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Traffic Impact Assessment for Bellvista II Development Caloundra

Prepared for Stockland

November 2010



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EXECUTIVE SUMMARY

This traffic impact assessment has been prepared for Stockland for submission to the Urban Land Development Authority (ULDA) as part of two Reconfiguration of Lot applications for the Bellvista II precincts of the Caloundra South Urban Development Area (UDA). This report provides assessment of the latest proposed layout and builds on earlier assessments previously issued to local and State government (Cardno Eppell Olsen report August 2010).

The site is located adjacent to Bellvista Boulevard, in Caloundra West. The proposed development will comprise of the following applications:

- Application 1, for 233 detached residential lots plus two medium density sites (for approximately 12 dwellings);
- Application 2, for 410 detached residential lots plus three medium density sites (for approximately 41 dwellings);
- Combined, for 643 detached residential lots (plus potential for 53 medium density dwellings).

It is noted that at the time of traffic analysis the yield was conservatively assumed to be higher, and the following report is based on up to 750 residential dwellings where Application 1 consisted of 249 residential dwellings while Application 2 (future development) consisted of up to the remaining 501 residential dwellings. Using these conservative yields, the Bellvista II site, once completed, will generate around 571 trips each peak hour to and from Caloundra Road. The impact of the development onto the surrounding road network has been assessed based on up-to-date traffic count data.

The assessment is based on previous conservative assumption of up to 750 dwellings compared to the currently proposed maximum of 696 dwellings, which equates to 5,700 vehicles per day (vpd) compared to 5,462vpd for the actual proposed yield. The assessment concludes the following:

- upgrading is required at the Caloundra Road/Bellvista Boulevard roundabout by 2011 irrespective of the development;
- with the minor upgrading of an additional 60m approach lane to the Bellvista Boulevard approach, the intersection operates acceptably for:
 - Application 1 through to its design horizon (year 2022);
 - Applications 1 and 2 combined until 2015.
- a major upgrade at the Caloundra Road/Bellvista Boulevard roundabout consisting of the eastbound through lanes being reconstructed as designated continuous through lanes allows the intersection to operate acceptably with Applications 1 and 2 until 2023;

- by 2024, the upgraded intersection would operate above its limits of acceptability in the AM Peak;
- duplication of Bellvista Boulevard is not required;
- the proposed road hierarchy and access layout are considered acceptable, whereby further detail is to be provided at the detail design stage.

It is considered that with the conservative assumptions used (and also potential future road links to developments further south which would alter traffic distribution from the subject site) that, with the provision of the mitigations above, there are no traffic aspects to preclude the approval of the proponent's Reconfiguration of Lot applications.

1.0 INTRODUCTION

1.1 Background

Cardno Eppell Olsen has been commissioned by Stockland to provide a traffic impact assessment for a proposed mixed use (residential) development, which is known as Bellvista II, as part of two Reconfiguration of Lot development applications to be made to the Urban Land Development Authority (ULDA). This report builds on previous reports submitted to Sunshine Coast Regional Council, copies of which are already with the ULDA (Cardno Eppell Olsen report August 2010).

It is acknowledged that the adjacent Bellvista I is now fully developed. The proposal would add to the existing Bellvista I development which is to the northwest of the subject site and would be accessed via Bellvista Boulevard which connects to Caloundra Road.

1.2 Scope of Work

This report has been prepared to document a review of the traffic impacts along with the site review of the proposed development of the Bellvista II development at Bellvista Boulevard, Caloundra. In undertaking this report the following has been considered and undertaken:

- analysis of access and intersection operations consideration of intersection layout requirements to ensure acceptable levels of operation on the road network based on:
 - future connections to Caloundra South;
 - completion of Bellvista I and II;
 - impacts of each part of the development application;
 - impact from Kawana Arterial;
 - 2010 up-to-date background traffic volumes;
 - the future growth extent of Unity College.
- review potential improvements to local connectivity within Bellvista II and to the regional road network;
- a review of the environmental capacity on Bellvista Boulevard.

1.3 References

In preparing this report the following background materials/reference documents have been reviewed/consulted:

- Austroads Guide to Traffic Engineering Practice – Part 5: Intersections at Grade;
- DMR's Guidelines for Assessment of Road Impacts of Developments;
- DMR's 'Road Planning Design Manual';
- Queensland Transport's Preconstruction Processes Manual;
- Australian/New Zealand Standards 2890.1 – Parking Facilities Part 1: Off-street Car Parking.

2.0 EXISTING SITUATION

2.1 Subject Site

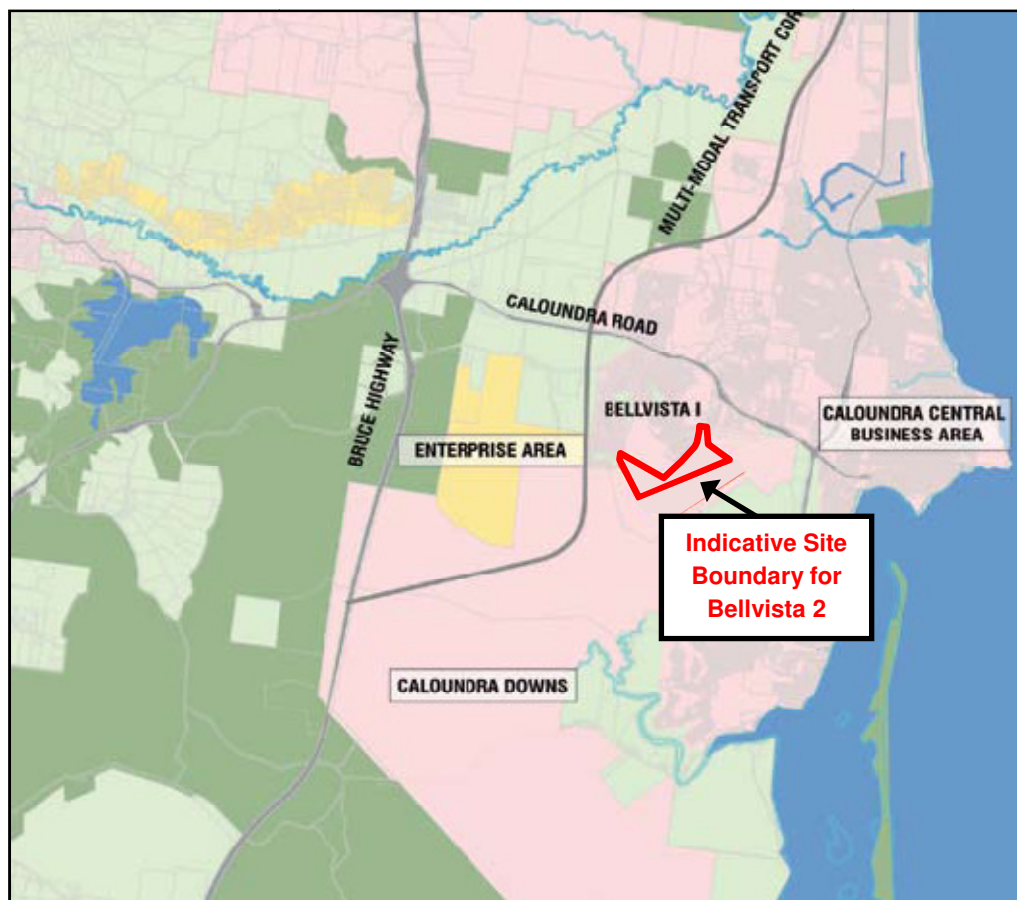
The site is located adjacent to Bellvista Boulevard, in Caloundra West. Bellvista Boulevard is a two-lane two-way road (undivided) and has roundabout intersections with Stornaway Avenue and Dumbarton Avenue which provide access into the existing western Bellvista I development. A priority controlled intersection exists with Berkey Place which is in close proximity to the Caloundra Road roundabout. The Caloundra Road roundabout is 50m diameter and has three legs, with the main legs of Caloundra Road (east and west) having two-lane approaches.

The Bellvista I development is a 1,000 dwelling development which had been completed at the time of May 2010 traffic counts.

An overview of the site location is shown on Figures 2.1 and 2.2.

Figure 2.1

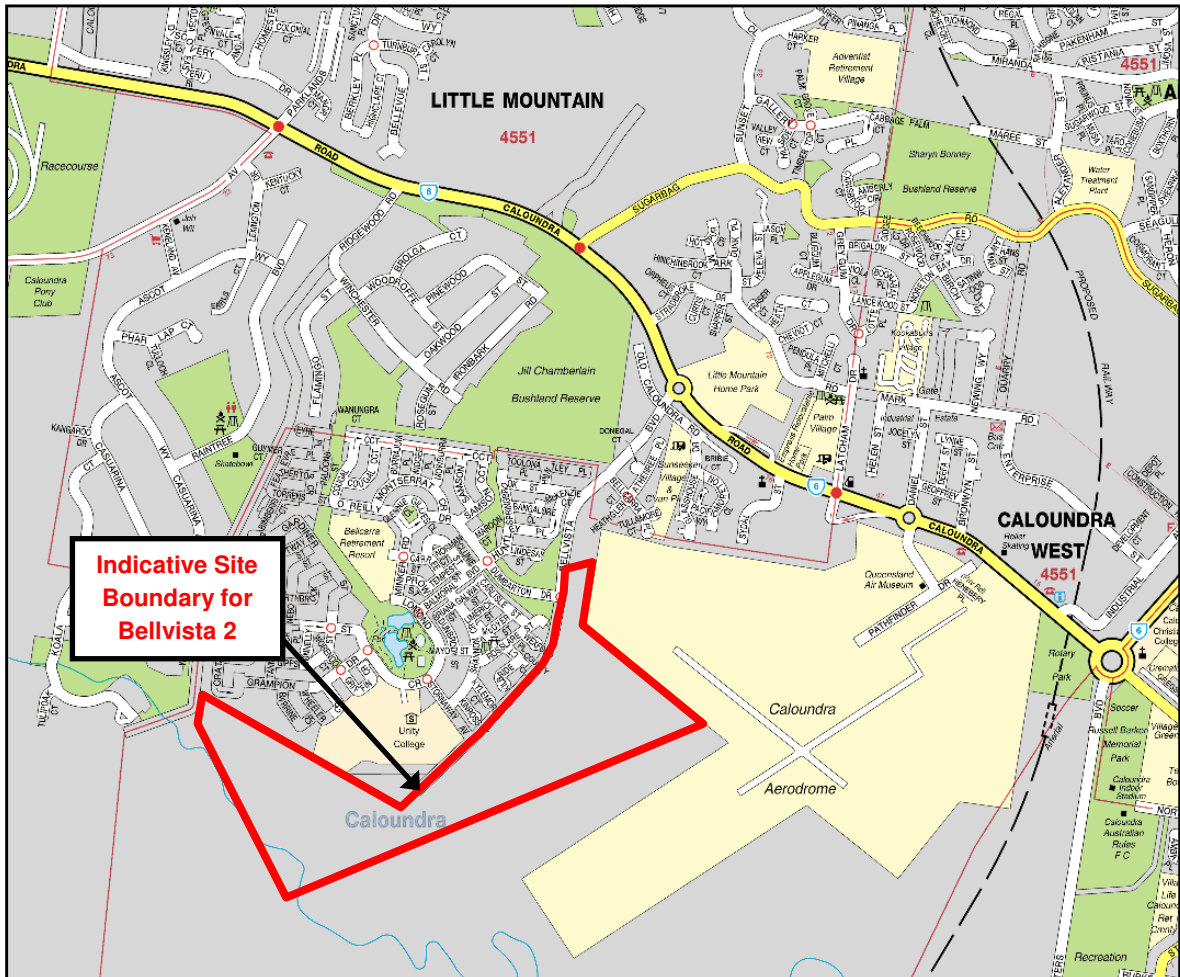
Indicative Site Location Overview



** Amended from Stockland's Draft Bellvista II Vision Document*

Figure 2.2

Indicative Site Location



2.2 Key Roads

2.2.1 Caloundra Road

Caloundra Road is a four lane arterial road, controlled by Department of Transport and Main Roads. This road serves as the major route between Caloundra and the Bruce Highway. Features of this road generally include; limited access, roundabout and signal controlled intersections and central medians. The road has a 70km/hr posted speed limit. No parking is allowed in the vicinity of Bellvista Boulevard with limited on-street parking provided to the east of Sydal Street. No on-street cycle lanes are provided in the immediate vicinity.

The road runs predominantly east west with deviations along its length. It has changes in its gradient along its length.

2.2.2 Bellvista Boulevard

Bellvista Boulevard is a two lane two-way road running north to south from Caloundra Road, and is a trunk collector at its northern end. The road has a 60km/hr posted speed limit and has limited access with priority controlled intersections in its northern sections and roundabouts in the south. There is a proposed pathway along Bellvista Boulevard to a point midway between Bellcarra Place and Dumbarton Drive.

2.2.3 Dumbarton Drive

Dumbarton Drive is a Council controlled road. In the Caloundra Road Hierarchy the road's hierarchy is not listed, although based on its function it would be classified as a Collector Street. It is a two-way two lane street with a median along its length. It runs from Bellvista Boulevard to Balmoral Boulevard. It runs parallel to a creek with a pedestrian path along its northern edge. No access is provided along its length. Dumbarton Drive provides access to Bellvista I along with Stornaway Avenue.

2.2.4 Berkey Place

Berkey Place is a Council controlled Access Place. To the west of Bellvista Boulevard, Berkey Place is a cul-de-sac serving seven residential dwellings. To the east it is a two-way two lane street which forms the sole access into a residential estate of approximately 147 dwellings. It has a proposed pedestrian path planned along its length. The street is located to the north of the proposed development.

2.2.5 Bellcarra Place

Bellcarra Place is Council controlled and acts as a Collector Street. To the east it is a two-way two lane street which forms the sole access into a residential estate of approximately 147 dwellings. Property access is provided along its lengths.

Bellcarra Place has a straight alignment that rises from its eastern end to its western end at Bellvista Boulevard. No pedestrian paths are provided along its length.

2.3 Key Intersections

2.3.1 Caloundra Road/Bellvista Boulevard Intersection

The intersection of Caloundra Road and Bellvista Boulevard is an existing three-way intersection. Caloundra Road runs east west with the southern leg being Bellvista Boulevard. The western and eastern legs of the intersection are comprised of two lanes in each direction with the southern leg comprised of a single approach and departure lane. All movements are allowed at this intersection. No pedestrian facilities are provided on any legs.

2.3.2 Bellvista Boulevard/Berkey Place Intersection

The Bellvista Boulevard/Berkey Place intersection is a four-way intersection in close proximity to the Caloundra Road/Bellvista Boulevard intersection, being located 20m to the south of this intersection. The intersection is controlled by give-way signs with the priority movement north south along Bellvista Boulevard. All approach and departure lanes are single lanes. In its existing form all movements are allowed but no pedestrian facilities have been provided.

2.3.3 Bellvista Boulevard/Dumbarton Drive Intersection

The existing roundabout intersection of Bellvista Boulevard and Dumbarton Drive is a three legged intersection with Bellvista Boulevard running north south and Dumbarton Drive to the west. The intersection has single approach and departure lanes on all legs although the roundabout has been designed to accommodate two circulating lanes and has been constructed with a wide pavement on the northern and southern legs to allow additional approach and departure lanes by only changing the line markings. All movements are allowed and a pedestrian path has been provided on the western leg that runs north south.

2.3.4 Bellvista Boulevard/Bellcarra Place Intersection

The existing intersection of Bellvista Boulevard and Bellcarra Place is a priority give-way T-junction with the priority movement being north south along Bellvista Boulevard. There are single approach and departure lanes on all legs with a pedestrian path provided along the eastern side of the northern leg that stops as soon as it crosses Bellcarra Place. All movements are allowed at this intersection.

2.3.5 Caloundra Road/Latcham Street Intersection

The existing intersection of Caloundra Road and Latcham Street is a priority four-way signalised intersection. The east and westbound legs of Caloundra Road each have two through lanes and departure lanes. The western leg also has a left slip lane and two right turn lanes. From the north a single approach lanes also provides a left slip lane. From the south there is a left slip lane, a short right turn lane and a through and right turn lane.

Pedestrian crossings are provided across the northern and western legs of the intersection.

2.3.6 Caloundra Road/Daniel Street/Pathfinder Drive Intersection

The existing intersection of Caloundra Road, Daniel Street and Pathfinder Drive is a four-way roundabout. The eastern and western legs of Caloundra Road provide two approach and departure lanes in each direction. The northern and southern roads of Daniel Street and Pathfinder Drive respectively have a single approach and departure lanes in each direction. Pedestrian paths are provided on the northern and southern legs of the intersection.

2.3.7 Caloundra Road/Sugarbag Road Intersection

The existing Caloundra Road/Sugarbag Road intersection is a signalised T-junction intersection. Along Caloundra Road in the eastbound direction the road has two through lanes and a left slip lane, with two downstream lanes. From the westbound leg of Caloundra Road there are two through lanes with two downstream lanes with a short right turn lane. From the northern leg of Sugarbag Road there is a left slip lane and a right turn lane. Pedestrian movements are provided across the eastern leg. All movements are allowed at this intersection.

