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Casuarina Town Centre Concept Plan Traffic Impact Study

Prepared for Kings Beach No. 2 Pty Ltd

June 2008

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Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
1.0	26 October 2007	Peter Bilton Michael Pickerill	signed	Brett McClurg	Signed
2.0	20 December 2007	Peter Bilton Michael Pickerill Brett McClurg	signed	Brett McClurg	signed
2.1	18 January 2008	Michael Pickerill	signed	Brett McClurg	Signed
2.2	25 January 2008	Michael Pickerill	signed	Brett McClurg	signed
3.0	26 February 2008	Michael Pickerill	Signed	Brett McClurg	Signed
3.1	11 June 2008	Michael Pickerill		Brett McClurg	

EXECUTIVE SUMMARY

This report has been prepared to document the traffic related issues associated with the proposed Town Centre development within Casuarina. The site is located towards the northern end of Casuarina. The subject application is for concept plan approval hence individual details are subject to further consideration and applications. Nonetheless, for assessment herein, the development is to comprise a supermarket, mixed use developments (retail/commercial below with residential above), residential (low – medium density), resort, hotel, open space and car parking.

Public Car Parking

State agencies have considered that the appropriate provision of public car parking to satisfy the demand of beach goers in Casuarina is 300 public spaces per kilometre length of beach. It should be noted that for the Salt development to the immediate north of the site, a parking ratio of 200 public spaces per kilometre of beach frontage has previously been accepted. The development site has a beach frontage of approximately 538m hence 162 public car spaces are required (at 300 spaces/km). The proposal is to provide 170 public parking spaces within a 200m distance of the foreshore walkway/cycleway to ensure easy and convenient access to the beach. Such parking is to be provided via a combination of open public car parks in discrete areas adjacent to the foreshore, underground public car parks adjacent to the foreshore and kerbside parking in streets adjacent to the foreshore.

Parking requirements (both private and public) for each of the development components will be provided additional to this 170 space public parking provision. The former will be provided by a mix of on site and on street parking.

Disabled parking will be provided within the public parking areas and there will be easy access for disabled users to the foreshore (parkland and boardwalk) via vehicle turnaround areas at the end of each beach access road.

Pedestrian and Cycle Access

The proposed development will maintain the existing bikeway and pathway network along the foreshore. The existing pedestrian access points to the beach are to be retained and a new beach access path is also proposed. In addition, a network of pathways will be provided throughout the development site to ensure convenient pedestrian connections between the foreshore and the development components. Continuing with the seaside village and outdoor lifestyle theme of Casuarina, the street network will readily accommodate cycling on roadways.

Street Network

The proposed street network represents an appropriate design outcome achieving the following key objectives:

- connection of Casuarina Way to provide a collector route for local traffic within Casuarina. This route would accommodate public transport services through the Casuarina catchment;
- connection of the foreshore to Casuarina Way via a number of local streets and walkways;
- connection of Casuarina Way to Tweed Coast Road via The Boulevard (replacing the existing connection via Dianella Drive);
- provision of public car parking and public open space areas adjacent to the foreshore;
- provision of an esplanade road (approximately 200m long) adjacent to the foreshore;
- accessibility to, from and within the individual uses within the Town Centre;
- easy and convenient pedestrian and cycle access to/from the foreshore and within the Town Centre.

Based on preliminary lot yields and development land uses, it is estimated that by 2018 Casuarina Way (through the Town Centre) will carry approximately 14,000vpd immediately north of The Boulevard, approximately 14,000vpd immediately south of The Boulevard and the east-west connection to Tweed Coast Road (The Boulevard (west)) will carry approximately 15,400vpd. Traffic signals are required for the new intersections of The Boulevard/Casuarina Way and The Boulevard/Tweed Coast Road to operate efficiently and safely.

These volumes represent appropriate traffic volumes within an active and vibrant Main Street environment, as proposed for the Town Centre. Although these volumes can be accommodated by two lane roadways, it is recognised that some sections will be constructed with four lanes to allow better access to kerbside parking and to provide stand up lane capacity at intersections. The sections where four lanes will be necessary are as follows:

- new roadway (The Boulevard) between Tweed Coast Road and Casuarina Way;
- northern and southern legs at the intersection of Casuarina Way and The Boulevard.

From our analysis, there do not appear to be any inherent safety problems with the proposed street network. It is recommended that the Casuarina Way/The Boulevard intersection be signalised at the completion of Stage 1 of development when the four way intersection is created.

New Connection to Tweed Coast Road

The proposed street network will see the closure of Dianella Drive where it connects to Tweed Coast Road (at the northern end of the Town Centre). Dianella Drive will take on a local access role for the adjacent residential catchment, with a cul-de-sac just east of Tweed Coast Road.

To replace the existing role of Dianella Drive a new connection (The Boulevard) between Casuarina Way and Tweed Coast Road will be provided, intersecting with Tweed Coast Road some 80 - 100m south of the existing Dianella Drive intersection. This revision to the street network is an appropriate outcome as it introduces the opportunity for direct access into the Town Centre from Tweed Coast Road. It also provides increased traffic levels into the Town Centre to activate the streets. This is an important factor in the success of the Town Centre. The proposed arrangements retain the Casuarina masterplan policy of allowing only three traffic connection points to Tweed Coast Road.

There are no traffic safety deficiencies with the proposed location of the new intersection on Tweed Coast Road. Traffic signals will be provided at this intersection, as funded by Council's Tweed Road Contribution Policy (TRCP). It is recommended that signalisation occur as soon as the new intersection is created and the first stage of development is completed. RTA records indicate that two accidents have occurred at the existing intersection involving turning movements. Therefore turning movement safety at this intersection will be improved by signalisation and relocation away from a bend.

Treatment of Foreshore Interface

The area immediately adjacent to the foreshore (or coastal edge) is a 7(f) zone running the full north-south length of Casuarina. The development proposal herein intends to retain the bulk of this zone as green open space with public pedestrian access. This provides a better environmental outcome for the 7(f) zone than the placement of a roadway (hard surface, vehicle traffic, parking) in the 7(f) zone. The exception to this is a section (approximately 200m) of esplanade commencing at the eastern end of the Main Street. This esplanade road is important to provide a circulation route and a point of arrival at the foreshore in this immediate location. It also provides an opportunity for pick up/set down of disabled users for direct access to the foreshore.

Previous versions of the master plan for this section of Casuarina proposed an esplanade roadway immediately adjacent to the foreshore, along the full length of the site. That proposed roadway was to be located in the 7(f) zone abutting this development and the dunal system. The latter roadway was not proposed to be continuous along the entire length of Casuarina. The current proposal is to reduce the length and significance of this esplanade, in line with community consultation results and sound planning (traffic, land use and amenity) principles. Road connections (with public car parking) will be provided at three locations along the foreshore. This arrangement is considered to be a far more appropriate outcome for the Town Centre for the following reasons:

- safety and convenience benefit - reduced need for pedestrians (from within the Town Centre) to cross a roadway (The Esplanade) to access the foreshore and parking spaces are located adjacent to the beach access pathways. The proposed public car park locations present no discernable change to the walking distance (from car to beach and car to the main park) from what would have been possible under the full "esplanade" option;
- environmental benefit - less chance of multiple informal tracks being created through the dune system to access the beach;
- amenity and environmental benefit - reduced traffic/environmental concerns (noise, adverse amenity, safety risk, odour, oil runoff) adjacent to the pedestrian/cycle foreshore environment and the 7(f) zone;
- safety and amenity benefit - reduced potential for "hooning" traffic in an unsupervised area during off peak times;
- amenity benefit - increased area of passive recreation between the dunes and the adjacent development.

It is noted that since the beach would not be directly visible from an esplanade road there is no "sight seeing" benefit provided by an esplanade road. The required provision of public car parking on site will be adequately achieved without the esplanade road.

Tweed Road Contribution Plan

The development contribution towards infrastructure funding has been assessed using the Tweed Road Contribution Plan in Section 5.0. The total contribution towards infrastructure funding has been indicatively estimated to be $2,640,728 for the total concept plan development. It must be recognised that this is an estimate based upon the ultimate development yields assumed herein and obviously will vary as individual applications are made.

For the project application, the TRCP contribution is estimated to be $573,146 since the project application only represents subdivision into a number of master lots (56) plus Stage 1 of the shopping centre site.

It is noted that whilst the TRCP estimate is provided herein, the applicant (Kings Beach No. 2 Pty Ltd) will make a claim for credits against the TRCP contributions on the basis that:

- the applicant has funded the construction of the Tweed Coast Road which provides a material public benefit;
- the signalisation of the Tweed Coast Road/The Boulevard intersection is included within the funding contributions received under the TRCP.

Such a claim for credits is not included within this report.

1.0 INTRODUCTION

1.1 Background

Cardno Eppell Olsen has been commissioned to undertake a traffic impact assessment for the proposed Town Centre development within Casuarina. The Casuarina Town Centre will be a mixed use development with a seaside village theme that focuses on outdoor living. The town centre will include a strong pedestrian and cyclist network and a variety of facilities within walking distance of the residential developments to reduce dependence on private vehicle travel within the area.

The proposed development will encompass a Town Centre comprising a combination of retail, and commercial land uses, residential apartments, residential lots, tourist accommodation units, a resort, open space and the ancillary roadways and public parking areas. The development proposal seeks a preliminary approval for the overall concept plan.

The development concept plan is shown on Figure A.1 at Appendix A and for the purposes of planning and assessing the impacts of traffic the following land uses have been assumed in this report:

- a supermarket/retail complex of 8,163sq.m GFA (potential ultimate yield);
- a commercial complex of 4,792sq.m GFA;
- residential/retail mixed use land of 31,290sq.m GFA, incorporating 3,700sq.m of retail and 209 dwelling units;
- medium density residential land of 104,968sq.m GFA (approximately 795 dwelling units);
- 42 detached dwellings.

It is stressed that the concept plan is subject to ongoing review and refinement hence the adopted land use areas and quantum may change. Individual applications will be necessary for each component, precinct or stage within the overall concept plan area. Nonetheless the land use areas adopted herein are considered appropriate for traffic assessment purposes. Note that the GFA assumed for the supermarket/retail complex represents the potential ultimate yield. The project application represents approximately 4,000sq.m GFA.

1.2 Scope of Report

The objective of this report is to evaluate the impact of traffic generated within the site, both internal and external to Casuarina. This includes consideration of appropriate infrastructure contribution, intersection analysis and the required public and private parking spaces.

The assessment has been undertaken with information provided by Kings Beach No. 2 Pty Ltd, Tweed Shire Council and NSW Roads and Traffic Authority. Relevant codes, policies and information have been used from the following:

- Tweed Shire Council Development Control Plan (2007) Section A2 – Site Access and Parking Code;
- Tweed Shire Council Development Control Plan No. 16 – Subdivision Manual;
- Tweed Shire Council Development Control Plan No. 55 – Seaside City;
- Tweed Shire Council Tweed Road Contribution Plan CP No. 4, V4.9 (July 2005);
- RTA Guide to Traffic Generating Developments (including Table 2.1: Key issues in preparing traffic impact studies);
- AUSTROADS Guide to Traffic Engineering Practice Part 11 – Parking;
- AUSTROADS Guide to Traffic Engineering Practice Part 14 – Bicycles;
- Australian Standard 2890.1 – Off-street car parking.

The broad methodology for the assessment has been to identify the likely traffic generation for the development components and assess the operation of the proposed road network form to identify any necessary upgrading to the existing or proposed traffic network. In addition, the overall transport network has been considered to determine its appropriateness for the subject development and to ensure that it satisfies good transport planning principles.

The appropriate financial contribution to road infrastructure has been estimated as per the requirements of the Tweed Road Contribution Plan (TRCP).

Parking requirements for the residential and non residential uses have been calculated for the overall development according to the 'Tweed Shire Council Development Control Plan (2007) Section A2 – Site Access and Parking Code'. Given the direct coastline frontage of the development site, public parking for beach goers has also been considered.

2.0 EXISTING CONDITIONS

2.1 Subject Site

The site is located at Casuarina on the northern NSW coastline south of Kingscliff, and is situated east of Tweed Coast Road. The exact location of the subject site is shown on Figure A.2 at Appendix A.

The site is located towards the northern end of Casuarina and the development is to comprise a supermarket, mixed use developments (retail/commercial below with residential above), residential (low – medium density), resort, hotel, open space and car parking.

The site of the proposed development is currently undeveloped. Directly north and south of the site is developed or approved for residential uses (low to medium density). The land to the west of Tweed Coast Road is currently undeveloped. Further to the north lies Seaside City, a 32 hectare proposed residential development consisting of approximately 205 title lots. Seaside City is bounded to the north by the Salt development. For the purposes of assigning traffic volumes, the developments directly south and north of the site have been labelled zones A – D (south of site) and E – F (north of site).

2.2 Existing Road Hierarchy and Network

The existing road hierarchy of various roads and streets in the vicinity of the proposed development is illustrated on Figure A.3 at Appendix A.

The Tweed Coast Road is a regional arterial road which runs north-south and lies to the west of the proposed development. In the vicinity of the proposed development, the Tweed Coast Road is a two lane, two way, undivided road with an 80km/h speed limit. Whilst the Tweed Coast Road is owned by the New South Wales Roads and Traffic Authority (RTA) it is classified by them as a secondary road and as such Tweed Shire Council is responsible for it.

The existing intersection of Tweed Coast Road/Dianella Drive is an unsignalised T-junction. Tweed Coast Road consists of a single through lane in each direction, a right hand stand-up turn lane from the south (approximately 80m) and a left hand slip lane from the north (approximately 80m). The Dianella Drive approach consists of a single stand up right turn lane and a short left turn slip lane (approximately 60m).

2.3 Traffic Volumes

2.3.1 Existing Daily Traffic

The RTA-reported AADT (Annual Average Daily Traffic) on key streets in the area of the proposed development is shown in Table 2.1.

Table 2.1 ***AADT on Key Streets***

Road	Location	AADT	Date
Tweed Coast Road	North of Barclay Drive	9,036	2/1/2007
	South of Cudgen Road	8,485	9/3/2006
Casuarina Way	North of Riberry Drive (Seaside City)	2,438	9/3/2006
	North of Salt	4,302	2/1/2007

2.3.2 Existing Peak Hour Traffic

AM and PM peak hour traffic turning movement surveys of the Tweed Coast Road/Dianella Drive intersection were conducted by Australasian Traffic Surveys on Friday 10 November 2006. The resultant turning movement volumes are shown on Figure C.1 at Appendix C.

2.3.3 Current Traffic Generation of Site

As the site is currently undeveloped there is no existing traffic generated by the subject site.

2.3.4 Heavy Vehicle Flows and Percentages

The traffic survey conducted for the intersection of Tweed Coast Road/Dianella Drive indicates that the percentage of heavy (commercial) vehicles was in the range of 4%-12%. Heavy vehicle movements for the AM peak hour were an average of 10% and for the PM peak hour an average of 5%. These percentages are shown on Figure C.1 at Appendix C and indicate the following:

- Tweed Coast Road north – heavy vehicle percentage of 4% - 11% in AM peak and 5% - 6% in PM peak;
- Tweed Coast Road south – heavy vehicle percentage of 4% - 9% in AM peak and 5% in PM peak;
- Dianella Drive – heavy vehicle percentage of 10% - 12% in AM peak and 4% - 5% in PM peak.

It would appear that the high percentage of heavy vehicle traffic on Dianella Drive is a reflection of the development activity (land development and building construction) in Casuarina and Salt. This also results in a relatively high percentage of heavy vehicles in the Tweed Coast Road.

2.3.5 Intersection Analysis

Proposed intersections and estimated future traffic volumes have been analysed using the computer software SIDRA Intersection 3.1 to determine the most appropriate intersection forms and the impact of the development on existing intersections. The methodology and results of these assessments are discussed in Section 4.0. The SIDRA Intersection 3.1 outputs and analysed intersection forms are included at Appendix D.

2.4 Speed Limits

The existing posted speed limit of the road sections in the vicinity of the proposed development are shown in Table 2.2.

Table 2.2 ***Speed Limits***

Road	Posted Speed Limit
Tweed Coast Road	80km/h
Casuarina Way	50km/h
Dianella Drive	50km/h
Barclay Drive	50km/h

2.5 Road Crash Data

Crash data provided by the RTA indicates on the section of the Tweed Coast Road between Barclay Drive and Dianella Drive:

- a total of four crashes occurred in the five year period from 1 July 2001 to 30 June 2006;
- two crashes were reported at the Dianella Drive/Tweed Coast Road intersection;
- three of the crashes resulted in injuries;
- there were no fatalities recorded.

The crash statistical data provided by the RTA is included at Appendix E.

Two accidents involved vehicles turning right into Dianella Drive from Tweed Coast Road south being struck by vehicles from the north. This intersection is located on a bend of Tweed Coast Road, though a protected right turn lane is provided for vehicles, and the sight distance to the north is approximately 110m.

One accident involved a vehicle turning right out of Barclay Drive being struck by a vehicle from the north on Tweed Coast Road.

The fourth accident was a single vehicle accident which occurred on Tweed Coast Road to the north of Barclay Drive. This accident occurred on a bend and was identified as being fatigue-related.

The crash history reported is not considered to be of significance, however it is noted that the signalisation of the new intersection proposed to replace Dianella Drive/Tweed Coast Road is anticipated to improve traffic safety at this location.

2.6 Public Transport

2.6.1 Rail Station Locations

There are no rail stations in the proximity of the proposed development. The closest Queensland Rail station is located at Robina, QLD, while the closest CountryLink station is located at Kyogle, NSW. The respective locations of the closest Queensland Rail and CountryLink rail stations are of no relevance in this application.

2.6.2 Bus Routes and Bus Stop Locations

Surfside Bus Lines operates a bus route from Tweed Centro through to Pottsville that services Casuarina. Route 603 travels along Tweed Coast Road and will pick up and drop off passengers wherever it is safe to do so.

2.6.3 Bus Service Frequencies

The number and frequency of services for the Route 603 bus operated by Surfside Bus Lines are outlined in Table 2.3.

Table 2.3 ***Surfside Bus Lines Route 603***

Time of Week	Period	Number of Services	Approximate Frequency
Monday - Friday	AM	5	hourly
	PM	11	hourly
Saturday	AM	5	hourly
	PM	12	hourly
Sunday	AM	5	hourly
	PM	6	hourly

3.0 PROPOSED DEVELOPMENT

3.1 The Development

The development concept plan layout as considered herein is shown on Figure A.1 at Appendix A.

The Casuarina Town Centre will be a mixed use development with a seaside village theme with a focus on outdoor living, a strong pedestrian and cyclist network and a variety of facilities within walking distance of the residential developments to reduce dependence on private vehicle travel within the area. The proposed development will feature residential accommodation, tourist accommodation, retail land use, commercial land use, a supermarket and public parking for access to the beach.

The proposed development incorporates the following elements of transport infrastructure:

- connection of the existing northern and southern ends of Casuarina Way through the site to provide a collector route for local traffic within Casuarina. This route would accommodate public transport services;
- connection of the foreshore to Casuarina Way (via The Boulevard and other local streets and walkways);
- section of esplanade road (200m approximately) adjacent to the foreshore;
- closure of Dianella Drive at its junction with Tweed Coast Road;
- provision of a new roadway (The Boulevard) and associated intersection on Tweed Coast Road to connect Casuarina Way to Tweed Coast Road (in place of the existing connection via Dianella Drive);
- local streets providing access within the Town Centre and to public car parking and open space areas adjacent to the foreshore;
- a network of pathways and bicycle routes facilitating easy and convenient pedestrian and cycle access to/from the foreshore and within the Town Centre.

It is recognised that the overall concept plan is somewhat conceptual at this stage and will vary subject to market demand and development planning. Nonetheless, for planning assessment purposes it is necessary to define a development pattern and indicative yields. The development proposed as part of the concept plan includes the following:

- a supermarket/retail complex of 8,163sq.m GFA (potential ultimate yield);
- a commercial complex of 4,792sq.m GFA;
- residential/retail mixed use land of 31,290sq.m GFA, incorporating 3,700sq.m of retail and 209 dwelling units;
- medium density residential land of 104,968sq.m GFA (approximately 795 dwelling units);
- 42 detached dwellings.

Note that the adopted GFA for the supermarket/retail complex represents the potential ultimate yield. The project application is for approximately 4,000sq.m GFA.

While individual components of the Casuarina Town Centre concept plan may be developed in stages, construction of the ultimate design for Casuarina Town Centre is expected to be complete by 2018. Traffic impacts for a ten year design horizon of 2028 have therefore been assessed.

3.2 Access

Access to the external road network from the development will be gained via a new connection to Tweed Coast Road to the west, using The Boulevard (to replace Dianella Drive) and connection to Casuarina Way to the north and to the south.

This proposed form of access achieves the following:

- connects the Town Centre to Casuarina residents, Salt residents and Seaside City residents via Casuarina Way;
- connects the Town Centre to Kingscliffe residents via Casuarina Way and Tweed Coast Road;
- connects the Town Centre to external users via Tweed Coast Road directly without bypassing residences along Dianella Drive;
- provides the internal connectivity with Casuarina along Casuarina Way for public transport routes and other local/internal movements;
- diverts traffic to/from Salt, Seaside City and parts of Casuarina through the Town Centre rather than past residences along Dianella Drive;
- provides direct access to the foreshore from Tweed Coast Road via The Boulevard rather than bypassing residences along Dianella Drive.

3.2.1 Service Vehicle Access

Service vehicle access to the site facilities will generally occur from Tweed Coast Road via The Boulevard and Casuarina Way. The detailed design of service vehicle access requirements will be addressed in subsequent applications for each development component.

3.2.2 Public Transport Access

The connection of Casuarina Way will provide a local collector route and allow for a single continuous public transport route through the Casuarina area. This will also extend north to Seaside City and Salt and will also connect to Kingscliff. Proposed provision of parallel parking spaces on Casuarina Way will provide sufficient space to accommodate future bus stops.

The existing Surfside Bus Lines Route 603 uses Dianella Drive from Casuarina Way to Tweed Coast Road. The closure of Dianella Drive will provide an opportunity for the buses on this route to travel further south along Casuarina Way and connect with Tweed Coast Road via Celerywood Drive. This provides improved local access within Casuarina to the bus route.

Whilst the management and designation of bus routes is not under the control or responsibility of the developer, the proposed street design, in particular the connection of Casuarina Way throughout the full length of Casuarina, provides the opportunity for the bus operator to redirect bus services from Tweed Coast Road onto Casuarina Way. In this location the bus route and stops will be more accessible to residents within Casuarina, without detriment to other users.

3.2.3 Beach Access and 7(f) Zone Connections

Public parking for the beach/foreshore is to be provided by a combination of public at grade car parks and public on-street parking, all within a 200m walk of the foreshore. The quantum of such parking is addressed in Section 3.5. Vehicular access to these parking areas will occur to/from Tweed Coast Road via The Boulevard, Casuarina Way and other new local streets.

The Tweed Local Environment Plan 2000 identifies areas of coastal land set aside for environmental protection from inappropriate development. The proposed development is adjacent to a land within the 7(f) zone. Any development within the 7(f) zone requires the consent of Council. In order to minimise the number of informal paths to the beach within the 7(f) zone, it is proposed to have formal paths within the 7(f) zone connecting the public parking areas through to the beach. These connections are shown on Figure A.1 at Appendix A. It is noted that as part of the aim to reduce informal tracks in the 7(f) zone, the esplanade road identified in the original Casuarina Master Plan has been excluded. The basis for this exclusion is clarified in Section 3.3 below.

It is proposed to provide a Surf Lifesaving Club premises (limited to office, toilets and equipment storage) adjacent to the foreshore. This is proposed near the eastern end of The Boulevard. Pedestrian access to the beach from the Surf Lifesaving Club will be via the proposed pathways through the 7(f) zones. Emergency service vehicles (ambulances etc) will be able to access the beach via existing Beach Access 6 north of the proposed development.

It is also proposed to upgrade the existing Beach Access near the proposed Surf Life Saving Club to allow for the vehicular access. This will provide more direct access to the club than via Beach Access 6, minimising the travel distance (for emergency and regular trips) and negating the need for vehicles to use the north-south boardwalk in the 7(f) zone.

Note that plans showing the pedestrian and cycle linkages throughout the site are included within the architectural and landscaping reports.

3.3 Treatment of Foreshore Interface

The area immediately adjacent to the foreshore (or coastal edge) is 7(f) zone running the full north-south length of Casuarina. The development proposal herein intends to retain the bulk of this zone as green open space with public pedestrian access, with the exception of a section (approximately 200m long) of esplanade road. This provides a better environmental outcome for the 7(f) zone than the placement of a roadway (hard surface, vehicle traffic, parking) along the full length. This esplanade road is important to provide a circulation route and a point of arrival at the foreshore in this immediate location. It also provides an opportunity for pick up/set down of disabled users for direct access to the foreshore.

Previous versions of the master plan for this section of Casuarina indicated a roadway immediately adjacent to the foreshore, along the full length of the site. That proposed roadway was to be located in the 7(f) zone abutting this development and the coastal dunes. The latter roadway was not proposed to be continuous along the entire length of Casuarina.

The current proposal reduces the length of this esplanade, in line with community consultation results and sound planning principles. The latter includes land use and amenity aspects, as well as traffic principles. Road connections (with open public car parking) at three selected locations along the foreshore are proposed. This arrangement is considered to be a far more appropriate outcome for the Town Centre for the following reasons:

- environmental benefit - less chance of multiple informal tracks being created through the dune system to access the beach;
- safety and convenience benefit - removed need for pedestrians (from within the Town Centre) to cross a roadway (the Esplanade) to access the foreshore and parking spaces are located adjacent to the beach access pathways. The proposed public car park locations present no discernable change to the walking distance (from car to beach and car to the main park) from what would have been possible under the full "esplanade" option;
- amenity and environmental benefit - reduced traffic/environmental concerns (noise, adverse amenity, safety risk, odour, oil runoff) adjacent to the pedestrian/cycle foreshore environment and the 7(f) zone;
- safety and amenity benefit - reduced potential for "hooning" traffic in an area with a little public surveillance during off peak times;
- amenity benefit - increased area of passive recreation between the dunes and the adjacent development.

It is noted that since the beach would not be directly visible from an esplanade road (due to the dunal system) there is no "sight seeing" benefit provided by an esplanade road. The required provision of public car parking on site will be adequately achieved without the esplanade road (see discussion in Section 3.7).

3.4 Dianella Drive Closure

The proposed street network will see the closure of Dianella Drive where it connects to Tweed Coast Road (at the northern end of the Town Centre). Dianella Drive will take on a local access role (as a cul-de-sac at its western end) for the adjacent residential catchment.

The closure of Dianella Drive and relocation of the connection to and intersection with Tweed Coast Road does not result in any significant additional travel for vehicles between Casuarina Way and Tweed Coast Road. The closure will occur by construction of a full, permanent cul-de-sac arrangement (kerbing and landscaped verge etc) at the western end of Dianella Drive.

A new intersection on the Tweed Coast Road will be created to provide direct access to the Casuarina Town Centre and to connect Casuarina Way with the Tweed Coast Road, replacing the existing collector function of Dianella Drive. This connection will occur via a proposed new road, The Boulevard. This revision to the street network is an appropriate outcome as it introduces the opportunity for direct access into the Town Centre from Tweed Coast Road without the need for traffic to pass through residential areas. It also provides increased traffic levels into the Town Centre to activate the streets. This is an important factor in the success of the Town Centre.

The closure of Dianella Drive is necessary as the intersection spacing between the Tweed Coast Road/Dianella Drive intersection and the Tweed Coast Road/The Boulevard intersection would be less than the desirable intersection spacing of 300m. In addition, the Casuarina Master Plan policy allows for only three connections from Casuarina to Tweed Coast Road.

The creation and signalisation of the new intersection at Tweed Coast Road/The Boulevard and the closure of Dianella Drive at Tweed Coast Road have been discussed with the New South Wales Roads and Traffic Authority (RTA) and Tweed Shire Council. The RTA has advised that the Tweed Coast Road is one of their secondary roads hence Council is responsible for it. Council has accepted this in principle and are supportive of the proposed concept.

The proposed form of the Dianella Drive closure is shown on Figure A.5 (plan 8491-100-B) at Appendix A and the proposed intersection of Tweed Coast Road/The Boulevard is shown on Figure A.6 (plan 8491-101-D) at Appendix A. It is noted that the latter intersection is to be signalised to address traffic volumes and improve traffic safety. Such signalisation is consistent with Tweed Shire Council planning and will be funded via TRCP contributions.

3.5 Road Cross Sections

The proposed cross sections for each of the streets within the site have been developed to suit the specific needs of the Town Centre development, including on-street parking requirements. The cross sections incorporate the relevant aspects of Tweed Shire Council's Subdivisions Manual (DCP 16) as well as aspects of AUSTROADS Guide to Traffic Engineering Practice Part 11 – Parking and Part 14 – Bicycles.

It is important to recognise that the proposed development in the Town Centre incorporates a number of relatively unique road cross sections (eg. Main Street, loop roads, special kerbside parking arrangements). