afternoon peak periods. In order to gauge traffic conditions, counts were undertaken during these peak periods at the following intersections:-

- Forest Road/Huntley Road;
- Forest Road/Sharp Road;
- Forest Road/Bloomfield Hospital Access Road; and
- Forest Road/Agricultural Institute Access Road.

2.10 In addition to these counts, MWT have provided peak period traffic counts at the intersection of Summer Street and Peisley Street, undertaken in association with the Orange Base Hospital development and Orange Health Campus.

2.11 The results of the surveys are shown on Figures 2 and 3, and summarised in Table 2.1.

2.12 Table 2.1 shows that Summer Street and Peisley Street carried some 800 to 1150 vehicles per hour two-way during the morning peak hour period and some 1000 to 1550 vehicles per hour two-way during the afternoon peak hour period.

2.13 Traffic flows on Forest Road were some 350 to 650 vehicles per hour two-way during peak periods.

2.14 Huntley Road was found to carry morning and afternoon peak period traffic flows of some 400 to 550 vehicles per hour two-way. Traffic flows on Sharp Road were lower at some 250 to 400 vehicles per hour two-way.

- 2.15 Traffic flows on the Hospital Access Road were some 100 to 120 vehicles per hour two-way during peak periods. Flows on the Agricultural Institute Access Road during the same peak hour periods were some 15 vehicles per hour two-way.

Table 2.1 Existing Two-way (Sum of Both Directions) Peak Hour Traffic Flows		
Road/Location	Morning	Afternoon
Forest Road		
- north of Sharp Road	610	650
- south of Huntley Road	525	660
- north of Hospital Access Road	475	610
- north of Agricultural Institute Access Road	385	510
- south of Agricultural Institute Access Road	370	495
Peisley Street		
- north of Summer Street	810	1075
- south of Summer Street	1050	1400
Summer Street		
-east of Peisley Street	1145	1530
south of Summer Street	795	985
Huntley Road		
- east of Forest Road	435	515
Sharp Road		
- west of Forest Road	270	395
Hospital Access Road		
- east of Forest Road	100	110
Agricultural Institute Access Road		
- west of Forest Road	15	15

Intersection Operations

- 2.16 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figures 2 and 3 have been analysed using the SIDRA program.

2.17 SIDRA simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode
> 70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
> 70	=	"F"	Unsatisfactory and requires other control mode

- 2.18 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.
- 2.19 The SIDRA analysis found that the signalised intersection of Summer Street and Peisley Street is operating with average delays of less than 35 seconds per vehicle during the morning and afternoon peak periods. This represents a level of service C, which is a satisfactory level of service.
- 2.20 The unsignalised intersections of Forest Road with Huntley Road and Sharp Road are operating with average delays, for the movement with the highest average delay, of less than 20 seconds per vehicle during peak periods. This represents a level of service B, which is an acceptable level of intersection operation.
- 2.21 The existing hospital access and access to the Agricultural Institute on Forest Road are operating with average delay, for all movements through the intersections, of less than 15 seconds per vehicle during peak periods. This represents a level of service A/B, a good level of intersection operation.

Hospital Development

- 2.22 As previously discussed construction has commenced on the Orange Base Hospital and Health Campus, located on the eastern side of Forest Road, adjacent to the existing Bloomfield Hospital. The proposed private hospital and supporting facilities will be located on the western side of Forest Road and will share access
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with the new hospital development via a new signalized intersection.

2.23 The expected additional traffic generation of the Orange Base Hospital redevelopment and Orange Private Hospital on Forest Road is summarised below:-

□ from the August 2005 traffic report prepared by MWT, the expected peak hour additional traffic generation from the Orange Base Hospital will be:-

- 375 vehicles per hour during the morning peak period;
- 360 vehicles per hour during the afternoon peak period.

□ from the July 2008 traffic report prepared by John Coady Consulting, the expected peak hour traffic generation from the Orange Private Hospital will be:-

- 230 vehicles per hour during the morning peak period;
- 270 vehicles per hour during the afternoon peak period.

2.24 The hospital developments are therefore expected to generate an additional some 605 vehicles per hour two-way during the morning and some 630 vehicles per hour two-way during the afternoon peak periods.

2.25 The additional hospital traffic has been combined with existing peak period traffic on the road network, as shown on Figures 4 and 5. The intersections previously analysed have then been reanalysed using the SIDRA computer program to assess the base case (existing traffic plus hospital traffic) for the operation of the surrounding road network. The SIDRA analysis found the proposed signalised hospital access on Forest Road will operate with average delays of less than 20 seconds per vehicle during the morning and afternoon peak periods. This

represents a level of service B, which is a good level of intersection operation.

- 2.26 The signalised intersection of Summer Street and Peisley Street with the additional hospital traffic, will operate with average delays of less than 35 seconds per vehicle during peak periods. This represents a level of service C, a satisfactory level of service.
- 2.27 The remaining unsignalised intersections in the vicinity of the site, including the intersections of Forest Road with Huntley Road and Sharp Road, will operate with average delays, for the movement with the highest average delay, of less than 20 second per vehicle during peak periods. This represents a level of service B, which is an acceptable level of intersection operation.

Orange City Council's Proposed Roadworks

- 2.28 The Orange Structure Plan indicates a number of proposed roadworks to service the future development of South Orange. The proposed roadworks include:-
- proposed southern distributor road from Forest Road to intersect with extension of Woodward Street to the west. The intersection of southern distributor road and Forest Road will controlled by a roundabout;
 - continuation of the southern distributor roads across to Pinnacle Road and beyond;
 - upgrading of Woodward Street from Racecourse Road to the proposed southern distributor road.
- 2.29 Council has prepared a concept plan for the proposed southern distributor road from Elsham Avenue and Blowes Road through to Anson Street. A copy of

Council's plan is attached in Appendix A.

2.30 Council has advised that it has acquired the road corridors required for the works indicated on the Concept Plan. The works indicated on the concept plan include:-

- extension of Blowes Road from east of Elsham Avenue;
- closure of Elsham Avenue north of Blowes Road;
- extension of Edward Street to intersect with Blowes Road;
- the southern distributor road to cross the Main Western railway line at a major signalised railway crossing;
- realignment of the intersection of Huntley Road with Forest Road;
- construction of a roundabout at the intersection of the southern distributor road with Forest Road;
- construction of the southern distributor road between Forest Road and Anson Street;
- extension of Anson Street to intersect with the southern distributor road.