2.3.8 Caloundra Road/Pierce Street/Parklands Boulevard Intersection

The intersection of Caloundra Road, Pierce Street and Parklands Boulevard is a four-way signalised intersection. Both the eastern and western legs of the intersection, being Caloundra Road, provide a left slip lane, two through lanes and a right turn lane with two departure lanes. Both the northern and southern legs provide a left slip lane, a through and right lane and a right turn lanes with a single departure lane. All legs are median separated and all legs apart from the eastern leg have pedestrian crossings. All movements at this intersection are allowed.

2.4 Future Road Network Planning

Bellvista Boulevard is currently defined as a Trunk Collector and, with the proposed Bellvista II development, Bellvista Boulevard will retain this function.

It is expected that, with any future overall redevelopment of Caloundra Downs, there would be future connections to that development thereby providing additional capacity for non-local traffic separated from Bellvista Boulevard.

2.5 Existing Traffic Volumes

Traffic counts were undertaken by Austraffic at four locations, including an up-to-date intersection count at Caloundra Road/Bellvista Boulevard. In addition to these counts undertaken, counts from DTMR were obtained for three additional intersections. The count locations and the date of the count are shown below:

- Caloundra Road/Bellvista Boulevard intersection (25/05/10);
- Bellvista Boulevard/Berkey Place intersection (17/07/08);
- Bellvista Boulevard/Dumbarton Drive intersection (17/07/08);
- Caloundra Road/Nicklin Way/Pelican Waters Boulevard intersection (18/06/09);
- Caloundra Road/Latcham Street intersection (1/09/04);
- Caloundra Road/Sugarbag Road intersection (2/09/04);
- Caloundra Road/Daniel Street/Pathfinder Drive intersection (15/11/07).

The counts at Caloundra Road/Bellvista Boulevard intersection were undertaken from 6:00am until 10:00am and from 3:00pm until 7:00pm.

The counts at Bellvista Boulevard/Berkey Place intersection and Bellvista Boulevard/Dumbarton Drive intersection were undertaken from 6:00am until 9:00am and from 3:00pm until 6:00pm. For the intersection of Caloundra Road, Nicklin Way and Pelican Waters Boulevard the counts were undertaken from 6:30am until 9:30am and from 3:30pm until 6:30pm. The counts at the intersections of Caloundra Road/Latcham Street, Caloundra Road/Sugarbag Road and Caloundra Road/Daniel Street/Pathfinder Drive were undertaken from 6:00am until 6:00pm. It was determined that the AM peak occurred from 8:00am until 9:00am with the PM peak occurring from 4:15pm until 5:15pm. The traffic count data can be found in Cardno Eppell Olsen report of August 2010.

Traffic volumes for the intersection of Bellvista Boulevard and Belcarra Place were determined based on the existing through traffic volumes with the traffic coming from the catchment determined based on the 57 lots generating 0.8trips/lot in each peak hour. The distribution was the same as that assumed for the development.

The remaining background traffic data has been sourced directly from DTMR's website.

2.6 Traffic Growth

Traffic growth was based on data held by DTMR. It was assumed that in the vicinity of the development the growth on Caloundra Road would be 2%, as this is the conservative value of historic growth from census data for Caloundra Road. This data was used on the recommendation of DTMR officers owing to a lack of sufficiently up-to-date modelling information available from DTMR. The data provided by DTMR indicated that to the east of the site historic growth had been 1% while to the west of the development it increases to 2%. It is noted that this method is a simplistic and conservative approach which does not take account of significant and complex road network changes currently occurring or planned.

Additional growth of the Unity College school within Bellvista I has been taken into account using an assumed increase of 539 students.

3.0 PROPOSED DEVELOPMENT

3.1 Site Use

It is noted that there are two Reconfiguration of Lot applications being made to the Urban Land Development Authority (ULDA) in relation to the proposed development. The two applications consist of:

- Application 1, for 233 detached residential lots plus two medium density sites (for approximately 12 dwellings);
- Application 2, for 410 detached residential lots plus three medium density sites (for approximately 41 dwellings);
- Combined, for 643 detached residential lots (plus potential for 53 medium density dwellings).

For the purposes of traffic modelling, it is assumed that the residential dwellings will be developed from late 2011 through to early 2014 with 22 dwellings being constructed each month during that period. Additionally, the yield above is lower than the assumed yield for traffic analysis used in this report (of up to 750 dwellings). The layout of the proposed development is attached at Appendix A.

3.2 Assessment Scenarios

Assessment was undertaken for the following scenarios for both the AM and PM peaks in relation to the ultimate maximum development yield:

- 2010 base year background traffic;
- 2014 development year background traffic;
- 2024 ten year design horizon background traffic;
- 2014 development year with development traffic;
- 2024 ten year design horizon with development traffic.

For some intersections only the existing base year scenarios as well as the ten year design horizon with development scenarios were assessed if it was shown to operate below practical capacity at these scenarios.

4.0 TRAFFIC OPERATION

4.1 Development Traffic Generation

4.1.1 Residential Development

As discussed in Section 3, at the time of traffic analysis a conservative value of yield was assumed based on a maximum yield of 750 residential dwellings for Bellvista II and that the development applications are split as follows:

- 249 residential dwellings (Application 1);
- the balance (of up to 501) residential dwellings (Application 2).

It is noted, that subsequent to the analysis in this report, the yield has been reduced as follows:

- Application 1, for 233 detached residential lots plus two medium density sites (for approximately 12 dwellings);
- Application 2, for 410 detached residential lots plus three medium density sites (for approximately 41 dwellings);
- combined, for 643 detached residential lots (plus potential for 53 medium density dwellings).

Therefore the expected trip generation are over estimated relative to the currently proposed yield.

Given that there are two proposed Reconfiguration of Lots applications, Table 4.1 below presents the estimated traffic generation of the preliminary development and ultimate development. For Application 1 (of 249 residential dwellings), a daily generation rate of 8 trips per day per dwelling has been used, whilst a lower rate of 7.60 trips per day per dwelling has been used for the total ultimate development (of up to 750 residential dwellings) of both applications. This lower rate is a combination of two accepted rates for residential dwellings. For a residential lot, a rate of 8 trips per day is accepted while for a medium density dwelling a rate of 6 trips per dwelling is accepted. It is assumed that 150 of the dwellings will be medium density which when combined with the residential dwellings gives an average rate of 7.60 trips per dwelling.

A standard residential peak hour factor of 10 has been applied to derive the peak hour trips of 0.8 trips per hour per dwelling. The assignment of arriving and departing traffic is discussed later in Section 4.2.

Table 4.1

Residential Trip Generation

Component	Dwellings	Daily Rate (vpd/ dwelling)	Daily Trips (vpd)	Peak Hour Trips (to external road network)			
				AM		PM	
				Arriving (25%)	Departing (75%)	Arriving (60%)	Departing (40%)
Application 1 (249 residential dwellings)	249	8.00	1,992	50	149	119	80
Both Applications 1 & 2 (up to 750 residential dwellings)	750	7.60	5,700	143	428	342	228
TOTAL	750		5,700	143	428	342	228

Based on this the proposed site will generate an additional 571 trips in each peak hour onto the external road network.

This is deemed as a conservative estimate considering there is a school within the Bellvista I area which may also reduce trips to and from Caloundra Road from the proposed Bellvista II development.

4.2 Development Traffic Distribution

The in/out split of traffic adopted for the peak periods is based on generally accepted distributions as well as based on the traffic in/out split that occurs currently at the existing development at Bellvista. These are shown below:

- AM Peak: 25% out/75% out;
- PM Peak: 60% out/40% out.

For the distribution of traffic on the external road network the existing counts were used to determine this traffic split. At the intersection of Caloundra Road and Bellvista Boulevard it was found that approximately 50% of traffic was heading to the west with the remaining 50% of traffic travelling to the east. It was considered appropriate to continue to use this traffic split for the proposed Bellvista II development.

Along Caloundra Road it was assumed that traffic to the west would travel predominantly through to the Bruce Highway before dispersing. It was assumed that minimal traffic from the development would use any of the side roads on Caloundra Road to the west. For the traffic that travels to the east it was similarly assumed that it would continue travelling east until it came to the intersection of Caloundra Road, Nicklin Way and Pelican Waters Boulevard. Counts at this intersection indicate that it would be expected that approximately 75% of the traffic would then travel north along Nicklin Way with the remaining 25% of traffic continuing along Caloundra Road. This is shown below on Figure 4.1.

4.3 Summary of Development Traffic Generation

Based on the assumption listed above, the resultant anticipated development traffic volumes are presented on Figure 4.2.

4.4 Development Traffic Impact

Typically, the extents of traffic analysis are based on intersections that have a movement which is impacted by an increase of at least 5% due to a development. The percentage impacts on the road network surrounding the Bellvista II site is shown on Figure 4.3 for information.

Given the relative scale of the development and relatively minor impacts along Caloundra Road, the analysis on the road network beyond the Bellvista catchment is focussed on the Caloundra Road/Bellvista Boulevard intersection only.

Figure 4.1

Development Traffic Distribution

Parklands Boulevard				Sugarbag Road				Latham Drive				Daniel Street			
(0)	0	0	(0)	(0)	0	0	(0)	(0)	0	0	(0)	(0)	0	0	(0)
(0)	0	L	(0)	(0)	(0)	(0)	0	L	(0)	(0)	(0)	(0)	0	L	(0)
(50%)	(50%)	50%	T	0	0	0	(50%)	(50%)	(50%)	(50%)	(0)	0	0	0	(50%)
50%	(0)	0	R	R	T	L	50%	50%	R	0	L	50%	50%	(0)	0
50%	L	T	R	R	0	(0)	50%	50%	R	0	(0)	50%	50%	L	T
(50%)	0	0	0	T	50%	(50%)	(50%)	(50%)	T	50%	(50%)	(50%)	(50%)	0	0
(0)	(0)	(0)		L	0	(0)			L	0	(0)	(0)	(0)	L	0
(0)	0	0	(0)									(0)	0	0	(0)
Pierce Street								Latham Drive				Pathfinder Drive			
								(100%)	100%	100%	(100%)				
								(100%)	100%	100%	(100%)				
								(0)	0	L	(0)	(100%)	(0)		
								(0)	0	T	0	100%	0	(0)	
								0	(0)	0	R	R	T	L	0
								0	L	T	R	R	0	(0)	0
								(0)	0	100%	0	T	0	(0)	(0)
								(0)	(100%)	(0)	L	0	(0)		
								(100%)	100%	100%	(100%)				
								(100%)	100%	100%	(100%)				
								(0%)	0%	L	(0%)	(100%)			
								0%	(0)	0	R	R	T		
								0%	L	T					
								(0%)	0	100%					
								(0)	(100%)						
								(100%)	100%	100%	(100%)				
								Bellvista Boulevard							

Figure 4.2

Development Generated Traffic

Parklands Boulevard										Sugarbag Road										Latcham Drive										Daniel Street																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Percentage of Development Generated Traffic Impacts

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5.0 TRAFFIC OPERATION ASSESSMENT

5.1 Traffic Impacts

The intersections requiring consideration consist of the following:

- Caloundra Road/Bellvista Boulevard intersection;
- Bellvista Boulevard/Berkey Place intersection.

As indicated in Section 4.4, the extent of intersections analysed focuses only on the Caloundra Road/Bellvista Boulevard analysis along with consideration of the closely associated Bellvista Boulevard/Berkey Place intersection.

The intersections have been analysed for each of the scenarios outlined above using the SIDRA Intersection 3.2 analysis programme. This programme calculates the operation of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA Intersection 3.2 provides values for the degree of saturation (DOS), queues and delays. The DOS is a commonly used value, which is essentially a volume to capacity ratio. The typically adopted upper limits for the DOS, where it is considered that the operation of the intersection is constrained, are:

- unsignalised intersections: 0.80;
- roundabouts: 0.85;
- signalised intersections: 0.90 – 0.95.

A DOS exceeding these values indicates that the intersection is nearing its operational capacity. Above these values, users of the intersection are likely to experience unsatisfactory queuing and delays.

As discussed in Section 2.6, it is noted that a conservative and simplistic approach of traffic growth and distribution has been taken to predicting background volumes on the surrounding road network in lieu of more sophisticated modelling information from DTMR. Essentially the analysis ignores potential diversion onto Caloundra – Mooloolaba Road (Kawana Arterial). The wider road network changes recently completed and planned, including the Caloundra – Mooloolaba Road, are expected to significantly alter traffic volumes and distribution in the area as would further significant road network changes related to subsequent development to the south of Bellvista II.

5.2 Caloundra Road/Bellvista Boulevard Intersection

5.2.1 Existing Intersection Layout

The existing intersection of Caloundra Road and Bellvista Boulevard is an existing three legged roundabout with two approach and departure lanes on the Caloundra Road approach and departure lanes and a single approach and departure lane on the Bellvista Boulevard leg. The layout of this intersection is shown below on Figure 5.1 with the results of the SIDRA analysis can be found at Appendix B and are summarised in Table 5.1.

Figure 5.1 Caloundra Road/Bellvista Boulevard – Existing Layout

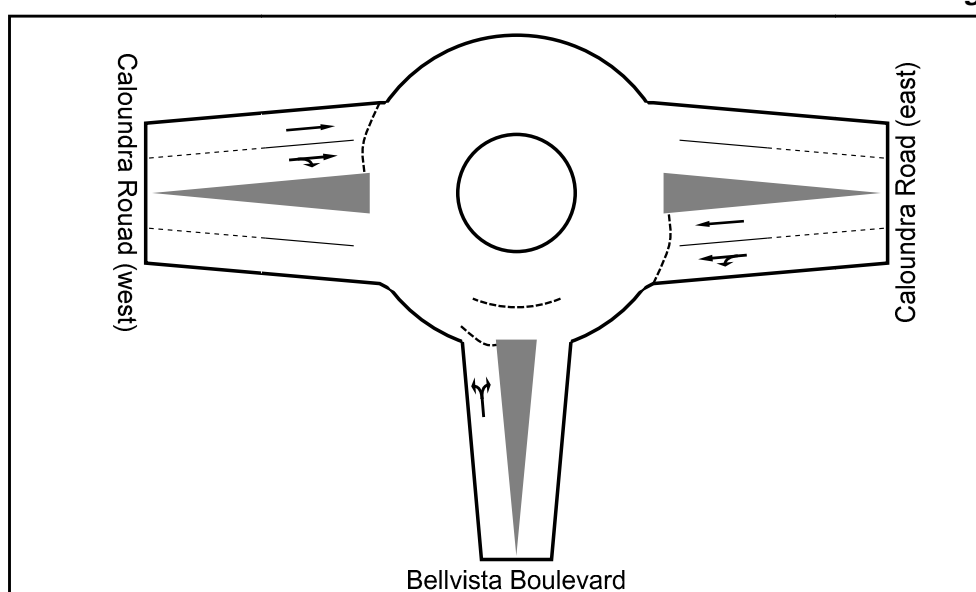


Table 5.1 Caloundra Road/Bellvista Boulevard – SIDRA Analysis Results

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95 th %le Queue	DOS	Delay	95 th %le Queue
2010 Background	0.83	8 sec	82m	0.48	6 sec	35m
2014 Background	0.95	11 sec	158m	0.53	6 sec	42m
2024 Background	1.02	22 sec	361m	0.60	6 sec	50m
2014 With Ultimate Dev't	1.44	254 sec	3,663m	0.96	13 sec	150m
2024 With Ultimate Dev't	1.57	300 sec	4,349m	1.21	41 sec	660m

The results in Table 5.1 above indicate that the existing layout will operate inadequately by 2011 irrespective of the development and therefore that a form of upgrade is required within 2011.

5.2.2 Minor Upgrade to Caloundra Road/Bellvista Boulevard Intersection

Due to the results above, an option to upgrade this intersection to an acceptable level of service was tested. The upgrade consists of the installation of a short 60m approach lane to the Bellvista Boulevard approach by the year of opening of Bellvista II. The minor upgrade considered is shown below in Figure 5.2. In relation to Application 1 (preliminary 249 residential dwellings), the design years of 2012 and 2022 have been used due to its expected completion by 2012, whilst for the remaining balance (Applications 1 and 2 combined) the design years of 2014 and 2024 have been retained (as per previous reports to Council).

Figure 5.2 *Caloundra Road/Bellvista Boulevard – Minor Upgrade Layout*

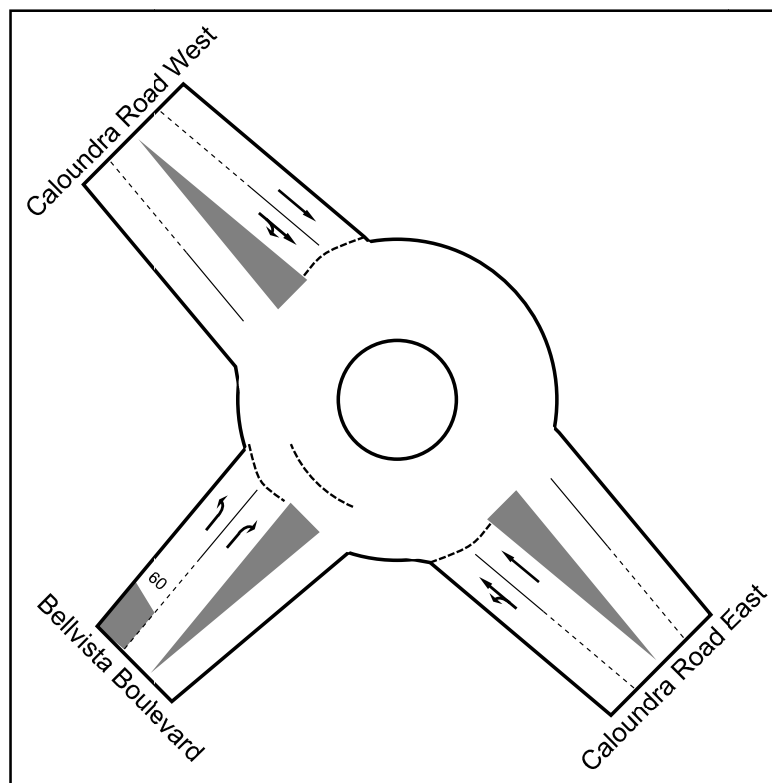


Table 5.2 Caloundra Road/Bellvista Boulevard – SIDRA Analysis Results

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95 th %le Queue	DOS	Delay	95 th %le Queue
2012 With Application 1 Dev't	0.69	8 sec	78m	0.55	6 sec	44m
2022 With Application 1 Dev't	0.81	10 sec	120m	0.63	6 sec	56m
2014 With Applications 1 and 2 Dev't	0.84	13 sec	153m	0.68	8 sec	73m
2024 With Applications 1 and 2 Dev't	0.99	30 sec	418m	0.76	9 sec	97m

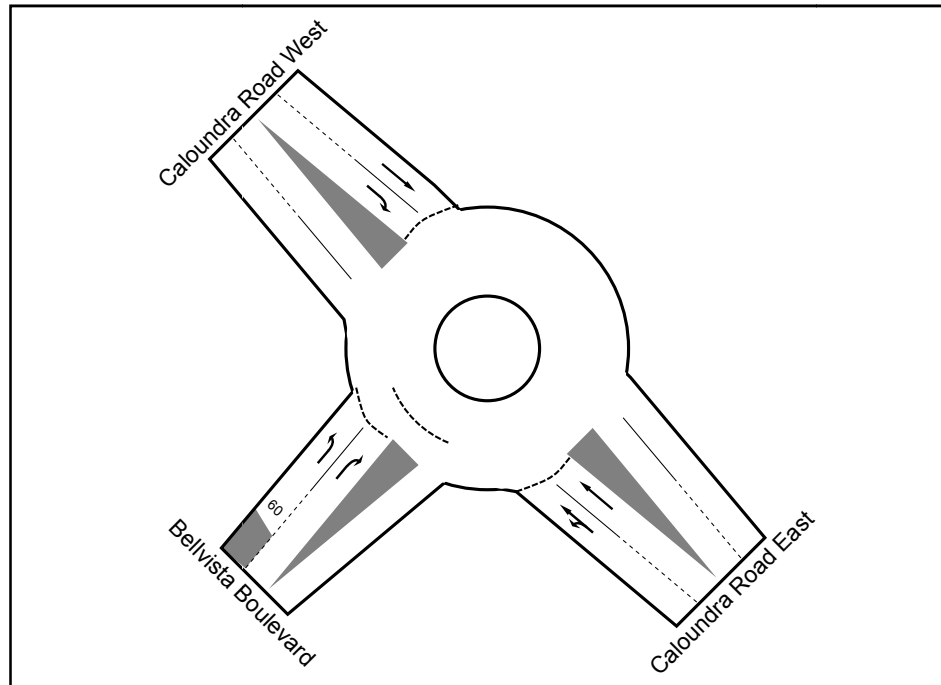
The results above indicate that the minor upgrade of an additional 60m length approach lane on Bellvista Boulevard would allow the roundabout to operate acceptably beyond the design horizon for Application 1. With both Applications 1 and 2 combined, the minor upgrade would operate acceptably until 2015 at which point it would operate above acceptable limits in the AM Peak thereby requiring further upgrade.

5.2.3 Major Upgrade to Caloundra Road/Bellvista Boulevard Intersection

Based on the analysis in Section 5.2.2 above, the results indicate that with both Applications 1 and 2, the minor intersection upgrade will operate above acceptable limits in the AM Peak from 2015 onwards.

An option to further upgrade this intersection to an acceptable level of service was tested. The upgrade consists of the provision of designated continuous eastbound through lanes on Caloundra Road by 2015. This layout is shown below on Figure 5.3 with the accompanying SIDRA results undertaken for the 2014 and 2024 with development scenarios shown in Table 5.3. Further detail of the upgrading requirements at Caloundra Road/Bellvista Boulevard intersection (by 2015) is shown on the preliminary conceptual design prepared by Browns Consulting Pty Ltd at Appendix C.

Figure 5.3 Caloundra Road/Bellvista Boulevard – Major Upgrade Layout



Note: the above SIDRA Layout does not accurately represent the two designated continuous eastbound lanes from Caloundra Road West

Table 5.3 Caloundra Road/Bellvista Boulevard – SIDRA Analysis Results

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95 th %le Queue	DOS	Delay	95 th %le Queue
2014 With Both Applications Development	0.75	7 sec	55m	0.67	7 sec	70m
2024 With Both Applications Development	0.89	7 sec	65m	0.80	9 sec	116m

The findings from the SIDRA analysis are as follows:

- 2014 (background plus development traffic) – operates within acceptable limits whereby the upgrading only includes the left turn 60m out of Bellvista Boulevard;
- 2023 (background traffic plus ultimate development traffic) – operates within acceptable limits;
- 2024 (background traffic) – operates above acceptable limits in the AM peak only as a result of through movements on Caloundra Road (western approach);

- 2024 (background traffic plus development traffic) – operates above acceptable limits in the AM peak only (Degree of Saturation 0.89). The critical movement still relates to Caloundra Road (western approach).

5.3 Bellvista Boulevard/Berkey Place Intersection

The existing intersection of Bellvista Boulevard and Berkey Place is an existing priority give-way controlled four-way intersection with a single approach and departure lane on all legs. The priority movement is along Bellvista Boulevard. It is noted that this intersection is very close to the existing Bellvista Boulevard/Caloundra Road roundabout (approximately 40m) and is therefore an existing deficiency. The western Berkey Place leg provides access to 3 dwellings while the eastern Berkey Place leg provides the only existing access to around 70 dwellings. The layout of this intersection is shown below on Figure 5.4 with the results of the SIDRA analysis can be found at Appendix B and are summarised in Table 5.4.

Figure 5.4 *Bellvista Boulevard/Berkey Place – Existing Layout*

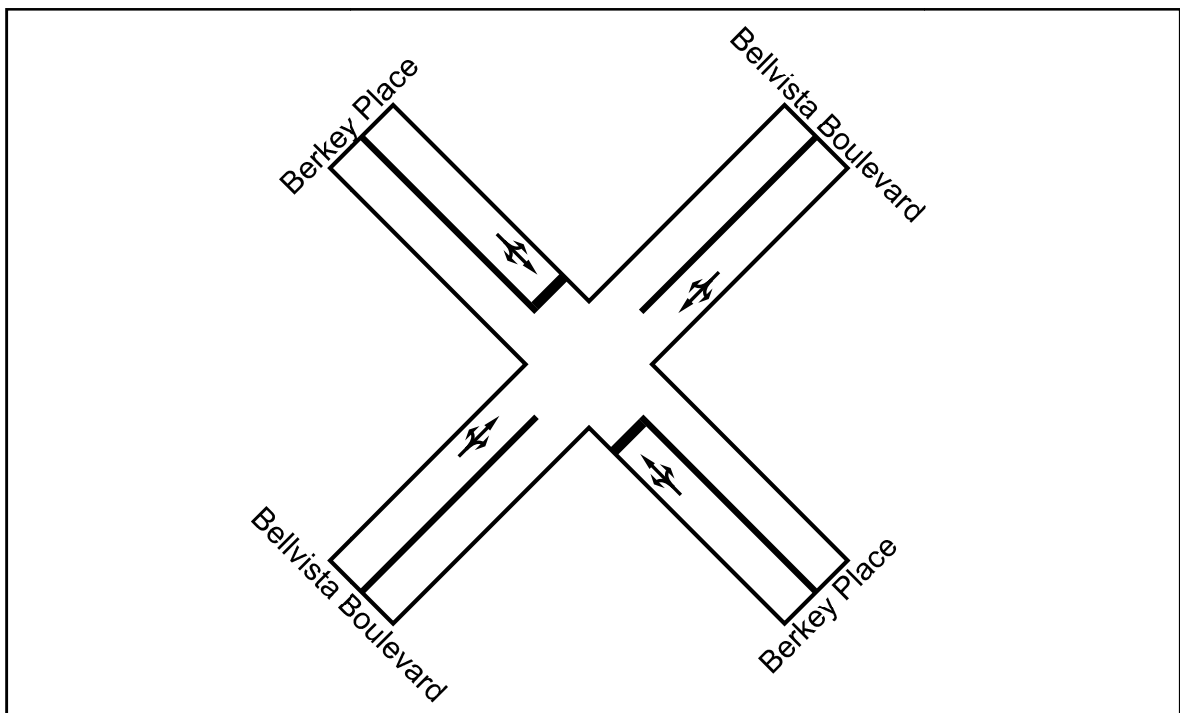


Table 5.4 *Bellvista Boulevard/Berkey Place – SIDRA Analysis Results*

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95 th %le Queue	DOS	Delay	95 th %le Queue
2008 Background	0.30	4 sec	25m	0.25	4 sec	20m
2024 Background	1.00	27 sec	82m	0.35	6 sec	33m
2024 With Development	1.00	78 sec	163m	1.00	28 sec	129m

The results above show that the intersection currently operates well below the practical degree of saturation. Analysis at future years shows that the intersection would operate above the practical degree of saturation. The analysis shows that the Berkley Place approaches would operate with a degree of saturation of 1.0. It is considered that such operating characteristics are unlikely as vehicles queues on the Bellvista Boulevard approach to the Caloundra Road/Bellvista Boulevard roundabout would allow vehicles on the minor approaches to enter the north bound direction of Bellvista Boulevard.

As mentioned above, because of the close proximity of this intersection to the Caloundra Road/Bellvista Boulevard intersection (approximately 40m), the impacts of the proposed mitigation at that intersection need to be considered for the “with development” analysis. The intersection layout and SIDRA analysis results are shown below on Figure 5.5 and summarised in Table 5.5 respectively.

Figure 5.5

**Bellvista Boulevard/Berkey Place –
Including Caloundra Road upgrade Layout**

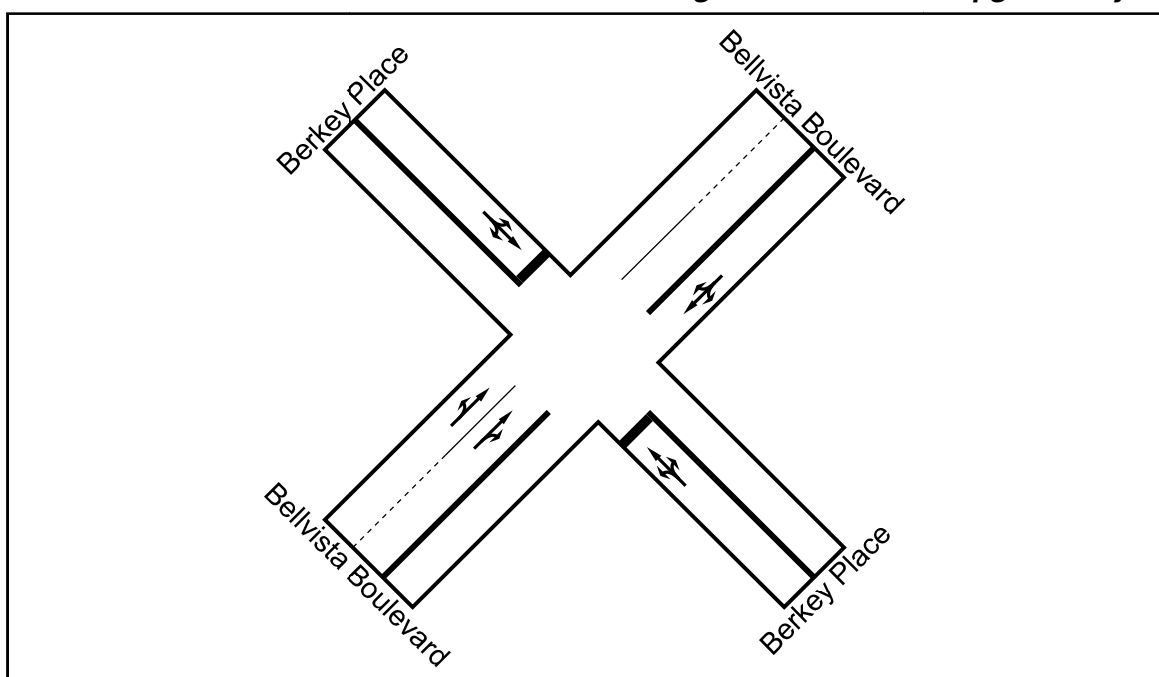


Table 5.5

**Bellvista Boulevard/Berkey Place –
Including Caloundra Road upgrade SIDRA Analysis Results**

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95 th %le Queue	DOS	Delay	95 th %le Queue
2024 With Development	1.00	51 sec	141m	1.00	22 sec	126m

The results indicate that the intersection, when consideration is made for the recommended upgrade to the Bellvista Boulevard approach to Caloundra Road, will operate above practical capacity during the AM and PM peak periods as a result of development traffic. However, these results are considered to be misleading as the queuing lengths above relate to the Bellvista Boulevard legs, for the right turns into each Berkey Place leg. It is considered that the queuing suggested on the northeast leg of Bellvista Boulevard would not occur, as there is sufficient width to allow through traffic to pass on the inside, and there is likely to be queuing traffic in the northbound direction which would allow for right turn traffic to filter through gaps in the slower moving/queuing traffic. The right turn movement out of Berkey Place (east) would similarly be aided by this northbound queuing traffic in terms of filtering into gaps.

As described above, it is considered that gaps will form in the queuing traffic northbound on Bellvista Boulevard. However, in order to protect the turning opportunities for right turn traffic it is recommended that keep clear road markings are provided on the northbound Bellvista Boulevard lanes at its intersection with Berkey Place.

With further refinement of the concept design for the Caloundra Road/Bellvista Boulevard it is likely that right turns to/from Berkey Place will be eliminated and that drivers will make use of the roundabouts to the north and south to replace the right turn movements.

6.0 SITE LAYOUT REVIEW

Details of the proposed site layouts for Applications 1 and 2 are attached at Appendix A which provides the general layout for the Bellvista II site.

6.1 Road Hierarchy and Layout

6.1.1 Bellvista Boulevard

Bellvista Boulevard is currently a Trunk Collector Street but it is expected that with the additional volumes from this proposal and potential future connection to Caloundra Downs in the south, it will be re-classified as a sub-arterial road. The road currently has no frontage access and has significant spacing between intersections allowing it to function appropriately as a higher order road.

The maximum two-way flow rate for AM and PM peak period has been calculated as being 2,114 and 2,233 vehicles per hour (vph) respectively. This theoretical maximum value for two way service flow rates and anticipated two way traffic flow on Bellvista Boulevard have been revised based on the 2010 peak AM and PM movement survey counts undertaken as part of the response to Council's Information Request. The combined background and development traffic would result in a substantially lower two way peak hour flow rate of 1,956vph and 1,487vph for the AM and PM peak periods. Therefore, the traffic generation from Bellvista II can be accommodated within the existing two-way two lane road i.e. duplication is not required.

It should be noted that the theoretical maximum two-way service flow rates are higher than previously reported given the lower percentage of heavy vehicles counted accessing Bellvista Boulevard. The lower heavy vehicle percentage is likely to be a result of the reduced level of construction traffic within the area.

Pedestrian access across Bellvista Boulevard would be best provided by way of staggered uncontrolled crossings at the existing Bellvista Boulevard/Stornaway Avenue roundabout as this is likely to attract a higher demand with the provision of new retail area within Area A. Traffic volumes do not preclude this form of crossing.

6.1.2 Application 1

The south western area of Precinct 1 would access Bellvista Boulevard via a new collector street which would also serve the future remaining balance of that Precinct (which is discussed in the following section). Precinct 2 would access an extended Bellvista Boulevard via two accesses thereby providing good connectivity and provision for emergency access.

It is expected that future bus services on Bellvista Boulevard would be within suitable distance of residents.

The local access streets are proposed to be a maximum of 16m width including a maximum 7m width pavement which is considered appropriate to service expected traffic volumes and on-street parking demand.

Specific traffic calming is not proposed and the development layout is aimed at minimising street lengths to limit vehicle speeds.

6.1.3 Application 2

It is proposed that the main road servicing Precinct 1 of the development is a collector street. This would provide the majority of the precinct with access onto Bellvista Boulevard at two locations. Access to Bellvista Boulevard would be by way a new leg onto the existing roundabout at Stornaway Avenue and an additional link provided some 130m south of the intersection at Bellvista Boulevard/Dumbarton Avenue. As for Application 1, this provides good connectivity and provision for emergency access.

Precinct 1 is a constrained area and therefore the function of its main access road is considered to be proposed appropriately as a Collector Street.

In terms of public transport i.e. bus, future services using Bellvista Boulevard and the Precinct 1 Collector Street should be within 400m of 90% of all residents (and 100% of businesses) within Bellvista II to provide a good level of accessibility. It is expected that provision for bus stops and routes would be provided within Precinct 1 and be included as part of the detailed design stage thereby giving appropriate coverage of public transport for Application 2.

Access to the Precinct 2 component is considered in Section 6.1.2 above.

