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"RISE"
MARANA STREET, BILAMBIL HEIGHTS

TRANSPORT IMPACT ASSESSMENT
CONCEPT PLAN MP08-0234

Prepared For

Terranora Group Management Pty Ltd

14 April 2009
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DOCUMENT REGISTER

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1 INTRODUCTION

CRG Traffic & Acoustics Pty Ltd has been engaged by Terranora Group Management Pty Ltd to undertake a Traffic Impact Assessment of its proposal to develop a residential community at Bilambil Heights.

It is intended that this report will form part of a Concept Plan to be lodged with the NSW Department of Planning. The assessment has generally been prepared in accordance with the NSW RTA *Guide to Traffic Generating Developments*, and addresses the following matters:

- The potential impact of proposed development traffic upon the surrounding road network;
- External road upgrade works required as a consequence of the proposed development;
- Public transport provisions;
- Proposed internal road network layout and geometry;
- Provision for pedestrians and cyclists.

2 SUBJECT SITE

2.1 Locational Characteristics

As shown in Figure 2.1 the subject site is located adjacent to Marana Street and McAlisters Road at Bilambil Heights and extends to Cobaki Road at Piggabeen.

The southern end of the site borders the Bilambil Heights area, which consists of detached housing development and some neighbourhood shopping facilities. The northern end of the site, at Piggabeen, has a rural character.

The site is located approximately 10 minutes (drive) from the Pacific Highway at West Tweed, and 15 minutes from the Tweed Heads Central Business District.

2.2 Previous Use & Approvals

The site forms part of the former Terranora Lakes Country Club and golf course. This Club, which ceased operating in 1996, was once a popular and successful Club providing a variety of indoor and outdoor recreational activities including tennis, golf, gaming and dining.

In 1997, the site was approved by the Tweed Shire Council for the development of an integrated resort. The approval was modified in 2001 to allow for the following staging and scale of development:

Stage 1 –	Hotel comprising of 74 suites & modify existing golf course
Stage 2 –	38 x 3 & 4 bedroom villas
Stage 3 –	88 x 2 br units, 8 x 3 br units, 4 x 4 br units (100 units) New 18 hole golf course
Stage 4 –	New additional 9 hole golf course Village Square, restaurants, convention centre, 400 hotel units, 104 x 2 bedroom units, arts & crafts centre, environmental centre & walking tracks
Stage 5 -	144 x 2 bedroom units
Stage 6 -	40 x 2 bedroom units
Stage 7 -	40 x 2 bedroom units

Total No. of Accommodation Units -	474 hotel suites & 466 x 2, 3 & 4 bedroom units & villas

It is noted that the current approval only allows Stages 4 – 7 to be developed after the Cobaki Parkway is constructed, together with its connections to Piggabeen Road and the Tugun Bypass. Council's 'Amendment to Developer Consent 96/516' dated 3 August 2001 included the following consent conditions (paraphrased) relating to traffic impact:

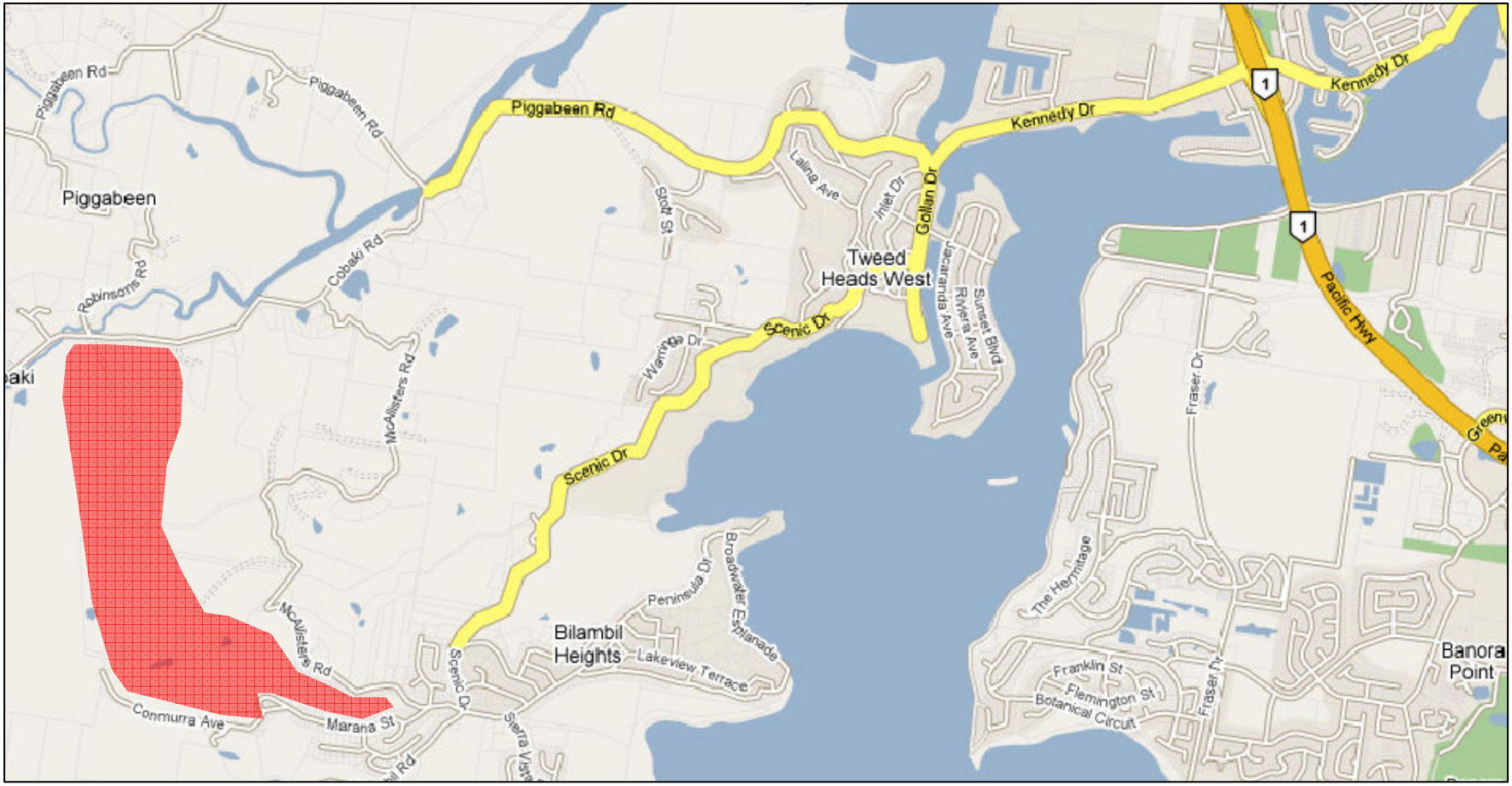


FIGURE 1.1 – LOCATION OF SUBJECT SITE

Condition 54 –	Payment of $1,227,384.75 Section 94 contribution charges
Conditions 55 & 56 -	Construction of a roundabout at Piggabeen Road / Gollan Dr / Inlet Dr prior to completion of Stage 4. Cost of roundabout can be offset against Section 94 charges to the maximum value of $321,555.
Condition 57 -	Access to the site via Cobaki Road to be via Grevillea Rd only. A roundabout to be constructed at the Cobaki Rd / Robinson Rd / Grevillea Rd intersection prior to completion of Stage 4.
Condition 58 -	Construction of two traffic control devices in Marana Street, prior to the completion of Stage 1.
Condition 59 -	Provision of "Reduce Speed" signage in Marana Street and intersection warning signage at Marana St / McAlisters Rd intersection, prior to completion of Stage 1.
Condition 60 -	Provision of additional "Reduce Speed" and intersection warning and directional signage at the Scenic Drive / McAlisters Rd intersection, prior to completion of Stage 1.
Condition 61 -	Construction of cul-de-sac turning area at the end of Marana Street, with dimensions suitable for a 14m bus.
Condition 64 -	Cobaki and Piggabeen Roads are to be upgraded between the Cobaki Parkway intersection and site access providing a 7m seal over 9m formation, including pavement rehabilitation and noise reducing open graded AC. Pavement upgrading also to be undertaken between Anconia Street and Carramar Drive. Construction to be completed prior to the completion of Stage 4.

The above conditions were based on the following trip generation estimates:

Stages 1 – 3:	*850 vehicles per day*
Stages 4 – 7:	*1,810 vehicles per day*
Total -	*2,660 vehicles per day*

It is understood that these estimates are based on the following traffic generation rate which has since been included in the Tweed Road Contribution Plan:

Tourist Resort -	*2.48 daily trips per room or unit* *Plus 12 daily trips per 100m^2 GLA of restaurant*

3 CONCEPT PLAN

3.1 Layout

As shown in Figure 3.1 and 3.2, the proposed Concept Plan is characterized by a spine road which extends between Marana Street, down the western side of the property to Cobaki Road. A series of intersections off this road provide access to adjacent residential neighbourhoods. A commercial precinct is proposed to be located in the eastern sector of the site, at its highest point.

Access to the external road network will ultimately be gained via the following roads:

- Marana Street;
- Cobaki Road;
- McAlisters Road extension.

3.2 Land Use

The proposed Master Plan contains a range of residential densities and commercial uses. A summary of the proposed development yield is provided as follows:

Residential / Accommodation -	
Detached house lots -	251
Apartments -	403
Hotel Apartments -	160
Villas and townhouses -	176
SOHO units -	16
Retirement cottages -	100
Retirement apartments -	486
Retirement villas -	12
Nursing home beds -	200
Non – Residential -	
Retail (incl. tavern) -	4,447m^2
Commercial -	5,300m^2
Health spa -	600m^2
School -	1 site (approx. 300 enrolments)

3.3 Transport Network

The proposed road network will generally consist of private roads with the only public roads being those that provide through access to the external major road network.

The private road network has been designed in accordance with traditional neighbourhood planning principles where there is a focus on connectivity and mobility, particularly for non-motorised travel modes.

FIGURE 3.1 – PROPOSED CONCEPT PLAN

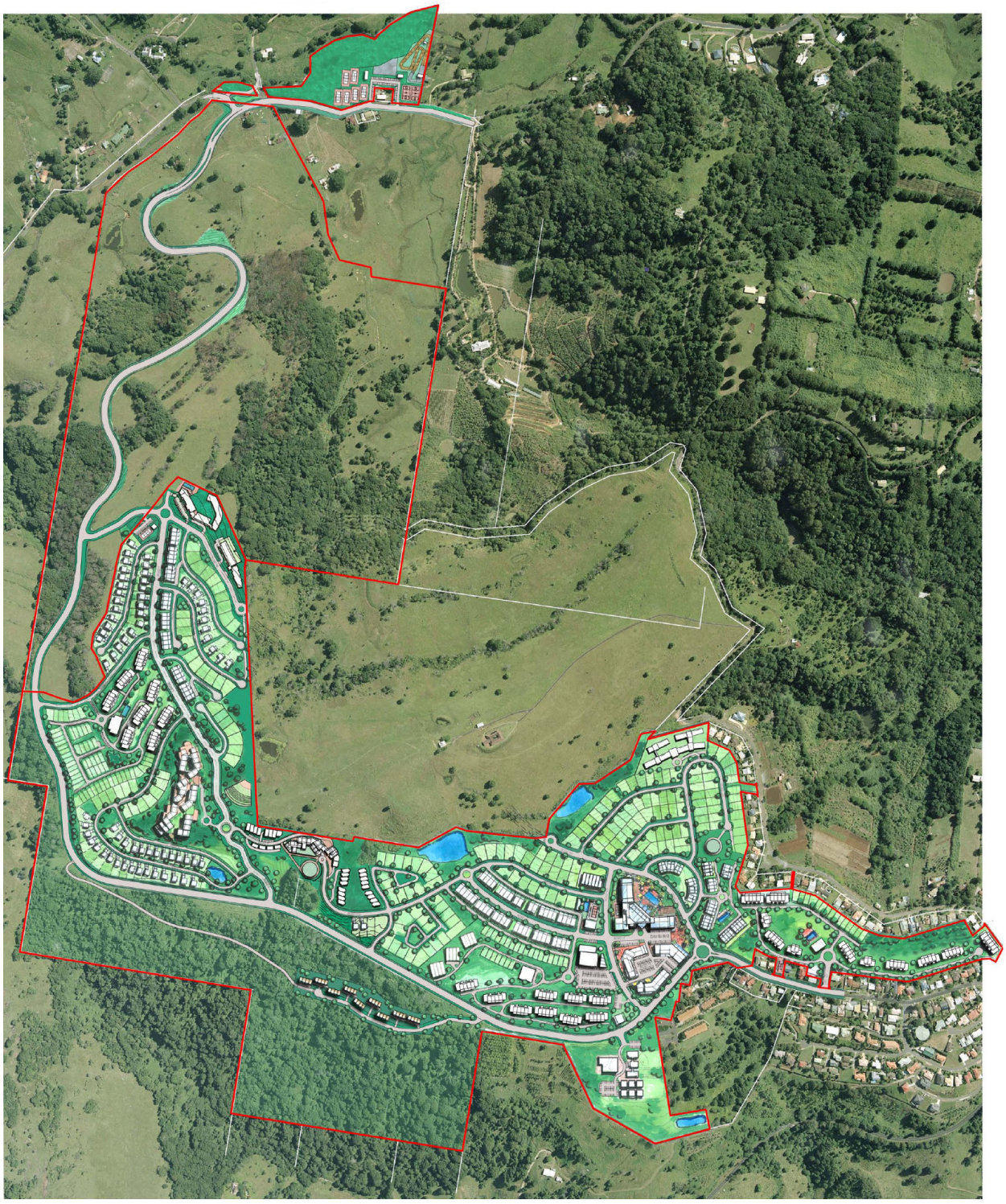


FIGURE 3.2 – PROPOSED CONCEPT PLAN

4 EXISTING TRAFFIC & TRANSPORT NETWORK

4.1 Road Network

Marana Street is a local access street and provides access to adjoining detached housing allotments and the subject site. The street has a pavement width of approximately 12 metres. Whilst Marana Street currently only carries in the order of 750 – 1,000 vehicles per day at its eastern end, this volume was at its peak (in the order of 6,500vpd) when the former Terranora Lakes Country Club was in operation.

McAlisters Road functions as a Collector Road between Scenic Drive and Mountain View Esplanade and then a local access street to the west. West of Mountain View Esplanade, McAlisters Road provides access to adjoining detached housing allotments and some rural properties. All local streets in the vicinity of the subject site have a speed limit of 50 Km / Hr.

The Mountain View Esplanade / McAlisters Road intersection consists of a four way priority junction with traffic exiting Mountain View Esplanade having priority. Traffic exiting each of the other legs are required to give way.

Scenic Drive provides for sub-arterial travel between Bilambil and West Tweed and currently carries in the order of 6,800 vehicles per day north of McAlisters Road. Its speed limit ranges from 80Km / Hr through its mid-section to 50 Km / Hr through Bilambil Heights. The capacity of the road is constrained by its mountainous topography and horizontal alignment.

Kennedy Drive is a sub-arterial route linking West Tweed to Tweed Heads via a grade separated connection to the Pacific Highway.

The Scenic Drive / McAlisters Road intersection operates as a priority four way junction with Scenic Drive – Bilambil Road being the major road. A dedicated turning lane is provided for traffic turning right into McAlisters Road. The intersection is located at the top of a crest which restricts visibility, particularly to and from the Bilambil Road leg. There is a significant level of cross movement between McAlisters Road and Simpsons Drive, due to the location of commercial uses (convenience shops and child care) in Simpsons Drive. There is also a school bus stop in Simpsons Drive which generates a relatively high level of pedestrian activity before and after school periods.

4.2 Traffic Volumes

Traffic surveys undertaken by the Tweed Shire Council indicate that Kennedy Drive currently carries in the order of 18,500 vehicles per day at the Cobaki Bridge and approximately 20,000 vehicles per day east of the Pacific Highway.

Scenic Drive and Gollan Drive currently carry approximately 6,800 vehicles per day and 13,000 vehicles per day, respectively.

CRG has undertaken manual traffic counts at the following intersections:

- Kennedy Drive / Piggabeen Road / Golan Drive
- Scenic Drive / Simpson Drive / Bilambil Drive
- McAllisters Drive / Simpson Drive / Marana Street / Buenavista Drive

The surveys were conducted on Thursday 5th March 2009 from 7.00-10.00am and 2.00-6.00pm. The results are summarised in Appendix A.

Tube counters were also installed in Cobaki Road and Scenic Drive from Monday 3rd March to Tuesday 10th March 2009. The results of these surveys are presented in Appendix A and reveal that Cobaki Road currently carries in the order of 530 vehicles per day and Scenic Drive carries in the order of 6,800 vehicles per day.

4.3 Public Transport & School Bus Routes

Surfside Buslines currently services the Bilambil Heights area with a bus service between the subject site and Kingscliff via Tweed Heads. This service operates on an hourly frequency, seven days a week.

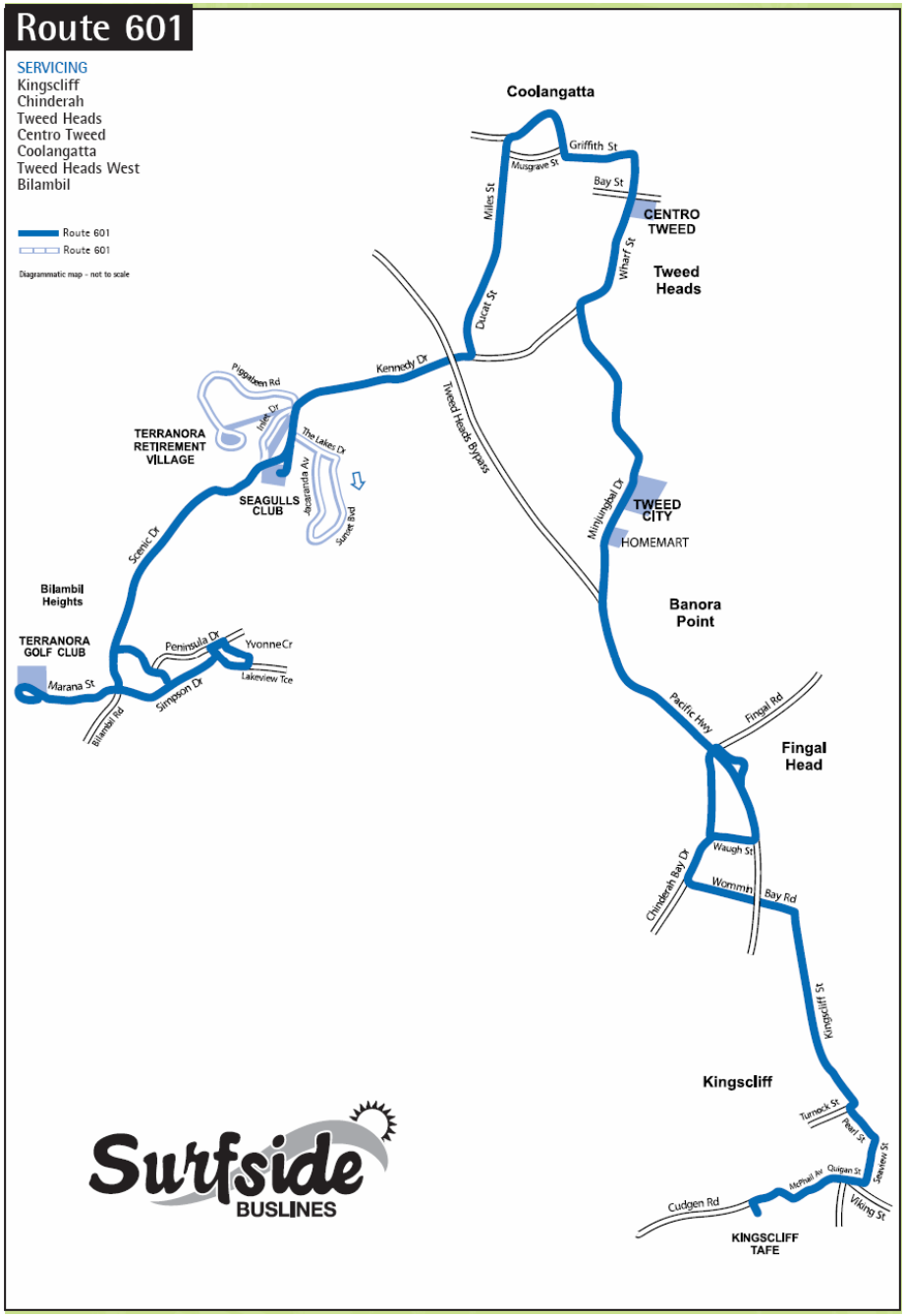


FIGURE 4.1 – EXISTING BUS ROUTE IN THE VICINITY OF THE SITE

5 TRANSPORT PLANNING

5.1 Tweed Road Network Strategy

As shown in Figure 5.1, the Banora Point and Tweed Road Development Strategy (2004) includes the following road network upgrades for the 'Ultimate' scenario:

- Pacific Highway Tugun Bypass
- Cobaki Parkway extending between Piggabeen Road and Boyd Street
- Cobaki Parkway Extension between Piggabeen Road and Scenic Drive, including a connection between McAlisters Road and Cobaki Parkway

The Tugun Bypass is now completed and fully operational. The layout of the Tweed Bypass interchange in relation to the existing Kennedy Drive interchange is shown in Figure 5.2.

5.2 Draft Bilambil Heights Local Area Structure Plan Research

As shown in Figure 5.2, the Draft Bilambil Heights Local Area Structure Plan research conducted by the applicant in discussion with Tweed Shire Council designates the Marana Street – Mountainview Esplanade route and McAlisters Road as *Neighbourhood Connector* roads. Such roads are intended to provide for local travel between and within neighbourhoods and typically carry in the order of 3,000 – 5,000 vehicles per day.

5.3 Future Projected Traffic Demands

Council's traffic model indicates that Scenic Drive will ultimately carry in the order of 10,000 vehicles per day, east of the future Cobaki Parkway Extension, and 8,000 vehicles per day to the west. According to the model, the McAlisters Road extension will also carry in the order of 10,000 vehicles per day.

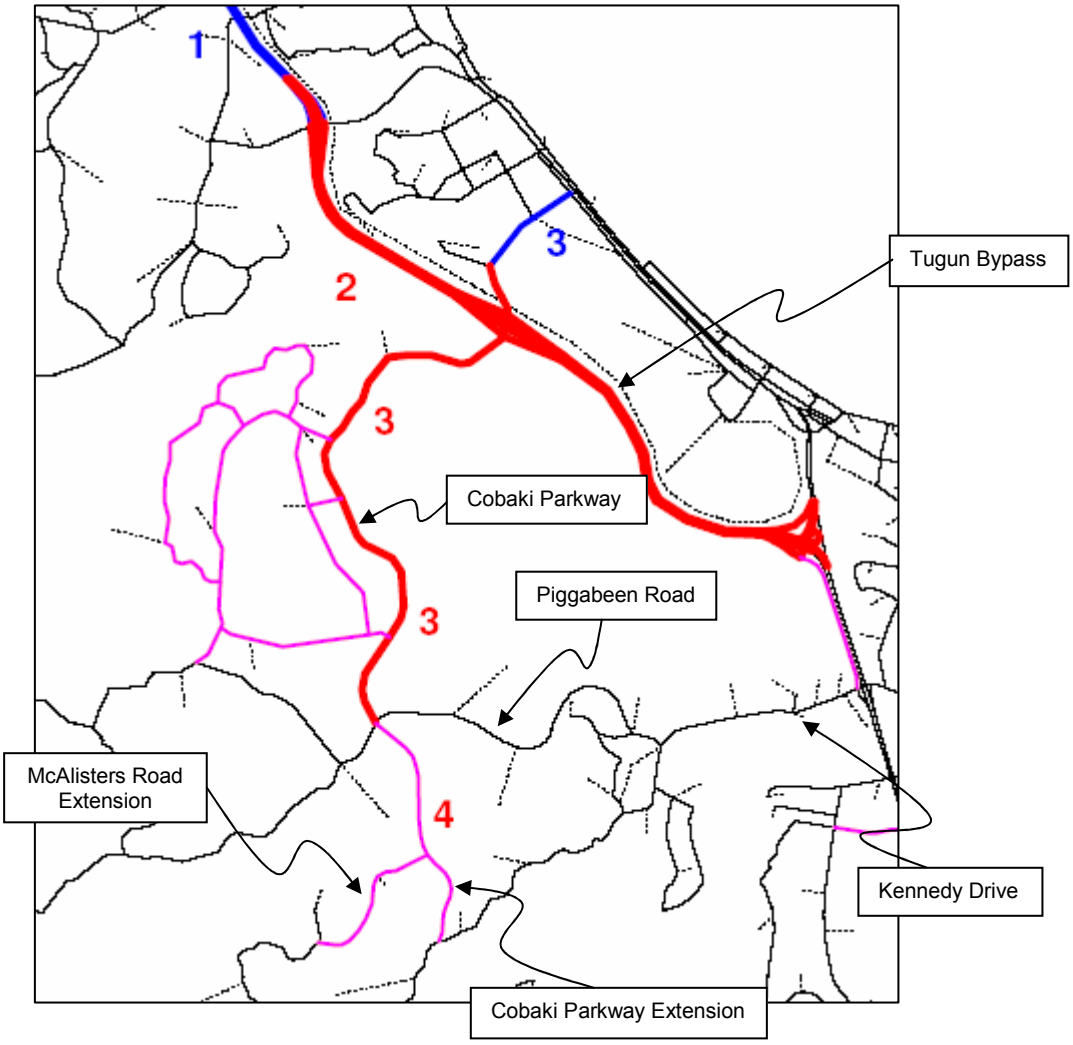


FIGURE 5.1 – PLANNED 'BASE' ULTIMATE ROAD NETWORK
(SOURCE: TWEED & BANORA POINT ROAD NETWORK STRATEGY 2000)

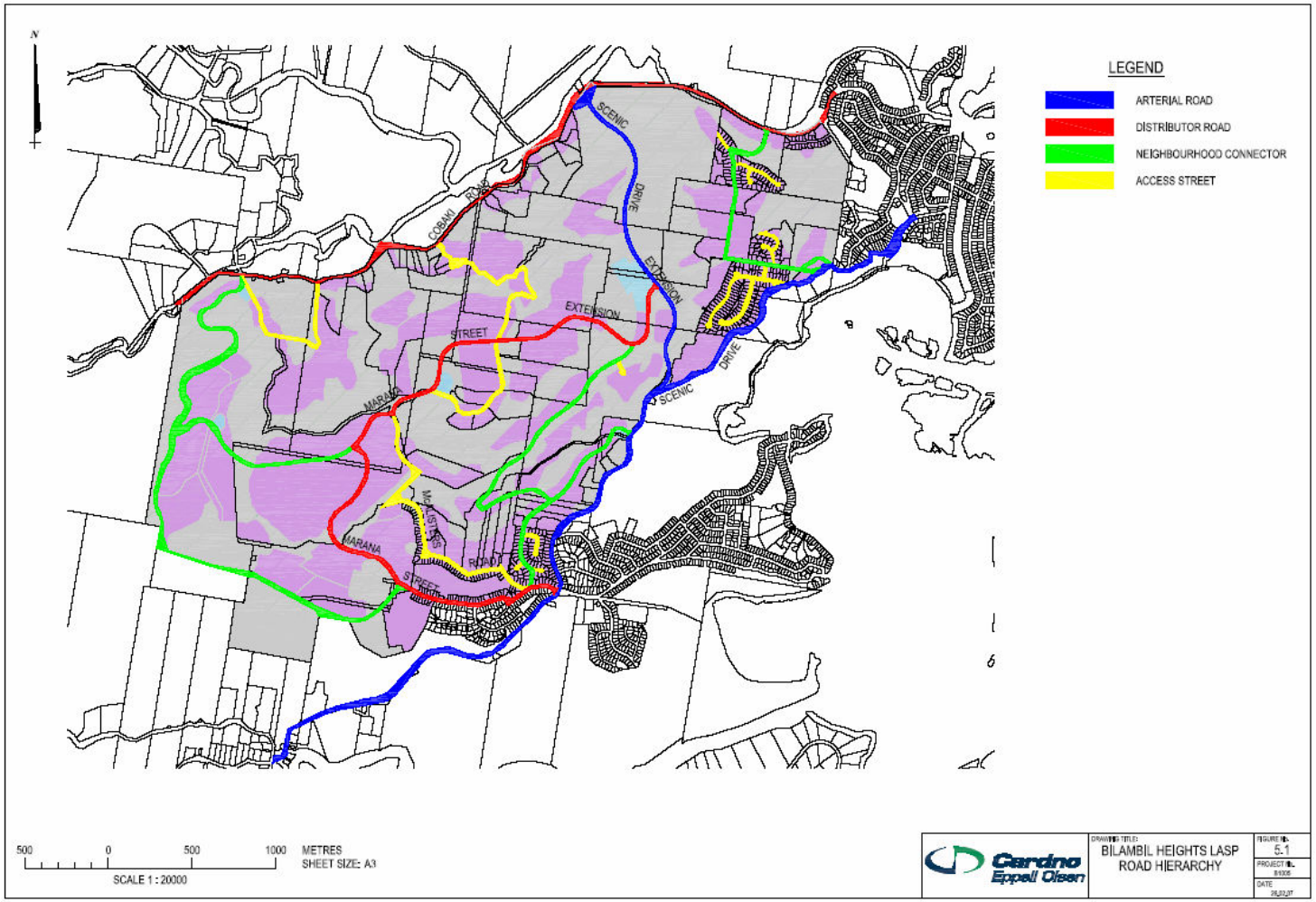


FIGURE 5.2 – PLANNED ROAD NETWORK UNDER BILAMBIL HEIGHTS LOCAL REVIEW

6 DEVELOPMENT TRAFFIC ESTIMATES

6.1 Trip Generation

The location of the subject site together with the type and quality of product proposed, and the mix of uses, is such that the trip generation of the overall development is likely to differ from conventional residential communities. For example, the Master Plan contains a substantial amount of accommodation for retirees and aged persons. Consequently, the proposed commercial uses will be designed to service this market, whilst also benefiting other local residents.

Consideration should also be given to the "self containing" effect of the proposed commercial uses upon the overall impact of the development upon the surrounding road network. In this respect, it is considered appropriate that trip generation rates adopted by the Tweed Road Network Model be used for the assessment of external impacts, together with those recommended by the New South Wales Road and Traffic Authority's *Guide to Traffic Generating Developments* for retirement and aged care development.

The TRCP trip generation rates for various uses within the site are as follows:

Component	**TRCP Trip Rate**
Detached housing[1] -	6.5 daily trips / dwelling
Attached housing and villas[2] -	3.9 daily trips / dwelling
Apartments[2] -	3.9 daily trips / dwelling
Tourist Hotel -	2.48 daily trips / room or unit
Primary or Secondary school -	1.4 daily trips per enrolment
Retirement housing[3] -	2.0 daily trips / dwelling
Aged persons accommodation[4] -	1.0 daily trips / dwelling
Retail / refreshment -	40.0 daily trips / 100m^2 TUA
Commercial services -	10.0 daily trips / 100m^2 TUA

Notes:
[1] Containing four or more bedrooms
[2] Containing less than four bedrooms
[3] To be occupied by retired persons only
[4] Aged persons hostel or nursing home
TUA = Total Use Area

Application of the above rates to the proposed development schedule results in the trip generation estimates shown in Table 6.1.

TABLE 6.1 – DEVELOPMENT EXTERNAL TRIP GENERATION ESTIMATES

Component	Unit	No. Proposed	Trip Rate		No. Trips (vpd)	
			Daily	Peak Hr	Daily	Peak Hr
Detached housing	Dwelling	251	6.5	0.65	1632	163
Attached housing / villa	Dwelling	179	3.9	0.39	698	70
Apartment / SOHO	Dwelling	419	3.9	0.39	1634	163
Hotel Apartment	Unit	160	2.48	0.25	397	40
Retirement dwelling	Dwelling	598	2	0.2	1196	120
Aged persons accom	Bed	200	1	0.1	200	20
Retail / refreshment	100m2 TUA	4447	40	4	1779	178
Commercial services	100m2 TUA	5300	10	1	530	53
School	Enrolments	300	1.4	0.3	420	120
TOTAL					**8,485**	**927**

TABLE 6.2 – DEVELOPMENT EXTERNAL TRIP GENERATION (PEAK HOUR DIRECTIONAL DISTRIBUTION)

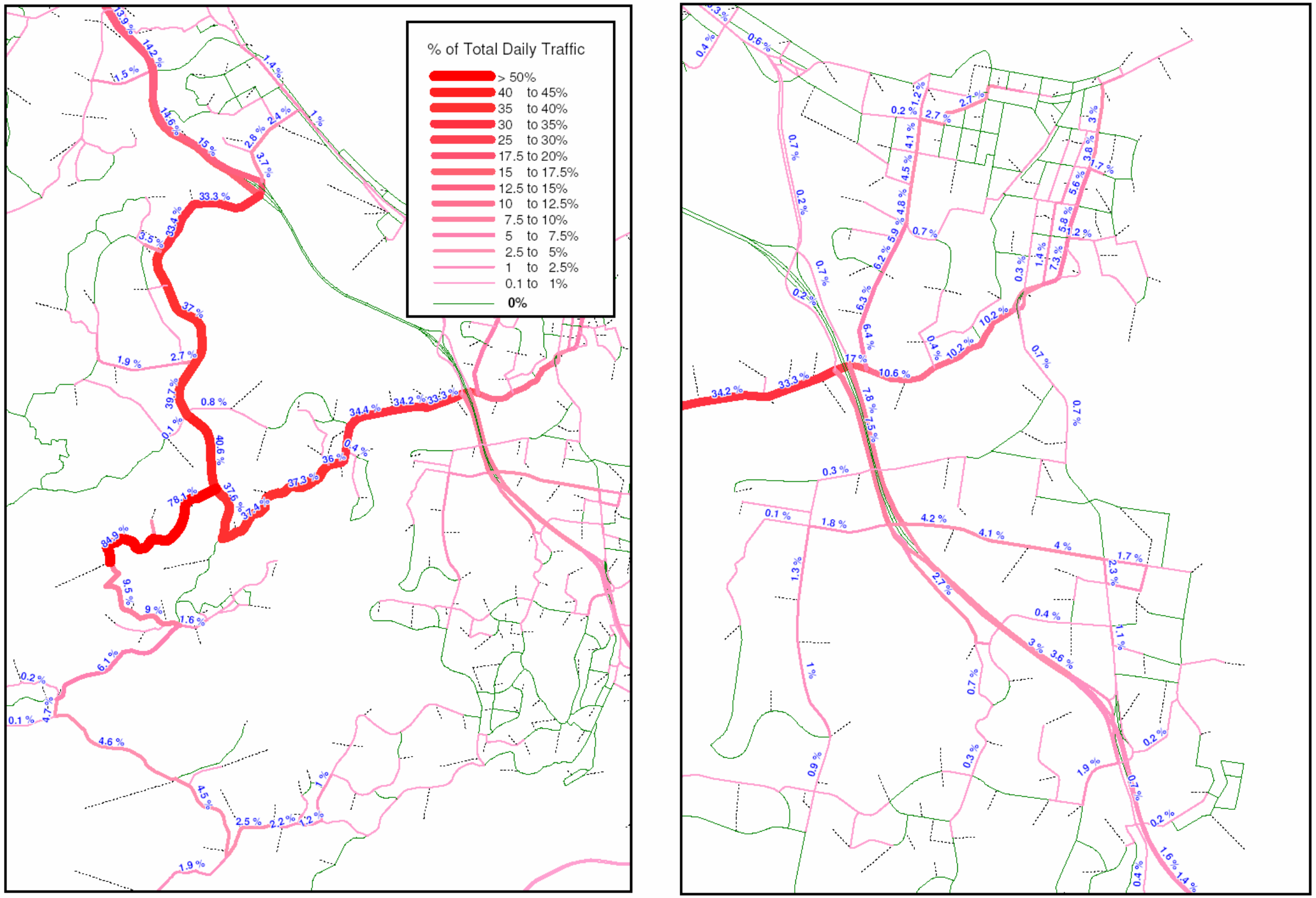
Use	Morning Peak Hour (vph)			Afternoon Peak Hour (vph)		
	In	Out	Total	In	Out	Total
Detached housing	33	130	163	98	65	163
Attached housing / villa	14	56	70	42	28	70
Apartment / SOHO	33	130	163	98	65	163
Hotel Apartments	30	10	40	10	30	40
Retirement dwelling	24	96	120	72	48	120
Aged persons accom	4	16	20	12	8	20
Retail / refreshment	89	89	178	89	89	178
Commercial services	27	27	53	27	27	53
School	70	50	120	50	70	120
TOTAL	**323**	**604**	**927**	**497**	**430**	**927**

Notes: 1) Assumes residential traffic directional split of 80% out / 20% in during the morning peak and 40% out / 60% in during the afternoon peak
2) Retail rate has been applied to mixed use modules

6.2 Trip Distribution

The distribution of traffic generated by development on the subject site has been estimated through use of the Tweed Road Network Model (VLC Zenith Model). VLC have advised the percentage distribution of trips generated by a "zone" which is located approximately over the subject site. It is noted that the zone used for comparison only contains residential development.

Output from the model is provided as Figure 6.1. In summary, the model indicates that traffic generated by the residential component of the development will be approximately as follows:



Forecast Traffic Distribution of Residential Zone on Bilambil Heights (Ultimate Scenario)

FIGURE 6.1 – ESTIMATED PERCENTAGE DISTRIBUTION OF TRAFFIC GENERATED BY RESIDENTIAL DEVELOPMENT ON THE SUBJECT SITE (SOURCE: VLC ZENITH MODEL)

6.3 Road Network Assignment

A summary of the estimated development trip distribution by region and road link is provided in Table 6.3 and 6.4, respectively.

TABLE 6.3 – ESTIMATED DISTRIBUTION OF DEVELOPMENT TRAFFIC (BY REGION)

Origin / Destination	Percentage Distribution of Trips	Development Traffic		
		Daily	Morning Peak Hr	Afternoon Peak Hr
Pacific Highway (North)	30%	1727	173	173
Gold Coast via Boyd Street	4%	230	23	23
Tweed Heads via Kennedy Drive	10%	576	58	58
Coolangatta via Ducat St	6%	345	35	35
Pacific Highway (South)	15%	863	86	86
Bilambil Road	6%	345	35	35

TABLE 6.4 – ESTIMATED DISTRIBUTION OF DEVELOPMENT TRAFFIC (BY ROAD LINK ASSUMING ULTIMATE DEVELOPMENT & ULTIMATE ROAD NETWORK)

Origin / Destination	Percentage Distribution of Trips	Development Traffic		
		Daily	Morning Peak Hr	Afternoon Peak Hr
Pacific Highway (North of Tugun)	30%	1727	173	173
Pacific Highway (South of Kennedy)	15%	863	86	86
Boyd Street	4%	230	23	23
Kennedy Dr (West of Hwy)	34%	1957	196	196
Kennedy Dr (East of Hwy)	10%	576	58	58
Ducat Street	6%	345	35	35
Gollan Drive	37%	2130	213	213
Scenic Drive	15%	863	86	86
Cobaki Road	20%	1151	115	115
Cobaki Parkway	37%	2130	213	213
Piggabeen Road	1%	58	6	6
Marana Street	10%	576	58	58
McAlisters Road Extension	60%	3454	346	346

An interpretation of the model output shown in Figure 6.1 indicates that the impact of traffic generated by the entire development upon the existing road network would be as shown in Table 6.5.

TABLE 6.5 – ESTIMATED DISTRIBUTION OF DEVELOPMENT TRAFFIC (BY ROAD LINK ASSUMING ULTIMATE DEVELOPMENT & EXISTING ROAD NETWORK)

Origin / Destination	Percentage Distribution of Trips	Development Traffic		
		Daily	Morning Peak Hr	Afternoon Peak Hr
Gold Coast Hwy through Bilinga	34%	1957	196	196
Pacific Highway (South of Kennedy)	15%	863	86	86
Kennedy Dr (West of Hwy)	68%	3914	392	392
Kennedy Dr (East of Hwy)	10%	576	58	58
Ducat Street	6%	345	35	35
Gollan Drive	35%	2015	202	202
Scenic Drive	40%	2303	230	230
Cobaki Road	50%	2878	288	288
Piggabeen Road	47%	2706	271	271
Marana Street	50%	2878	288	288

7 ROAD NETWORK IMPACT

7.1 Road Capacity

General

Future road network capacity requirements have been examined by Council through the *Tweed and Banora Point Road Network Strategy*. As discussed previously, the proposed scale of development on the subject site is similar (in fact less) than that allowed by Council in Tweed Road Network Model. Consequently, in the long term, the proposed development will not trigger the need for additional road network capacity than the level of development already allowed for.

The allowable impact of development on the subject site upon Kennedy Drive was established during the assessment of the currently approved Resort proposal. There is a need, therefore, to determine what scale and type of development can occur on the site prior to the extension and connection of Cobaki Parkway to Boyd Street, and what road upgrade works are required to mitigate the impact of traffic generated.

As demonstrated in Section 6, it is considered that the proposed development will have a significant impact upon the following road network elements:

- Scenic Drive
- Kennedy Drive
- Gollan Drive
- Marana Street – McAlisters Road
- Cobaki Road
- Piggabeen Road

Kennedy Drive, Scenic Drive & Gollan Drive

The traffic carrying capacity of Kennedy Drive has been studied in detail by the Tweed Shire Council. However, the scope of this assessment has been limited to a review of mid-block capacity with a view to establishing policy regarding how much development can occur west of the Cobaki Bridge, until the planned Cobaki Parkway route to Boyd Street (Tugun) is constructed.

The latest assessment, completed in June 2007, concludes that Kennedy Drive can carry up to 24,650 vehicles per day before development should cease. A trip generation of 2,660 vehicles per day on Kennedy Drive has been allocated to the subject site under the current Resort approval.

As discussed in Section 6, modeling undertaken by VLC indicates that only 68% of residential trips use Kennedy Drive with the balance dissipating throughout the local network or traveling south via Bilambil Road. Therefore, the proposed development would need to have a total external trip generation of approximately 3,911 vehicles per day (i.e. 2,660 vpd / 0.68) in order to generate 2,660 vehicles per day on Kennedy Drive.

Marana Street & McAlisters Road

Marana Street and McAlisters Road provide direct access to residential dwellings and have a 'neighbourhood connector' function in the local road network. Commonly applied sources, including AMCORD and the RTA *Guide to Traffic Generating Developments* consider such roads as having capacity for up to approximately 5,000 vehicles per day.

Traffic counts undertaken by CRG indicate that McAlisters Road currently carries in the order of 2,000 vehicles per day, between Scenic Drive and Mountain View Esplanade. Marana Street and other Mountain View Esplanade carries less than this volume, however, given that McAlisters Road is the only route into the catchment, it must be adopted as the control point.

It is considered, therefore, that the proposed development can generate up to 3,000 vehicles per day on Marana Street, Mountain View Esplanade and McAlisters Road before the environmental capacity of the McAlisters Road is reached.

As indicated by Tables 6.4 and 6.5, it is estimated that the proposed development would generate almost 3,000 vehicles per day on Marana Street, under current road network conditions, if the proposed Spine Road through the site is connected to Cobaki Road during the early stages of the development. This volume on Marana Street will reduce significantly when Marana Street is extended through the subject site and connected to McAlisters Road as future development occurs in the urban release area.

Under the current Resort approval over the site, traffic control devices are required to be implemented in Marana Street. It is recommended that this condition remain for the proposed development.

It is also recommended that the western section of Marana Street be upgraded so that the pavement width is consistent with the eastern section of the street. Kerb and channeling should also be provided on the northern side of the road.

Cobaki Road & Piggabeen Road

It is estimated that the proposed development will generate in the order of 3,000 vehicles per day on Cobaki Road, however, this will reduce to approximately 1,200 vehicles per day when the ultimate road network is completed.

It is recommended that the requirement under the current approval for Cobaki Road to be upgraded to a 7 metre seal over a 9 metre formation, be retained for the proposed development.

7.2 Intersection Upgrade Requirements

The capacity of the following intersection has been analysed using SIDRA software:

- Scenic Drive / McAlisters Road / Simpsons Drive / Bilambil Road
- Piggabeen Road / Gollan Drive / Kennedy Drive.

The following comments are provided in relation to each of the critical intersections located external to the site.

Scenic Drive / McAlisters Road / Simpsons Drive / Bilambil Road

The Scenic Drive / McAlisters Road intersection consists of a four way priority junction with Scenic Drive – Bilambil Road being the major road.

Safety deficiencies exist at the intersection due to the following:

- Poor visibility due to the alignment of the Bilambil Road (south) leg;
- High pedestrian activity during school periods.

SIDRA analysis (see Appendix C) indicates that the existing intersection configuration will satisfactorily accommodate predicted traffic volumes. However, it is considered that the intersection should be signalised in order to address the above safety deficiencies. It would be reasonable for the proposed development to undertake the construction of, or contribute towards the cost of such works.

McAlisters Road / Marana Street

This intersection has recently been reconstructed as a 'staggered T junction' and will function adequately under projected traffic conditions.

Piggabeen Road / Gollan Drive / Kennedy Drive

SIDRA analysis (see Appendix C) indicates that this intersection is reaching capacity and will require upgrading as part of the proposed development. The approved development (resort) over the site is required to implement a roundabout at the Piggabeen Road / Gollan Drive / Kennedy Drive intersection, with the cost of which credited back through the TRCP charges.

It is considered reasonable that a similar condition be applied to the proposed development when the project's traffic demand requires the upgrade to occur.

Cobaki Road / Proposed New Road

It is proposed that Cobaki Road be realigned in the vicinity of the subject site so that the proposed new road has priority over the western leg. This would be desirable when the proposed spine road is constructed through the project given the expected traffic volume on the new road as a consequence of the proposed development (approx. 3,000 vehicles per day).

8 PROPOSED ROAD NETWORK

As shown in Figure 8.1, it is proposed that all roads within the estate will be privately owned and managed, except for those that connect with the existing and proposed external road network.

The 'Spine Road', which will extend between Marana Street and Cobaki Road will function as a two lane Neighbourhood Connector Road. Its speed limit is likely to be set at 50 Km / Hr and will generally carry in the order of 3,000 – 4,000 vehicles per day. Minor road intersections with this road will be constructed as simple priority T junctions with only the intersection of the two public roads constructed as a roundabout subject to detailed design at Development Application stage. The 'Spine Road' has been designed so that it could become a public or school bus route, if required in the future.

The private road network has been designed in accordance with 'traditional neighbourhood' planning principles, whereby the emphasis is on connectivity and mobility, and encouraging residents to walk / cycle throughout the estate rather than have to drive.

Rear lanes have been included within the proposed private road network so to achieve a better urban form along major thoroughfares. The private road network has been designed to facilitate satisfactory access for refuse and fire trucks.

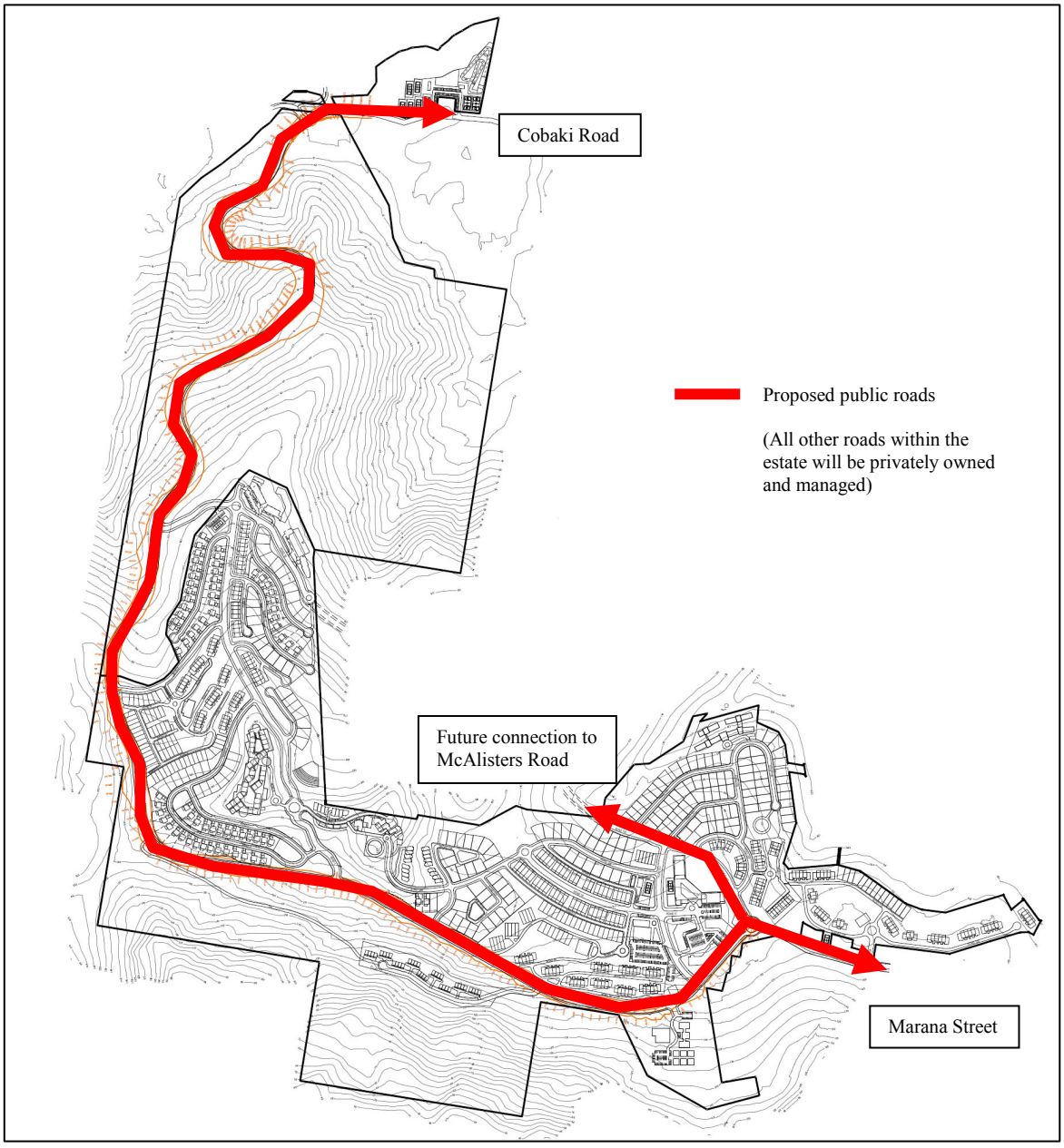


FIGURE 8.1 – PROPOSED ROAD NETWORK CONFIGURATION

9 PUBLIC TRANSPORT CONSIDERATIONS

With the knowledge that the Tweed Shire Council's public transport contractor Surfside Bus Lines (Surfside) currently provides a bus service to the west end of Marana Street, the applicant met with the strategic planning manager of Surfside on the 27th February 2009 and discussed Surfside's views on an amended public bus service that might be generated out of the development of the Rise project.

Surfside stated that:

i. They would not enter the proposed Rise Town Centre as their policy is now not to internally service regional or local shopping centres / villages because of the traffic congestion that is created by buses clashing with passenger vehicles.

ii. They would support a bus stop on the planned Spine Road immediately adjacent to the Rise Town Centre.

iii. They would support probably 2 to 3 new bus stops on the proposed Spine Road, likely to be located adjacent to intersections with the proposed Rise private roads.

iv. They could not comment on the requirements for any subsidies until further negotiations occurred between Surfside and the NSW Department of Transport which would occur some time in the future as the Rise project and the Bilambil Heights Urban Release Area expanded. This is because the future requirements for new bus routes will be determined by the Department of Transport and Surfside would be requested by the Department to initially supply a test service to assess its viability.

10 PROVISION FOR PEDESTRIANS & CYCLISTS

The Rise project has been designed with a heavy emphasis placed on pedestrian, cycle and golf buggy usage. The proposed private road system has taken these non motor vehicle uses into account and promotes the minimal use of motor vehicles throughout the estate.

Specific urban and road cross section designs have been included to encourage pedestrian to walk, residents and guests to cycle, and residents to use golf carts to all points of interest within the estate.

Where private pedestrian, golf cart and cycle routes cross public roads (two locations only) it is planned that underpasses will be constructed to allow the private routes to be continuous throughout the project.

The Urban Planning of Rise is such that at completion, resident and guests will not have to walk, cycle or golf cart any further that 400 to 500m to a local convenience node, hence promoting the non use of motor vehicles throughout the estate.

11 SUMMARY OF CONCLUSIONS & RECOMMENDATIONS

Subject Site

The subject site is located adjacent to Marana Street and McAlisters Road at Bilambil Heights and extends to Cobaki Road at Piggabeen. The site is located approximately 10 minutes (drive) from the Pacific Highway at West Tweed, and 15 minutes from the Tweed Heads Central Business District.

The site forms part of the former Terranora Lakes Country Club and golf course. This Club, which ceased operating in 1996, was once a popular and successful Club providing a variety of indoor and outdoor recreational activities including tennis, golf, gaming and dining.

Current Development Approval over Subject Site

In 1997, the site was approved by the Tweed Shire Council for the development of an integrated resort. The approval was modified in 2001 to allow for the following staging and scale of development:

Stage 1 –	Hotel comprising of 74 suites & modify existing golf course
Stage 2 –	38 x 3 & 4 bedroom villas
Stage 3 –	88 x 2 br units, 8 x 3 br units, 4 x 4 br units (100 units) New 18 hole golf course
Stage 4 –	New additional 9 hole golf course Village Square, restaurants, convention centre, 400 hotel units, 104 x 2 bedroom units, arts & crafts centre, environmental centre & walking tracks
Stage 5 -	144 x 2 bedroom units
Stage 6 -	40 x 2 bedroom units
Stage 7 -	40 x 2 bedroom units
Total No. of Accommodation Units -	474 hotel suites & 466 x 2, 3 & 4 bedroom units & villas

It is noted that the current approval only allows Stages 4 – 7 to be developed after the Cobaki Parkway is constructed, together with its connections to Piggabeen Road and the Tugun Bypass.

Proposed Concept Plan

As indicated below, the proposed Concept Plan comprises a residential community with varying forms of dwelling types and commercial uses. Access to the external road network will ultimately be gained via Marana Street, Cobaki Road and an extension of McAlisters Road to Scenic Drive.

The proposed Concept Plan contains a range of residential densities and commercial uses. A summary of the proposed development yield is provided as follows:

Residential / Accommodation -	
Detached house lots -	251
Apartments -	403
Hotel Apartments -	160
Villas and townhouses -	176
SOHO units -	16
Retirement cottages -	100
Retirement apartments -	486
Retirement villas -	12
Nursing home beds -	200
Non – Residential -	
Retail (incl. tavern) -	4,447m^2
Commercial -	5,300m^2
Health spa -	600m^2
School -	1 site (approx. 300 enrolments)

Traffic Impact

The traffic carrying capacity of Kennedy Drive has been studied in detail by the Tweed Shire Council. However, the scope of this assessment has been limited to a review of mid-block capacity with a view to establishing policy regarding how much development can occur west of the Cobaki Bridge, until the planned Cobaki Parkway route to Boyd Street (Tugun) is constructed.

The latest assessment, completed in June 2007, concludes that Kennedy Drive can carry up to 24,650 vehicles per day before development should cease. A trip generation of 2,660 vehicles per day on Kennedy Drive has been allocated to the subject site under the current Resort approval. Modeling undertaken by VLC indicates that only 68% of residential trips use Kennedy Drive with the balance dissipating throughout the local network or traveling south via Bilambil Road. Therefore, the proposed development would need to have a total external trip generation of approximately 3,911 vehicles per day (i.e. 2,660 vpd / 0.68) in order to generate 2,660 vehicles per day on Kennedy Drive.

The Marana Street – Mountain View Esplanade – McAlisters Road route will function as a Neighbourhood Connector route in the local road network, and have capacity for up to 5,000 vehicles per day (vpd). McAlisters Road currently carries in the order of 2,000 vpd, leaving approximately 3,000 vpd available for the proposed development. However it is noted that Marana Street, Mountain View Road and McAlisters Road previously carried a much heavier traffic load when the Terranora Country Club was fully functioning in the past. Whilst the future ultimate road network will enable development traffic to spread throughout the network, care should be taken in the sequencing of development to ensure that this capacity is not exceeded prior to other road network elements (such as the Spine Road and Cobaki Road upgrade) being constructed.

Required Road Upgrade Works

It is considered that the following road upgrade works will be required as a consequence of the proposed development:

- Widening of Cobaki Road, between the site and the Cobaki Parkway intersection, to a 7 metre seal over a 9 metre formation (as per the current approval over the site) when the construction of the Spine Road occurs.

- Construction of or contribution towards a roundabout at the Kennedy Drive / Gollan Drive / Piggabeen Road intersection (as per the current approval over the site) when the traffic demand from the Rise project dictates this requirement.

- Provision of traffic control devices in Marana Street (as per the current approval over the site) during the early stages of the project.

- Pavement widening and kerb and channelling at the western end and on the northern side of Marana Street during the early stages of the project.

- It is also considered reasonable that the proposed development be required to undertake the construction of or contribute towards the implementation of traffic signals at the Scenic Drive / McAlisters Road intersection, in order to address existing and increasing safety deficiencies at the intersection when the project's traffic demand requires the upgrade to occur.

APPENDICES

A1 Surveyed Intersection Traffic Volumes - AM Peak Hour (2009)
A2 Surveyed Intersection Traffic Volumes - PM Peak Hour (2009)
A3 Surveyed Mid-block Traffic Volumes (2009)

B1 Estimated Development traffic volumes (AM Peak Hour Full Development / Existing road conditions)
B2 Estimated Development traffic volumes (AM Peak Hour – Full Development / Existing road conditions)

C1 Guidelines for the Interpretation of SIDRA Results
C2 SIDRA analysis – Scenic Dr / McAlisters Road / Simpson Road / Bilambil Road
C3 SIDRA analysis – Gollan Drive / Piggabeen Road

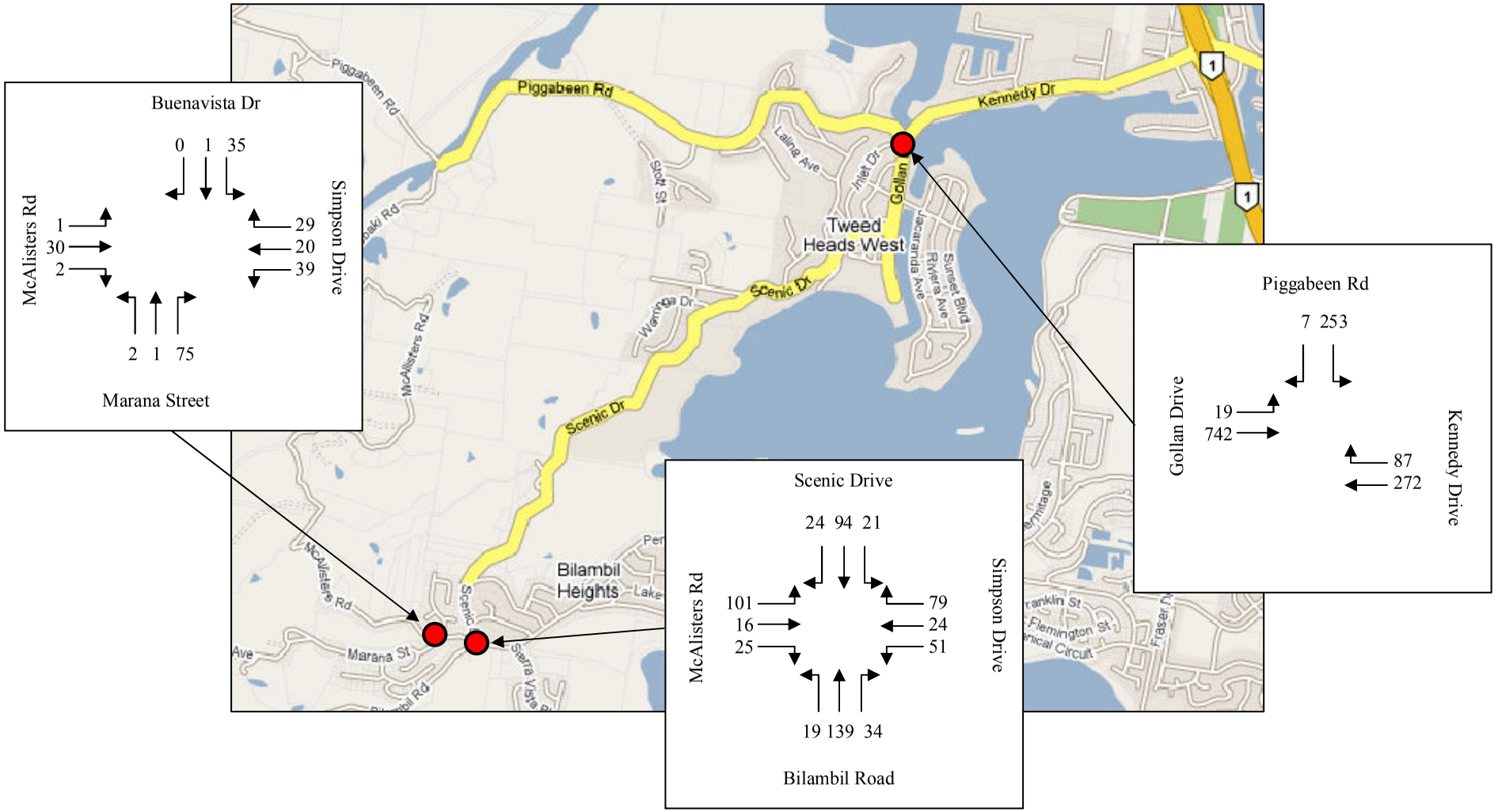


FIGURE A1 – SURVEYED INTERSECTION TRAFFIC VOLUMES – AM PEAK HOUR (2009)

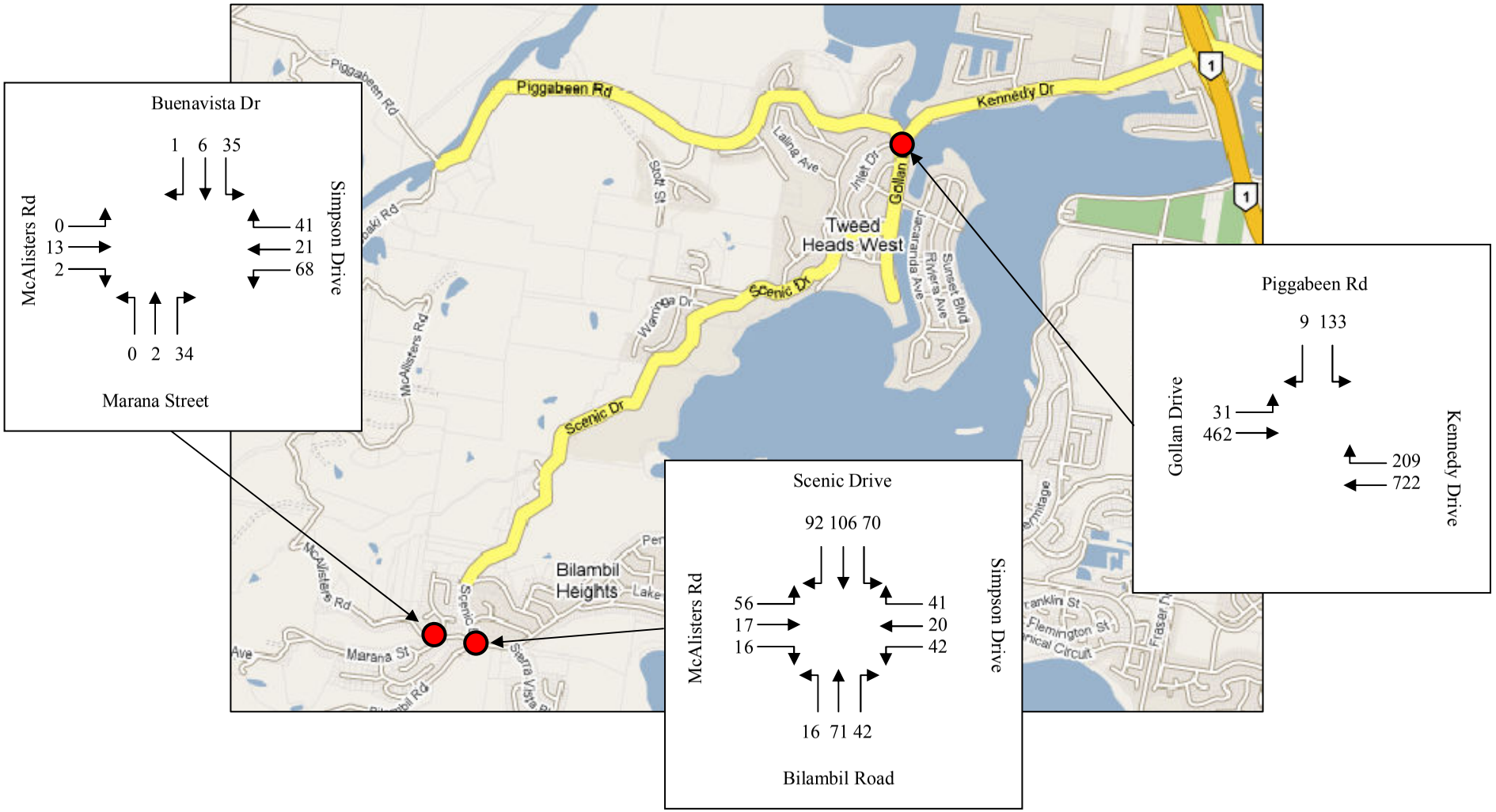


FIGURE A2 – SURVEYED INTERSECTION TRAFFIC VOLUMES – PM PEAK HOUR (2009)

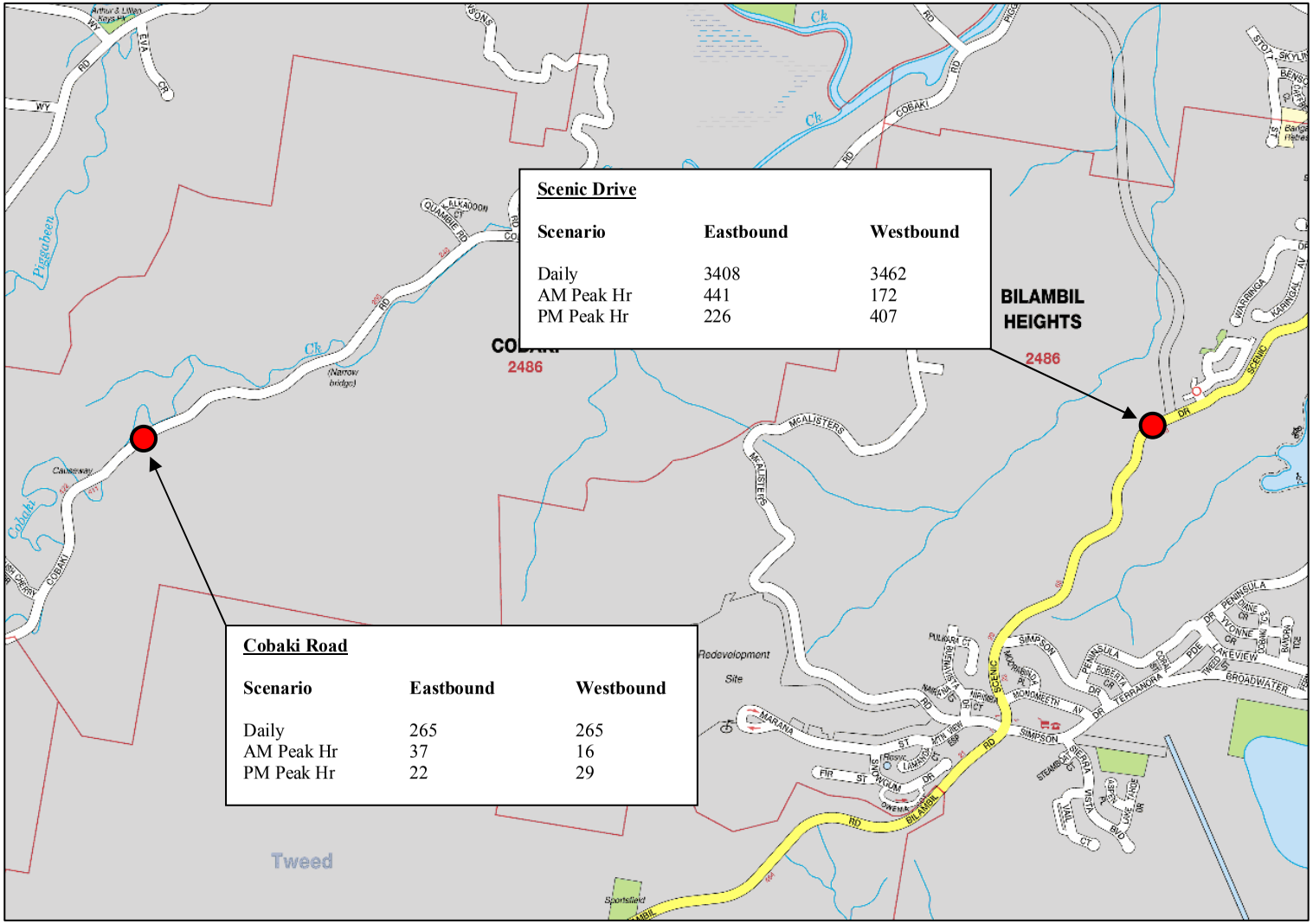


FIGURE A3 – SURVEYED MID-BLOCK TRAFFIC VOLUMES (2009)

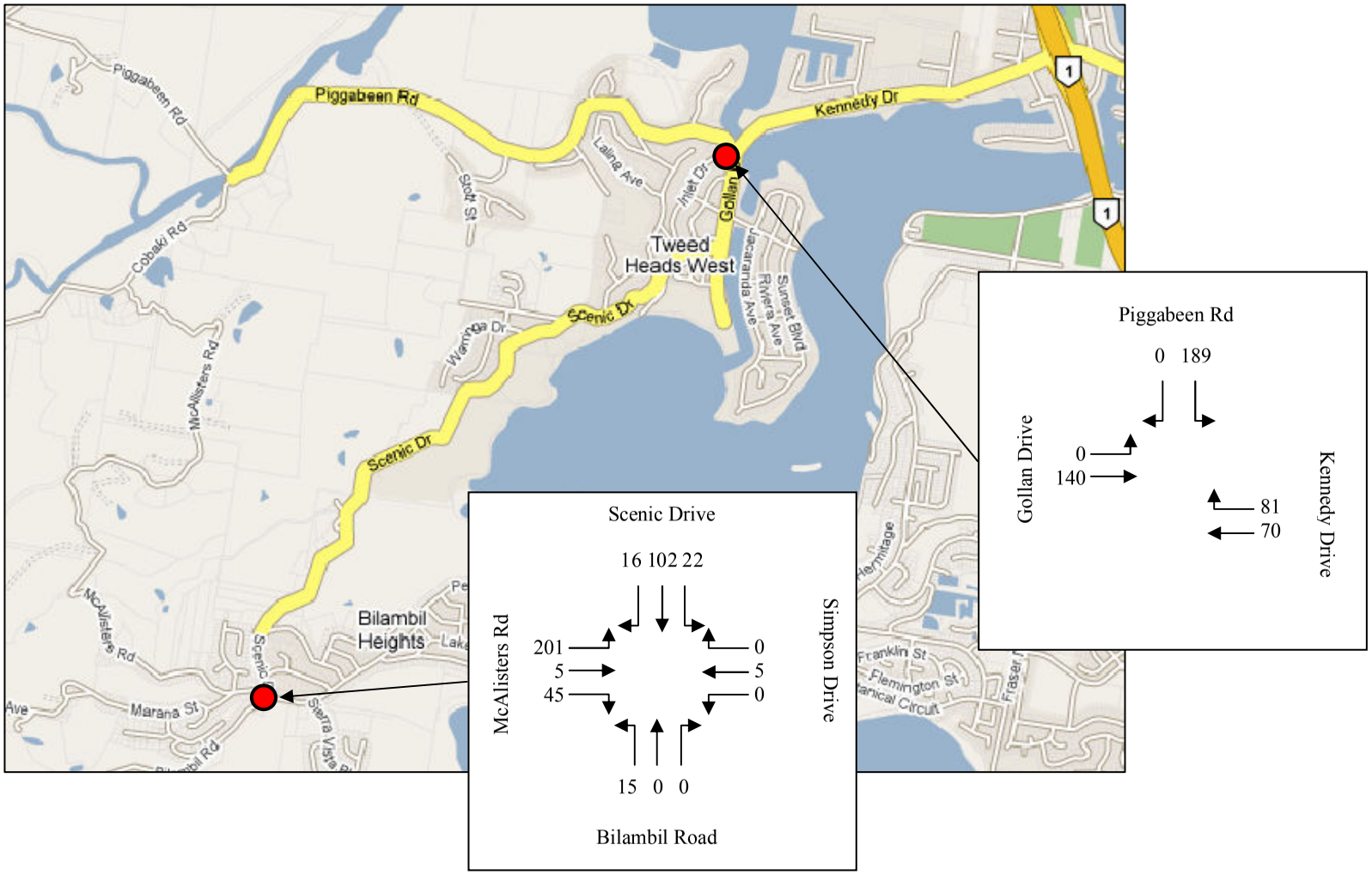


FIGURE B1 – ESTIMATED DEVELOPMENT TRAFFIC VOLUMES (AM PEAK HR, FULL DEVELOPMENT)

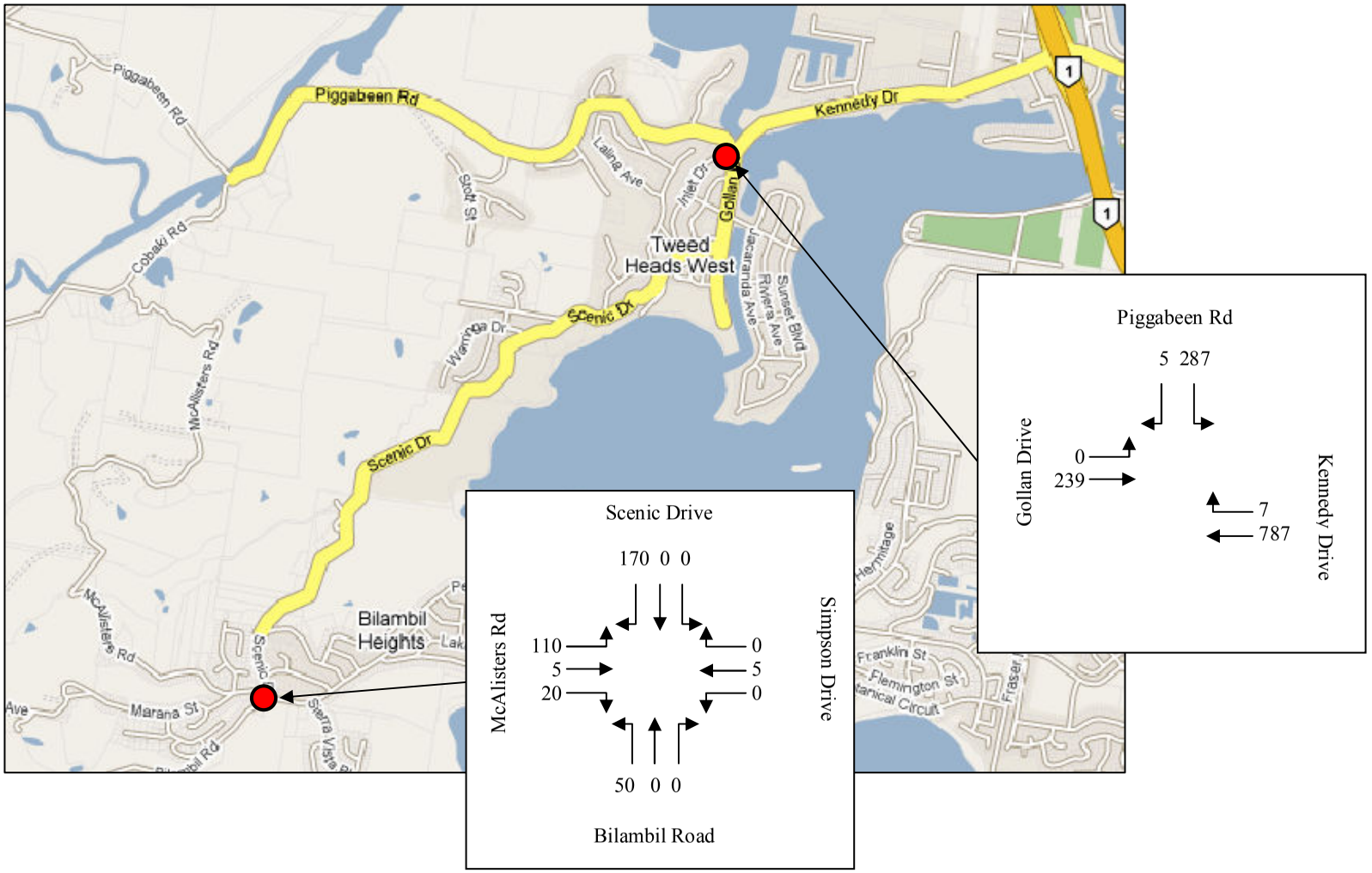


FIGURE B2 – ESTIMATED DEVELOPMENT TRAFFIC VOLUMES (PM PEAK HR, FULL DEVELOPMENT)

APPENDIX C1 - Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

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

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

1 *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

APPENDIX C2 - RESULTS OF SIDRA ANALYSIS OF
SCENIC DRIVE / McAlisters ROAD / SIMPSONS DRIVE / BILAMBIL ROAD INTERSECTION
(4 –WAY INTERSECTION)

AVERAGE VEHICLE DELAYS

Key Indicators		Existing Traffic Demand (2007)		Projected Development Traffic Demand (2007)	
		AM	**PM**	**AM**	**PM**
Degree of Saturation		0.143	0.114	0.503	0.470
Average Vehicle Delay (sec/veh)					
Bilambil Road (South)	L T R	8.4 0.5 8.7	8.8 0.9 9.1	8.4 0.5 8.7	8.8 0.9 9.1
Simpson Drive (East)	L T R	8.7 10.0 11.2	9.0 10.9 12.1	8.7 13.5 14.8	9.0 13.9 15.1
Scenic Drive (North)	L T R	8.2 0.0 8.7	8.2 0.0 8.6	8.2 0.0 8.8	8.2 0.0 8.7
McAlisters Road (West)	L T R	8.7 9.5 11.0	8.5 10.5 12.0	9.7 10.6 12.1	9.4 11.6 13.1
TOTAL AVERAGE VEHICLE DELAY		**5.9**	**6.7**	**7.9**	**8.1**

FIGURE C1(A) – SIDRA ANALYSIS – SCENIC DR / SIMPSON ROAD / MCALISTERS ROAD

APPENDIX C2 - RESULTS OF SIDRA ANALYSIS OF
SCENIC DRIVE / McAlisters ROAD / SIMPSONS DRIVE / BILAMBIL ROAD INTERSECTION
(4 –WAY INTERSECTION)

QUEUE LENGTHS (m)

Key Indicators		Existing Traffic Demand (2007)		Projected Development Traffic Demand (2007)	
		AM	**PM**	**AM**	**PM**
95%^{ile} Queue Length (m)					
Bilambil Road (South)	L T R	4 4 4	4 4 4	5 5 5	4 4 4
Tweed Coast Road (South approach)	L T R	2 4 4	2 3 3	2 7 7	2 5 5
Morton Street	L T R	0 0 0	0 0 3	0 0 2	0 0 5
Tweed Coast Road (North approach)	L T R	2 2 2	2 2 2	12 5 5	10 6 6

FIGURE C1(B) – SIDRA ANALYSIS – SCENIC DR / SIMPSON ROAD / MCALISTERS ROAD

APPENDIX C3 - RESULTS OF SIDRA ANALYSIS OF
GOLLAN DRIVE / KENNEDY DRIVE / PIGGABEEN ROAD INTERSECTION
(3 –WAY INTERSECTION)

AVERAGE VEHICLE DELAYS

Key Indicators		Existing Traffic Demand (2007)		Projected Development Traffic Demand (2007)	
		AM	**PM**	**AM**	**PM**
Degree of Saturation		0.425	0.539	0.703	2.499
Average Vehicle Delay (sec/veh)					
Gollan Drive (South)	L T	8.2 0.0	8.2 0.0	8.2 0.0	8.2 0.0
Kennedy Drive (North)	T R	0.0 9.6	0.0 19.6	0.0 10.8	0.0 37.4
Piggabeen Road (West)	L R	10.8 35.8	24.1 52.4	16.3 63.6	64.8 1468.0
TOTAL AVERAGE VEHICLE DELAY		**2.8**	**3.9**	**5.1**	**112.9**

FIGURE C2(A) – SIDRA ANALYSIS – GOLLAN DR / KENNEDY DR / PIGGABEEN ROAD

APPENDIX C3 - RESULTS OF SIDRA ANALYSIS OF
GOLLAN DRIVE / KENNEDY DRIVE / PIGGABEEN ROAD INTERSECTION
(3 –WAY INTERSECTION)

QUEUE LENGTHS (m)

Key Indicators		Existing Traffic Demand (2007)		Projected Development Traffic Demand (2007)	
		AM	PM	AM	PM
95%^{ile} Queue Length (m)					
Gollan Drive (South)	L T	0 0	0 0	0 0	0 0
Kennedy Drive (North)	T R	0 0	0 3	0 4	0 21
Piggabeen Road (West)	L R	17 1	17 2	56 2	60 483

FIGURE C2(B) – SIDRA ANALYSIS – GOLLAN DR / KENNEDY DR / PIGGABEEN ROAD

TABLE 4.1 - RESULTS OF SIDRA ANALYSIS OF GOLLAN DRIVE / KENNEDY DRIVE / PIGGABEEN ROAD INTERSECTION (PROPOSED ROUNDABOUT) AVERAGE VEHICLE DELAYS					
Key Indicators		**Existing Traffic Demand (2007)**		**Projected Development Traffic Demand (2007)**	
		AM	**PM**	**AM**	**PM**
Level of Service		N/A	N/A	A	A
Degree of Saturation		N/A	N/A	0.646	0.688
Average Vehicle Delay (sec/veh)					
Gollan Drive (South)	L T	N/A	N/A	7.5 5.7	7.8 6.2
Kennedy Drive (North)	T R	N/A	N/A	6.0 11.8	5.6 11.4
Piggabeen Road (West)	L R	N/A	N/A	9.1 13.8	17.6 19.4
TOTAL AVERAGE VEHICLE DELAY		**N/A**	**N/A**	**7.1**	**8.4**

FIGURE C2(C) – SIDRA ANALYSIS – GOLLAN DR / KENNEDY DR / PIGGABEEN ROAD

TABLE 4.2 - RESULTS OF SIDRA ANALYSIS OF GOLLAN DRIVE / KENNEDY DRIVE / PIGGABEEN ROAD INTERSECTION (PROPOSED ROUNDABOUT) QUEUE LENGTHS (m)					
Key Indicators		**Existing Traffic Demand (2007)**		**Projected Development Traffic Demand (2007)**	
		AM	**PM**	**AM**	**PM**
95%[ile] Queue Length (m)					
Gollan Drive (South)	L T	N/A	N/A	4 17	15 63
Kennedy Drive (North)	T R	N/A	N/A	30 30	15 15
Piggabeen Road (West)	L R	N/A	N/A	27 0	44 1

FIGURE C2(D) – SIDRA ANALYSIS – GOLLAN DR / KENNEDY DR / PIGGABEEN ROAD