2.31 It should be noted that the construction of the southern distributor road will allow for a re-distribution of existing and future traffic generation for South Orange, particularly in relation to traffic accessing the Orange town centre via Anson Street rather than Forest Road and Peisley Street. However, Council has advised that the timing of construction of the southern distributor road and associated road works are not proposed in the next 10 years.

Public Transport

- 2.32 The nearest bus service is located to the north of the site, at the intersection of Forest Road and Tynan Street. Bus route 534 provides a convenient bus service between the town centre and Warrendine. This service is located some 2km north of the site.
- 2.33 The proposed development has been designed to allow future expanded bus services within Orange to access the site.

3 TRANSPORT AND ACCESSIBILITY IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT

3.1 The proposed development includes some 550 residential lots plus a retail centre. Access to the site will be provided from Forest Road with opportunities to link into the land to the west in the future. A concept layout for the proposed development is shown on Figure 6. In addition, the northern parcel of the site could incorporate a development equivalent to a further 50 to 70 residential lots. The northern parcel of the site will have separate access onto Forest Road, with no internal connection to the balance of the site.

3.2 This chapter examines the implications of the proposed development through the following sections:-

- public transport;
- parking provision;
- access and internal circulation;
- pedestrian and cycle network;
- traffic generation and effects;
- Director-General's requirements; and
- summary.

Public Transport

3.3 As previously discussed in Chapter 2, the nearest bus services are located to the north of the site, at the intersection of Forest Road and Tynan Street. The proposed development has been designed to allow future expanded bus services within Orange to access the site. These bus services would provide a good level of public transport to surrounding development in the area (including the Orange Base

Hospital redevelopment currently under construction, the Orange Private Hospital and the proposed development).

- 3.4 The public transport strategy for the proposed development has been developed to allow bus services through the site. The main internal circulation roads passing through the site will be designed to cater for bus services.
- 3.5 The public transport strategy will be provided in accordance with the following design objectives:-
- enable access for integrated bus routes which achieve a high proportion of dwellings within 400 metres of a bus stop;
 - improving the choice of travel and reducing dependence solely on cars for travel purposes;
 - improve accessibility to employment and services by walking, cycling and public transport;
 - moderate the growth in the demand for travel and the distances travelled, especially by car; and
 - support the efficient and viable operation of public transport services.
- 3.6 Pedestrian/cycle paths will be provided within the road reserve and through open space areas, linking to Forest Road and to future residential areas to the west of the site.

- 3.7 The proposed development will increase residential and employment densities and would therefore strengthen the demand for future expanded bus services through the area.
- 3.8 This is consistent with government policy and planning principles which aim to ensure that urban structure, building forms, land use locations, development designs, subdivision locations and street layout help achieve the following planning objectives:
- (a) improving accessibility to housing, employment and services by walking, cycling, and public transport;
 - (b) improving the choice of transport and reducing dependence solely on cars for travel purposes;
 - (c) moderating growth in the demand for travel and the distances travelled, especially by car; and
 - (d) supporting the efficient and viable operation of public transport services.

Parking Provision

- 3.9 Parking will be provided in accordance with Council's parking code and RTA guidelines for residential development. Specific provisions will be determined at the time of development applications.
- 3.10 For the retail centre, parking will also be provided in accordance with Council's parking code and RTA guidelines.

Access and Internal Circulation

- 3.11 Vehicular access to the proposed development is proposed to be provided via a new seagull intersection on Forest Road. The intersection will be located some 450 metres south of the proposed traffic signal controlled intersection, which will provide access to the Orange Base Hospital (eastern side) and Orange Private Hospital (western side). A second possible access will be provided to link into future residential development to the west.
- 3.12 The northern parcel of the site will have separate access onto Forest Road, with no internal connection to the balance of the site.
- 3.13 The proposed access arrangements are considered appropriate and will be designed in accordance with Australian Standards and Austroads design requirements.
- 3.14 The internal road network, as shown on Figure 6, incorporates a logical hierarchy of road functions and appropriate design to prioritise and facilitate pedestrian and cycle activity. Roads within the site will be designed to promote a movement system that gives appropriate priority to walking, cycling, public transport and private car. Roads will be designed to cater for emergency vehicles, buses and service vehicles.
- 3.15 The retail centre will be located at the entry to the site off Forest Road, where the principal internal circulation roads intersect. This will minimise the number of access points along Forest Road and reduce traffic generation by allowing residents to combine trips.
- 3.16 The internal circulation roads within the proposed development will be based on Council's Geometric Road Design Guide, with roads within the residential development based on two levels of streets (local streets and distributor streets).

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- 3.17 On local streets the residential environment dominates. Traffic speeds and volumes are low and pedestrian/cycle movements encouraged. Vehicle speeds should, as far as possible, be controlled by street length, parked cars, landscaping design, built form and activity along the frontage. Bicycles are generally provided for on-street.
- 3.18 Distributor streets collect traffic from local streets and generally carry higher traffic flows. A good level of residential amenity and safety is maintained by restricting traffic volumes and traffic speeds. Vehicle speeds on distributor streets should be controlled by street alignment, parked cars, street lengths, intersection design and built form. Bicycles will be provided for in a mix of on-street and off-street facilities.
- 3.19 The proposed road hierarchy provides a framework for the promotion of alternative travel modes to private car (in particular providing appropriate access for public transport and designing the road network to incorporate convenient pedestrian and cyclist facilities). Roads within the proposed development will incorporate the following characteristics:-
- Interdistrict Road
 - two traffic lanes (one in each direction);
 - on-street parking provided within kerbside parking lane;
 - 22 metre road reserve with a 13metre carriageway width;
 - generally provide pedestrian foot[paths on both sides of the road; and
 - cyclists to be provided for on-street.
 - Local Distributor Street
 - two traffic lanes (one in each direction);
 - on-street parking provided within kerbside parking lane;
 - 20 metre road reserve with an 11 metre carriageway width;
 - generally provide pedestrian footpaths on both sides of the road; and
 - cyclists to be provided for on-street.
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- Local Street
 - two traffic lanes (one in each direction);
 - 18 metre road reserve with a 9 metre carriageway width;
 - on-street parking permitted;
 - generally provide pedestrian footpath on one side of the road; and
 - cyclists to be provided for on-street.

- Local Street (Edge Street)
 - two traffic lanes (one in each direction);
 - 14 metre road reserve with a 9 metre carriageway width;
 - verge widths of 4.5 metres on one side and 0.5 metres on other side;
 - pedestrian footpath on one side of the road; and
 - cyclists to be provided for on-street.

3.20 The internal road network will be designed to accommodate the swept paths of service vehicles, including removal trucks, garbage trucks, delivery vans and buses. The proposed layout will provide for an efficient subdivision pattern and a low speed environment in accordance with Council's road design requirements.

Pedestrian and Cycle Network

3.21 The pedestrian and cycle network through the proposed residential subdivision will be based on the following principles:-

- provide convenient access and connections to local shops, parks, amenities and community areas, both within and external to the site;

- provide convenient access to future adjacent residential areas located to the west;

- integrate the pedestrian and cycle network with open space areas; and
 - provide adequate on-road and off-road cycle facilities.
- 3.22 The residential subdivision will incorporate a series of pedestrian paths through the site. Primary and secondary pedestrian movements will be developed. Primary routes provided along the main collector roads passing through the site. Secondary pedestrian routes will be developed adjacent to the proposed access roads and through open space areas, linking the various residential precincts to destination zones within the site.
- 3.23 Pedestrian and cycle facilities will be developed to encourage walking and cycling for both destination and recreational movements. The pedestrian and cycle network will be integrated with existing topography to encourage the use of the network when accessing the open space and public transport routes.
- 3.24 The cycle network will provide links to Forest Road and will include a mix of on-road and off-road facilities. Off-road facilities will include dedicated cycle paths and shared pedestrian/cycle paths.

Traffic Generation and Effects

- 3.25 During the preparation of this report a meeting was held with Roads and Traffic Authority officers (Fiona Francis of Western Region RTA, on Wednesday 21 April 2010) and discussions held with Council staff (Allen Renike in May 2010). Matters raised for consideration were as follows:-
- proposed main site access to provide a seagull treatment on Forest Road;
 - northern parcel of the site will have a separate access onto Forest Road;
-

- assessment of the cumulative impact of the proposed development and the public and private hospitals;
- proposed roadworks in the vicinity of the site, including the southern distributor road;
- an assessment of traffic volumes likely to be generated through intersections along Forest Road and Peisley Street to the north of the site.

3.26 The traffic generated by the proposed development will have its greatest effects during the morning and afternoon peak periods when it combines with traffic on the surrounding road network. Estimates of the traffic generated by the proposed development have been based on generation rates developed by the RTA.

3.27 For residential development, the RTA guidelines suggest a daily traffic generation of 9 vehicles per day two-way per dwelling and a peak hour traffic generation of 0.85 vehicles per hour two-way per dwelling during the morning and afternoon peak periods. We note that not all trips are external trips. As a guide the RTA suggests that up to 25% of trips can be internal to a major subdivision.

3.28 Application of these rates to the proposed main residential component of the development results in a traffic generation of some 470 vehicles per hour two-way during the morning and afternoon peak periods. Up to 120 of these trips would be contained within the subdivision. The northern portion of the site will generate a further 40 to 60 vehicles per hour two-way during peak periods, with no internal connection to the balance of the site.

3.29 In regards to the retail centre, the RTA guidelines formula for Thursday afternoon gives generation rates of 4.6 and 15.5 vehicles per hour 100m² two-way for specialty shops and supermarkets respectively. Based on a supermarket of 2,500m² and

specialty shops of 1,000m², the proposed retail facility would generate some 430 vehicles per hour two-way during peak periods. A proportion of this traffic would be passing trade or shared trips (vehicles on Forest Road passing the centre or residents from the proposed residential development). For the purpose of our assessment we have adopted an additional external traffic generation of some 150 vehicles per hour two-way during the afternoon peak period. Thus the additional traffic generated by the proposed development will be some 560 vehicles per hour two-way during the afternoon. During the morning, the retail generation would be about half the afternoon generation. The additional total generation would be some 480 vehicles per hour two-way during the morning peak period.

- 3.30 It should be noted, some people working or visiting the hospital would use the retail facility. Some people living in the residential development would also work at the hospitals.
- 3.31 Some 70% of the residential traffic would be expected to be outbound during the morning. The reverse would apply during the afternoon. In regards to the retail trips, the traffic would be some 50% in and 50% out.
- 3.32 The additional development traffic during the morning and afternoon peak periods was assigned to the road network. The base case traffic flows plus development traffic are shown on Figures 4 and 5 and summarised in Table 3.1.
- 3.33 It can be seen from Table 3.1 that the proposed development will increase peak period traffic flows on Forest Road by some 240 to 440 vehicles per hour two-way north of the site and by some 50 to 60 vehicles per hour two-way south of the site.
- 3.34 Increases on Peisley Street and Summer Street will be some 80 to 180 vehicles per hour two-way during peak periods. Increases on Huntley Road and Sharp Road will be less at some 50 to 110 vehicles per hour two-way during peak periods.
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Table 3.1 Base Two-Way (Sum of Both Directions) Peak Hour Traffic Flows Plus Development Traffic				
Road/Location	Morning		Afternoon	
	Base Traffic	Plus Development	Base Traffic	Plus Development
Forest Road				
- north of Sharp Road	980	+265	101	+295
- south of Huntley Road	1070	+385	1220	+495
- north of New Hospital Access Road	1020	+385	1170	+495
- north of Site Access Road	-	+385	-	+495
- north of Agricultural Institute Access Road	450	+55	580	+65
- south of Agricultural Institute Access Road	435	+55	565	+65
Peisley Street				
- north of Summer Street	970	+80	1225	+90
- south of Summer Street	1370	+160	1700	+180
Summer Street				
- east of Peisley Street	1305	+80	1680	+90
- west of Peisley Street	795	-	985	-
Huntley Road				
- east of Forest Road	505	+65	595	+75
Sharp Road				
- west of Forest Road	375	+105	515	+125
Hospital Access Road				
- east of Forest Road	480	-	470	-
Private Hospital Access Road				
- west of Forest Road	230	-	270	-
Northern Site Access Road				
- west of Forest Road	-	+60	-	+60
Site Access Road				
- west of Forest Road	-	+530	-	+700
Agricultural Institute Access Road				
- west of Forest Road	15	-	15	-

