NATURE COAST DEVELOPMENTS
PTY LIMITED

TRANSPORT IMPACT STUDY FOR PROPOSED RESIDENTIAL SUBDIVISION, ROSEDALE

AUGUST 2007

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EXECUTIVE SUMMARY

Colston Budd Hunt & Kafes Pty Ltd has been commissioned by Nature Coast Development Pty Limited to prepare a report examining the transport implications of a proposed 806 residential lot subdivision at Rosedale on the New South Wales south coast. The site is located on the western and northern sides of George Bass Drive, between the townships of Rosedale and Tomakin, as shown on Figure 1.

The site forms part of the Rosedale Urban Expansion Area, which has been identified for residential subdivision to enable a range of dwelling type within the estate. The subdivision will incorporate residential development ranging from residential villas to large rural lots, community facilities and provisions for open space and the natural environment

The proposed residential subdivision has been developed with consideration to integrating bus services through the site with public transport in the surrounding area. The main internal collector road passing through the site has been designed to cater for future potential bus services.

Vehicular access to the residential subdivision is proposed to be provided at two locations off George Bass Drive. These access points will be connected via an internal circulation road passing through the site. Seagull intersection treatments will be provided at both access points onto George Bass Drive. The proposed arrangements are shown on plans prepared by Candalepas Associates and incorporate storage lanes for right turning vehicles at both locations.

The internal circulation roads within the proposed residential subdivision have been based on AMCORD guidelines and Council's road design requirements. The proposed arrangements, subject to detailed design, are considered appropriate and should provide for an efficient subdivision pattern and a low speed environment.

The residential subdivision will incorporate a series of pedestrian and cycle paths/facilities through the site. These 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 through the area.

The proposed development will have a peak period traffic generation of some 450 to 550 vehicles per hour two-way during peak periods. The surrounding road network, incorporating the proposed "seagull" controlled access points onto George Bass Drive, will be able to cater for the future traffic growth including traffic from the proposed development.

1. INTRODUCTION

1.1 Colston Budd Hunt & Kafes Pty Ltd has been commissioned by Nature Coast Developments Pty Limited to prepare a report examining the transport implications of a proposed 806 residential lot subdivision at Rosedale on the New South Wales south coast. The site is located on the western and northern sides of George Bass Drive, between the townships of Rosedale and Tomakin, as shown on Figure 1.

1.2 The site forms part of the Rosedale Urban Expansion Area, which has been identified for residential subdivision to enable a range of dwelling type within the estate. The subdivision will incorporate residential development ranging from residential villas to large rural lots, community facilities and provisions for open space and the natural environment.

1.3 The report forms part of an overall Masterplan document for a Part 3(a) application to the Department of Planning. The findings of the transport assessment of the proposed development are set down through the following chapters:-

- Chapter 2 - describing the existing conditions; and
- Chapter 3 - assessing the transport implications of the proposed development.

2. EXISTING CONDITIONS

Site Location and Road Network

2.1. The site of the proposed residential subdivision forms part of the Rosedale Urban Expansion Area, which has been identified for residential development. The site is located south of Batemans Bay, between the townships of Rosedale and Tomakin on the New South Wales south coast. It is located on the western and northern sides of George Bass Drive, as shown on Figure 1.

2.2. The site is occupied by undeveloped rural properties and steep bushland. The total site area is approximately 190 hectares and incorporates an area of SEPP 14 Wetlands within the southern part of the site. Access to the site is provided to/from George Bass Drive via two access points. The northern access is via Bevian Road and the southern access is via the continuation of Bevian Road through the site located adjacent to the SEPP 14 Wetlands.

2.3. A residential and tourist development at Barlings Beach, to the south of the site, has been approved by Eurobodalla Council. Access to the new development will be provided via a new intersection onto George Bass Drive.

2.4. The road network in the vicinity of the site includes George Bass Drive, Tomakin Road, Rosedale Parade and Bevian Road. George Bass Drive is located to the east and south of the site. It provides a rural style coastal road which forms part of a route connecting Batemans Bay in the north with Moruya in the south. George Bass Drive provides an alternative north-south route to that of the Princes Highway, which is the major transport route along the New South Wales south coast.

2.5. In the vicinity of the site, George Bass Drive generally provides one traffic lane in each direction with sealed shoulders. It provides an 80km/hr speed restriction through Rosedale and northwards to Batemans Bay. South of Rosedale, George Bass Drive provides a 100km/hr speed environment.

2.6. The section of George Bass Drive in the vicinity of the northern Bevian Road intersection has been the subject of recent realignment and upgrading. The northern intersection of George Bass Drive with Bevian Road is an unsignalised T junction.

2.7. Tomakin Road is located to the south-west of the site and provides an east-west undivided carriageway between the Princes Highway at Mogo to George Bass Drive. It provides one traffic lane in each direction, clear of intersections. Tomakin Road intersects with the Princes Highway and George Bass Drive at unsignalised T junctions. It is understood that Council intend to upgrade the intersection of George Bass Drive and Tomakin Road to a possible roundabout controlled intersection.

2.8. Rosedale Parade is located to the east of the site and provides a local access road connecting the township of Rosedale to George Bass Drive. It provides an undivided carriageway with one traffic lane and one parking lane in each direction, clear of intersections.

2.9. Bevian Road is located to the north-east of the site and currently provides an unsealed road servicing rural properties to the north. It is proposed to upgrade Bevian Road to provide the main northern access road accessing the proposed development. Bevian Road, at George Bass Drive provides one traffic lane in each direction.

Consultation Process

2.10. During the preparation of this report, meetings were held with Eurobodalla Council (20 October 2006) and the Roads and Traffic Authority South Coast Regional office (4 May 2007). The issues raised for consideration are addressed through the report and were as follows:-

- potential for an upgraded intersection on George Bass Drive, providing the southern access to the site;
- the proximity of the southern access on George Bass Drive with that of the proposed access to the Barlings Beach development;
- possible reduction in speed limit on George Bass Drive (southern section) to 80km/hr;
- proposed seagull treatments on George Bass Drive at Bevian Road at both the northern and southern access points to the site;
- an assessment of traffic volumes likely to be generated through the intersections of Princes Highway with Broulee Road at Moruya and with Tomakin Road at Mogo during the weekday morning and afternoon peak periods.

Traffic Flows

2.11 In order to gauge traffic conditions, counts were undertaken during the weekday morning and afternoon periods at the following intersections:-

- George Bass Drive/Bevian Road;
- George Bass Drive/Rosedale Parade;
- George Bass Drive/Tomakin Road.

2.12 In accordance with the Roads and Traffic Authority's request, traffic counts were also undertaken at the intersections of the Princes Highway with Broulee Road at Moruya and with Tomakin Road at Mogo.

2.13 The results of these counts are shown on Figures 2 and 3 and summarised in Table 2.1.

Table 2.1: Existing Peak Hour Two-Way (Sum of Both Directions) Traffic Flows

Location	Morning	Afternoon
Princes Highway		
- north of Tomakin Road	630	685
- south of Tomakin Road	475	560
- north of Broulee Road	695	670
- south of Broulee Road	945	930
George Bass Drive		
- north of Bevian Road	310	280
- north of Rosedale Parade	320	280
- south of Rosedale Parade	315	290
- north of Tomakin Road	350	490
- south of Tomakin Road	405	515
Broulee Road		
- east of Princes Highway	290	300
Tomakin Road		
- east of Princes Highway	245	225
- west of George Bass Drive	195	185
Rosedale Parade		
- east of George Bass Drive	55	50
Bevian Road		
- west of George Bass Drive	20	20

2.14 Table 2.1 shows that the Princes Highway carried the heaviest traffic flows of some 475 to 950 vehicles per hour two-way during the morning and afternoon peak periods.

2.15 Traffic flows on George Bass Drive and Broulee Road were some 280 to 550 vehicles per hour two-way during peak periods. Flows were generally observed to be higher south of Tomakin Road compared to north of Tomakin Road.

2.16 Tomakin Road was found to carry morning and afternoon peak period traffic flows of some 180 to 250 vehicles per hour two-way.

2.17 Traffic flows on Rosedale Parade were some 50 to 60 vehicles per hour two-way at peak times. Flows on Bevian Road during the same peak hour periods were some 20 vehicles per hour two-way.

Intersection Operations

2.18 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. SIDRA analyses isolated intersections controlled by signals, roundabouts or signs. The program produces a number of measures of intersection operations. 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 level of service (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 based on the movement with the highest average delay per vehicle, equivalent to following level of service (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 analysis found that the unsignalised intersections of the Princes Highway with Tomakin Road and Broulee Road are operating with average delays for the highest delayed movement 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.

2.20 The remaining intersections of George Bass Drive/Tomakin Road, George Bass Drive/Rosedale Parade and George Bass Drive/Bevian Road were found to operate at a level of service A/B during peak periods. Average delays for all movements through the intersections were less than 15 seconds per vehicle, representing a good level of intersection operation.

Public Transport

2.21 Local bus services are proved by Priors Bus Company. The 760 and 761 services link Rosedale with Batemans Bay and Moruya. Between them these services provide some seven to eight services each way on weekdays, and some three to four services each way on Saturdays and Public Holidays.

2.22 The site is therefore accessible by bus services.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1. It is proposed to develop a residential subdivision comprising 806 residential lots. The site forms part of the Rosedale Urban Expansion Area, which has been identified for residential subdivision to enable a range of dwelling type within the estate. The subdivision will incorporate residential development ranging from residential villas, dwelling homes and large rural lots. The development will incorporate community facilities and provisions for open space and the natural environment. A concept layout for the proposed subdivision of the subject site is shown on Figure 4.

3.2. This chapter examines the traffic implications of the proposed residential subdivision through the following sections:-

- public transport;
- parking provision;
- access arrangements;
- internal layout;
- pedestrian and cycle network;
- traffic generation and effects; and
- summary.

Public Transport

3.3. The proposed residential subdivision is close to bus services which link Rosedale with Batemans Bay and Moruya. These services offer alternatives to travel by modes other than car. The proposed subdivision, with its increase in residential population, will strengthen demand for public transport services in the area.

3.4. The public transport aspects of the proposed residential subdivision have been developed with consideration to integrating bus services through the site with public transport in the surrounding area. The main internal collector road passing through the site has been designed to cater for future potential bus services.

3.5. The public transport strategy for the residential development will be provided in accordance with the following design objectives:-

- establish an integrated bus route which achieves a high proportion of dwellings within 400 metres of a bus stop;
- implement a bus service in the early stages of development to encourage usage; and
- encourage use of public transport by improving the choice of travel and reducing dependence solely on cars for travel purposes.

Parking Provision

3.6. Parking will be provided in accordance with Council's requirement for residential development and will be determined at the time of application for individual dwellings. It should be noted that off-street parking will be provided for each residential lot and community facilities, while on-street parking will be provided for visitors on the internal access roads throughout the subdivision.

Access Arrangements

3.7. Vehicular access to the residential subdivision is proposed to be provided at two locations off George Bass Drive. These access points will be connected via an

internal circulation road passing through the site. The topography and location of SEPP 14 wetland reserves affect the development of the site and the location of the access points.

3.8. The proposed access points will be via Bevian Road to the north and via the continuation of Bevian Road through the site located adjacent to the SEPP 14 Wetlands. In association with the residential subdivision, "seagull" intersection treatments will be provided at both access points onto George Bass Drive. The proposed arrangements are shown on plans prepared by Candalepas Associates and incorporate storage lanes for right turning vehicles at both locations. In the case of the southern access a left turn deceleration lane would be included for the ingress movement. It should be noted that the plans prepared by the architects are conceptual and are subject to detailed design. The proposed access points will provide appropriate sight distances along George Bass Drive in both directions and will provide appropriate storage lanes for turning vehicles.

3.9. It should be noted that the following discussions with the RTA, consideration could be given to reviewing the speed environment on George Bass Drive in the vicinity of the southern access road, with the intent of reducing the speed limit adjacent to the southern part of the site to 80 km/hr. This would be consistent with the speed limit adjacent to the northern access point and would be appropriate taking into consideration the existing and future developments in the area. This includes residential development at Rosedale, Burrewarra Point and Tomakin, the existing caravan park to the south-east of the southern access point and the proposed Barlings Beach development.

Internal Layout

3.10. The internal road network, as shown on Figure 4, incorporates a logical hierarchy of road functions and appropriate design to prioritise and facilitate pedestrian and cycle activity and enhance amenity.

3.11 Roads within the development will be community title roads or dedicated roads, subject to discussions with Council. These roads and the overall development of the site have been designed to achieve an appropriate high level of sustainability in the development and future function of communities. Design objectives that specifically relate to the provision of traffic facilities and accessibility include the following:-

- promote movement system that gives appropriate priority to walking, cycling, public transport and private cars;
- guarantee movement system that relates accessibility demand to location of development type;
- ensure movement priorities, traffic speeds and street and road designs are appropriate to location and give appropriate priority to pedestrians and children;
- guarantee adequate accessibility for emergency vehicles; and
- promote the development of place and quality built environment with people and human relationships at the centre (public domain, legibility, focus, linkages, connectivity etc.).

3.12 Local shops and community facilities will be located at the entry to the site off George Bass Drive, where the principal internal circulation roads intersect. This will reduce overall traffic generation by allowing residents to combine trips.

3.13 The internal circulation roads within the proposed residential subdivision have been based on guidelines similar to those set out in AMCORD. Within the residential precincts, AMCORD distinguishes two levels of streets, access streets and collector streets.

3.14 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.

3.15 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 vehicle speeds. Vehicle speeds on collector streets should be controlled by street alignment, parked cars, street length, intersection design and built form. Bicycles are provided for in a mix of on-street and off-street facilities.

3.16 The adoption of the AMCORD guidelines provides a framework for the promotion of alternative travel modes to the private car (in particular improved public transport, pedestrian and cyclist facilities).

3.17 Roads within the proposed development will incorporate the following principles:-

❒ Collector Street (divided carriageway)

- two traffic lanes (one in each direction);
- on-street parking provided within kerbside parking lane;
- 5 metre wide traffic lanes with passing opportunities;
- generally provide pedestrian footpaths on both sides of the road; and
- cyclists to be provided for on-street.

❒ Collector Street (minor)

- two traffic lanes and one kerbside parking lane;
- 7.6 metre wide carriageway;
- carriageway wide enough for two vehicles to pass each other while passing a parked car;
- generally provide pedestrian footpaths on both sides of the road; and
- cyclists to be provided for on-street.

❒ Access Street

- two traffic lanes;
- 6.5 – 7.5 metre wide carriageway;
- carriageway wide enough for two vehicles to pass;
- parking on carriageway;
- generally provide pedestrian footpath on one side of the road; and
- cyclists to be provided for on-street.

❒ Access Place

- one traffic lane with passing opportunities;
- 3.5 metre wide carriageway;
- no separate footpath;

- parking on verge or indented parking bays; and
- cyclists to be provided for on-street.

3.18 The internal road network will be designed to accommodate the swept path of large service vehicles, including removal trucks, garbage trucks, delivery vans and buses, where necessary. Overall, subject to detailed design, the proposed layout provides for an efficient subdivision pattern and a low speed environment in accordance with the principles in AMCORD and Council's road design requirements. Access, internal circulation and layout arrangements are considered appropriate.

Pedestrian and Cycle Network

3.19 The residential subdivision will incorporate a series of pedestrian paths through the site. Primary and secondary pedestrian movements will be developed, with 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 and to the main public transport corridor along the collector road network.