As for Application 1, the local access streets are proposed to be a maximum of 16m width including a maximum 7m width pavement which is considered appropriate to service expected traffic volumes and on-street parking demand.

Specific traffic calming is not proposed and the development layout is aimed at minimising street lengths to limit vehicle speeds.

6.2 On-Street Parking

The quantum of on-street parking which can be provided within the development layout of 370 spaces provides a rate of approximately 1 space per 2 dwellings and is therefore acceptable to accommodate visitor parking. Preliminary layouts of on-street parking are shown at Appendix D.

7.0 CONCLUSIONS

7.1 Background

Cardno Eppell Olsen has been commissioned by Stockland to provide a traffic impact assessment for a proposed mixed use (residential) development, which is known as Bellvista II, as part of two Reconfiguration of Lot applications, for submission to the Urban Land Development Authority.

The assessment is based on analysis completed for an earlier conservative assumption that the Bellvista II proposal would consist of ultimately up to 750 residential dwellings expected to be completed in 2014, split between Application 1 (249 residential dwellings) and Application 2 (up to 501 residential dwellings). The impacts of the traffic generated on the surrounding road network from this proposal and the internal layout have been assessed based on up-to-date traffic counts and this site yield. It is noted though, that the traffic analysis within this assessment is therefore considered conservative given the actual lower yield of the current application as follows:

- Application 1, for 233 detached residential lots plus two medium density sites (for approximately 12 dwellings);
- Application 2, for 410 detached residential lots plus three medium density sites (for approximately 41 dwellings);
- combined, for 643 detached residential lots (plus potential for 53 medium density dwellings).

The daily trip generation used for the proposed development in this assessment is 5,700 vehicles per day, which compares to 5,462vpd for the actual proposed yield.

7.2 Development Traffic Generation and Impacts

Using the previous yield assumptions, the Bellvista II site, once completed, will generate around 571 trips each peak hour to and from Caloundra Road. This assumes conservatively that all residential traffic will travel between Caloundra Road and Bellvista II (i.e. no reduction has been made for internal trips). The distribution of this traffic at Caloundra Road is based on existing traffic patterns.

Background traffic growth has been taken as 2% linear per annum on Caloundra Road from historical traffic growth data. This is in lieu of strategic modelling information currently held and under development by DTMR.

The extent of impacted intersections is limited to the Caloundra Road/Bellvista Boulevard intersection given the relative scale of development (with previous wider analysis available in the Cardno Eppell Olsen August 2010 report).

The results indicate that modifications are required to the Bellvista Boulevard leg of the Caloundra Road/Bellvista Boulevard roundabout within the period of development construction i.e. by 2011, irrespective of development. Initially, minor mitigations to the Bellvista Boulevard approach could consist of the provision of a 60m turning lane to provide a dedicated left turn lane and a dedicated right turn lane. These mitigations allow the intersection to operate acceptably at the design horizon for Application 1 (as a stand-alone Application). With Application 2 included, the minor upgrade operates above acceptable limits in the AM Peak by 2015.

From 2015, upgrades to the roundabout itself would be required for the combined Applications. A concept has been developed which provides designated continuous eastbound through lanes on Caloundra Road (which eliminates delay on the critical leg). The analysis results indicate that this major upgrade would operate acceptably with both Applications 1 and 2 through to year 2023. By 2024, the AM Peak would operate above acceptable limits of capacity.

It is considered that the likely development of future road links would reduce the traffic loading placed onto the Caloundra Road/ Bellvista Boulevard and that given the conservative assumptions on traffic growth on Caloundra Road, the major upgrade above would be acceptable for the Applications' design horizon.

7.3 Road Hierarchy and Layout

The road hierarchy proposed of a collector street to serve Precinct 1 with a secondary access to Bellvista Boulevard via the collector street is considered acceptable. This loop road is considered suitable for future bus services and would be appropriate for frontage access also. Precinct 2 also has two accesses to Bellvista Boulevard.

The proposed road reserve width of a maximum of 16m for local access streets across both Applications, with maximum pavement widths of 7m, is considered suitable for their expected traffic volume and demand for on-street parking.

The lengths of internal streets are minimised to limit vehicle speeds and as such no traffic calming is proposed.

Precinct 1 could provide better access and reduced travel time by provision of a road connection between the new collector street and new esplanade street adjacent to Lots 99 and 161. A form of roundabout at this location could provide additional speed restriction along the new collector street also.

The development is expected to provide 370 on-street parking spaces which is a rate of approximately 1 space per 2 dwellings which is considered acceptable.

7.4 Summary

The assessment is based on previous conservative assumption of up to 750 dwellings compared to the currently proposed maximum of 696 dwellings. The assessment concludes the following:

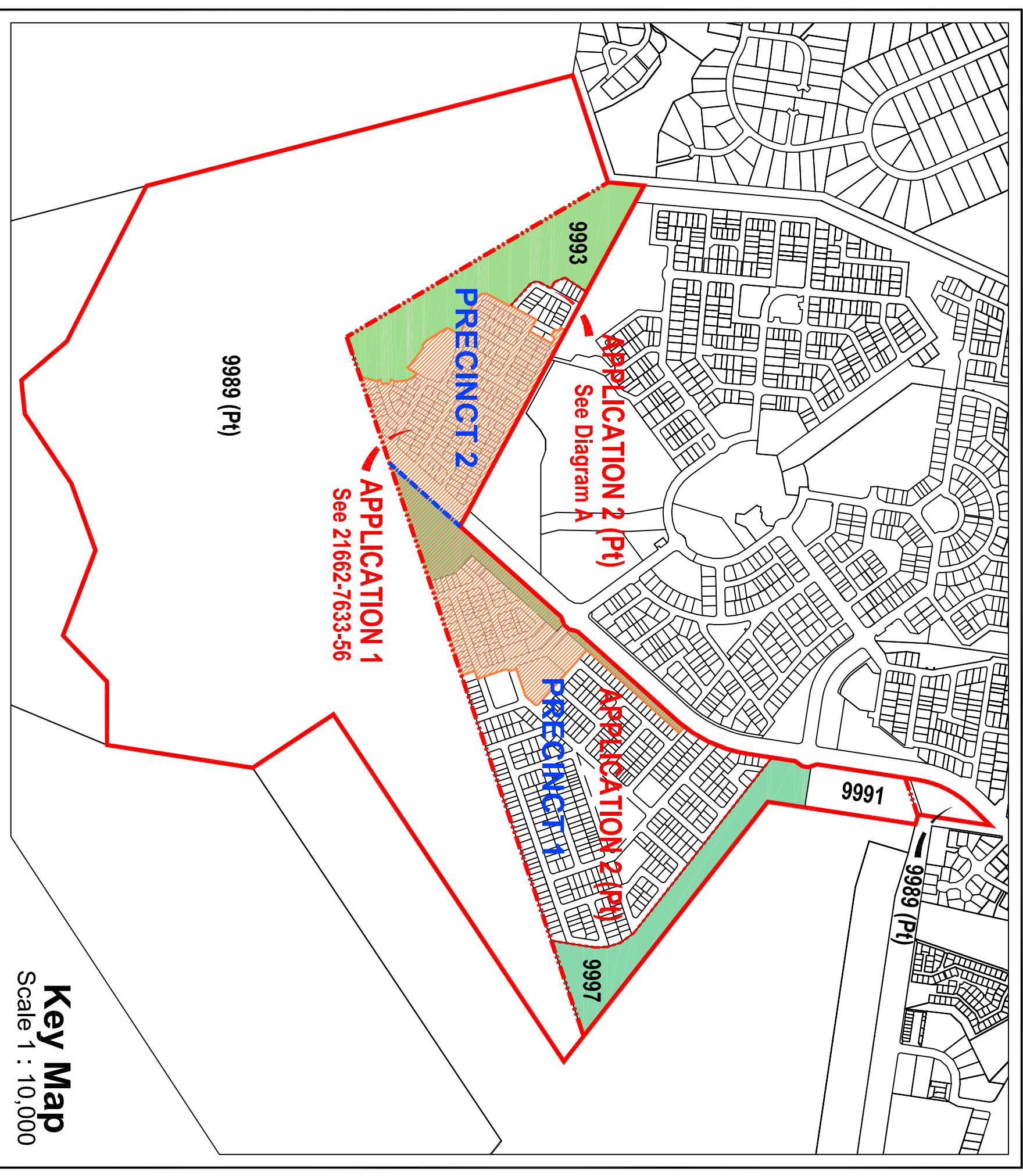
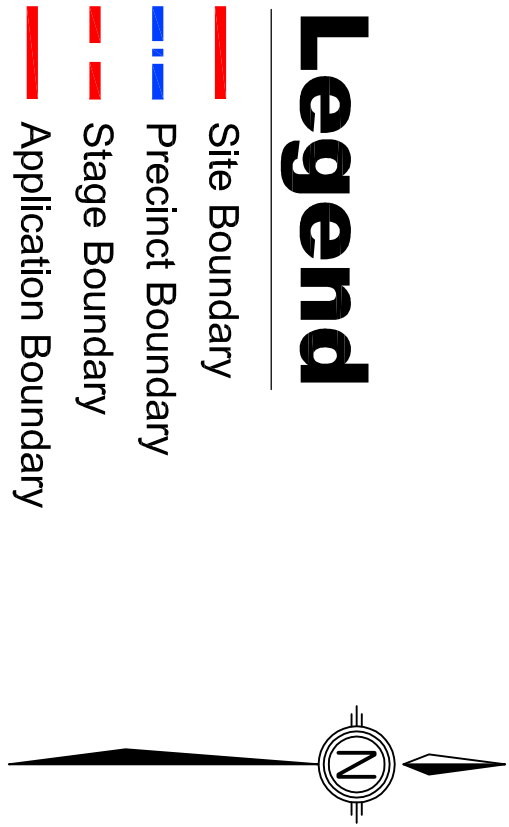
- upgrading is required at the Caloundra Road/Bellvista Boulevard roundabout by 2011 irrespective of the development;
- with the minor upgrading of an additional 60m approach lane to the Bellvista Boulevard approach, the intersection operates acceptably for:
 - Application 1 through to its design horizon (year 2022);
 - Applications 1 and 2 combined until 2015.
- a major upgrade at the Caloundra Road/Bellvista Boulevard roundabout consisting of the eastbound through lanes being reconstructed as designated continuous through lanes allows the intersection to operate acceptably with Applications 1 and 2 until 2023;
- by 2024, the upgraded intersection would operate above its limits of acceptability in the AM Peak;
- duplication of Bellvista Boulevard is not required;
- the proposed road hierarchy and access layout are considered acceptable, whereby further detail is to be provided at the detail design stage.

It is considered that with the conservative assumptions used (and also potential future road links to developments further south which would alter traffic distribution from the subject site) that, with the provision of the mitigations above, there are no further traffic reasons to preclude the approval of the proponent's Reconfiguration of Lot applications.

Appendix A
Development Plans

LAND USE BUDGET - APPLICATION 1												
Land Use	Stage 1	Balance	Sub Total	Stage 2	Stage 3	Stage 4	Stage 5	Balance	Sub Total	Stage 6	Balance	Total Site
Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1
Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)
Area of Subject Site	9,383	10,282	19,675	2,607	3,191	2,743	2,295	1,194	33,832	45,582	65,527	
Sustainable Area	9,383	10,282	19,675	2,607	3,191	2,743	2,295	1,194	33,832	45,582	65,527	
Single Family Attachments	2,746	2,746	2,746	1,212	1,569	1,880	1,569	0,710	—	6,890	8,686	
Medium Density Attachments	0,379	0,379	0,379	—	—	—	—	—	—	—	0,379	
Commercial Sites	0,422	0,422	0,422	—	—	—	—	—	—	—	0,422	
Super Attachments	—	1,377	1,377	—	—	—	—	—	27,776	27,776	29,333	
Total Area of Attachments	3,547	1,377	4,884	1,212	1,569	1,880	1,569	0,710	27,776	34,766	39,660	
Road	—	—	—	—	—	—	—	—	—	—	—	
Sub Aerial Road	—	—	—	0,887	—	—	—	—	0,887	—	0,887	
Collector Streets	0,485	—	—	—	—	—	—	—	—	—	0,485	
Local Access Streets	1,122	—	—	0,606	0,833	0,786	0,744	—	3,272	4,449	8,255	
Pedestrian Connections/Thresholds	0,008	—	—	0,008	—	—	—	—	—	—	0,008	
Total Area of New Road	1,645	—	—	1,385	0,886	0,833	0,744	—	4,314	5,399	10,000	
Open Space	—	—	—	—	—	—	—	—	—	—	—	
Active Park	0,733	—	—	—	—	—	—	—	—	—	0,733	
Paved Open Space	3,486	—	—	—	—	—	—	—	—	—	3,486	
Stormwater Conveyance	4,231	—	—	—	—	—	—	—	—	—	4,231	
Total Open Space	8,965	—	—	—	—	—	—	—	—	—	8,965	
Street Type	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	
Shared Access Driveway	82	—	—	30	57	34	—	—	121	—	203	
Esplanade Street	—	—	—	—	165	252	212	153	—	882	882	
Local Access Street	630	—	—	630	226	291	166	—	1,258	1,888	3,146	
Collector Street	73	—	—	73	—	—	—	—	—	—	73	
Trunk Collector Street	167	—	—	167	—	—	—	—	—	—	167	
Sub Aerial Road	—	—	—	247	—	—	—	—	—	—	247	
Total Length of New Road	952	—	—	952	503	533	569	504	319	—	2,428	

YIELD BREAKDOWN - APPLICATION 1												
Single Family Dwellings	Stage 1	Balance	Sub Total	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Balance	Sub Total	Total	
23m Deep Product	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	Product 1	
23m Deep Product	1	2%	—	1	2%	—	0%	—	3	2%	4	
23m Deep Product	2	3%	—	2	3%	—	0%	—	2	1%	2	
23m Deep Product	3	4%	—	3	4%	—	0%	—	1	0%	1	
23m Deep Product	4	5%	—	4	5%	—	0%	—	9	5%	13	
23m Deep Product	5	6%	—	5	6%	—	0%	—	20	12%	28	
23m Deep Product	6	7%	—	6	7%	—	0%	—	9	5%	13	
23m Deep Product	7	8%	—	7	8%	—	0%	—	18	11%	23	
23m Deep Product	8	9%	—	8	9%	—	0%	—	6	4%	7	
23m Deep Product	9	10%	—	9	10%	—	0%	—	8	5%	11	
23m Deep Product	10	11%	—	10	11%	—	0%	—	8	5%	11	
23m Deep Product	11	12%	—	11	12%	—	0%	—	66	39%	87	
23m Deep Product	12	13%	—	12	13%	—	0%	—	3	2%	3	
23m Deep Product	13	14%	—	13	14%	—	0%	—	3	2%	3	
23m Deep Product	14	15%	—	14	15%	—	0%	—	6	4%	6	
23m Deep Product	15	16%	—	15	16%	—	0%	—	3	2%	3	
23m Deep Product	16	17%	—	16	17%	—	0%	—	3	2%	3	
23m Deep Product	17	18%	—	17	18%	—	0%	—	3	2%	3	
23m Deep Product	18	19%	—	18	19%	—	0%	—	3	2%	3	
23m Deep Product	19	20%	—	19	20%	—	0%	—	3	2%	3	
23m Deep Product	20	21%	—	20	21%	—	0%	—	3	2%	3	
23m Deep Product	21	22%	—	21	22%	—	0%	—	3	2%	3	
23m Deep Product	22	23%	—	22	23%	—	0%	—	3	2%	3	
23m Deep Product	23	24%	—	23	24%	—	0%	—	3	2%	3	
23m Deep Product	24	25%	—	24	25%	—	0%	—	3	2%	3	
23m Deep Product	25	26%	—	25	26%	—	0%	—	3	2%	3	
23m Deep Product	26	27%	—	26	27%	—	0%	—	3	2%	3	
23m Deep Product	27	28%	—	27	28%	—	0%	—	3	2%	3	
23m Deep Product	28	29%	—	28	29%	—	0%	—	3	2%	3	
23m Deep Product	29	30%	—	29	30%	—	0%	—	3	2%	3	
23m Deep Product	30	31%	—	30	31%	—	0%	—	3	2%	3	
23m Deep Product	31	32%	—	31	32%	—	0%	—	3	2%	3	
23m Deep Product	32	33%	—	32	33%	—	0%	—	3	2%	3	
23m Deep Product	33	34%	—	33	34%	—	0%	—	3	2%	3	
23m Deep Product	34	35%	—	34	35%	—	0%	—	3	2%	3	
23m Deep Product	35	36%	—	35	36%	—	0%	—	3	2%	3	
23m Deep Product	36	37%	—	36	37%	—	0%	—	3	2%	3	
23m Deep Product	37	38%	—	37	38%	—	0%	—	3	2%	3	
23m Deep Product	38	39%	—	38	39%	—	0%	—	3	2%	3	
23m Deep Product	39	40%	—	39	40%	—	0%	—	3	2%	3	
23m Deep Product	40	41%	—	40	41%	—	0%	—	3	2%	3	
23m Deep Product	41	42%	—	41	42%	—	0%	—	3	2%	3	
23m Deep Product	42	43%	—	42	43%	—	0%	—	3	2%	3	
23m Deep Product	43	44%	—	43	44%	—	0%	—	3	2%	3	
23m Deep Product	44	45%	—	44	45%	—	0%	—	3	2%	3	
23m Deep Product	45	46%	—	45	46%	—	0%	—	3	2%	3	
23m Deep Product	46	47%	—	46	47%	—	0%	—	3	2%	3	
23m Deep Product	47	48%	—	47	48%	—	0%	—	3	2%	3	
23m Deep Product	48	49%	—	48	49%	—	0%	—	3	2%	3	
23m Deep Product	49	50%	—	49	50%	—	0%	—	3	2%	3	
23m Deep Product	50	51%	—	50	51%	—	0%	—	3	2%	3	
23m Deep Product	51	52%	—	51	52%	—	0%	—	3	2%	3	
23m Deep Product	52	53%	—	52	53%	—	0%	—	3	2%	3	
23m Deep Product	53	54%	—	53	54%	—	0%	—	3	2%	3	
23m Deep Product	54	55%	—	54	55%	—	0%	—	3	2%	3	
23m Deep Product	55	56%	—	55	56%	—	0%	—	3	2%	3	
23m Deep Product	56	57%	—	56	57%	—	0%	—	3	2%	3	
23m Deep Product	57	58%	—	57	58%	—	0%	—	3	2%	3	
23m Deep Product	58	59%	—	58	59%	—	0%	—	3	2%	3	
23m Deep Product	59	60%	—	59	60%	—	0%	—	3	2%	3	
23m Deep Product	60	61%	—	60	61%	—	0%	—	3	2%	3	
23m Deep Product	61	62%	—	61	62%	—	0%	—	3	2%	3	
23m Deep Product	62	63%	—	62	63%	—	0%	—	3	2%	3	
23m Deep Product	63	64%	—	63	64%	—	0%	—	3	2%	3	
23m Deep Product	64	65%	—	64	65%	—	0%	—	3	2%	3	
23m Deep Product	65	66%	—	65	66%	—	0%	—	3	2%	3	
23m Deep Product	66	67%	—	66	67%	—	0%	—	3	2%	3	
23m Deep Product	67	68%	—	67	68%	—	0%	—	3	2%	3	
23m Deep Product	68	69%	—	68	69%	—	0%	—	3	2%	3	
23m Deep Product	69	70%	—	69	70%	—	0%	—	3	2%	3	
23m Deep Product	70	71%	—	70	71%	—	0%	—	3	2%	3	
23m Deep Product	71	72%	—	71	72%	—	0%	—	3	2%	3	
23m Deep Product	72	73%	—	72	73%	—	0%	—	3	2%	3	
23m Deep Product	73	74%	—	73	74%	—	0%	—	3	2%	3	
23m Deep Product	74	75%	—	74	75%	—	0%	—	3	2%	3	
23m Deep Product	75	76%	—	75	76%	—	0%	—	3	2%	3	
23m Deep Product	76	77%	—	76	77%	—	0%	—	3	2%	3	
23m Deep Product	77	78%	—	77	78%	—	0%	—	3	2%	3	
23m Deep Product	78	79%	—	78	79%	—	0%	—	3	2%	3	
23m Deep Product	79	80%	—	79	80%	—	0%	—	3	2%	3	
23m Deep Product	80	81%	—	80	81%	—	0%	—	3	2%	3	
23m Deep Product	81	82%	—	81	82%	—	0%	—	3	2%	3	
23m Deep Product	82	83%	—	82	83%	—	0%	—	3	2%	3	
23m Deep Product	83	84%	—	83	84%	—	0%	—	3	2%	3	
23m Deep Product	84	85%	—	84	85%	—	0%	—	3	2%	3	
23m Deep Product	85	86%	—	85	86%	—	0%	—	3	2%	3	
23m Deep Product	86	87%	—	86	87%	—	0%	—	3	2%	3	
23m Deep Product	87	88%	—	87	88%	—	0%	—	3	2%	3	
23m Deep Product	88	89%	—	88	89%	—	0%	—	3	2%	3	
23m Deep Product	89	90%	—	89	90%	—	0%	—	3	2%	3	
23m Deep Product	90	91%	—	90	91%	—	0%	—	3	2%	3	
23m Deep Product	91	92%	—	91	92%	—	0%	—	3	2%	3	
23m Deep Product	92	93%	—	92	93%	—	0%	—	3	2%	3	
23m Deep Product	93	94%	—	93	94%	—	0%	—	3	2%	3	
23m Deep Product	94	95%	—	94	95%	—	0%	—	3	2%	3	
23m Deep Product	95	96%	—	95	96%	—	0%	—	3	2%	3	
23m Deep Product	96	97%	—	96	97%	—	0%	—	3	2%	3	
23m Deep Product	97	98%	—	97	98%	—	0%	—	3	2%	3	
23m Deep Product	98	99%	—	98	99%	—	0%	—	3	2%	3	
23m Deep Product	99	100%	—	99	100%	—	0%	—	3	2%	3	
23m Deep Product	100	101%	—	100	101%	—	0%	—	3	2%	3	
23m Deep Product	101	102%	—	101	102%	—	0%	—	3	2%	3	
23m Deep Product	102	103%	—	102	103%	—	0%	—	3	2%	3	
23m Deep Product	103	104%	—	103	104%	—	0%	—	3	2%	3	
23m Deep Product	104	105%	—	104	105%	—	0%	—	3	2%	3	
23m Deep Product	105	106%	—	105	106%	—	0%	—	3	2%	3	
23m Deep Product	106	107%	—	106	107%	—	0%	—	3	2%	3	
23m Deep Product	107	108%	—	107	108%	—	0%	—	3	2%	3	
23m Deep Product	108	109%	—	108	109%	—	0%	—	3	2%	3	
23m Deep Product	109	110%	—	109	110%	—	0%	—	3	2%	3	
23m Deep Product	110	111%	—	110	111%	—	0%	—	3	2%	3	
23m Deep Product	111	112%	—	111	112%	—	0%	—	3	2%	3	
23m Deep Product	112	113%	—	112	113%	—	0%	—	3	2%	3	
23m Deep Product	113	114%	—	113	114%	—	0%	—	3	2%	3	
23m Deep Product	114	115%	—	114	115%	—	0%	—	3	2%	3	
23m Deep Product	115	116%	—	115	116%	—	0%	—	3	2%	3	
23m Deep Product	116	117%	—	116	117%	—	0%	—	3	2%	3	
23m Deep Product	117	118%	—	117	118%	—	0%	—	3	2%	3	
23m Deep Product	118	119%	—	118	119%	—	0%	—	3	2%	3	
23m Deep Product	119	120%	—	119	120%	—	0%	—	3	2%	3	
23m Deep Product	120	121%	—	120	121%	—	0%	—	3	2%	3	
23m Deep Product	121	122%	—	121	122%	—	0%	—	3	2%	3	
23m Deep Product	122	123%	—	122	123%	—	0%	—	3	2%	3	
23m Deep Product	123	124%	—	123	124%	—	0%	—	3	2%	3	
23m Deep Product	124	125%	—	124	125%	—	0%	—	3	2%	3	
23m Deep Product	125	126%	—	125	126%	—	0%	—	3	2%	3	
23m Deep Product	126	127%	—	126	127%	—	0%	—	3	2%	3	
23m Deep Product	127	128%	—	127	128%	—	0%	—	3	2%	3	
23m Deep Product	128	129%	—	128	129%	—	0%	—	3	2%	3	
23m Deep Product	129	130%	—	129	130%	—	0%	—	3	2%	3	
23m Deep Product	130	131%	—	130	131%	—	0%	—	3	2%	3	
23m Deep Product	131	132%	—	131	132%	—	0%	—	3	2%	3	
23m Deep Product	132	133%	—	132	133%	—	0%	—	3	2%	3	
23m Deep Product	133	134%	—	133	134%	—	0%	—	3	2%	3	
23m Deep Product	134	135%	—	134	135%	—	0%	—	3	2%	3	
23m Deep Product	135	136%	—	135	136%	—	0%	—	3	2%	3	
23m Deep Product	136	137%	—	136	137%	—	0%	—	3	2%	3	
23m Deep Product	137	138%	—	137	138%	—	0%	—	3	2%	3	
23m Deep Product	138	139%	—	138	139%	—	0%	—	3	2%	3	
23m Deep Product	139	140%	—	139	140%	—	0%	—	3	2%	3	
23m Deep Product	140	141%	—	140	141%	—	0%	—	3	2%	3	
23m Deep Product	141	142%	—	141	142%	—	0%	—	3	2%	3	
23m Deep Product	142	143%	—	142	143%	—	0%	—	3	2%	3	
23m Deep Product	143	144%	—	143	144%	—	0%	—	3	2%	3	



LAND USE BUDGET - APPLICATION 2														
Land Use	Stage 7	Sub Total Precinct 2		Stage 8	Stage 9	Stage 10	Stage 11	Stage 12	Stage 13	Stage 14	Stage 15	Sub Total Precinct 1		
		Area (ha)	Area (m)									Area (ha)	Area (m)	
Area of Subject Site	1,377	1,377	3,100	2,934	4,495	3,995	3,100	4,030	2,311	1,526	25,451	26,828		
Saleable Areas	Single Family Allowments	0.953	0.953	1.594	2,057	2,296	2,232	2,060	2,277	1,750	1,018	15,416	16,268	
	Medium Density Allowments	—	—	0.442	—	—	0.323	—	0.432	—	1,197	1,197	17,465	
	Total Area of Allowments	0.953	0.953	2,036	2,057	2,296	2,555	2,060	2,709	1,750	1,018	16,613		
Road	—	—	—	—	—	—	0.759	—	—	—	—	1,233	1,233	
Collector Street	—	—	0.664	—	—	—	—	—	—	—	—	6,746	6,746	
Local Access Streets	0.624	0.624	0.600	0.877	0.697	0.641	0.689	1.281	0.571	0.358	6,344	6,746		
Protestant Commercial Thresholds	—	—	—	—	—	—	0.651	0.640	—	—	0.691	0.691	6,962	
Total Area of New Roads	0.624	0.624	1.664	0.877	0.697	1.660	1.620	1.321	0.571	0.358	7,638	7,638		
Open Space	—	—	—	—	—	—	—	—	—	—	—	1,300	1,300	
Active Park	—	—	—	—	—	1,300	—	—	—	—	—	1,300	1,300	
Total Open Space	—	—	—	—	—	1,300	—	—	—	—	—	1,300	1,300	
Road Type	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	Length (m)	
Shannon Access Driveway	—	—	64	30	—	—	71	—	—	—	44	209	209	
Edinburgh Street	172	472	—	—	136	—	229	—	—	—	—	365	365	
Local Access Streets	115	415	307	520	441	348	402	796	341	260	346	557	557	
Collector Street	—	—	257	—	—	420	—	—	—	—	677	677	677	
Total Length of New Road	287	287	628	550	577	840	631	796	341	304	4657	4954	4954	

Single Family Dwellings		YIELD BREAKDOWN - APPLICATION 2														Sub Total Precinct 1		Total			
		Stage 7	Stage 8	Stage 9	Stage 10	Stage 11	Stage 12	Stage 13	Stage 14	Stage 15											
		Su1 Total Precinct 2	Stage 8	Stage 9	Stage 10	Stage 11	Stage 12	Stage 13	Stage 14	Stage 15											
22m Deep Product		0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	32	12	3%		
Times 2.5m	0	0%	0	0%	0	3%	5%	3	5%	3	5%	3	4%	0	0%	0	0%	8	2%		
Times 3.0m	0	0%	0	0%	0	2	4%	2	3%	2	3%	2	4%	0	0%	0	0%	8	2%		
Villa 10m	2	9%	2	9%	0	0%	3	5%	0	0%	5	8%	1	2%	3	5%	4	9%	0	0%	
Premium Villa 12.5m	1	4%	2	6%	0	0%	13	23%	6	10%	13	21%	3	6%	12	21%	5	12%	5	21%	
Curtyard 10m	2	9%	2	9%	2	6%	7	12%	8	14%	11	18%	3	5%	9	16%	3	7%	3	13%	
Traditional 10m	1	4%	2	9%	2	6%	2	4%	1	2%	3	5%	1	2%	3	5%	0	0%	5	21%	
Premium Traditional 10m	0	0%	0	0%	2	6%	2	4%	3	5%	1	2%	2	4%	4	7%	2	5%	1	4%	
Subtotal	6	28%	6	28%	8	23%	32	56%	23	40%	38	61%	15	23%	31	54%	14	33%	14	58%	
22m Deep Product																					
Villa 10m	2	9%	2	9%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	
Premium Villa 12.5m	2	9%	2	9%	3	9%	2	4%	1	2%	2	3%	0	0%	0	0%	2	5%	1	4%	
Curtyard 10m	1	4%	2	9%	3	9%	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	1	4%	
Traditional 10m	2	9%	2	9%	2	6%	2	4%	0	0%	2	3%	1	2%	1	2%	2	5%	1	4%	
Premium Traditional 10m	0	0%	0	0%	5	14%	0	0%	1	2%	0	0%	2	4%	4	7%	0	0%	2	8%	
Subtotal	7	30%	7	30%	13	37%	4	7%	2	3%	4	6%	3	6%	4	7%	4	9%	5	21%	
32m Deep Product																					
Villa 10m	1	4%	1	4%	1	3%	6	11%	4	7%	4	6%	4	8%	4	7%	2	5%	0	0%	
Premium Villa 12.5m	2	9%	2	9%	3	9%	8	14%	12	21%	8	13%	9	16%	5	9%	0	21%	0	0%	
Curtyard 10m	4	17%	4	17%	4	11%	3	5%	9	16%	3	5%	11	22%	5	9%	6	14%	58	14%	
Premium Traditional 10m	1	4%	1	4%	2	6%	2	4%	4	7%	4	6%	6	12%	6	11%	4	9%	4	11%	
Traditional 10m	2	9%	2	9%	4	11%	2	4%	4	7%	1	2%	3	6%	2	4%	4	9%	0	0%	
Subtotal	10	43%	10	43%	14	40%	21	37%	33	57%	20	32%	33	65%	22	39%	25	58%	5	21%	
Total Residential Allowments		23	100%	23	100%	35	100%	57	100%	58	100%	62	100%	51	100%	57	100%	43	100%	24	100%
Super Lots		Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots	Lots
Maximised Density	0	0	0	0	1	15	0	0	0	0	1	11	0	0	1	15	0	0	0	0	
Density	23	23	23	23	36	50	57	57	58	58	63	73	51	51	58	72	43	43	24	380	
Per Residential Density	16.7	16.7	16.7	16.7	19.0	19.4	19.4	19.4	19.9	22.8	22.8	26.8	18.5	18.5	21.9	17.9	18.6	15.7	17.7	17.6	

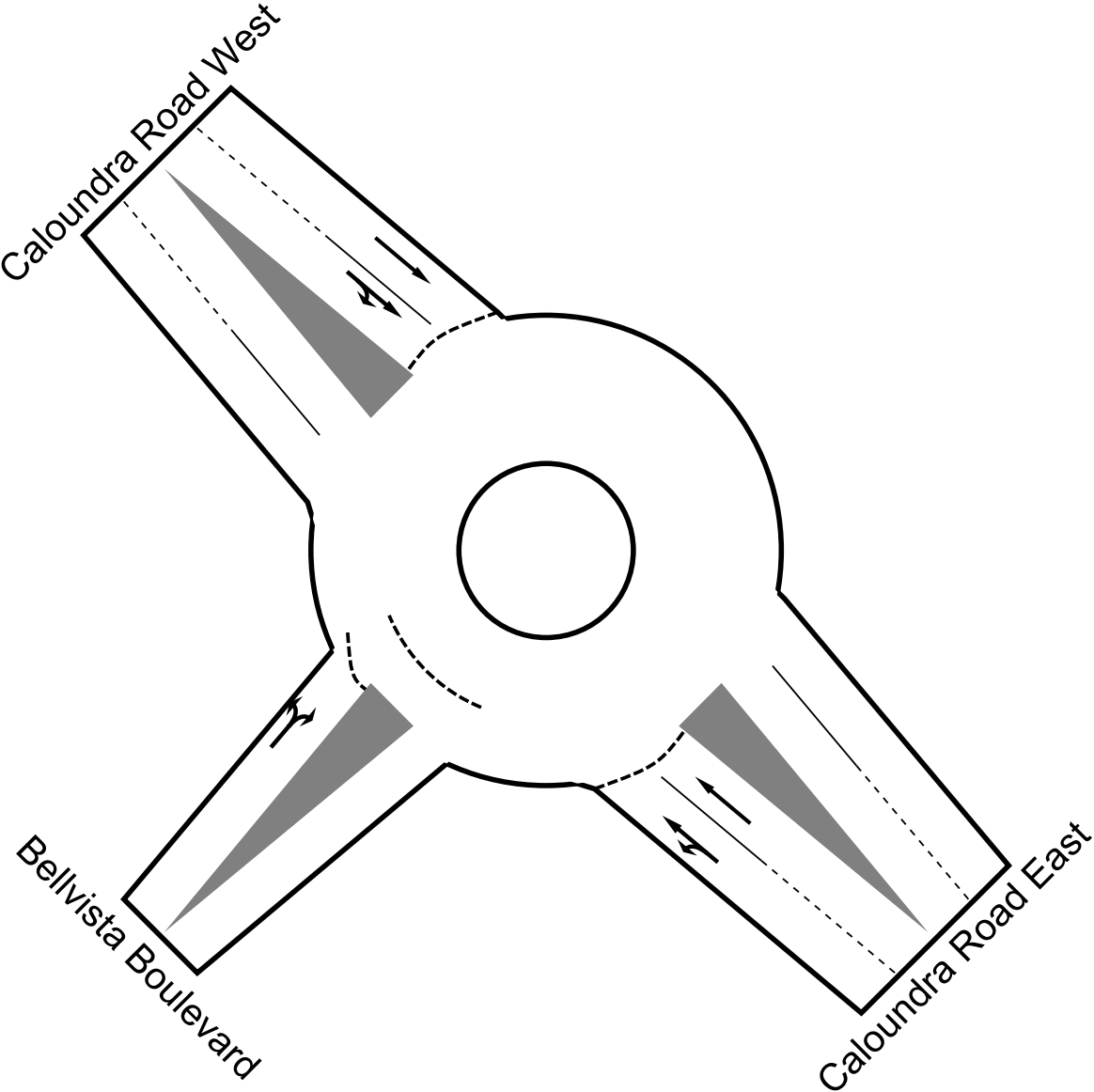
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Appendix B

SIDRA Results

Caloundra Road/Bellvista Boulevard Intersection

Existing Layout



Caloundra Road/Bellvista Boulevard
 2010 AM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	187	309		496	5			0.301	4.1	21	500
2 T		379		379	5			0.301	3.8	19	500
	187	688	0	875	5			0.301	3.9	21	
NorthWest: Caloundra Road West											
1 T		903		903	5			0.605	4.5	55	500
2 TR		408	264	672	5			0.605	9.3	54	500
	0	1311	264	1575	5			0.605	6.5	55	
SouthWest: Bellvista Boulevard											
1 LR	389		396	785	5			0.831	15.5	82	500
	389	0	396	785	5			0.831	15.5	82	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3235	5			0.832	8.0	82	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2010 PM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	274	528		802	5			0.478	4.2	35	500
2 T		615		615	5			0.478	4.1	34	500
	274	1143	0	1417	5			0.478	4.2	35	
NorthWest: Caloundra Road West											
1 T		675		675	5			0.390	3.2	28	500
2 TR		260	266	526	5			0.390	7.9	27	500
	0	935	266	1201	5			0.390	5.3	28	
SouthWest: Bellvista Boulevard											
1 LR	138		191	329	5			0.436	12.2	22	500
	138	0	191	329	5			0.436	12.2	22	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				2947	5			0.478	5.5	35	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 AM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	310		534	5			0.334	4.3	24	500
2 T		406		406	5			0.334	4.0	22	500
	224	716	0	940	5			0.334	4.2	24	
NorthWest: Caloundra Road West											
1 T		957		957	5			0.667	5.5	72	500
2 TR		405	301	706	5			0.667	10.9	69	500
	0	1362	301	1663	5			0.667	7.8	72	
SouthWest: Bellvista Boulevard											
1 LR	426		433	859	5			0.933	23.4	143	500
	426	0	433	859	5			0.933	23.4	143	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3462	5			0.933	10.7	143	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 PM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st 2nd				

SouthEast: Caloundra Road East											
1 LT	286	550		836	5			0.502	4.3	38	500
2 T		639		639	5			0.502	4.2	36	500

	286	1189	0	1475	5			0.502	4.3	38	

NorthWest: Caloundra Road West											
1 T		703		703	5			0.410	3.3	31	500
2 TR		269	278	547	5			0.410	8.1	29	500

	0	972	278	1250	5			0.410	5.4	31	

SouthWest: Bellvista Boulevard											
1 LR	150		202	352	5			0.481	12.6	26	500

	150	0	202	352	5			0.481	12.6	26	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3077	5			0.502	5.7	38	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 AM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	249	301		550	5			0.351	4.5	26	500
2 T		415		415	5			0.351	4.2	24	500
	249	716	0	965	5			0.351	4.3	26	
NorthWest: Caloundra Road West											
1 T		973		973	5			0.696	6.2	80	500
2 TR		389	326	715	5			0.696	12.1	76	500
	0	1362	326	1688	5			0.696	8.7	80	
SouthWest: Bellvista Boulevard											
1 LR	501		508	1009	5			1.101	203.1	981	500
	501	0	508	1009	5			1.101	203.1	981	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3662	5			1.102	61.1	981	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 PM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	346	530		876	5			0.547	4.8	44	500
2 T		659		659	5			0.547	4.7	41	500
	346	1189	0	1535	5			0.547	4.7	44	
NorthWest: Caloundra Road West											
1 T		740		740	5			0.444	3.5	35	500
2 TR		232	338	570	5			0.444	9.0	32	500
	0	972	338	1310	5			0.444	5.9	35	
SouthWest: Bellvista Boulevard											
1 LR	191		242	433	5			0.618	14.0	39	500
	191	0	242	433	5			0.618	14.0	39	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3278	5			0.618	6.4	44	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 AM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	326		550	5			0.344	4.3	25	500
2 T		417		417	5			0.344	4.0	23	500
	224	743	0	967	5			0.344	4.2	25	
NorthWest: Caloundra Road West											
1 T		987		987	5			0.689	5.8	77	500
2 TR		428	301	729	5			0.689	11.2	74	500
	0	1415	301	1716	5			0.689	8.1	77	
SouthWest: Bellvista Boulevard											
1 LR	426		433	859	5			0.946	24.8	148	500
	426	0	433	859	5			0.946	24.8	148	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3542	5			0.947	11.1	148	

=====

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 PM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st 2nd				

SouthEast: Caloundra Road East											
1 LT	286	602		888	5			0.533	4.3	42	500
2 T		678		678	5			0.533	4.3	40	500

	286	1280	0	1566	5			0.533	4.3	42	

NorthWest: Caloundra Road West											
1 T		725		725	5			0.423	3.3	32	500
2 TR		286	278	564	5			0.423	7.9	30	500

	0	1011	278	1289	5			0.423	5.3	32	

SouthWest: Bellvista Boulevard											
1 LR	150		202	352	5			0.505	13.1	28	500

	150	0	202	352	5			0.505	13.1	28	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3207	5			0.534	5.7	42	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 AM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							

SouthEast: Caloundra Road East											
1 LT	296	298		594	5			0.394	4.8	31	500
2 T		445		445	5			0.394	4.5	28	500
	296	743	0	1039	5			0.394	4.7	31	

NorthWest: Caloundra Road West											
1 T		1030		1030	5			0.730	6.7	90	500
2 TR		385	373	758	5			0.730	13.0	86	500
	0	1415	373	1788	5			0.730	9.4	90	

SouthWest: Bellvista Boulevard											
1 LR	640		647	1287	5			1.433	794.4	3663	500
	640	0	647	1287	5			1.433	794.4	3663	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4114	5			1.435	253.8	3663	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 PM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	457	544		1001	5			0.683	6.7	74	500
2 T		736		736	5			0.683	7.7	72	500
	457	1280	0	1737	5			0.683	7.2	74	
NorthWest: Caloundra Road West											
1 T		831		831	5			0.530	3.9	46	500
2 TR		180	449	629	5			0.530	10.7	42	500
	0	1011	449	1460	5			0.530	6.8	46	
SouthWest: Bellvista Boulevard											
1 LR	264		316	580	5			0.963	43.2	150	500
	264	0	316	580	5			0.963	43.2	150	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3777	5			0.964	12.6	150	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 AM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	388		612	5			0.386	4.3	30	500
2 T		465		465	5			0.386	4.1	27	500
	224	853	0	1077	5			0.386	4.2	30	
NorthWest: Caloundra Road West											
1 T		1107		1107	5			0.772	7.2	104	500
2 TR		517	301	818	5			0.772	12.7	100	500
	0	1624	301	1925	5			0.772	9.6	104	
SouthWest: Bellvista Boulevard											
1 LR	426		433	859	5			1.002	57.2	295	500
	426	0	433	859	5			1.002	57.2	295	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3861	5			1.002	18.7	295	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 PM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st 2nd				

SouthEast: Caloundra Road East											
1 LT	286	680		966	5			0.581	4.4	48	500
2 T		737		737	5			0.581	4.4	45	500

	286	1417	0	1703	5			0.581	4.4	48	

NorthWest: Caloundra Road West											
1 T		809		809	5			0.472	3.4	38	500
2 TR		350	278	628	5			0.472	7.6	36	500

	0	1159	278	1437	5			0.472	5.2	38	

SouthWest: Bellvista Boulevard											
1 LR	150		202	352	5			0.548	14.0	31	500

	150	0	202	352	5			0.548	14.0	31	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3492	5			0.581	5.7	48	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 AM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	249	379		628	5			0.403	4.4	32	500
2 T		474		474	5			0.403	4.3	29	500
	249	853	0	1102	5			0.403	4.4	32	
NorthWest: Caloundra Road West											
1 T		1121		1121	5			0.779	7.3	106	500
2 TR		503	326	829	5			0.779	13.0	102	500
	0	1624	326	1950	5			0.779	9.7	106	
SouthWest: Bellvista Boulevard											
1 LR	501		508	1009	5			1.188	357.1	1567	500
	501	0	508	1009	5			1.188	357.1	1567	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4061	5			1.187	94.6	1567	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 PM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	346	660		1006	5			0.631	4.9	55	500
2 T		757		757	5			0.631	5.5	57	500
	346	1417	0	1763	5			0.631	5.1	57	
NorthWest: Caloundra Road West											
1 T		846		846	5			0.509	3.6	43	500
2 TR		313	338	651	5			0.509	8.5	40	500
	0	1159	338	1497	5			0.509	5.7	43	
SouthWest: Bellvista Boulevard											
1 LR	191		242	433	5			0.717	16.8	49	500
	191	0	242	433	5			0.717	16.8	49	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3693	5			0.718	6.7	57	

=====

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Existing Traffic Volumes
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)	
	L	T	R	Tot								

SouthEast: Caloundra Road East												
1 LT	224	404		628	5			0.396	4.3	31	500	
2 T		477		477	5			0.396	4.1	28	500	

	224	881	0	1105	5			0.396	4.2	31		

NorthWest: Caloundra Road West												
1 T		1137		1137	5			0.789	7.5	110	500	
2 TR		540	301	841	5			0.789	13.0	106	500	

	0	1677	301	1978	5			0.789	9.9	110		

SouthWest: Bellvista Boulevard												
1 LR	426		433	859	5			1.018	74.4	361	500	

	426	0	433	859	5			1.018	74.4	361		
=====												
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue		
				3942	5			1.017	22.3	361		
=====												

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 PM Existing Traffic Volumes
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st 2nd				
SouthEast: Caloundra Road East											
1 LT	286	706		992	5			0.597	4.4	50	500
2 T		757		757	5			0.597	4.5	48	500
	286	1463	0	1749	5			0.597	4.4	50	
NorthWest: Caloundra Road West											
1 T		830		830	5			0.485	3.4	39	500
2 TR		367	278	645	5			0.485	7.5	37	500
	0	1197	278	1475	5			0.485	5.2	39	
SouthWest: Bellvista Boulevard											
1 LR	150		202	352	5			0.563	14.4	32	500
	150	0	202	352	5			0.563	14.4	32	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3576	5			0.597	5.7	50	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Background + Development Traffic Volumes
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	296	377		673	5			0.448	4.8	37	500
2 T		504		504	5			0.448	4.6	33	500
	296	881	0	1177	5			0.448	4.7	37	
NorthWest: Caloundra Road West											
1 T		1178		1178	5			0.809	7.8	119	500
2 TR		499	373	872	5			0.809	14.1	115	500
	0	1677	373	2050	5			0.809	10.5	119	
SouthWest: Bellvista Boulevard											
1 LR	640		647	1287	5			1.565	1031.7	4349	500
	640	0	647	1287	5			1.565	1031.7	4349	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4514	5			1.567	300.1	4349	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 PM Background + Development Traffic Volumes
Intersection ID: 0
Roundabout

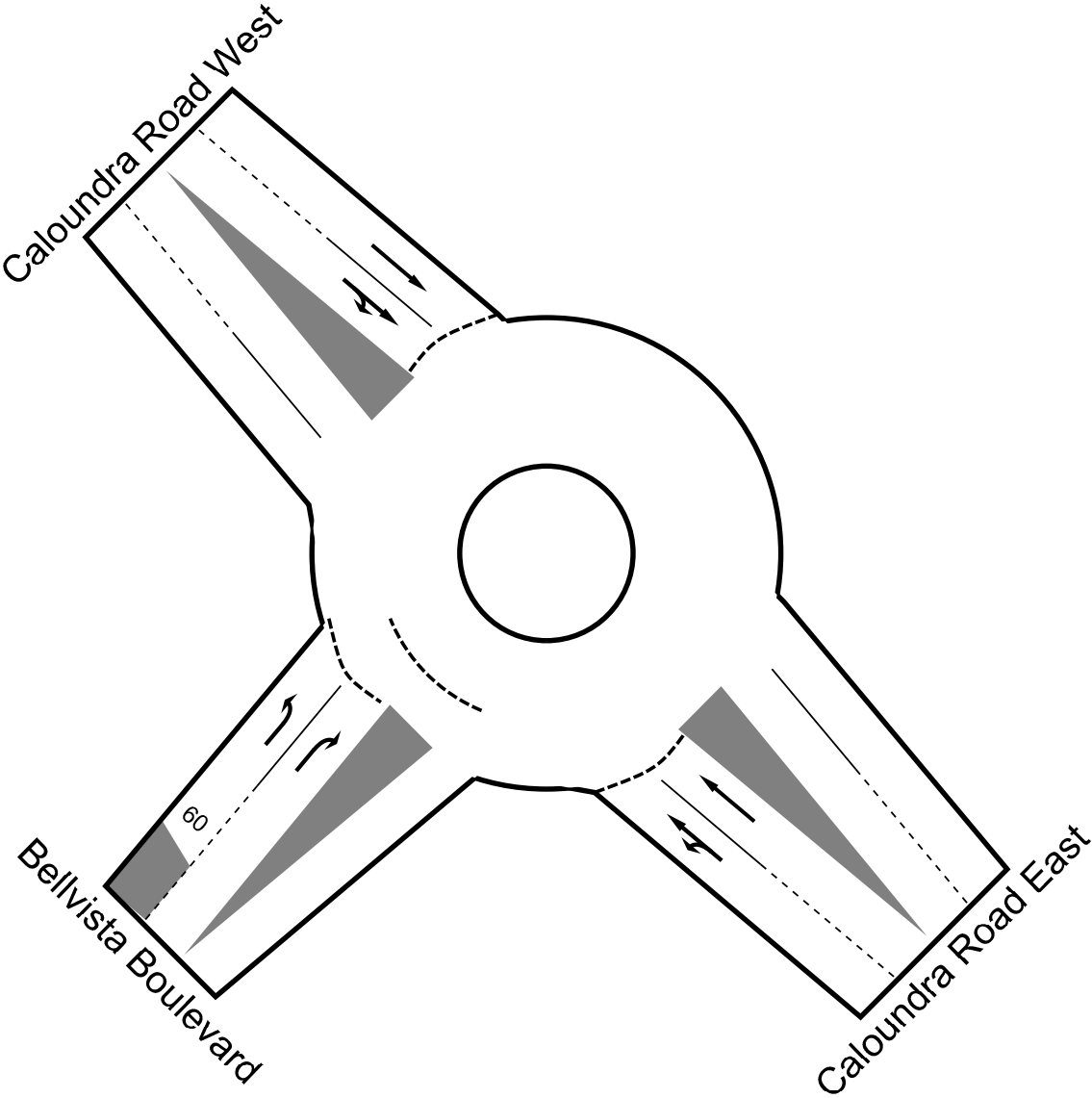
Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	457	649		1106	5			0.755	7.9	96	500
2 T		814		814	5			0.755	9.4	93	500
	457	1463	0	1920	5			0.755	8.5	96	
NorthWest: Caloundra Road West											
1 T		934		934	5			0.581	3.9	52	500
2 TR		263	449	712	5			0.581	9.9	49	500
	0	1197	449	1646	5			0.581	6.5	52	
SouthWest: Bellvista Boulevard											
1 LR	264		316	580	5			1.119	245.3	660	500
	264	0	316	580	5			1.119	245.3	660	
ALL VEHICLES											
				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4146	5			1.121	40.8	660	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Upgraded Roundabout Layout



Caloundra Road/Bellvista Boulevard
 2012 AM Background Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	310		534	5			0.333	4.3	24	500
2 T		406		406	5			0.333	4.0	22	500
	224	716	0	940	5			0.333	4.2	24	
NorthWest: Caloundra Road West											
1 T		957		957	5			0.638	5.2	61	500
2 TR		405	301	706	5			0.638	10.5	60	500
	0	1362	301	1663	5			0.638	7.5	61	
SouthWest: Bellvista Boulevard											
1 L	426			426	5			0.457	7.1	24	60
2 R			433	433	5			0.370	12.9	18	500
	426	0	433	859	5			0.457	10.0	24	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3462	5			0.638	7.2	61	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 PM Background Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	286	550		836	5			0.502	4.3	38	500
2 T		639		639	5			0.502	4.2	36	500
	286	1189	0	1475	5			0.502	4.3	38	
NorthWest: Caloundra Road West											
1 T		703		703	5			0.408	3.3	30	500
2 TR		269	278	547	5			0.408	8.1	28	500
	0	972	278	1250	5			0.408	5.4	30	
SouthWest: Bellvista Boulevard											
1 L	150			150	5			0.215	7.4	9	60
2 R			202	202	5			0.209	13.5	10	500
	150	0	202	352	5			0.215	10.9	10	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3077	5			0.502	5.5	38	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 AM Background + Development Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	249	301		550	5			0.350	4.5	26	500
2 T		415		415	5			0.350	4.2	24	500
	249	716	0	965	5			0.350	4.3	26	
NorthWest: Caloundra Road West											
1 T		977		977	5			0.691	6.8	78	500
2 TR		385	326	711	5			0.691	12.8	74	500
	0	1362	326	1688	5			0.691	9.3	78	
SouthWest: Bellvista Boulevard											
1 L	501			501	5			0.542	7.7	32	60
2 R			508	508	5			0.438	13.2	24	500
	501	0	508	1009	5			0.542	10.4	32	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3662	5			0.692	8.3	78	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2012 PM Background + Development Traffic Volumes - wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	346	530		876	5			0.546	4.8	44	500
2 T		659		659	5			0.546	4.7	41	500
	346	1189	0	1535	5			0.546	4.7	44	
NorthWest: Caloundra Road West											
1 T		740		740	5			0.441	3.5	34	500
2 TR		232	338	570	5			0.441	9.0	32	500
	0	972	338	1310	5			0.441	5.9	34	
SouthWest: Bellvista Boulevard											
1 L	191			191	5			0.286	7.7	13	60
2 R			242	242	5			0.261	13.6	13	500
	191	0	242	433	5			0.286	11.0	13	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3278	5			0.547	6.0	44	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 AM Background Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	326		550	5			0.343	4.3	25	500
2 T		417		417	5			0.343	4.0	23	500
	224	743	0	967	5			0.343	4.2	25	
NorthWest: Caloundra Road West											
1 T		987		987	5			0.660	5.5	66	500
2 TR		428	301	729	5			0.660	10.7	65	500
	0	1415	301	1716	5			0.660	7.7	66	
SouthWest: Bellvista Boulevard											
1 L	426			426	5			0.464	7.2	25	60
2 R			433	433	5			0.374	13.0	19	500
	426	0	433	859	5			0.464	10.1	25	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3542	5			0.660	7.3	66	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 PM Background Traffic Volumes - wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	286	602		888	5			0.533	4.3	42	500
2 T		678		678	5			0.533	4.3	40	500
	286	1280	0	1566	5			0.533	4.3	42	
NorthWest: Caloundra Road West											
1 T		725		725	5			0.421	3.3	31	500
2 TR		286	278	564	5			0.421	7.9	30	500
	0	1011	278	1289	5			0.421	5.3	31	
SouthWest: Bellvista Boulevard											
1 L	150			150	5			0.228	7.7	10	60
2 R			202	202	5			0.218	13.6	11	500
	150	0	202	352	5			0.228	11.1	11	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3207	5			0.533	5.5	42	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 AM Background + Development Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	296	298		594	5			0.396	4.8	31	500
2 T		445		445	5			0.396	4.5	28	500
	296	743	0	1039	5			0.396	4.7	31	
NorthWest: Caloundra Road West											
1 T		1047		1047	5			0.848	14.7	153	500
2 TR		368	373	741	5			0.848	23.2	135	500
	0	1415	373	1788	5			0.848	18.2	153	
SouthWest: Bellvista Boulevard											
1 L	640			640	5			0.716	9.8	55	60
2 R			647	647	5			0.574	14.1	38	500
	640	0	647	1287	5			0.716	11.9	55	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4114	5			0.848	12.8	153	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 PM Background + Development Traffic Volumes - wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	457	544		1001	5			0.681	6.7	73	500
2 T		736		736	5			0.681	7.7	71	500
	457	1280	0	1737	5			0.681	7.1	73	
NorthWest: Caloundra Road West											
1 T		831		831	5			0.523	3.9	44	500
2 TR		180	449	629	5			0.523	10.7	40	500
	0	1011	449	1460	5			0.523	6.8	44	
SouthWest: Bellvista Boulevard											
1 L	264			264	5			0.463	9.4	25	60
2 R			316	316	5			0.395	14.5	23	500
	264	0	316	580	5			0.463	12.2	25	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3777	5			0.681	7.8	73	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 AM Background Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	224	388		612	5			0.384	4.3	29	500
2 T		465		465	5			0.384	4.1	27	500
	224	853	0	1077	5			0.384	4.2	29	
NorthWest: Caloundra Road West											
1 T		1108		1108	5			0.743	6.7	91	500
2 TR		516	301	817	5			0.743	12.0	88	500
	0	1624	301	1925	5			0.743	9.0	91	
SouthWest: Bellvista Boulevard											
1 L	426			426	5			0.498	7.8	27	60
2 R			433	433	5			0.393	13.2	20	500
	426	0	433	859	5			0.498	10.5	27	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3861	5			0.743	8.0	91	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 PM Background Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	286	680		966	5			0.581	4.4	48	500
2 T		737		737	5			0.581	4.4	45	500
	286	1417	0	1703	5			0.581	4.4	48	
NorthWest: Caloundra Road West											
1 T		809		809	5			0.471	3.4	37	500
2 TR		350	278	628	5			0.471	7.6	35	500
	0	1159	278	1437	5			0.471	5.2	37	
SouthWest: Bellvista Boulevard											
1 L	150			150	5			0.251	8.1	11	60
2 R			202	202	5			0.234	13.9	12	500
	150	0	202	352	5			0.251	11.4	12	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3492	5			0.581	5.4	48	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 AM Background + Development Traffic Volumes wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	249	379		628	5			0.403	4.4	32	500
2 T		474		474	5			0.403	4.3	29	500
	249	853	0	1102	5			0.403	4.4	32	
NorthWest: Caloundra Road West											
1 T		1129		1129	5			0.805	9.4	120	500
2 TR		495	326	821	5			0.805	15.7	113	500
	0	1624	326	1950	5			0.805	12.0	120	
SouthWest: Bellvista Boulevard											
1 L	501			501	5			0.592	8.6	37	60
2 R			508	508	5			0.466	13.6	26	500
	501	0	508	1009	5			0.592	11.1	37	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4061	5			0.805	9.7	120	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2022 PM Background + Development Traffic Volumes - wUG
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	346	660		1006	5			0.630	4.9	55	500
2 T		757		757	5			0.630	5.5	56	500
	346	1417	0	1763	5			0.630	5.1	56	
NorthWest: Caloundra Road West											
1 T		846		846	5			0.506	3.6	41	500
2 TR		313	338	651	5			0.506	8.5	39	500
	0	1159	338	1497	5			0.506	5.7	41	
SouthWest: Bellvista Boulevard											
1 L	191			191	5			0.340	8.6	16	60
2 R			242	242	5			0.298	14.0	16	500
	191	0	242	433	5			0.340	11.6	16	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3693	5			0.630	6.1	56	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Background Traffic Volumes wUG
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)	
	L	T	R	Tot								

SouthEast: Caloundra Road East												
1 LT	224	404		628	5			0.394	4.3	30	500	
2 T		477		477	5			0.394	4.1	28	500	

	224	881	0	1105	5			0.394	4.2	30		

NorthWest: Caloundra Road West												
1 T		1138		1138	5			0.765	7.1	98	500	
2 TR		539	301	840	5			0.765	12.5	96	500	

	0	1677	301	1978	5			0.765	9.4	98		

SouthWest: Bellvista Boulevard												
1 L	426			426	5			0.507	8.0	28	60	
2 R			433	433	5			0.398	13.3	20	500	

	426	0	433	859	5			0.507	10.6	28		
=====												
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue		
				3942	5			0.765	8.2	98		
=====												

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 PM Background Traffic Volumes - wUG
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)	
	L	T	R	Tot								

SouthEast: Caloundra Road East												
1 LT	286	706		992	5			0.597	4.4	50	500	
2 T		757		757	5			0.597	4.5	47	500	

	286	1463	0	1749	5			0.597	4.4	50		

NorthWest: Caloundra Road West												
1 T		830		830	5			0.483	3.4	39	500	
2 TR		367	278	645	5			0.483	7.5	37	500	

	0	1197	278	1475	5			0.483	5.2	39		

SouthWest: Bellvista Boulevard												
1 L	150			150	5			0.259	8.3	12	60	
2 R			202	202	5			0.240	14.0	12	500	

	150	0	202	352	5			0.259	11.5	12		
=====												
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue		
				3576	5			0.597	5.4	50		
=====												

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Background + Development Traffic Volumes wUG
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st	2nd			
SouthEast: Caloundra Road East											
1 LT	296	377		673	5			0.448	4.8	37	500
2 T		504		504	5			0.448	4.6	33	500
	296	881	0	1177	5			0.448	4.7	37	
NorthWest: Caloundra Road West											
1 T		1201		1201	5			0.985	48.2	418	500
2 TR		476	373	849	5			0.985	61.9	346	500
	0	1677	373	2050	5			0.985	53.9	418	
SouthWest: Bellvista Boulevard											
1 L	640			640	5			0.785	11.9	66*	60
2 R			647	647	5			0.613	14.7	42	500
	640	0	647	1287	5			0.785	13.3	66	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4514	5			0.985	29.5	418	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

* Queue length exceeds short lane length due to specification of a percentile queue in the Tools-Options (Model tab). For calculation of this statistic, you may specify the lane with full length.

Caloundra Road/Bellvista Boulevard
2024 PM Background + Development Traffic Volumes - wUG
Intersection ID: 0
Roundabout

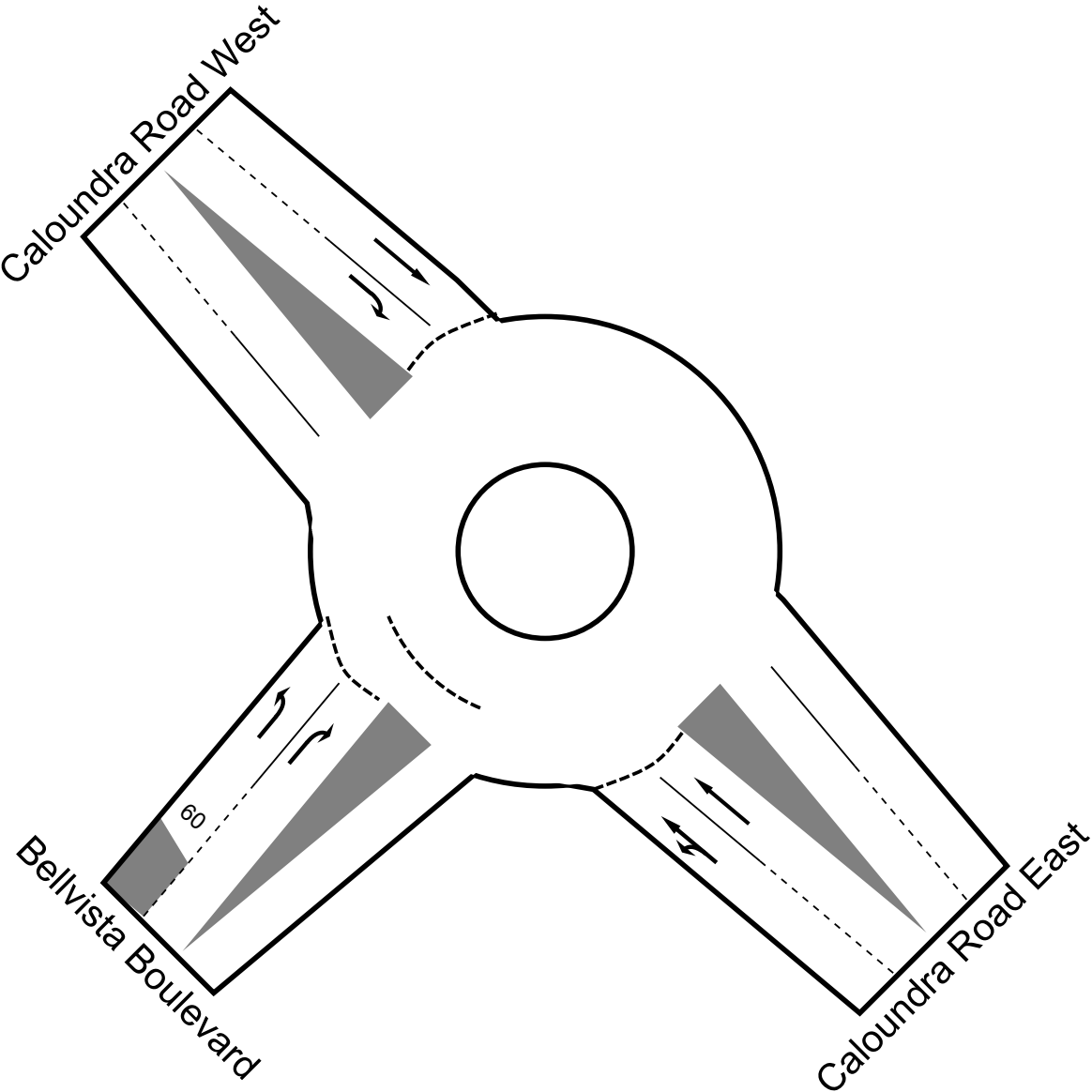
Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	457	649		1106	5			0.758	7.9	97	500
2 T		814		814	5			0.758	9.4	94	500
	457	1463	0	1920	5			0.758	8.6	97	
NorthWest: Caloundra Road West											
1 T		937		937	5			0.593	4.0	53	500
2 TR		260	449	709	5			0.593	10.3	50	500
	0	1197	449	1646	5			0.593	6.7	53	
SouthWest: Bellvista Boulevard											
1 L	264			264	5			0.553	11.8	32	60
2 R			316	316	5			0.454	16.0	28	500
	264	0	316	580	5			0.553	14.1	32	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4146	5			0.758	8.6	97	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Upgraded Roundabout Layout



Caloundra Road/Bellvista Boulevard
 2014 AM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)					Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot	%HV						
SouthEast: Caloundra Road East											
1 LT	224	326		550	5			0.337	4.3	23	500
2 T		417		417	5			0.337	4.0	21	500
	224	743	0	967	5			0.337	4.2	23	
NorthWest: Caloundra Road West											
1 T		1415		1415	5	1950		0.749	2.8		500
2 R			301	301	5			0.258	13.2	16	500
	0	1415	301	1716	5			0.749	4.6	16	
SouthWest: Bellvista Boulevard											
1 L	426			426	5			0.461	7.2	24	60
2 R			433	433	5			0.372	13.0	18	500
	426	0	433	859	5			0.461	10.1	24	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3542	5			0.749	5.8	24	
=====											

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 PM Existing Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	286	602		888	5			0.530	4.3	41	500
2 T		678		678	5			0.530	4.3	38	500
	286	1280	0	1566	5			0.530	4.3	41	
NorthWest: Caloundra Road West											
1 T		1011		1011	5	1950		0.535	2.6		500
2 R			278	278	5			0.200	12.0	12	500
	0	1011	278	1289	5			0.535	4.7	12	
SouthWest: Bellvista Boulevard											
1 L	150			150	5			0.227	7.7	10	60
2 R			202	202	5			0.217	13.6	11	500
	150	0	202	352	5			0.227	11.1	11	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3207	5			0.535	5.2	41	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
 2014 AM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	296	298		594	5			0.389	4.8	30	500
2 T		445		445	5			0.389	4.5	27	500
	296	743	0	1039	5			0.389	4.7	30	
NorthWest: Caloundra Road West											
1 T		1415		1415	5	1950		0.749	2.8		500
2 R			373	373	5			0.396	14.7	29	500
	0	1415	373	1788	5			0.749	5.3	29	
SouthWest: Bellvista Boulevard											
1 L	640			640	5			0.712	9.7	55	60
2 R			647	647	5			0.571	14.1	38	500
	640	0	647	1287	5			0.712	11.9	55	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4114	5			0.749	7.2	55	
=====											

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes

Caloundra Road/Bellvista Boulevard
 2014 PM Background + Development Traffic Volumes
 Intersection ID: 0
 Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs) 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	457	544		1001	5			0.673	6.6	70	500
2 T		736		736	5			0.673	7.6	68	500
	457	1280	0	1737	5			0.673	7.0	70	
NorthWest: Caloundra Road West											
1 T		1011		1011	5	1950		0.535	2.6		500
2 R			449	449	5			0.356	12.7	24	500
	0	1011	449	1460	5			0.535	5.7	24	
SouthWest: Bellvista Boulevard											
1 L	264			264	5			0.458	9.3	25	60
2 R			316	316	5			0.391	14.4	23	500
	264	0	316	580	5			0.458	12.1	25	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3777	5			0.673	7.3	70	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Existing Traffic Volumes
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn (secs)	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot			1st 2nd				
SouthEast: Caloundra Road East											
1 LT	224	404		628	5			0.385	4.3	28	500
2 T		477		477	5			0.385	4.1	26	500
	224	881	0	1105	5			0.385	4.2	28	
NorthWest: Caloundra Road West											
1 T		1677		1677	5	1950		0.888	3.1		500
2 R			301	301	5			0.259	13.2	16	500
	0	1677	301	1978	5			0.888	4.6	16	
SouthWest: Bellvista Boulevard											
1 L	426			426	5			0.502	7.9	27	60
2 R			433	433	5			0.394	13.3	20	500
	426	0	433	859	5			0.502	10.6	27	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3942	5			0.888	5.8	28	
=====											

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 PM Existing Traffic Volumes
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							

SouthEast: Caloundra Road East											
1 LT	286	706		992	5			0.592	4.4	48	500
2 T		757		757	5			0.592	4.5	46	500

	286	1463	0	1749	5			0.592	4.4	48	

NorthWest: Caloundra Road West											
1 T		1197		1197	5	1950		0.634	2.7		500
2 R			278	278	5			0.201	12.0	12	500

	0	1197	278	1475	5			0.634	4.4	12	

SouthWest: Bellvista Boulevard											
1 L	150			150	5			0.256	8.3	11	60
2 R			202	202	5			0.237	14.0	12	500

	150	0	202	352	5			0.256	11.5	12	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				3576	5			0.634	5.1	48	
=====											

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Caloundra Road/Bellvista Boulevard
2024 AM Background + Development Traffic Volumes (Upgraded)
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							

SouthEast: Caloundra Road East											
1 LT	296	377		673	5			0.441	4.8	35	500
2 T		504		504	5			0.441	4.6	32	500

	296	881	0	1177	5			0.441	4.7	35	

NorthWest: Caloundra Road West											
1 T		1677		1677	5	1950		0.888	3.1		500
2 R			373	373	5			0.401	14.7	30	500

	0	1677	373	2050	5			0.888	5.2	30	

SouthWest: Bellvista Boulevard											
1 L	640			640	5			0.780	11.7	65*	60
2 R			647	647	5			0.609	14.7	42	500

	640	0	647	1287	5			0.780	13.2	65	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4514	5			0.888	7.4	65	
=====											

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

* Queue length exceeds short lane length due to specification of a percentile queue in the Tools-Options (Model tab). For calculation of this statistic, you may specify the lane with full length.

Caloundra Road/Bellvista Boulevard
2024 PM Background + Development Traffic Volumes (Upgraded)
Intersection ID: 0
Roundabout

Lane No.	Demand Flow (veh/h)				%HV	Adj. Basic Satf.	Eff Grn 1st 2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
	L	T	R	Tot							
SouthEast: Caloundra Road East											
1 LT	609	585		1194	5			0.804	9.2	116	500
2 T		878		878	5			0.804	10.9	111	500
	609	1463	0	2072	5			0.804	9.9	116	
NorthWest: Caloundra Road West											
1 T		1197		1197	5	1950		0.634	2.7		500
2 R			449	449	5			0.358	12.7	25	500
	0	1197	449	1646	5			0.634	5.4	25	
SouthWest: Bellvista Boulevard											
1 L	264			264	5			0.576	12.9	34	60
2 R			316	316	5			0.474	16.7	31	500
	264	0	316	580	5			0.576	15.0	34	
=====											
ALL VEHICLES				Total Flow	% HV			Max X	Aver. Delay	Max Queue	
				4298	5			0.804	8.9	116	
=====											

Peak flow period = 30 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Appendix C

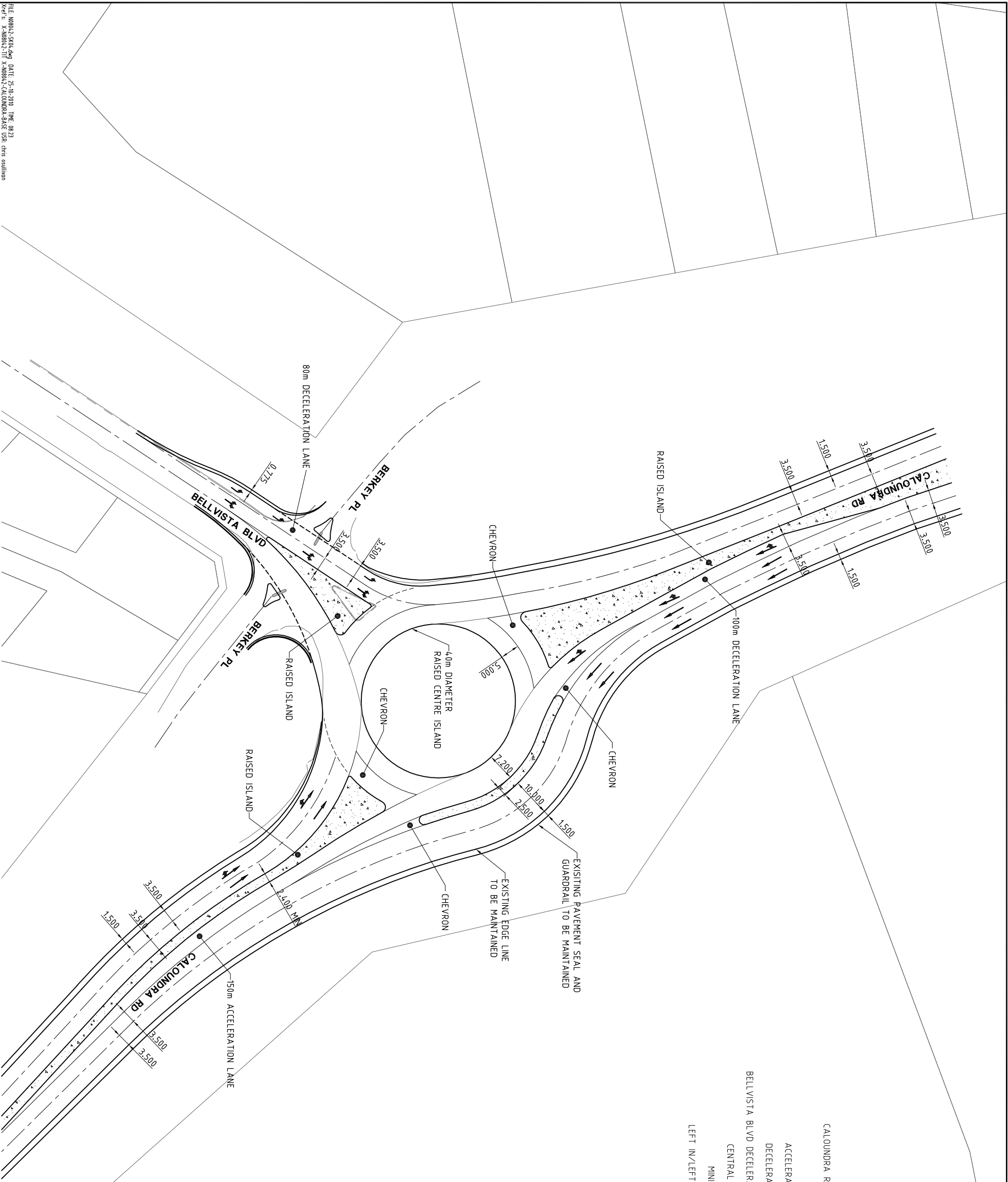
Caloundra Road/Bellvista Boulevard Intersection

Conceptual Upgrading Design Requirements



DESIGN PARAMETERS

CALOUNdra RD DESIGN SPEED = 80km/h	EXISTING
CARRIAGEWAY WIDTHS	RPDM TABLE 14.3
ACCELERATION LANE LENGTH = 150m	RPDM TABLE 13.13
DECELERATION LANE LENGTH = 100m	RPDM TABLE 13.11
BELLVISTA BLVD DECELERATION LANE LENGTH = 80m	RPDM TABLE 13.11
CENTRAL ISLAND DIAMETER = 4.0.0m	RPDM TABLE 14.3
MINIMUM ISLAND WIDTH = 2.4m	RPDM TABLE 13.10
LEFT IN/LEFT OUT ONLY AT BERKEY PL	



FILE: N08042-SK04.dwg DATE: 25-10-2010 TIME: 09:23
USER: K-M08042-111 K-M08042-CALOUNdra-RD-555E USE: civil3d

ISSUE	DATE	DESCRIPTION
A	22.10.10	
B		
C		
D		
E		
F		

DESIGN CHECK	DESIGN CHECK
1500	A1
1000	A3

SCALE (METRES)
1500 10 5 0 10 20 A1
1000 A3

PROJECT No.	N08042
APPROVED	BRETT THOMAS 7882 BROOK HILSON 7884
FOR & ON BEHALF OF BROWN CONSULTING (OLD) PTY LTD	

CLIENT	Stockland Caloundra Downs Pty Ltd
PROJECT	BELLVISTA II



Brown Consulting (OLD) Pty Ltd Engineers & Monitors
Level 1, 15 Nicklin Way, Building OLD Australia 4375
Telephone 07 5470 9260 Facsimile 07 5470 9262
Brisbane Canberra Melbourne Sydney Singapore Sunshine Coast



DRAWING TITLE

CALOUNdra RD/BELLVISTA BLVD
ROUNdABOUT UPGRADE
CONCEPT LAYOUT DESIGN

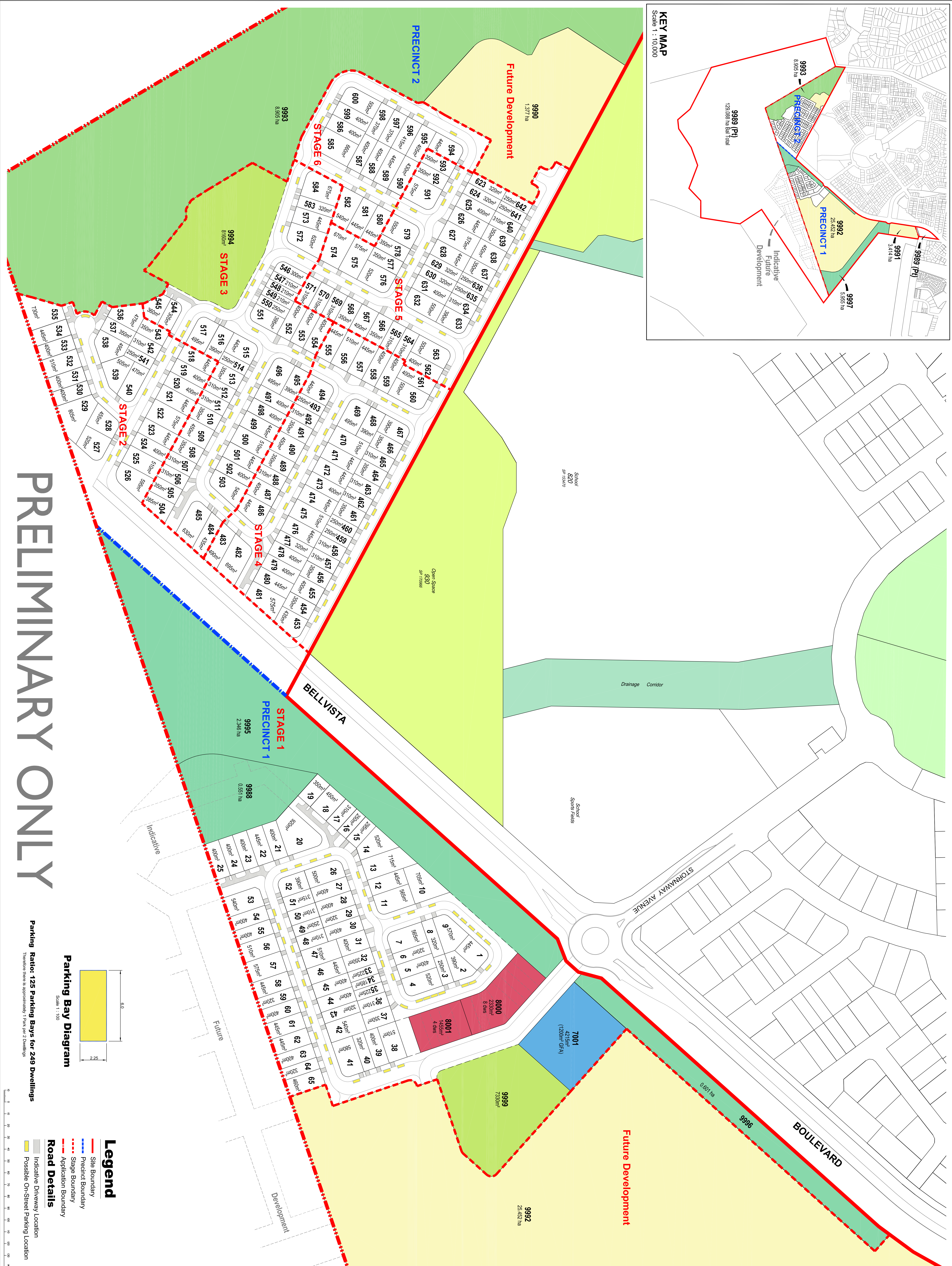
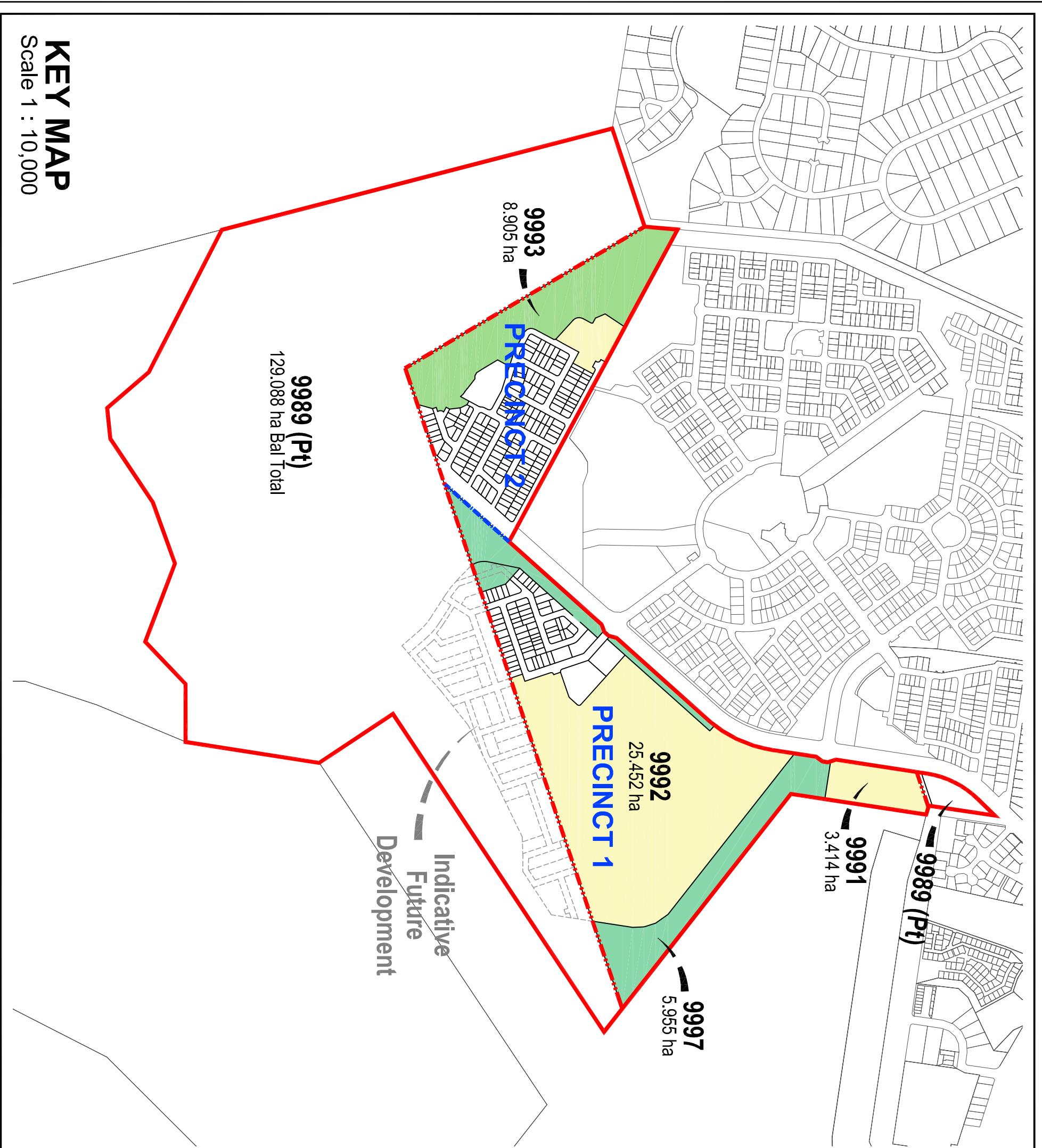
DRAWING NUMBER

N08042-SK04

ISSUE

Appendix D

On-street Parking Preliminary Layouts



REVISION B. 2501 / 102010: Revised Layout and Pricing and Specs	
Note All dimensions and areas are as shown on drawings and subject to survey and Council approval. Dimensions have been rounded to the nearest 0.1 metres. Areas have been rounded down to the nearest 0.1 metres. The boundaries shown on this plan should not be used for final detailed engineers design. Parking locations are subject to detailed traffic engineering report.	
CUSTOMER STOCKLAND	
PROJECT BELLVISTA 2	
ON-STREET CARPARKING OVER LOT 22 & 202 ON SP 190373 ALLOTMENT LAYOUT	
Level Datum Origin	
Date	28 NOVEMBER 2010
Drawn By	WNY
Check By	7853-SE-040
Local Authority: SHERBROOK DIST REGIONAL COUNCIL DEED AND EASEL DEDICATION APPLICATION Lot/s Reference: 21663-2, 2003, 2004 Locality: CAUNDARA, WEST	
Scale	1 : 1000
Plan Ref	A0
21663- 7633- 58	R1W B
RPS RPS Australia Ltd Pty Ltd 73 Jago Street JAGOMBA, VIC 3087 Australia Tel: 03 297 782 Fax: 03 297 783 Mobile: 0438 888 883 Email: sales@rps.com.au Web: www.rps.com.au	
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