- 3.35 The intersections previously analysed in Chapter 2 have been reanalysed with the SIDRA computer program for the base traffic flows plus additional development traffic, as shown in Figures 4 and 5.
- 3.36 The SIDRA analysis found that the signalised intersection of Summer Street and Peisley Street, for the base traffic flows plus development traffic, will continue to operate at a level of service C during the morning and afternoon peak periods. The intersection will operate with average delays of less than 40 seconds per vehicle during peak periods. This represents a level of service C, which is a satisfactory level of intersection operation.
- 3.37 The proposed new hospital access on Forest Road will operate with average delays of less than 25 seconds per vehicle during morning and afternoon peak periods. This represents a level of service B, which is a good level of intersection operation.
- 3.38 In association with the proposed development and prior to the construction of the southern distributor road, it is proposed to upgrade the intersections of Forest Road with Huntley Road and Sharp Road. The proposed intersection upgrading will incorporate the widening of Forest Road to provide two northbound and two southbound traffic lanes on approach to the intersections. Incorporating the proposed road widening, the unsignalised intersections of Forest Road with Huntley Road and Sharp Road will operate at level of service B during peak periods. The intersections will operate with average delays, for the movement with the highest average delay, of less than 20 seconds per vehicle during peak periods. This represents an acceptable level of intersection operation.
- 3.39 The proposed seagull controlled site access and the northern site access onto Forest Road will both operate with average delays, for the movement with the highest average delay, of less than 20 seconds per vehicle during the morning and afternoon

peak periods. This represents a level of service B, which is an acceptable level of intersection operation.

- 3.40 In summary, the traffic assessment found that the proposed development will have minimal impact on the operation of the surrounding road network and its intersections, including the proposed access arrangements to the development, the signalised intersection of Forest Road with the approved hospital developments and the proposed intersection improvements at Forest Road/Huntley Road and Forest Road/Sharp Road. The surrounding road network and its intersections will be able to cater for the additional development traffic at satisfactory traffic levels of service.

Director – General’s Requirements

- *provide a Transport & Accessibility Impact Assessment prepared in accordance with the RTA’s ‘Guide to Traffic Generating Developments’ and making reference to the ‘NSW Planning Guidelines for Walking and Cycling’ and the ‘Integrating Land Use and Transport policy package’;*
- 3.41 This report has been prepared with reference to the RTA’s “Guide to Traffic Generating Developments”. The traffic generation and its effects are discussed in paragraphs 3.25 to 3.40. Matter relating to pedestrians and cyclists are discussed in paragraphs 3.21 to 3.24. Public transport and matters relating to integrated land use and government transport policy are discussed in paragraphs 3.3 to 3.8.
- *adequacy of access arrangements to surrounding areas and consideration of the impacts on access for neighbouring sites;*

3.42 Access and internal circulation for the proposed development are discussed in paragraphs 3.11 to 3.20. The traffic impacts for neighbouring sites are discussed in paragraphs 3.36 to 3.40.

- *traffic generation including daily and peak traffic movements likely to be generated by the project and cumulatively at various stages of the development (taking into consideration the traffic likely to be generated from proposed and approved developments and predicted future growth); the impact on the safety and capacity of the surrounding road network and nearby intersections; and the need and provision of upgrade, road improvement works, or funding;*

3.43 The traffic generation and its effects on the surrounding road network, including future traffic growth resulting from the Orange Base Hospital development and the Orange Private Hospital, are discussed in paragraphs 3.25 to 3.40.

- *road design, in accordance with Australian Standards, and demonstrating how the road layout design supports safe and efficient bus access in accordance with the 'NSWTI Metropolitan Servicing Guidelines';*

3.44 The internal circulation roads within the proposed development will be designed in accordance with the Australian Standards and Council's Geometric Road Design Guide. Roads will be designed to promote a movement system that gives appropriate priority to walking, cycling, public transport and private car. Roads will be designed to cater for buses, emergency vehicles and service vehicles.

- *car parking (note: the Department supports reduced parking provision, if adequate public transport is available to access the site);*

3.45 Parking provision is discussed in paragraphs 3.9 to 3.10.

- *measures to promote sustainable means of transport including public transport usage, pedestrian and bicycle linkages both within the site and to key destinations, and the potential for implementing a location specific sustainable travel plan;*
- 3.46 Measures to promote a sustainable public transport strategy for the proposed development are discussed in paragraphs 3.3 to 3.8. The proposed pedestrian and cycle strategy for the development are discussed in paragraphs 3.21 to 3.24.
- *demonstrate how users of the development will be able to make travel choices that support the achievement of relevant State Plan targets;*
- 3.47 The location of the proposed residential component of the development, close to the hospital and retail centre will moderate the growth in demand for travel and the distances travelled, especially by car. People would have the ability to travel by walking, cycling or by use of public transport.
- 3.48 The proposed development has been designed to allow future expanded bus services within Orange to access the site. These bus services would provide a good level of public transport to surrounding development in the area (including the Orange Base Hospital redevelopment currently under construction, the Orange Private Hospital and the proposed development). This will improve travel choice, supporting government policy and good planning principles.
- *describe the existing pedestrian and cycle movements within the vicinity of the site and determine the adequacy of the proposal to meet the likely future demand for increased public transport and pedestrian and cycle access;*
- 3.49 The proposed pedestrian and cycle strategy for the proposed development is described in paragraphs 3.21 to 3.24. Public transport aspects of the development are discussed in paragraphs 3.3 to 3.8.
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- *provide an assessment of the implications of the proposed development for non-car travel modes (including walking and cycling, and the provision and cost of public transport and supporting infrastructure);*

3.50 These matters are discussed in paragraphs 3.3 to 3.8 and 3.47 to 3.49.

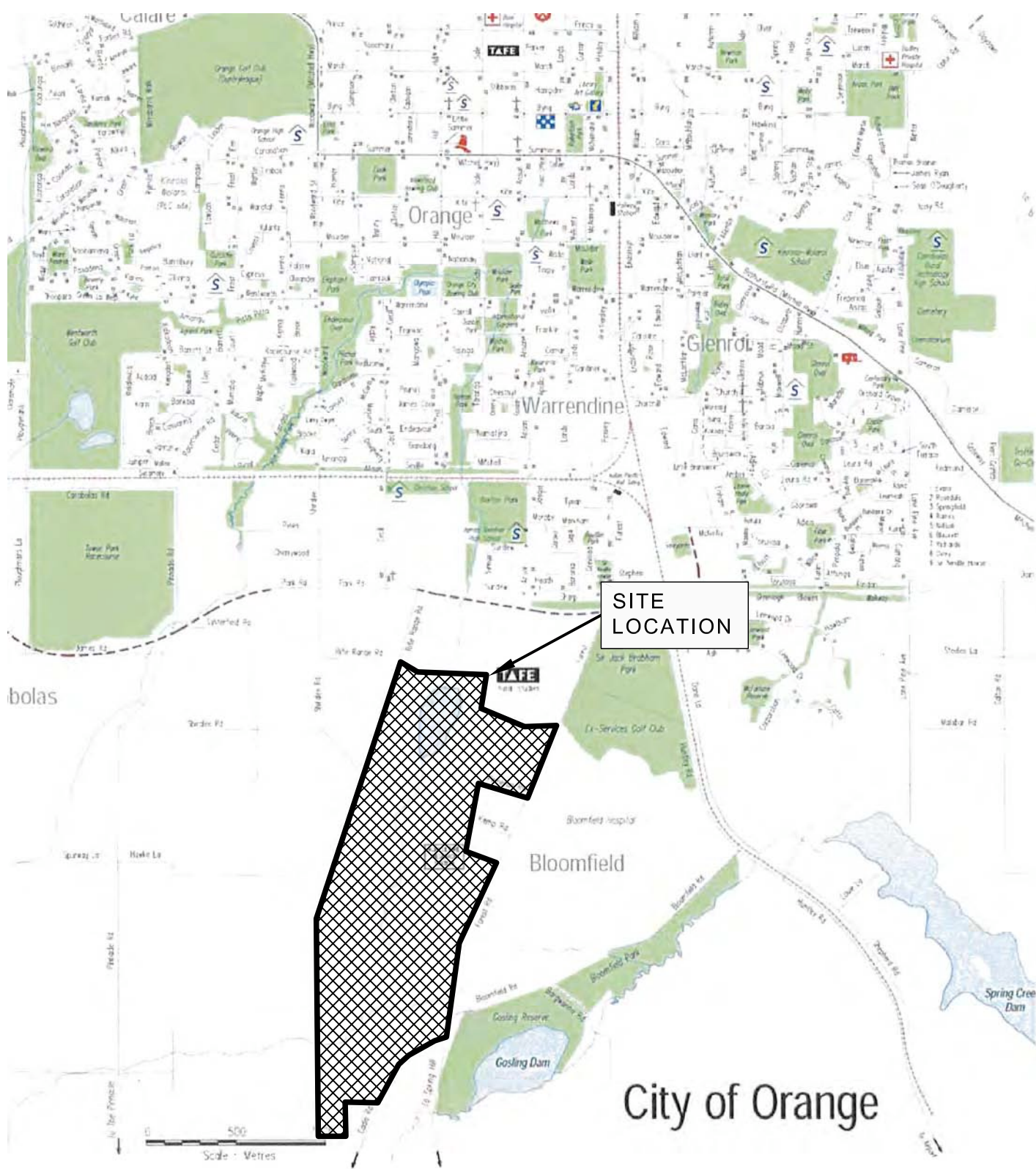
Summary

3.51 In summary, the main points relating to the transport and accessibility impact assessment for the proposed development are as follows:-

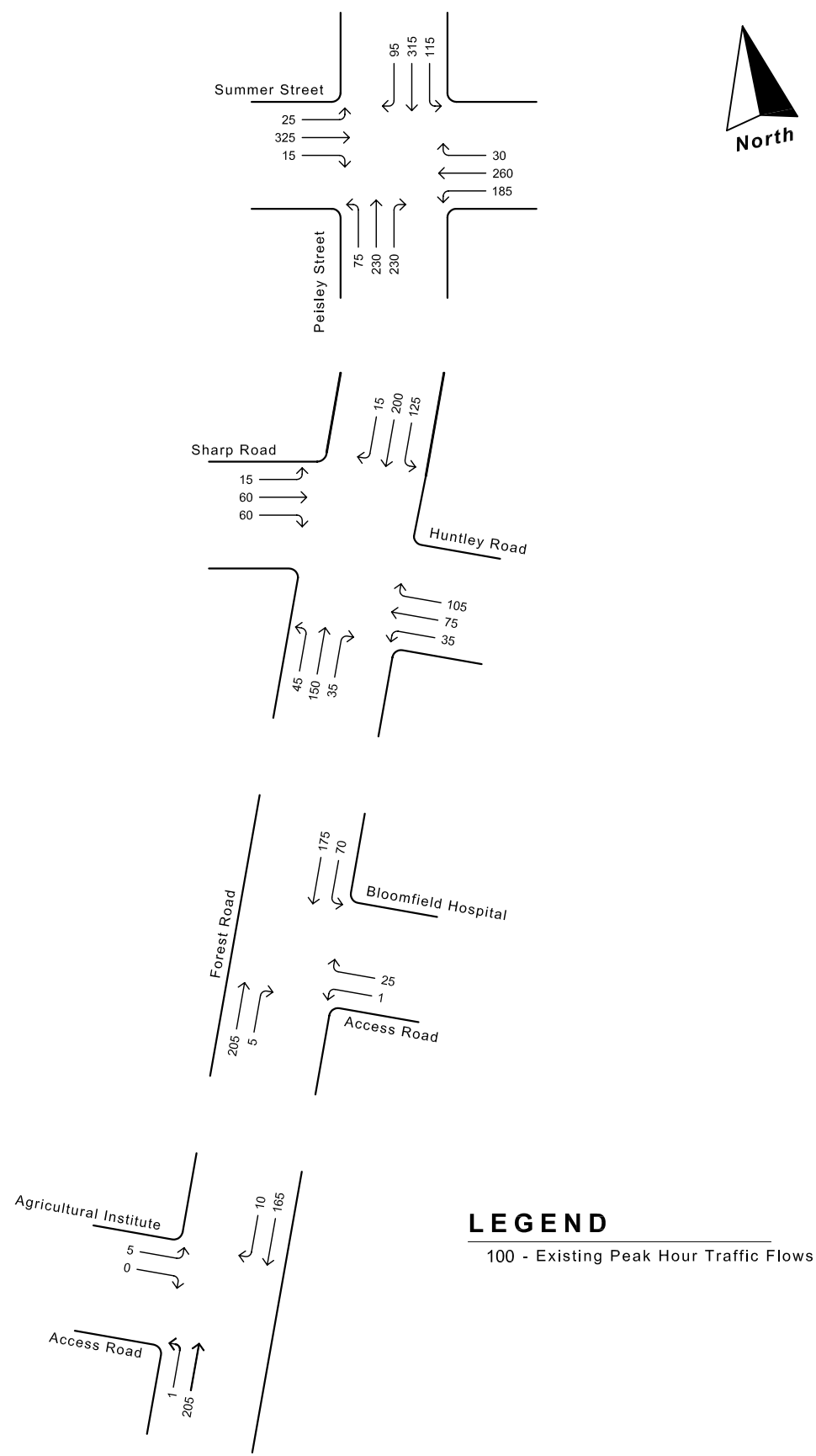
- vi) the proposed development includes some 550 residential lots and a retail centre of some 3,500m². In addition, the northern parcel of the site could incorporate a development equivalent to a further 50 to 70 residential lots. The northern parcel of the site will have separate access onto Forest Road, with no internal connection to the balance of the site;
- vii) the proposed development will increase residential and employment densities and would therefore strengthen the demand for future expanded bus services through the area. This is consistent with government policy objectives to reduce private car travel and encourage public transport use;
- viii) parking provision will be provided in accordance with Council's code;
- ix) access arrangements and internal circulation roads will be provided in accordance with Australian Standards and Council's Geometric Road Design Guide;
- x) the traffic assessment found that the proposed development will have minimal impact on the operation of the surrounding road network and its intersections,

including the proposed access arrangements to the development, the signalised intersection of Forest Road with the approved hospital developments and the proposed intersection improvements at Forest Road/Huntley Road and Forest Road/Sharp Road;

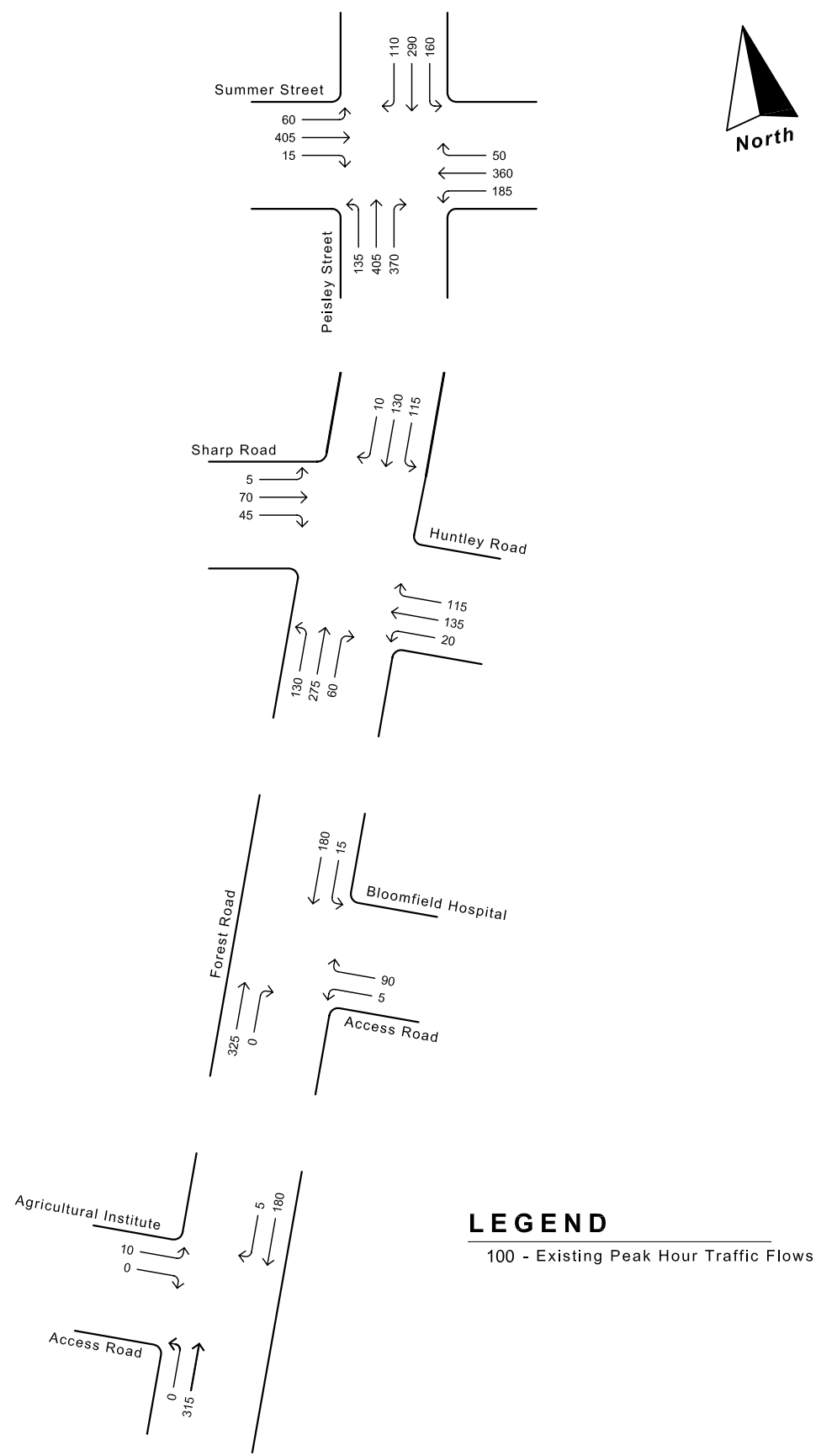
- xi) the surrounding road network and its intersections will be able to cater for the additional development traffic at satisfactory traffic levels of service; and
- xii) the director-general's requirements are discussed in paragraphs 3.41 to 3.50.



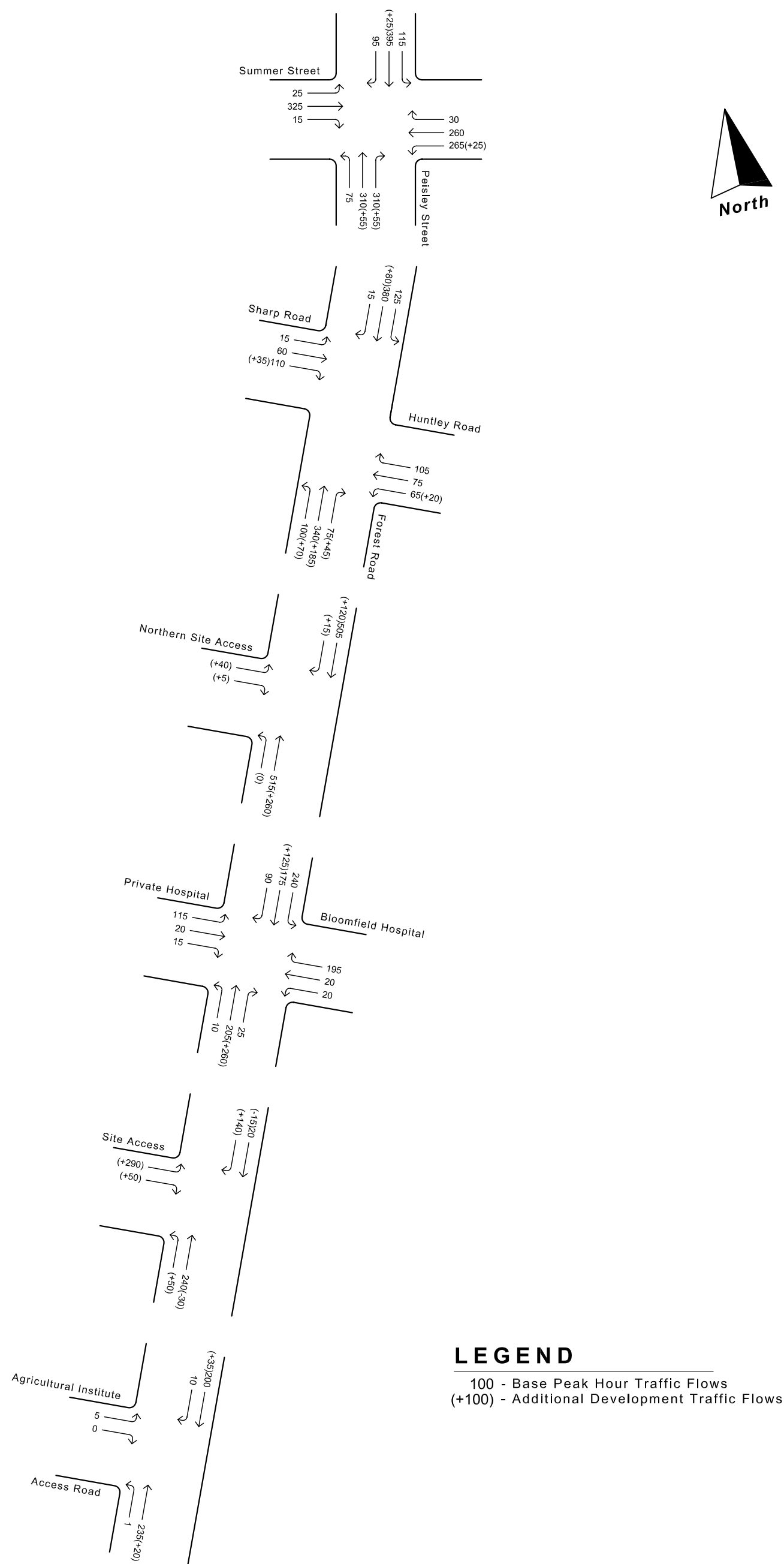
Location Plan



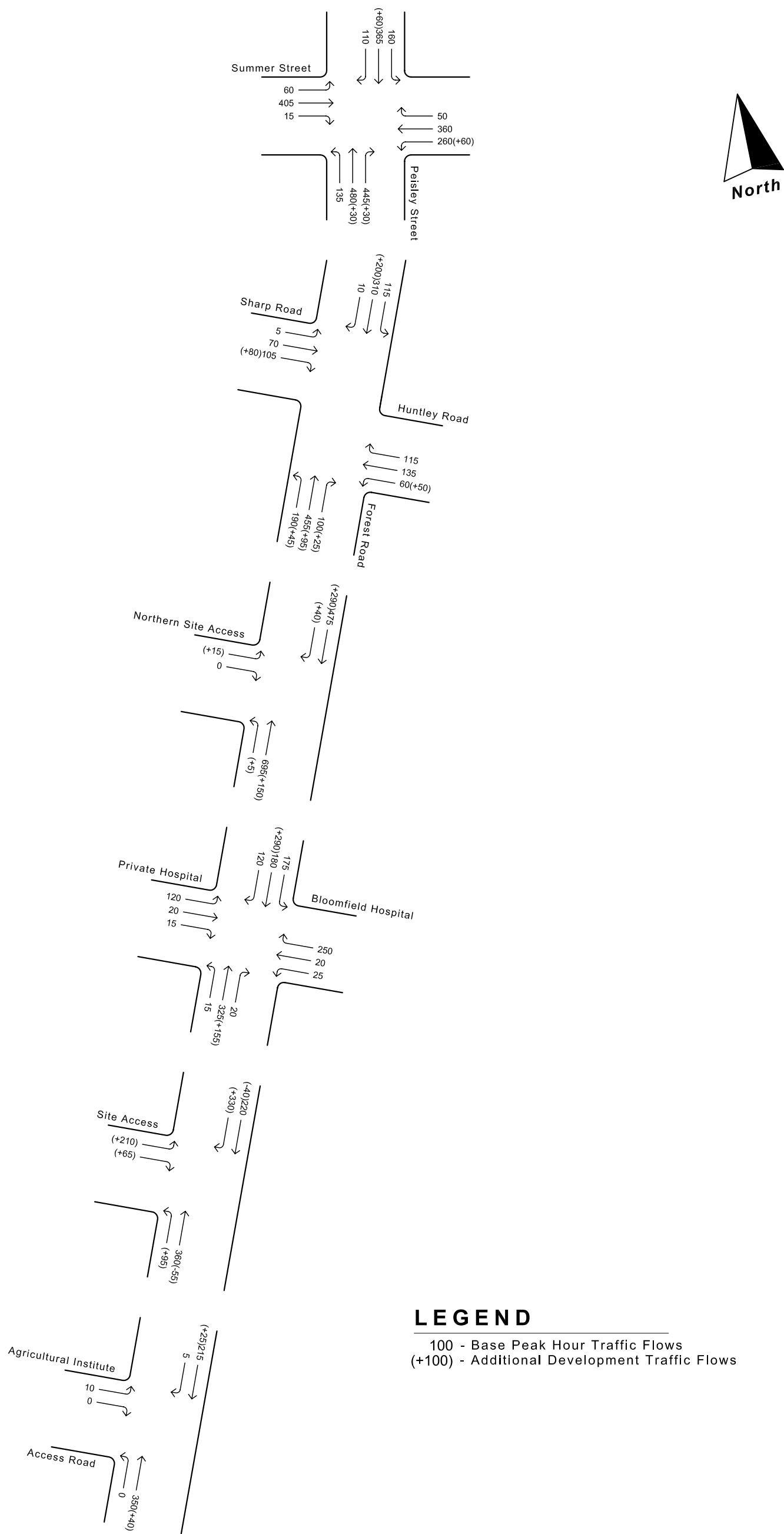
Existing morning peak hour traffic flows



Existing afternoon peak hour traffic flows



Base Morning peak hour traffic flows
plus development traffic



Base Afternoon peak hour traffic flows plus development traffic

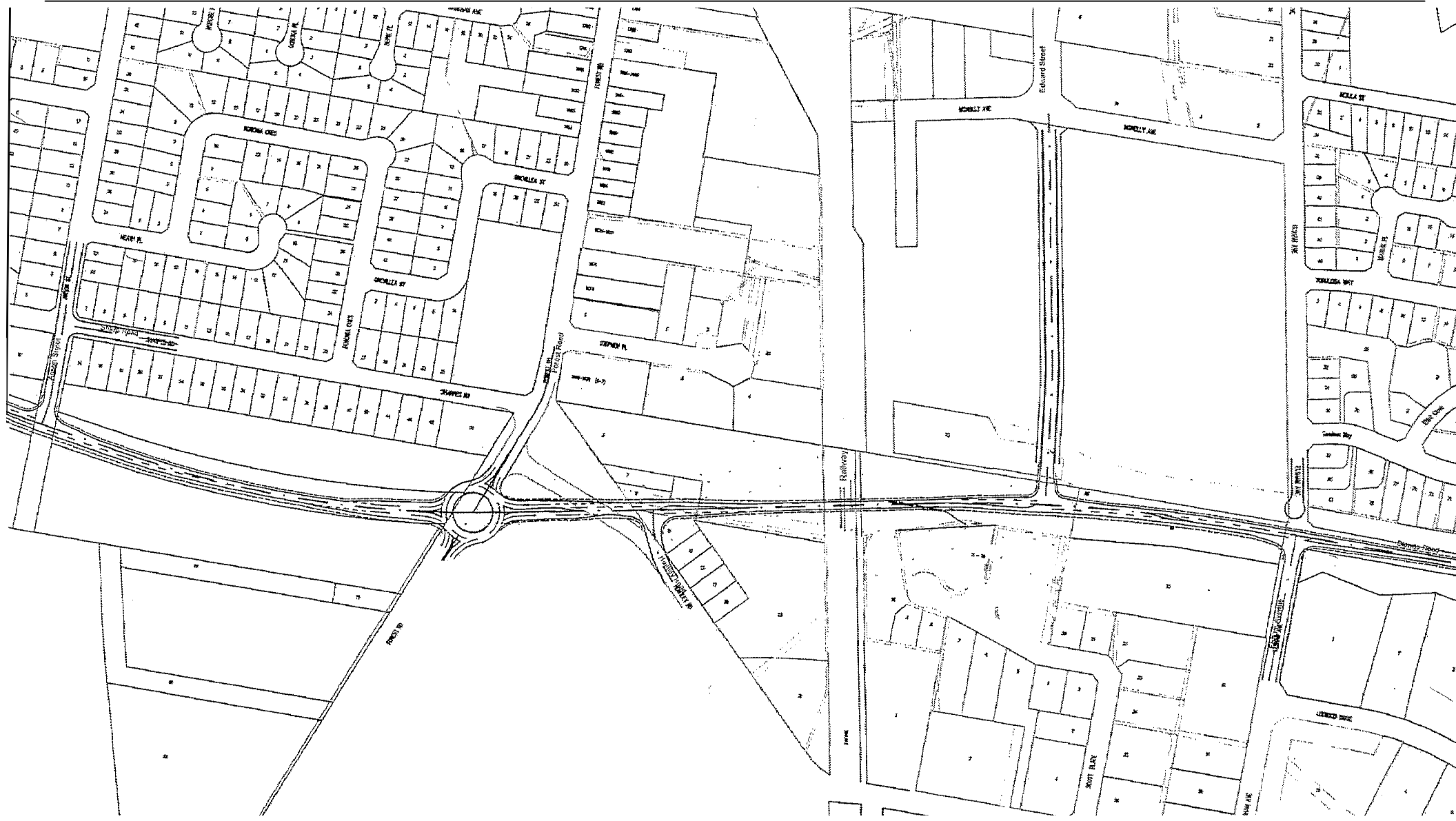


Concept Plan

APPENDIX A

PROPOSED SOUTHERN DISTRIBUTOR ROAD

ELSHAM AVENUE TO ANSON STREET CONCEPT PLAN



Proposed Southern Distributor Road Concept Plan

threatened species, Blue-billed Duck and Freckled Duck, of which the former is likely to have used the area for breeding. The forest remnants have a breeding population of Superb Parrots, which are also listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*. It is therefore recommended that the areas supporting these threatened species should be excluded from any proposed residential or commercial development. However, provided no other alternatives are available, an access road through the woodland to the northern parts of the residential development area may not have a significant impact, if carefully designed and placed. Recommended boundaries for the proposed reserved areas are shown on Figure 1. Any development of the site should incorporate the protection of these features as an integral part of the planning. Because the prime concern should be the protection of biodiversity, recreational use of the area should be passive and low key. In particular, the wetland area should not be accessible to the public or to dogs, although a discrete bird hide could be accommodated.

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