3.20 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 through the area.

3.21 The residential subdivision will incorporate the development of a cycle network throughout the site. The cycle network will incorporate links to George Bass

Drive and will include commuter, local and recreational routes. These routes will include a mix of on-road and off-road facilities. Off-road facilities will comprise dedicated cycle paths and shared pedestrian/cycle paths.

3.22 The proposed cycle network through the proposed residential subdivision has been developed through 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 adjacent residential areas of Rosedale and Barlings Beach;
- integrate the pedestrian and cycle network with open space and riparian corridors; and
- provide adequate on-road and off-road facilities.

Traffic Generation and Effects

3.23 Traffic generated by the proposed development will have its greatest effects during the morning and afternoon peak periods when it combines with commuter traffic on the surrounding road network. Surveys undertaken by the RTA indicate a generation rate of 0.85 vehicles per hour two-way during peak periods for residential dwelling houses and 0.4 to 0.65 vehicles per hour two-way during peak periods for medium density residential villas. This compares to the surveyed traffic generation rate of residential dwellings in the Rosedale area, of some 0.4 to 0.5 vehicles per hour per dwelling during peak periods.

3.24 In order to undertake a conservative analysis, we have adopted the higher RTA generation rates. Based on a residential housing mix of 50% dwelling homes/large rural lots and 50% residential villas, the proposed residential subdivision will have a peak period traffic generation of some 500 to 600 vehicles per hour two-way during the morning and afternoon peak periods. In addition, for large residential subdivisions, similar in size to that proposed, the traffic generation typically includes some 10% to 25% self-contained internal trips within the new subdivision. Adopting the lower figure of 10% results in an overall traffic generation of some 450 to 550 vehicles per hour two-way during peak periods onto the external road network. For the purpose of our assessment, we have used the higher generation of 550 vehicles per hour two-way. Some 65% of the expected traffic generation would be outbound in the morning. The reverse would apply in the afternoon.

3.25 The additional traffic has been assigned to the road network to assess the impact of the proposed subdivision, based on surveyed turning movements and the existing distribution of traffic on the surrounding road network. Existing traffic flows plus the additional traffic from the proposed residential subdivision are shown on Figures 5 and 6, and summarised in Table 3.1.

3.26 Traffic flow increases on George Bass Drive would be some 160 to 280 vehicles per hour two-way during peak periods.

3.27 Traffic flows on the Princes Highway north of Tomakin Road would increase by some 120 vehicles per hour two-way at peak times. South of Broulee Road, increases would be some 160 vehicles per hour two-way.

3.28 Bevian Road and the Southern Access Road would generally carry traffic flows of some 280 vehicles per hour two-way during peak periods, when the proposed

subdivision is fully developed. Roads within the subdivision, with the exception of the main collector road, would generally carry traffic flows less than 100 vehicles per hour two-way. This level of traffic flow would be typical for these types of roads.

Table 3.1: Existing Peak Hour Two-Way (Sum of Both Directions) Traffic Flows Plus Development Traffic

Location	Morning		Afternoon	
	Existing	Plus Development	Existing	Plus Development
Princes Highway				
- north of Tomakin Road	630	+120	685	+120
- south of Tomakin Road	475	-	560	-
- north of Broulee Road	695	-	670	-
- south of Broulee Road	945	+160	930	+160
George Bass Drive				
- north of Bevian Road	310	+280	280	+280
- north of Rosedale Parade	320	+240	280	+240
- south of Rosedale Parade	315	+240	290	+240
- north of Tomakin Road	350	+280	490	+280
- south of Tomakin Road	405	+160	515	+160
Broulee Road				
- east of Princes Highway	290	+160	300	+160
Tomakin Road				
- east of Princes Highway	245	+120	225	+120
- west of George Bass Drive	95	+120	185	+120
Rosedale Parade				
- east of George Bass Drive	55	-	50	-
Bevian Road				
- west of George Bass Drive	20	+280	20	+280
Southern Access Road				
- north of George Bass Drive	-	+280	-	+280

3.29 It is understood that the proposed residential subdivision will be developed over a period of some years. As previously discussed, access to the residential subdivision will be provided via Bevian Road and the Southern Access Road. "Seagull" intersection treatments will be provided at both access points onto George Bass Drive.

3.30 In order to assess the appropriateness of the intersection treatments to cater for the proposed staged development, the operations of the intersections have been analysed with the proposed development traffic added to future traffic flows along George Bass Drive and the Princes Highway, over a ten year development period. The analysis we have undertaken is considered conservative because the proposed development would be a proportion of the future traffic growth on the surrounding road network over this period. Nevertheless, we have increased traffic on George Bass Drive and the Princes Highway by two percent compounded for ten years and added the development traffic to this growth.

3.31 In addition to future traffic flows. The traffic generation of the approved Barlings Beach development has also been added to the base traffic flows. We understand that approval has been granted for a residential subdivision at Barlings Beach comprising some 215 dwellings. Access to the Barlings Beach development will be provided via a single "seagull" controlled intersection onto George Bass Drive and via Ainslie Parade. The growthed traffic flows plus development traffic are shown on Figures 7 and 8, and summarised in Table 3.2.

3.32 The intersections previously analysed in Chapter 2 and the proposed access points onto George Bass Drive, have been re-analysed with SIDRA for the additional traffic flows shown in Figures 5 to 8.

3.33 The analysis found that the unsignalised intersections of the Princes Highway with Tomakin Road and Broulee Road with existing traffic flows plus additional development traffic (Figures 5 and 6) would operate with average delays for the movement with the highest average delay of less than 25 seconds per vehicle during the morning and afternoon peak periods. This represents a level of service B, an acceptable level of intersection operation.

3.34 The proposed "seagull" controlled access points to the subdivision on George Bass Drive, including Bevian Road and the Southern Access Road would operate with average delays for the movement with the highest average delay of less than 15 seconds per vehicle during peak periods. This represents a level of service A/B, a good level of intersection operation.

Table 3.2: Existing Two-Way Traffic Flows Plus Future Growth Plus Development Traffic

Road/Location	Morning			Afternoon		
	Base Flows [1]	Plus Barlings Beach Development	Plus Proposed Development	Base Flows [1]	Plus Barlings Beach Development	Plus Proposed Development
Princes Highway						
- north of Tomakin Road	725	+30	+120	765	+30	+120
- south of Tomakin Road	570	-	-	625	-	-
- north of Broulee Road	850	-	-	750	-	-
- south of Broulee Road	1150	+45	+160	1035	+45	+160
George Bass Drive						
- north of Bevian Road	385	+70	+280	310	+70	+280
- north of Rosedale Parade	390	+70	+240	305	+70	+240
- south of Rosedale Parade	385	+70	+240	315	+70	+240
- north of Tomakin Road	415	+75	+280	550	+75	+280
- south of Tomakin Road	470	+45	+160	575	+45	+160
Broulee Road						
- east of Princes Highway	360	+45	+160	345	+45	+160
Tomakin Road						
- east of Princes Highway	245	+30	+120	260	+30	+120
- west of George Bass Drive	195	+30	+120	215	+30	+120
Rosedale Parade						
- east of George Bass Drive	55	-	-	50	-	-
Bevian Road						
- west of George Bass Drive	20	-	+280	20	-	+280
Southern Access Road						
- north of George Bass Drive	-	-	+280	-	-	+280

[1] Existing flows plus 5 years growth

3.35 The other intersections of George Bass Drive/Tomakin Road and George Bass Drive/Rosedale Parade would operate at level of service B or better during peak periods. Average delays for all movements through the intersections would be less than 20 seconds per vehicle, representing an acceptable level of intersection operation. As previously discussed, it is understood that Council are investigating the possible introduction of a roundabout at the intersection of George Bass

Drive/Tomakin Road. With existing traffic flows plus additional development traffic, the roundabout would operate at a good level of service during peak periods.

3.36 With the future ten year flows and the additional development traffic generated by the Barlings Beach project included (Figures 7 and 8), the intersections of the Princes Highway/Tomakin Road and Princes Highway/Broulee Road would operate with average delays for the movement with the highest average delay of less than 35 seconds per vehicle. This represents a level of service C or better, a satisfactory level of service.

3.37 The other intersections along George Bass Drive including the "seagull" controlled access points will operate with average delays for all movements through the intersections of less than 20 seconds per vehicle during the morning and afternoon peak periods. This represents an acceptable level of intersection operation, with level of service B or better during peak periods.

3.38 Hence, the surrounding road network, incorporating the proposed "seagull" controlled access points onto George Bass Drive, will be able to cater for the future traffic growth including traffic from the proposed development.

Summary

3.39 In summary, the main points relating to the proposed residential subdivision in Rosedale are:-

i) the proposed residential subdivision comprises 806 residential lots;

ii) vehicular access to the proposed subdivision will be via two "seagull" controlled intersections on George Bass Drive;

iii) consideration could be given to reducing the speed limited of George Bass Drive, adjacent to the southern part of the site to 80 km/hr;

iv) internal roads will be provided in accordance with the principles in AMCORD. The proposed arrangements, subject to detailed design, are considered appropriate;

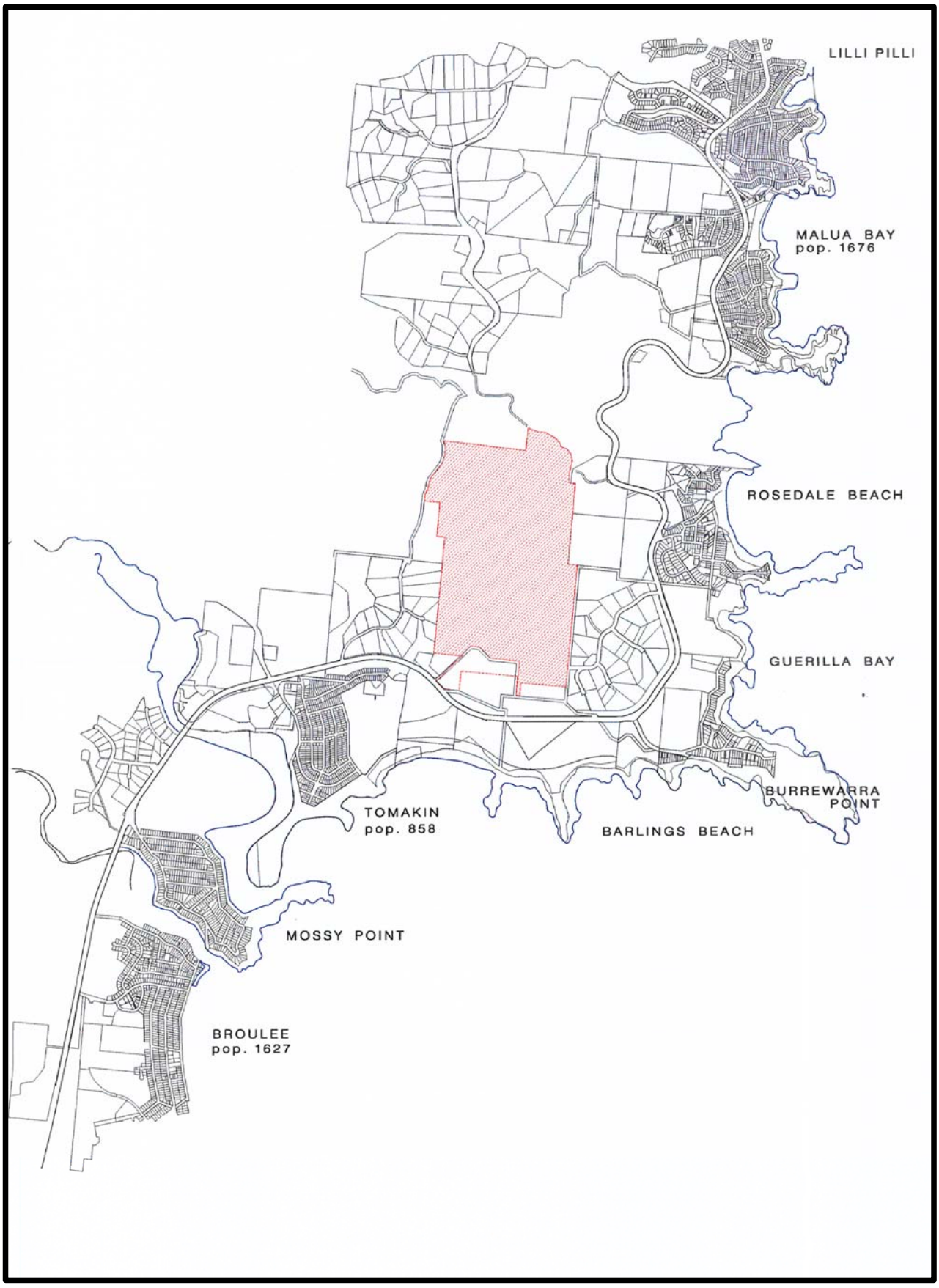
v) pedestrians and cycle networks through the proposed residential subdivision are considered appropriate;

vi) the proposed subdivision will increase residential densities and strengthen the demand for existing and future public transport services through the area;

vii) a possible bus route could be provided through the proposed residential subdivision, along the internal collector road;

viii) the proposed development will have a peak period traffic generation of some 450 to 550 vehicles per hour two-way during peak periods; and

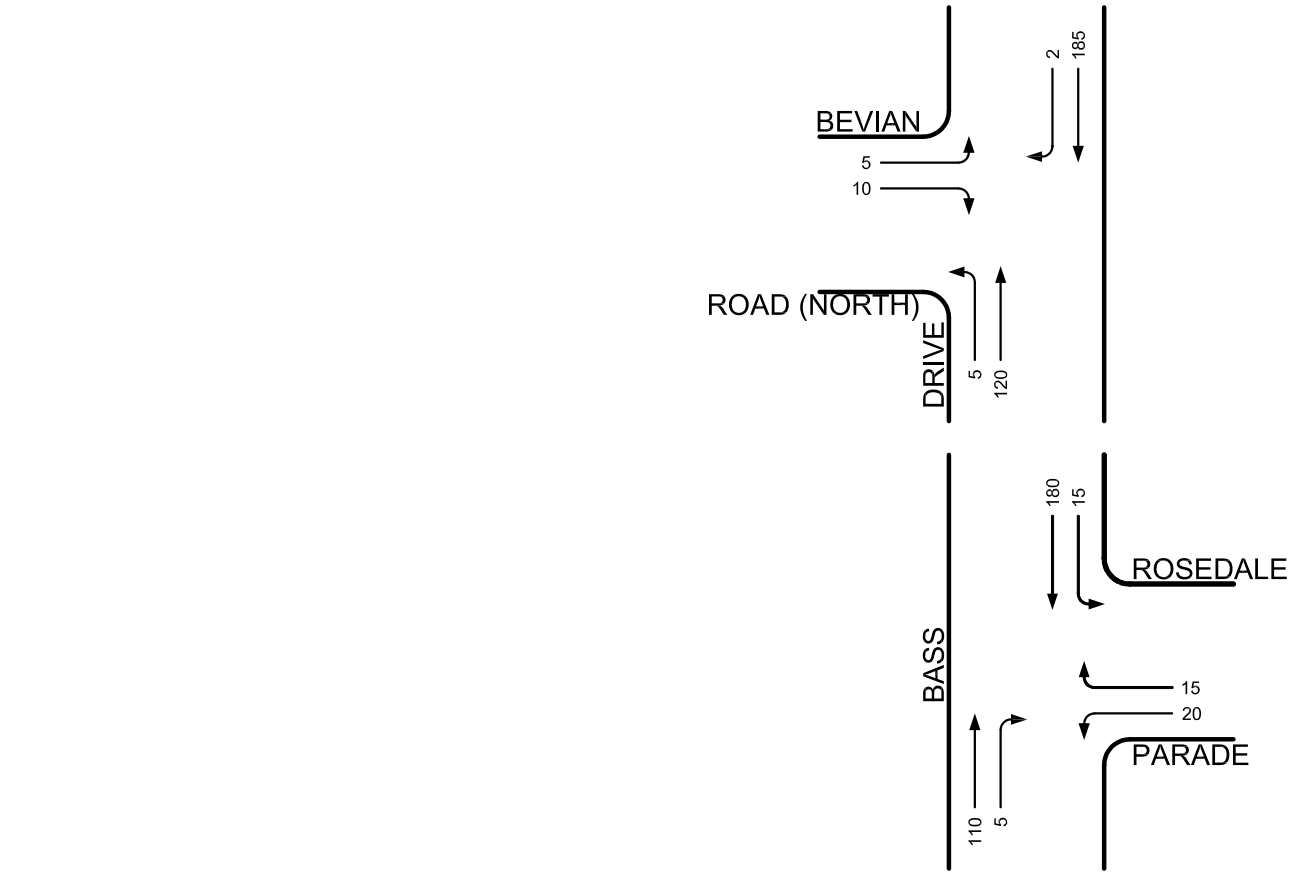
ix) the road network, incorporating the proposed "seagull" controlled access points onto George Bass Drive, will be able to cater for the future traffic growth including traffic from the proposed development.

