03

future year modelling
(2020 & 2030)

3.1 FUTURE YEAR MODELLING OVERVIEW

3.1.1 Background

The aim of the existing year (2010) transport modelling was to produce a fully functioning land use/transport model that accurately models the present traffic conditions within the Northern Area of Eurobodalla Shire for both a morning peak (8AM – 9AM) and evening peak (4PM – 5PM) period in non peak season conditions, and use these models to plan for the future. The purpose of the future year modelling is to grow the 2010 models and use them as a planning tool to aid in the future planning of the study area.

The 2010 base TRACKS model of the Eurobodalla Shire study area provided a foundation upon which future options could be tested and solutions implemented. TRACKS is a modelling software which enables the study area transport network to be constructed at the strategic level so as to produce a good representation of current conditions and then test future possibilities for operational feasibility before ever implementing them on the ground.

The existing models for 2010 were built to provide a good representation of average conditions in the study area for the base year in non peak season conditions; it is not intended to represent peak seasonal conditions when the residential population swells considerably. For peak season analysis to be adequately done, further tests would be required.

Future year models were produced for the years of 2020 and 2030. The growth in population, employment, education enrolments and the subsequent growth in dwellings across the study area were taken into consideration. Census data along with information provided in various Council reports and studies were used to determine the growth across the study area. For full details regarding the population and land use calculations and the assumptions used refer to Appendix 1-C.

3.1.2 2020 Model Upgrades

Batemans Bay Town Centre

The following road network upgrades were included in the 2020 model as identified in the current Paramics Model of Batemans Bay Town Centre (Bitzios, 2010):

- Intersection of the Princes Highway with Beach Road – increase length of right turn bay.
- Intersection of the Princes Highway with North Street – increase length of right turn bay.
- Intersection of Beach Road with Perry Street - Signalise with the inclusion of a right turn bay for vehicles turning into Perry Street from Beach Road.
- Intersection of Beach Road with Orient Street - upgrade by providing a right turn lane for vehicles turning right into Orient Street (S) and a left turn lane for vehicles turning left into Orient Street (S).
- Intersection of Beach Road with Flora Crescent - upgrade by providing a right turn and left turn lane for access to Flora Crescent.
- Intersection of North Street with Perry Street - signalise.
- Intersection of Museum Place with Camp Street - signalise and re-align so that it forms a cross roads.

South Batemans Bay Link Road

The 2020 model was developed and tested both with and without the proposed South Batemans Bay Link Road (shown in Figure 1.14). The Link Road was modelled as an extension to Glenella Road that provided a link between George Bass Drive and the Princes Highway. It included an extension of Herron Road that connected to the new Link Road. The

intersection of The Link Road and the Princes Highway was positioned at the current location of the Ridge Road intersection south of Batemans Bay.

The models were developed to allow movement to/from the north only at this new junction with the Princes Highway as it is understood that this is the current proposal. A sensitivity test was also conducted that allowed all movements to occur at this proposed new junction.

3.1.3 2030 Model Upgrades

A number of road network upgrades were included in the 2030 model based on the 2020 model outputs and requirements that were apparent as a result of our inspection of the model outputs. Some were also identified in the current Paramics Model of Batemans Bay Town Centre (Bitzios, 2010). All the upgrades included in the 2020 model are also included in the 2030 model. The following list of road network upgrades were included in the 2030 model in addition to those included in 2020:

- Princes Highway – two lanes in the southbound direction between Berrima Parade and Kings Highway.
- Princes Highway – two lanes in each direction between Kings Highway and Clyde Street, including the duplication of the Clyde River Bridge.
- Princes Highway – two lanes in the northbound direction between Clyde Street and North Street.
- Princes Highway – two lanes in the northbound direction between Burkes Lane (Mogo) and Cranbrook Road (Batemans Bay). While much of this length already has two northbound lanes, consideration should be given to providing additional lengths where possible.
- Princes Highway – implement clearways along the Princes Highway on approach to the intersection with Church Street (Moruya) to provide additional capacity.
- Princes Highway – signalise intersection of Princes Highway with Queen Street (Moruya).

The 2030 model was also developed both with and without the proposed South Batemans Bay Link Road. As was done in the 2020 modelling, the Link Road was modelled as an extension to Glenella Road that provided a link between George Bass Drive and the Princes Highway. A sensitivity test was also conducted that allowed all movements to occur at this proposed new junction in 2030.

3.2 LAND USE DATA IN THE TRANSPORT MODEL

3.2.1 Summary of Land Use

A summary of the 2010, 2020 and 2030 land use variables used in the modelling, and their associated quantities are shown in Table 3.1. For a full explanation of these variables and how these quantities were derived refer to Appendix 1-C.

Table 3.1 Summary of 2010 Land Use Variables

Land Use Variable	2010	2020	2030
Employees per Household	0.975	0.960	0.968
Vehicles per Household	1.604	1.630	1.619
Households	9009	11,840	13,752
TAFE and University Enrolments	450	535	591
School Enrolments	4468	4927	5301
Community Jobs	2127	2599	2928
Retail Jobs	2794	4012	4993
Finance Jobs	1839	2322	2607
Manufacturing Jobs	533	697	808
Total Jobs	8203	10,699	12,603

3.3 FUTURE NETWORK PERFORMANCE AND RESULTS

The performance criteria for the future road network are as described in Section 1.4.3.

3.3.1 ROAD NETWORK PERFORMANCE ASSESSMENT

3.3.2 Background

An existing 2010 TRACKS model was developed, validated and audited that accurately models the present traffic conditions within the Northern Area of Eurobodalla Shire for both a morning peak (8AM – 9AM) and evening peak (4PM – 5PM) period in non peak season conditions. This Eurobodalla Shire TRACKS Model was then used to forecast the effects of any changes to the road network and future land development that may occur in 2020 and 2030.

As previously agreed with Council, the model was used in conjunction with actual 2010 traffic flows to compare and assess the impacts that the future modelled output volumes were having on the road network.

It should be noted that macroscopic (strategic) modelling software is not generally designed for the purpose of comparing turning volumes at intersections; this level of analysis is usually reserved for mesoscopic or microscopic software packages which are designed with that functionality inherent in them.

Nevertheless, we have considered turn flows from our strategic TRACKS modelling in our assessments given the good level of validation achieved in the signed-off Base models. We have also made some minor adjustments where necessary to our future year traffic volumes, at turn and link locations to ensure that a robust and meaningful analysis was achieved. It should also be noted that the base models were validated in excess of requirements at all link locations.

The method used to correlate and compare both the future modelled volumes and the actual traffic is described as:

- If a GEH of less than 5 was calculated for a turning movement or link flow in the 2010 base model, then the future modelled volume was deemed robust and used in the study assessments.
- If a GEH of greater than 5 was calculated for a turning movement or link flow in the 2010 base model, then the growth between the future models (2020/2030) and the 2010 model was added to the actual 2010 traffic count and assessed on that basis.

The above method resulted in a good representation of larger traffic flows, however where traffic flows were minor or where little growth in traffic volumes occur, correlated traffic flows were not always achieved. As this only occurred in minor flows negligible impact was incurred.

3.3.3 2010 Road Network Performance

An assessment of the existing (2010() road network performance was carried out in Section 1.4.5.

The mid-block carriageway assessment showed that the majority of routes operate at LoS A or B with some sections of the Princes Highway operating at LoS C:

- Cullendulla Road to Kings Highway - southbound in the AM peak and northbound in the PM peak.
- Cranbrook Road to Tomakin Road - northbound in the AM peak and southbound in the PM peak.
- South Head Road to Bergalia Street - northbound in the AM peak and southbound in the PM peak.

The operating performance of 37 intersections within the LGA was assessed. Currently all the major intersections within the Eurobodalla Shire operate at a satisfactory level with delays not exceeding 35 seconds with LoS C or better. As is clear from these results, the current traffic conditions, from an operations perspective, flow well with minimal congestion and capacity to spare.

It should be noted that this assessment is for a non-peak period of the year and does not take into account the increases in traffic as a result of the peak holiday season. Hence, the above results are reflective only of the average conditions in the study area during non-peak season conditions, and should not be used as a reflection of peak conditions. The above LoS may vary in peak seasons; however further assessment is required before determining this.

3.3.4 2020 Road Network Performance

Mid-block Carriageway Performance

An assessment of the mid-block traffic volumes and carriageway LoS for key links within the study area was undertaken. The overall existing LoS on key route sections is presented in detail in Table 3.2 for the AM and PM peak periods.

Table 3.2 2020 Peak mid-block LoS

Location	AM Peak					PM Peak				
	Peak Flow (veh/hr)			LoS		Peak Flow (veh/hr)			LoS	
Princes Highway	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
North of Cullendulla Drive	207	212	419	B	B	360	200	560	C	B
Cullendulla Drive to Clyde Road	292	511	803	B	C	629	335	964	C	B
Clyde Road to Berrima Parade	322	624	946	B	C	598	384	982	C	B
Berrima Parade to Kings Highway	359	775	1,134	C	D	724	444	1,168	C	C
Kings Highway to Clyde Street	586	1,073	1,659	A	D	1,064	661	1,725	D	A
Clyde Street to North Street*	650	653	1,303	A	A	1,098	460	1,558	D	A
North Street to Beach Road*	629	619	1,248	A	A	1,093	430	1,523	A	A
Beach Road to Old Princes Hwy*	344	383	727	A	A	490	249	739	A	A
Old Princes Hwy to Cranbrook Rd	809	582	1,391	B	A	693	418	1,111	A	A
Cranbrook Road to Ridge Road	744	383	1,127	D	C	414	354	768	C	C
Ridge Road to Burkes Lane	736	381	1,117	D	C	387	346	733	C	C
Burkes Lane to Tomakin Road	736	381	1,117	A	A	387	346	733	A	A
Tomakin Road to Broulee Road	628	314	942	C	B	313	234	547	B	B

Location	AM Peak					PM Peak				
	Peak Flow (veh/hr)			LoS		Peak Flow (veh/hr)			LoS	
Broulee Road to Shelley Road	664	365	1,029	D	C	299	302	601	B	B
Shelley Rd to Larry M'tains Dr	625	443	1,068	C	C	303	351	654	B	C
Larry M'tains Dr to North Head Rd	613	444	1,057	C	C	305	353	658	B	C
North Head Road to Shore Street	788	750	1,538	B	A	572	549	1,121	A	A
Shore Street to Church Street*	842	627	1,469	B	A	574	434	1,008	A	A
Church Street to Queen Street*	939	425	1,364	C	A	429	485	914	A	A
Queen Street to Vulcan Street*	668	415	1,083	A	A	414	494	908	A	A
Vulcan Street to Ford Street*	673	498	1,171	A	A	570	529	1,099	A	A
Ford Street to South Head Road	923	393	1,316	C	A	486	723	1,209	A	A
South Head Road to Albert Street	591	365	956	C	B	401	531	932	B	C
Albert Street to Bergalia Street	567	340	907	C	B	370	406	776	B	C
Beach Road	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Princes Highway to Perry Street	504	307	811	A	A	813	318	1,131	A	A
Perry Street to Orient Street	1,082	178	1,260	A	A	836	524	1,360	A	A
Orient Street to Flora Crescent	881	289	1,170	A	A	769	589	1,358	A	A
Flora Crescent to Bavarde Avenue	958	312	1,270	A	A	617	902	1,519	A	A
Bavarde Avenue to Country Club Dr	1,166	539	1,705	A	A	713	1,162	1,875	A	A
Country Club Dr to George Bass Dr	1,031	443	1,474	A	A	633	930	1,563	A	A
George Bass Dr to Edward Rd	543	305	848	A	A	358	525	883	A	A
Edward Rd to Sunshine Bay Rd	378	108	486	A	A	125	346	471	A	A
Sunshine Bay Rd to George Bass Dr	149	184	333	A	A	206	193	399	A	A
George Bass Drive	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Beach Road to Glenella Road	626	237	863	A	A	374	442	816	A	A
Glenella Road to Sunshine Bay Rd	551	179	730	A	A	322	392	714	A	A
Sunshine Bay Rd to Surf Beach Ave	462	189	651	A	A	234	329	563	A	A
Surf Beach Road to Beach Road	322	274	596	A	A	307	346	653	A	A
Beach Road to Ridge Road	357	133	490	C	B	201	295	496	B	B
Ridge Road to Tomakin Road	130	361	491	B	C	236	199	435	B	B
Tomakin Road to Annetts Parade	356	482	838	B	C	232	358	590	B	B
Annettes Parade to Broulee Road	264	294	558	B	B	155	179	334	B	B
Broulee Road to Donnellys Drive	193	307	500	B	B	159	192	351	B	B
North Head Drive	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Donnellys Drive to Princes Highway	198	306	504	B	B	172	196	368	B	B
Dunns Creek Road	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Ridge Road to Tomakin Road	207	169	376	B	B	148	181	329	B	B
Tomakin Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to Dunns Creek Rd	100	268	368	B	B	173	96	269	B	B
Dunns Creek Rd to George Bass Dr	242	356	598	B	B	315	207	522	B	B
Broulee Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to George Bass Dr	76	85	161	A	A	60	71	131	A	A
Cullendulla Drive	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Prince Highway to Blairs Road	98	312	410	B	B	283	149	432	B	B
South Head Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to Conga Road	118	422	540	B	C	371	159	530	C	B

*Traffic volumes are lower due to vehicles using alternate routes in model. (Refer to discussion following)

The mid-block carriageway assessment shows that the majority of routes operate at LoS A or B with some sections of the Princes Highway operating at LoS C. The following sections of the Princes Highway are approaching capacity, operating at a LoS D, in the 2020 models:

- Princes Highway southbound between Berrima Parade and Kings Highway.
- Princes Highway between Kings Highway and Clyde Street, including Clyde River Bridge (Batemans Bay).
- Princes Highway northbound between Clyde Street and North Street.
- Princes Highway northbound between Cranbrook Road and Burkes Lane (Mogo).
- Prince Highway northbound between Shelley Road and Broulee Road.

It should be noted that the model showed traffic being diverted off the Princes Highway onto Clyde Street, south of the Clyde River Bridge, to gain access to Beach Road and Batemans Bay town centre. The implementation of a Local Area Traffic Management (LATM) Scheme along Clyde Street and Orient Street should be considered to minimise the traffic using this route. Further details are provided in Section 4 - Future Transport Plan.

Similarly, the model showed traffic being diverted off the Princes Highway onto Shore Street and Ford Street, south of the Moruya River Bridge, to gain access to bypass Moruya town centre. The provision of a LATM Scheme along Shore Street and Ford Street should be considered to minimise traffic diverting off the Princes Highway. Further details are provided in Section 4 - Future Transport Plan.

Intersection Performance

The operating performance of 37 intersections within the LGA has been assessed using the SIDRA software package to determine the Degree of Saturation (DS), Average Vehicle Delay (AVD in seconds) and LoS at each intersection. A summary of the operating performance of critical intersections within the study area is provided in Appendix 3-A and Appendix 3-B for the AM and PM peak periods, respectively.

A summary of the operating performance of critical intersections within the study area is provided in Table 3.3.

Table 3.3 Summary of 2020 intersection performance

Intersection	AM Peak			PM Peak		
	DoS	Delay	LoS	DoS	Delay	LoS
Princes Hwy/Berrima Pde	0.450	20.3	B	0.446	26.0	B
Princes Hwy/Kings Hwy/Peninsula Dr	0.134	15.3	B	0.185	14.0	A
Princes Hwy/Clyde St	0.304	47.5	D	0.316	53.7	D
Princes Hwy/North St*	0.511	16.3	B	0.708	16.1	B
Princes Hwy/Beach Rd*	0.736	31.0	C	0.678	34.1	C
Princes Hwy/Old Princes Hwy	0.344	13.6	A	0.532	21.6	B
Princes Hwy/Cranbrook Rd	0.632	34.6	C	0.487	29.6	C
Princes Hwy/Tomakin St	0.764	30.6	C	0.147	12.4	A
Princes Hwy/Broulee Rd	0.213	13.8	A	0.047	12.5	A
Princes Hwy/(Shelley Rd	0.290	29.3	C	0.269	14.6	B
Princes Hwy/Larry Mountain Rd	0.235	20.2	B	0.037	13.5	A
Princes Hwy/North Head Dr	0.546	15.0	B	0.225	10.2	A
Princes Hwy/Church St	0.922	60.2	E	0.784	35.6	C
Princes Hwy/Queen St	>1.000	>120	F	0.551	45.4	D
Princes Hwy/Campbell St/Vulcan St	0.190	15.9	B	0.175	14.6	B
Princes Hwy/Ford St	0.301	13.3	A	0.509	14.7	B
Princes Hwy/South Head Rd	>1.000	>120	F	0.490	23.8	B
Princes Hwy/Albert St	0.139	13.7	A	0.262	11.7	A
Princes Hwy/Bergalia St	0.175	12.6	A	0.092	11.3	A
Princes Hwy/Cullendulla Dr	0.344	10.2	A	0.172	10.1	A

Intersection	AM Peak			PM Peak		
	DoS	Delay	LoS	DoS	Delay	LoS
North St/Perry St*	0.529	26.8	B	0.712	32.3	C
Old Princes Hwy/South St	0.261	10.2	A	0.212	10.6	A
Clyde St/North St	0.309	10.5	A	0.315	10.4	A
Beach Rd/Orient St*	0.748	32.9	C	0.810	30.8	C
Beach Rd/Flora Cres*	0.750	17.4	B	0.562	14.4	A
Beach Rd/Bavarde Ave	0.184	13.9	A	0.041	15.1	B
Beach Rd/Glenella Rd	0.625	35.4	C	0.746	30.6	C
Beach Rd/Sunshine Rd	0.127	9.9	A	0.041	10.0	A
George Bass Dr/Sunshine Bay Rd	0.188	12.0	A	0.068	12.0	A
Beach Rd/George Bass Dr	0.186	14.9	B	0.193	15.1	B
George Bass Dr/Ainslie Pde	0.160	12.4	A	0.125	11.0	A
George Bass Dr/Tomakin Rd	0.529	17.6	B	0.716	23.5	B
George Bass Dr/Annetts Pde	0.118	14.0	A	0.116	16.2	B
George Bass Dr/Broulee Rd	0.126	13.4	A	0.121	12.6	A
Beach Rd/Perry St*	0.428	44.8	D	0.005	14.1	A
Beach Rd/Pacific St	0.386	26.1	B	0.262	15.1	B
Beach Rd/Edward Rd	0.604	18.7	B	0.588	21.9	B
Queen St/Ford St	0.021	12.3	A	0.059	13.0	A
Princes Hwy/Shore St	0.027	17.0	B	0.043	11.2	A

*These intersections were upgraded within the model to achieve the LoS shown. Refer to Section 3.1.2 for details of 2020 model upgrades.

The intersection operation assessment shows that the majority of intersections will operate within capacity at LoS A or B, with some intersections operating at LoS C. The following intersections will operate at capacity 2020:

- The intersection of Princes Highway with Clyde Street operates near capacity, LoS D, in the 2020 future year tests.
- The intersection of Princes Highway with Church Street operates at capacity in the 2020 PM peak period at LoS E. Significant delays are experienced by vehicles on all approaches. It should be noted that this intersection operates at LoS D in 2030 PM when clearways are implemented along Princes Highway on both approaches to the intersection. It should be noted also that there is a strong possibility that rat running which occurs in the 2030 model may affect the LoS of this intersection once this traffic is re-diverted onto the highway by way of an LATM scheme.
- The intersection of Princes Highway with Queen Street operates at capacity in both modelled peak periods at LoS F in the AM Peak and LoS D in the PM Peak. Significant delays are experienced by vehicles on the Queen Street eastern approach. It should be noted that this intersection operates at LoS D in 2030 AM, and LoS B in 2030 PM, with signalisation of the intersection in place in the model. Similar to the Church Street intersection above, it should be noted also the same possibility that rat running occurring in the 2030 model could affect the LoS of this intersection once this traffic is re-diverted onto the highway by way of an LATM scheme.
- The intersection of Princes Highway with South Head Road operates at capacity in the 2020 AM peak period at LoS F. Significant delays are experienced by vehicles on the South Head Road approach. It should be noted that this intersection operates at LoS B in the 2030 peak periods, with the installation of a roundabout.

The mid-block sections of road with LoS D were duplicated to two lane sections for the 2030 model scenarios.

The intersection of Princes Highway with Church Street was upgraded with clearways along Princes Highway during the AM peak period to increase the capacity at the intersection.

The intersection of Princes Highway with Queen Street was signalised for the 2030 model scenarios.

The intersection of Princes Highway with South Head Road was upgraded to a roundabout.

3.3.5 2020 Road Network with South Batemans Bay Link Road

Further analysis was undertaken for the 2020 land use characteristics, which included the South Batemans Bay Link Road. The South Batemans Bay Link Road will provide access for vehicles heading northbound along George Bass Drive towards Batemans Bay, and for vehicles heading southbound along Princes Highway from Batemans Bay. It will also provide a connection to Heron Road, south of Batemans Bay.

The 2020 model indicated that the South Batemans Bay Link Road carries 234 vehicles in the AM peak period and 228 vehicles in the PM peak period. It should be noted that the model only allowed for vehicle access to/from the north at the intersection with Princes Highway.

These results indicate that the Link Road provides an alternative route for vehicles travelling to/from the southern suburbs of Batemans Bay and helped to reduce traffic along sections of Beach Road and George Bass Drive.

A sensitivity test was conducted that allowed all movements at the junction of the Batemans Bay Link Road with the Princes Highway. The test showed a total of 359 vehicles per hour and 328 vehicles per hour will use the link road in the AM and PM peaks, respectively.

It should be further noted that it is likely that the full benefits of this link road will be more evident during peak holiday periods when traffic volumes are considerably higher. The road will also provide an important route for truck movements travelling to/from the proposed bulky goods precinct located in Surf Beach, reducing the need for these vehicles to travel through the Batemans Bay CBD.

3.3.6 2030 Road Network Performance

Mid-block Carriageway Performance

An assessment of the mid-block traffic volumes and carriageway LoS for key links within the study area was undertaken. The overall expected LoS on key route sections is presented in detail in Table 3.4 for the AM and PM peak periods.

Table 3.4 2030 Peak mid-block LoS

Location	AM Peak					PM Peak				
	Peak Flow (veh/hr)			LoS		Peak Flow (veh/hr)			LoS	
Princes Highway	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
North of Cullendulla Drive	220	227	447	B	B	394	215	609	C	B
Cullendulla Drive to Clyde Road	326	606	932	B	C	733	380	1,113	D	C
Clyde Road to Berrima Parade	360	735	1,095	C	C	715	435	1,150	C	C
Berrima Parade to Kings Highway#	402	904	1,306	B	C	858	503	1,361	C	B
Kings Highway to Clyde Street#	661	1,261	1,922	A	B	1,248	749	1,997	A	A
Clyde Street to North Street*#	739	803	1,542	A	A	1,289	502	1,791	B	A
Princes Highway	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
North Street to Beach Road*	676	785	1,461	A	A	1,224	452	1,676	A	A
Beach Road to Old Princes Highway	612	466	1,078	A	A	522	262	784	A	A
Old Princes Hwy to Cranbrook Rd*	1,003	666	1,669	D	A	741	466	1,207	A	A

Location	AM Peak					PM Peak				
	Peak Flow (veh/hr)			LoS		Peak Flow (veh/hr)			LoS	
Cranbrook Road to Ridge Road#	933	435	1,368	C	C	430	393	823	B	C
Ridge Road to Burkes Lane	921	432	1,353	C	C	403	380	783	B	C
Burkes Lane to Tomakin Road	921	432	1,353	A	A	403	380	783	A	A
Tomakin Road to Broulee Road	767	352	1,119	D	C	324	247	571	B	B
Broulee Road to Shelley Road#	805	425	1,230	D	C	324	323	647	B	B
Shelley Rd to Larry M'tains Dr	775	492	1,267	C	C	325	379	704	B	C
Larry M'tains Dr to North Head Rd	764	493	1,257	D	C	327	380	707	B	C
North Head Road to Shore Street	935	843	1,778	C	B	650	596	1,246	A	A
Shore Street to Church Street*	960	635	1,595	C	A	651	482	1,133	A	A
Church Street to Queen Street*	1,078	123	1,201	D	A	451	482	933	A	A
Queen Street to Vulcan Street*	483	106	589	A	A	464	473	937	A	A
Vulcan Street to Ford Street*	444	452	896	A	A	593	601	1,194	A	A
Ford Street to South Head Road	1,008	435	1,443	D	A	525	774	1,299	A	B
South Head Road to Albert Street	653	403	1,056	C	C	437	571	1,008	C	C
Albert Street to Bergalia Street	623	367	990	C	C	406	447	853	B	C
Beach Road	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Princes Highway to Perry Street	501	559	1,060	A	A	945	327	1,272	A	A
Perry Street to Orient Street	1,184	177	1,361	A	A	981	582	1,563	A	A
Orient Street to Flora Crescent	903	395	1,298	A	A	841	730	1,571	A	A
Flora Crescent to Bavarde Avenue	1,034	375	1,409	A	A	666	969	1,635	A	A
Bavarde Avenue to Country Club Dr	1,260	590	1,850	B	A	767	1,248	2,015	A	A
Country Club Dr to George Bass Dr	1,113	487	1,600	A	A	679	1,002	1,681	A	A
George Bass Dr to Edward Rd	569	327	896	A	A	373	545	918	A	A
Edward Rd to Sunshine Bay Rd	395	115	510	A	A	129	358	487	A	A
Sunshine Bay Rd to George Bass Dr	157	188	345	A	A	218	214	432	A	A
George Bass Drive	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Beach Road to Glenella Road	692	269	961	A	A	407	496	903	A	A
Glenella Road to Sunshine Bay Rd	611	204	815	A	A	352	441	793	A	A
Sunshine Bay Rd to Surf Beach Ave	526	207	733	A	A	262	380	642	A	A
Surf Beach Road to Beach Road	377	275	652	A	A	331	401	732	A	A
Beach Road to Ridge Road	437	159	596	C	B	239	368	607	B	B
Ridge Road to Tomakin Road	163	498	661	B	C	342	247	589	B	B
Tomakin Road to Annetts Parade	387	583	970	C	C	317	402	719	B	C
Annettes Parade to Broulee Road	271	370	641	B	B	222	206	428	B	B
Broulee Road to Donnellys Drive	191	352	543	B	B	215	211	426	B	B
North Head Drive	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Donnellys Drive to Princes Highway	196	350	546	B	B	228	215	443	B	B
Dunns Creek Road	**N/B**	**S/B**	**Total**	**N/B**	**S/B**	**N/B**	**S/B**	**Total**	**N/B**	**S/B**
Ridge Road to Tomakin Road	198	171	369	B	B	158	183	341	B	B
Tomakin Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to Dunns Creek Rd	116	330	446	B	B	210	111	321	B	B
Dunns Creek Rd to George Bass Dr	258	406	664	B	C	352	229	581	B	B
Broulee Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to George Bass Dr	79	108	187	A	B	75	81	156	A	A
Cullendulla Drive	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Prince Highway to Blairs Road	121	394	515	B	C	355	182	537	B	B
South Head Road	**E/B**	**W/B**	**Total**	**E/B**	**W/B**	**E/B**	**W/B**	**Total**	**E/B**	**W/B**
Princes Highway to Conga Road	125	448	573	B	C	388	167	555	C	B

*Traffic volumes are lower due to vehicles using alternate routes in model. (Refer to discussion following).

These links were upgraded within the model to achieve the LoS shown. Refer to Section 3.1.3 for details of 2030 model upgrades.

The mid-block carriageway assessment shows that the majority of routes operate at LoS A or B with some sections of the Princes Highway operating at LoS C. The following sections of the Princes Highway will be approaching capacity and will operate at a LoS D in 2030:

- Princes Highway northbound between Cullendulla Road and Clyde Road.
- Princes Highway northbound between Old Princes Highway and Cranbrook Road.
- Princes Highway northbound between Tomakin Road and Shelley Road.
- Princes Highway northbound between Larry's Mountain Drive and North Head Road.
- Princes Highway northbound between Church Street and Queen Street.
- Princes Highway northbound between Ford Street and South Head Road.

It should be noted that as with the 2020 scenario, the model showed traffic being diverted off the Princes Highway onto Clyde Street, south of the Clyde River Bridge, to gain access to Beach Road and Batemans Bay town centre, as well as being diverted off the Princes Highway onto Shore Street and Ford Street, south of the Moruya River Bridge, to gain access to bypass Moruya town centre.

Similarly, the model showed that the installation of traffic signals at the intersection of the Princes Highway with Old Princes Highway resulted in traffic being diverted via Bavarde Avenue, Gregory Street and Hughes Street onto the Princes Highway south of the intersection to avoid the new traffic signals. The provision of a LATM Scheme along Bavarde Avenue, Gregory Street and Pacific Street should be considered to minimise the traffic using this route. Further details are provided in the Section 4- Future Transport Plan.

Intersection Performance

The operating performance of 37 intersections within the LGA has been assessed using the SIDRA software package to determine the Degree of Saturation (DS), Average Vehicle Delay (AVD in seconds) and LoS at each intersection. A summary of the operating performance of critical intersections within the study area is provided in Appendix 3-C and Appendix 3-D for the AM and PM peak periods respectively.

A summary of the operating performance of critical intersections within the study area is provided in Table 3.5.

Table 3.5 Summary of 2030 intersection performance

Intersection	AM Peak			PM Peak		
	DoS	Delay	LoS	DoS	Delay	LoS
Princes Hwy/Berrima Pde	0.627	26.9	B	0.709	47.5	D
Princes Hwy/Kings Hwy/Peninsula Dr	0.176	16.7	B	0.229	14.9	B
Princes Hwy/Clyde St	0.607	105.1	F	0.467	66.3	E
Princes Hwy/North St*	0.606	16.9	B	0.824	19.5	B
Princes Hwy/Beach Rd*	0.762	38.7	C	0.766	36.1	C
Princes Hwy/Old Princes Hwy*	0.879	44.3	D	0.609	34.3	C
Princes Hwy/Cranbrook Rd	0.675	38.3	C	0.518	28.9	C
Princes Hwy/Tomakin St	>1.000	>120	F	0.177	12.9	A
Princes Hwy/Broulee Rd	0.270	15.6	B	0.061	12.5	A
Princes Hwy/Shelley Rd	0.500	47.5	D	0.332	15.9	B
Princes Hwy/Larry Mountain Rd	0.344	28.5	B	0.039	14.1	A
Princes Hwy/North Head Dr	0.641	18.1	B	0.250	10.5	A
Princes Hwy/Church St*	0.699	31.5	C	0.895	43.6	D
Princes Hwy/Queen St*	0.757	37.5	C	0.692	21.2	B
Princes Hwy/Campbell St/Vulcan St	0.155	14.7	B	0.203	15.0	B
Princes Hwy/Ford St	0.745	13.4	A	0.576	15.2	B
Princes Hwy/South Head Rd*	0.727	19.3	B	0.206	14.8	B
Princes Hwy/Albert St	0.172	14.6	B	0.286	12.2	A
Princes Hwy/Bergalia St	0.231	13.4	A	0.116	11.5	A
Princes Hwy/Cullendulla Dr	0.444	10.9	A	0.214	10.5	A
North St/Perry St*	>1.000	30.8	C	0.856	38.2	C
Old Princes Hwy/South St	0.199	10.8	A	0.240	10.8	A
Clyde St/North St	0.358	11.4	A	0.359	10.7	A
Beach Rd/Orient St*	0.904	40.2	C	0.913	32.9	C
Beach Rd/Flora Cres*	0.770	17.5	B	0.605	14.6	B
Beach Rd/Bavarde Ave	0.198	14.2	A	0.055	15.7	B
Beach Rd/Glenella Rd	0.703	36.4	C	0.841	32.5	C
Beach Rd/Sunshine Rd	0.158	11.2	A	0.042	10.1	A
George Bass Dr/Sunshine Bay Rd	0.214	12.0	A	0.075	12.2	A
Beach Rd/George Bass Dr	0.151	14.9	B	0.223	15.5	B
George Bass Dr/Ainslie Pde	0.219	14.0	A	0.176	12.9	A
George Bass Dr/Tomakin Rd	0.698	24.7	B	0.969	71.3	F
George Bass Dr/Annetts Pde	0.157	16.1	B	0.164	19.4	B
George Bass Dr/Broulee Rd	0.155	14.5	B	0.131	14.0	A
Beach Rd/Perry St*	0.040	39.6	C	0.055	15.1	B
Beach Rd/Pacific St	0.515	35.4	C	0.389	17.4	B
Beach Rd/Edward Rd	0.629	19.3	B	0.615	21.9	B
Queen St/Ford St	0.029	14.8	B	0.062	13.5	A
Princes Hwy/Shore St	0.529	22.6	B	0.056	11.6	A

*These intersections were upgraded within the model to achieve the LoS shown. Refer to Section 3.1.3 for details of 2030 model upgrades.

The intersection operation assessment shows that the majority of intersections will operate within capacity at LoS A or B, with some intersections operating at LoS C.

The following intersections will operate at capacity 2030; note also that mitigation measures are specified in Section 4 - Future Transport Plan.

The intersections are:

- Princes Highway with Berrima Parade - will operate near capacity at LoS D in the PM peak period.
- Princes Highway with Clyde Street – operates at capacity in the AM and PM peak periods, at LoS F and LoS E, respectively. Significant delays are experienced by vehicles in the model on the Clyde Street northern approach. Vehicles on Princes Highway do not experience these delays.
- Princes Highway with Tomakin Road - operates at capacity on the Tomakin Road approach in the AM and PM peak periods, with a LoS F. Significant delays are experienced by vehicles in the model on the Tomakin Road approach.
- Princes Highway with Shelley Street - will operate near capacity in the AM peak period at LoS D.
- Princes Highway with Church Street - will operate near capacity in the PM peak period at LoS D.
- George Bass Drive with Tomakin Road - operates at capacity on the Tomakin Road approach in the PM peak period, with a LoS F. Significant delays are experienced by vehicles in the model on the Tomakin Road approach.

As can be seen from the above results, the modelling indicated that an unsatisfactory LoS existed at various intersections and links. Some additional improvements have also been identified that are required to generally increase the safety and efficiency of the network. For a full list of the required upgrades and a detailed timetable for the implementation, refer to the Section 4 - Future Transport Plan.

3.3.7 2030 Road Network with Batemans Bay Link Road

Further analysis was undertaken for the 2030 land use characteristics, which included the Batemans Bay Link Road. The Batemans Bay Link Road will provide access for vehicles heading northbound along George Bass Drive towards Batemans Bay, and for vehicles heading southbound along Princes Highway from Batemans Bay. It will also provide a connection to Heron Road, south of Batemans Bay.

The 2030 model indicated that the Batemans Bay Link Road carries 284 vehicles in the AM peak period and 287 vehicles in the PM peak period. It should be noted that the model allowed for vehicle access to/from the north at the intersection with Princes Highway only.

A sensitivity test was conducted that allowed all movements at the junction of the Batemans Bay Link Road with the Princes Highway. The test showed a total of 400 vehicles per hour and 398 vehicles per hour will use the link road in the AM and PM peaks, respectively. These results indicate that the Link Road provides an alternative route for vehicles travelling to/from the southern suburbs of Batemans Bay and helped to reduce traffic along sections of Beach Road and George Bass Drive. The results show that maximum benefit would be obtained if all movements were allowed at the proposed intersection with Princes Highway, with up to 40% increase in vehicles using this route than if restrictions were applied.

It should be further noted that the likely full benefits of this link road will be more evident during peak holiday periods when traffic volumes are considerably higher. The road will provide an important route for truck movements travelling to/from the proposed bulky goods precinct located in Surf Beach, reducing the need for these vehicles to travel through the Batemans Bay town centre.

3.3.8 Conclusions

With the above mentioned upgrades the 2020 and 2030 scenarios generally operate well in terms of capacities. It should be noted that without these upgrades, the required LoS could not be maintained resulting in significant delays throughout the model, particularly in the higher populated areas. There are some junctions where LoS E and F occur and in most of these cases it is as a result of delays on a medium or minor approach to a major junction. Mainline flows along Princes Highway and George Bass Drive generally experience a satisfactory LoS.

The 2030 TRACKS modelling indicated that an unsatisfactory LoS existed at some intersections not listed in the above upgrades. For a full list of the required upgrades and a detailed timetable for their implementation, refer to Section 4 - Future Transport Plan.