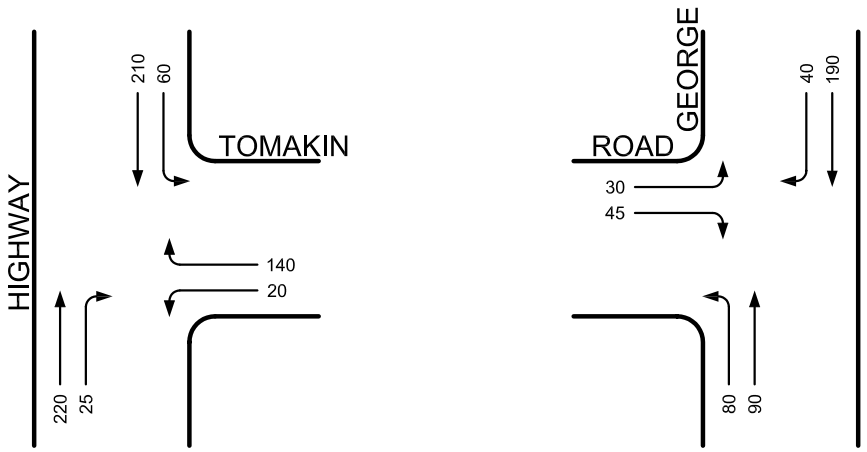


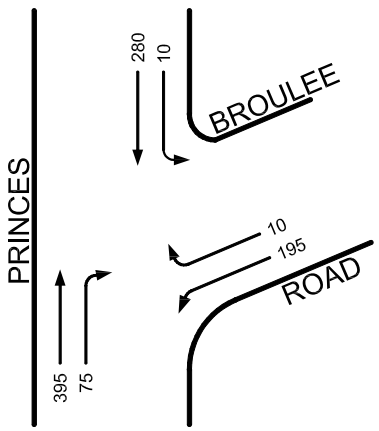
LOCATION PLAN

1

DRAWN BY CBHK Pty Ltd Ref: 6407 21 JUNE 2007







EXISTING MORNING PEAK HOUR TRAFFIC FLOWS

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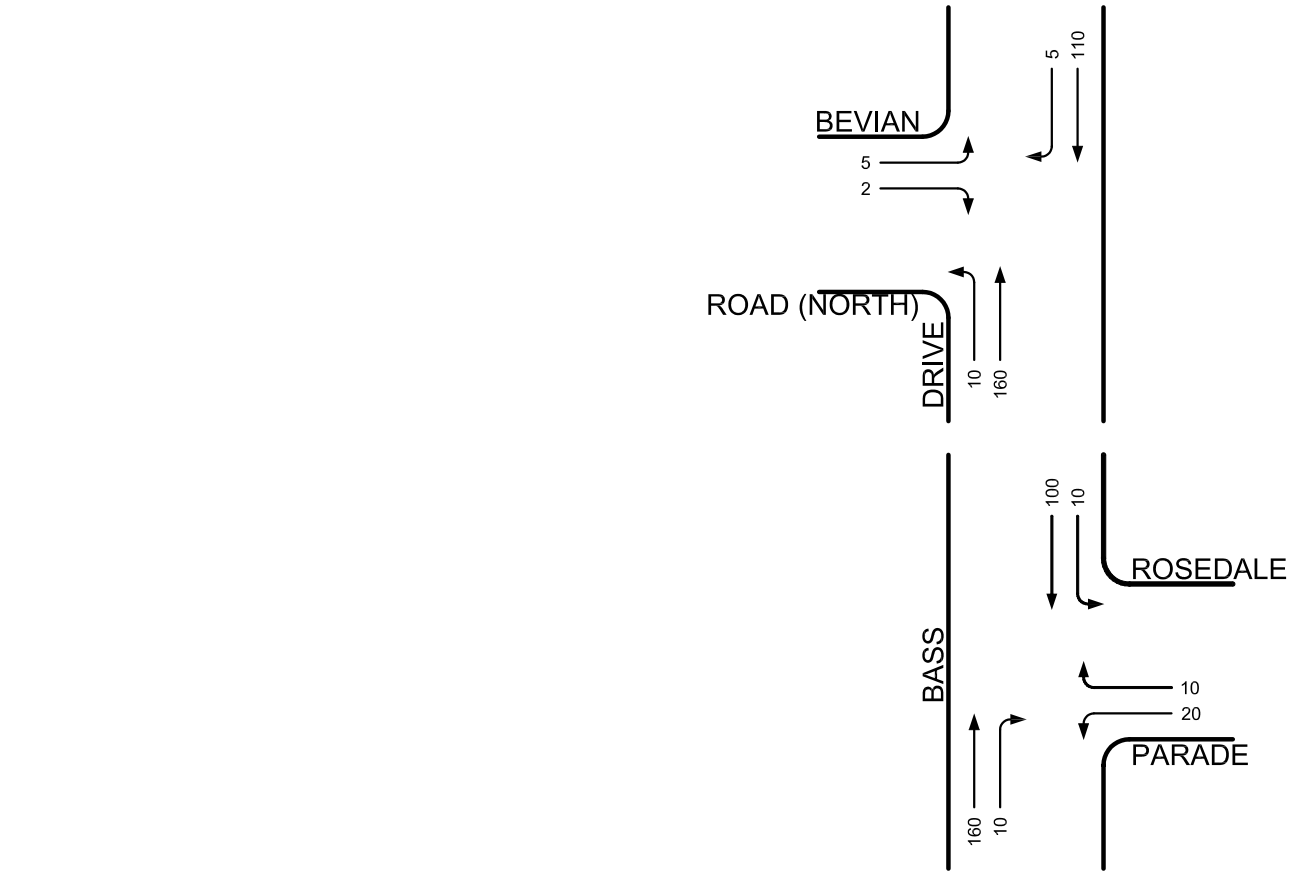

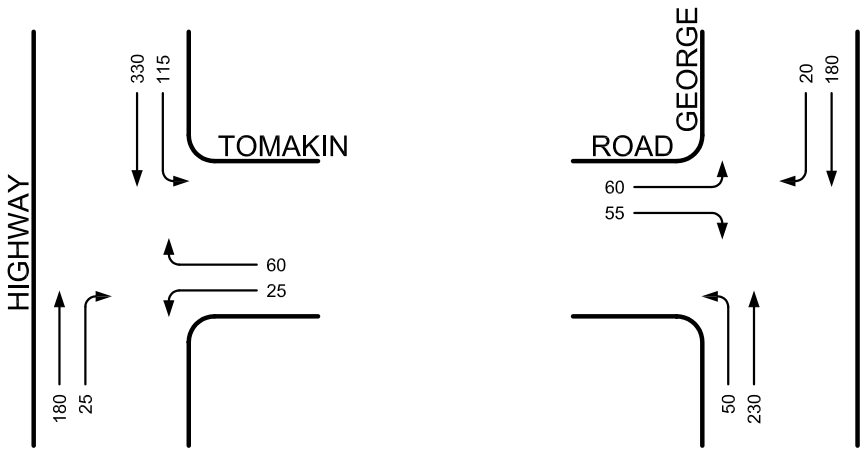

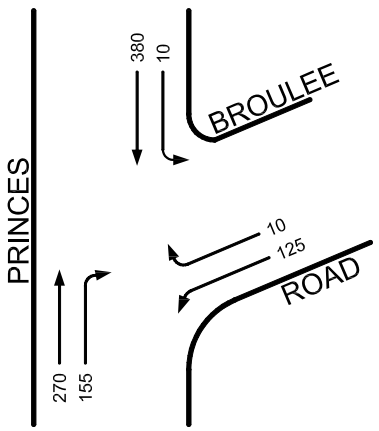

EXISTING AFTERNOON PEAK HOUR TRAFFIC FLOWS

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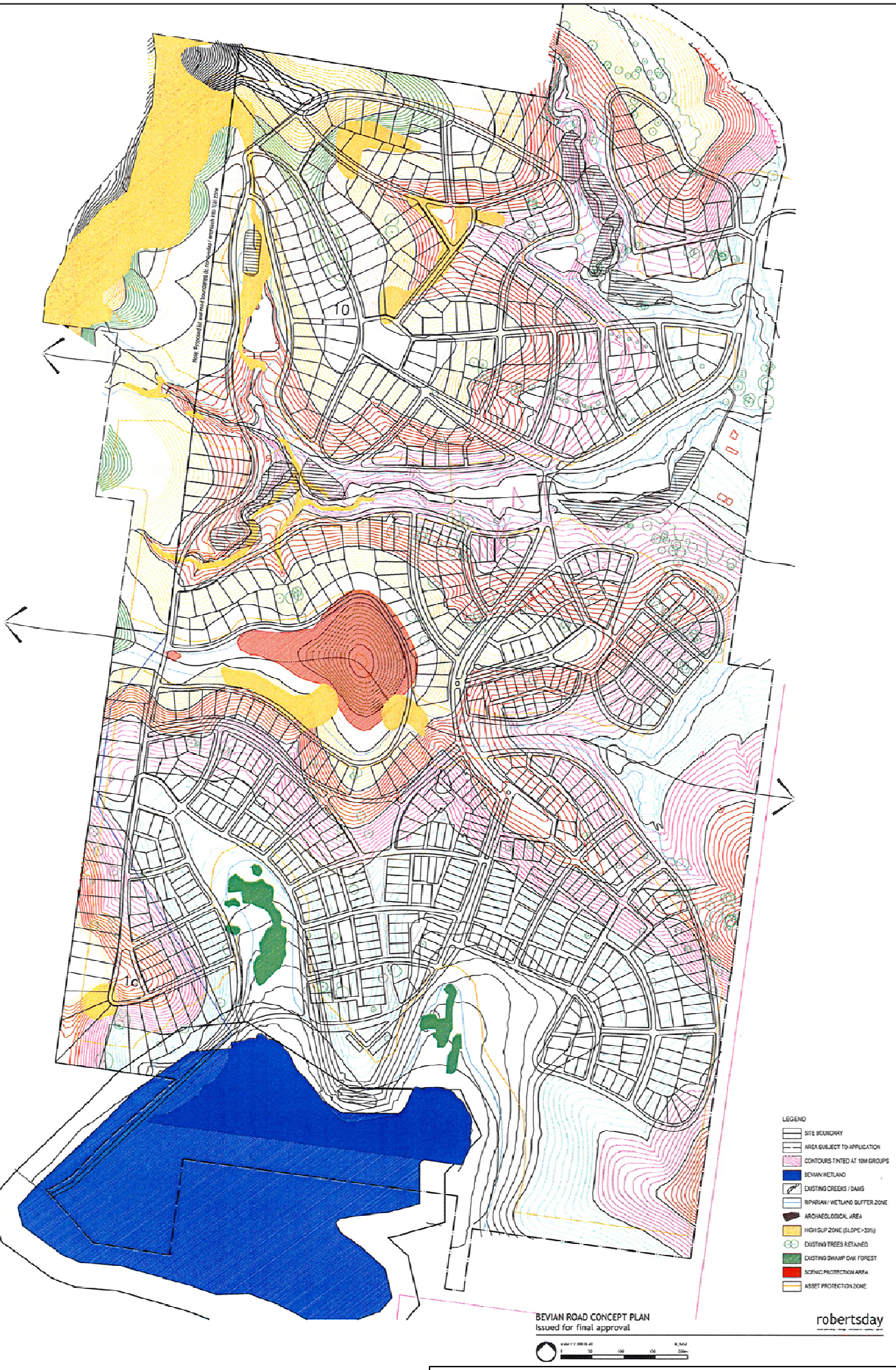
3



SITE PLAN

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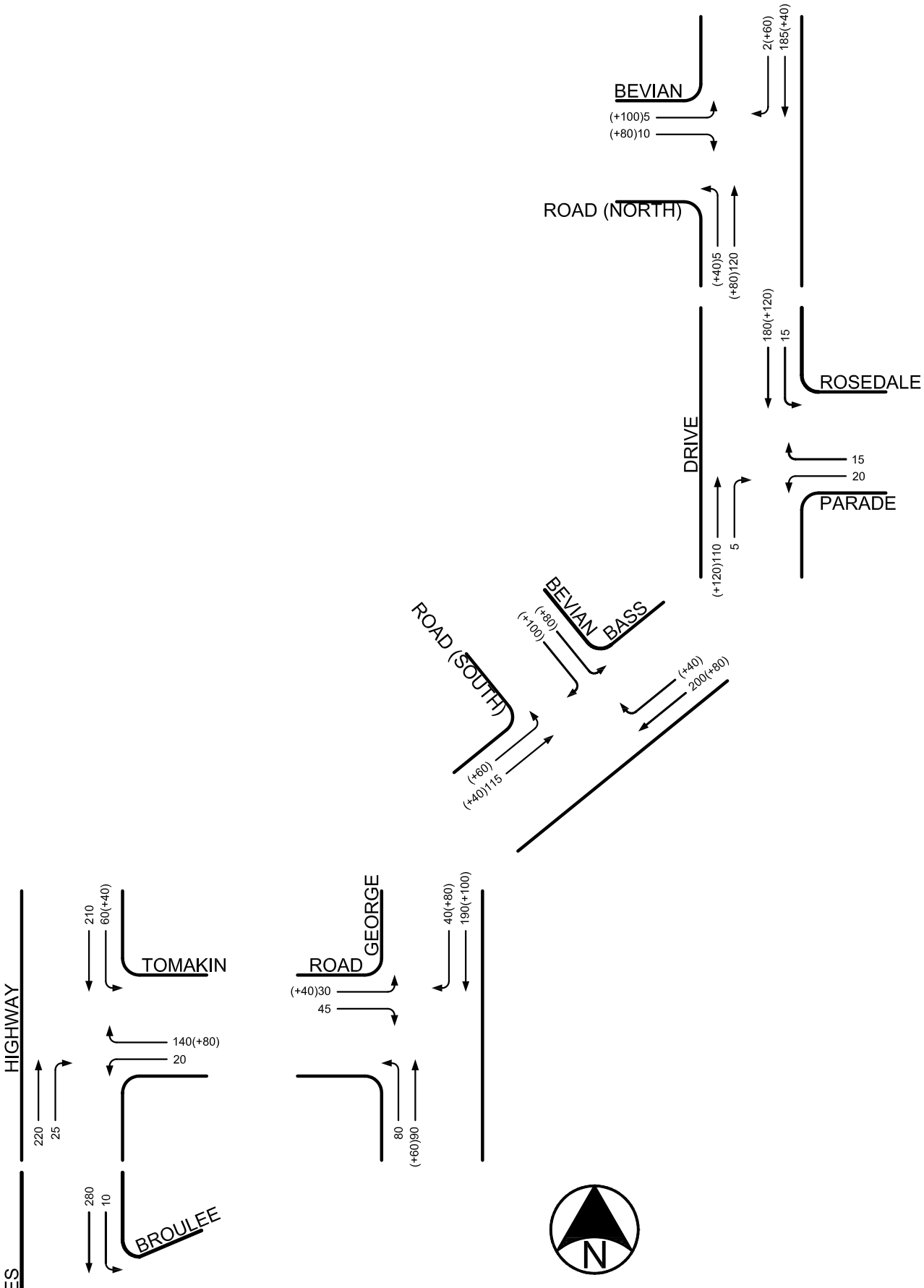

EXISTING MORNING PEAK HOUR TRAFFIC FLOWS PLUS DEVELOPMENT TRAFFIC

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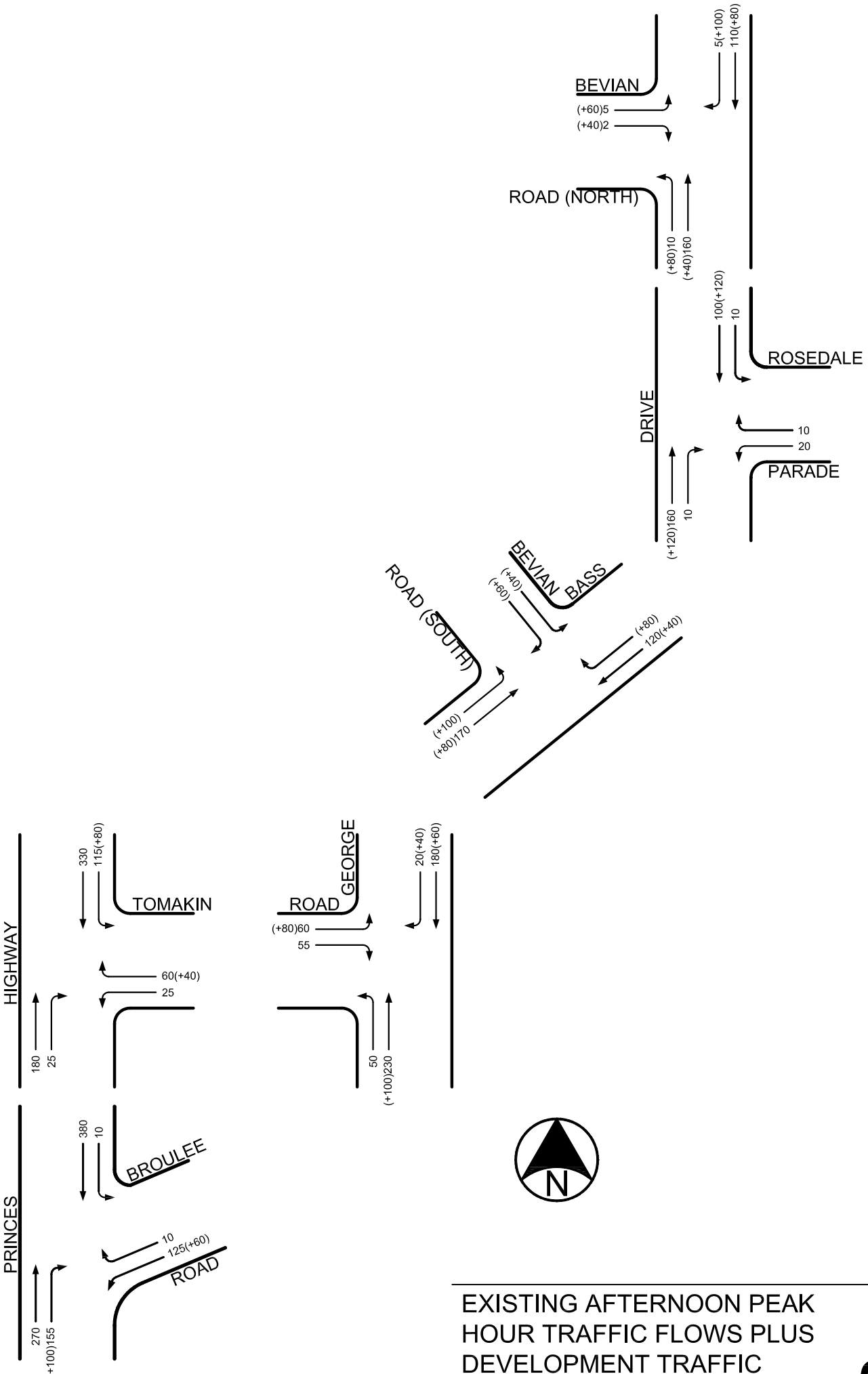
5



EXISTING AFTERNOON PEAK HOUR TRAFFIC FLOWS PLUS DEVELOPMENT TRAFFIC

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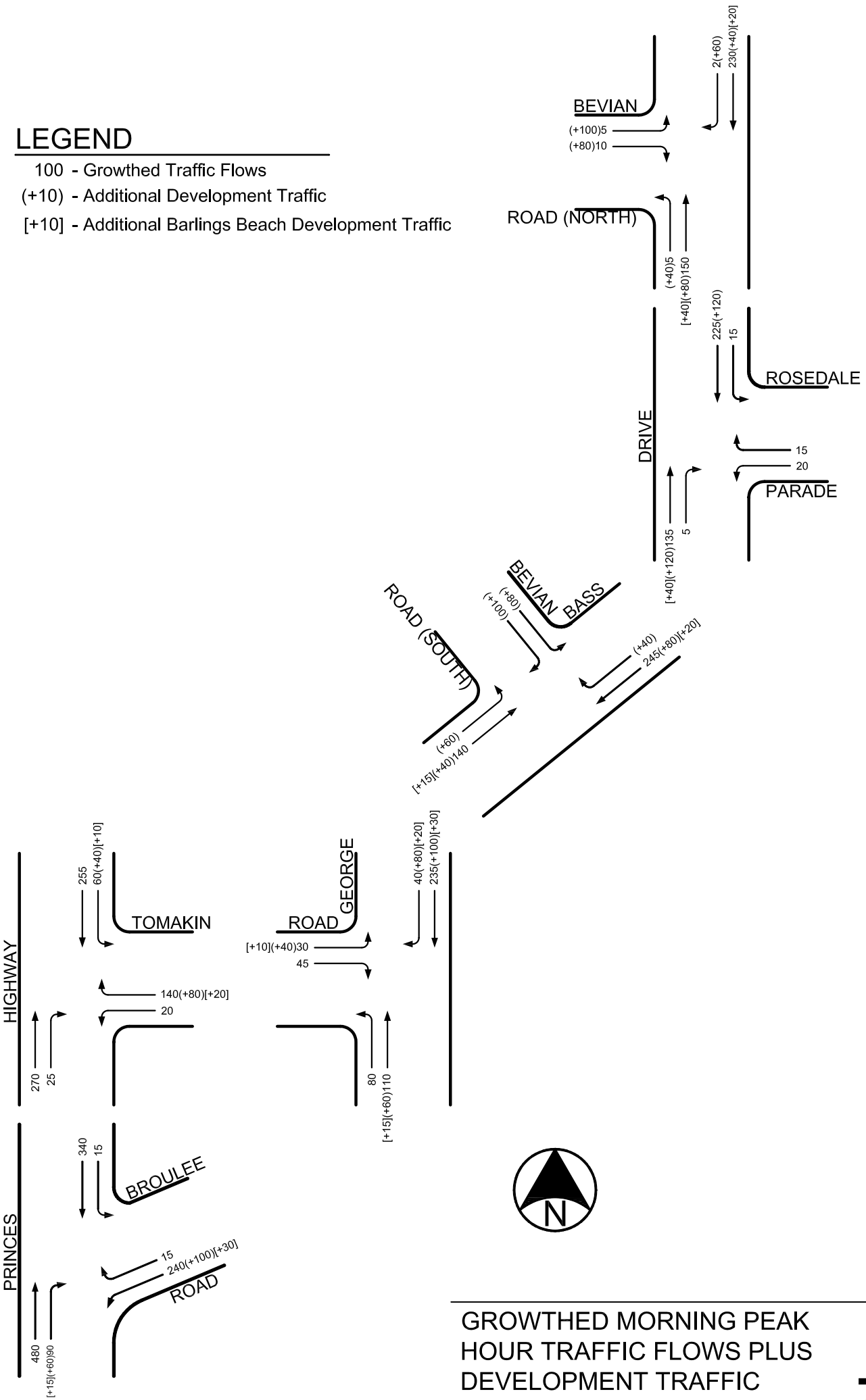
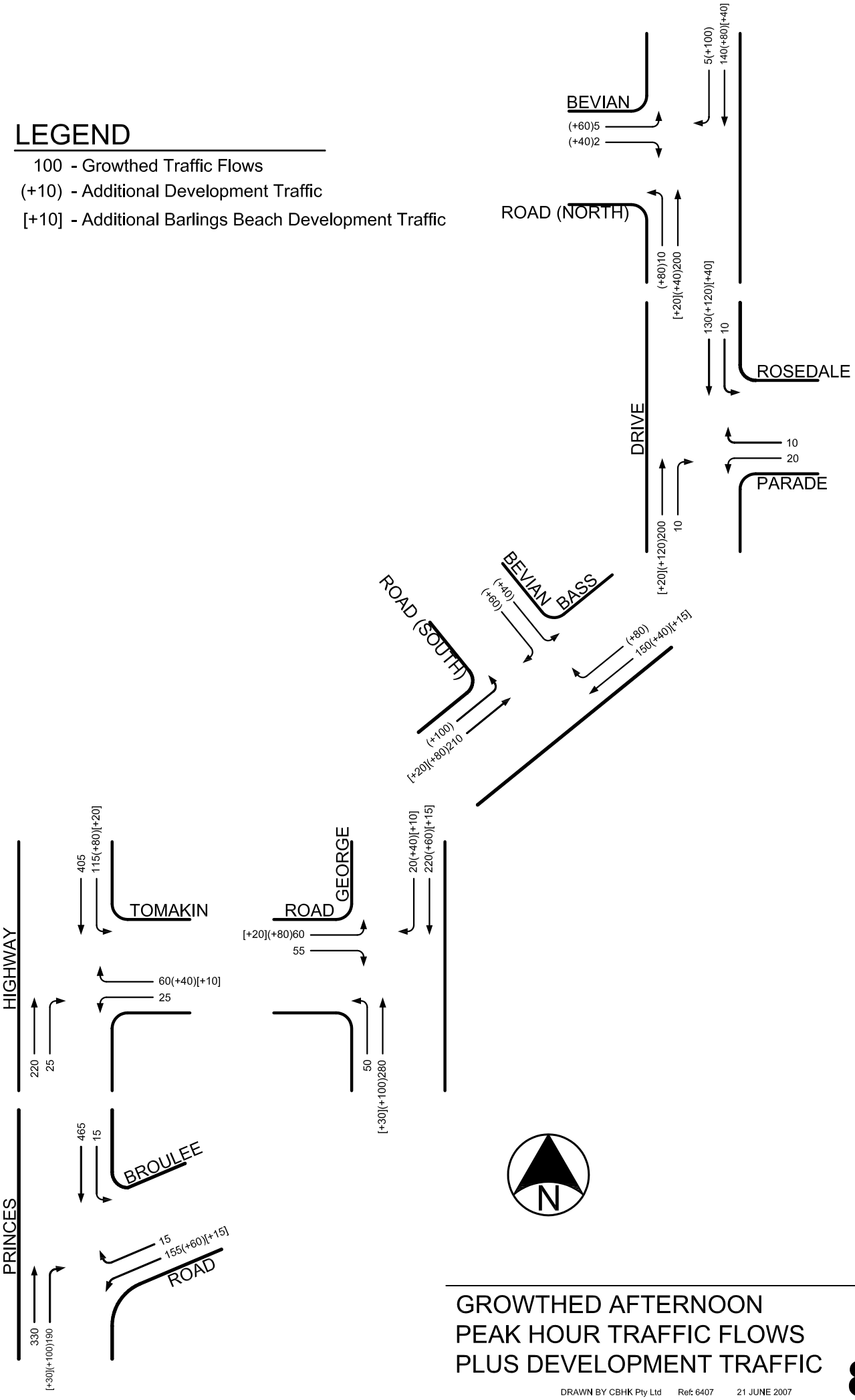
6


LEGEND
100 - Growthed Traffic Flows
(+10) - Additional Development Traffic
[+10] - Additional Barlings Beach Development Traffic
BEVIAN
(+100)5
(+80)10
2(+60)
230(+40)[+20]
ROAD (NORTH)
(+40)5
[+40](+80)150
225(+120)
15
ROSEDALE
DRIVE
15
20
PARADE
[+40](+120)135
5
BEVIAN BASS
(+80)
(+100)
ROAD (SOUTH)
(+40)
245(+80)[+20]
(+60)
[+15](+40)140
255
60(+40)[+10]
TOMAKIN
ROAD
GEORGE
40(+80)[+20]
235(+100)[+30]
[+10](+40)30
45
140(+80)[+20]
20
HIGHWAY
270
25
80
[+15](+60)110
340
15
BROULEE
15
240(+100)[+30]
ROAD
PRINCES
480
[+15](+60)90
N
GROWTHED MORNING PEAK HOUR TRAFFIC FLOWS PLUS DEVELOPMENT TRAFFIC
DRAWN BY CBHK Pty Ltd Ref: 6407 21 JUNE 2007
7


LEGEND
100 - Growthed Traffic Flows
(+10) - Additional Development Traffic
[+10] - Additional Barlings Beach Development Traffic
BEVIAN
(+60)5
(+40)2
5(+100)
140(+80)[+40]
ROAD (NORTH)
(+80)10
[+20](+40)200
130(+120)[+40]
10
ROSEDALE
DRIVE
10
20
PARADE
[+20](+120)200
10
BEVIAN BASS
(+40)
(+60)
ROAD (SOUTH)
(+80)
150(+40)[+15]
(+100)
[+20](+80)210
405
115(+80)[+20]
TOMAKIN
ROAD
GEORGE
20(+40)[+10]
220(+60)[+15]
[+20](+80)60
55
60(+40)[+10]
25
HIGHWAY
220
25
50
[+30](+100)280
465
15
BROULEE
15
155(+60)[+15]
ROAD
PRINCES
330
[+30](+100)190
N
GROWTHED AFTERNOON
PEAK HOUR TRAFFIC FLOWS
PLUS DEVELOPMENT TRAFFIC
DRAWN BY CBHK Pty Ltd Ref: 6407 21 JUNE 2007
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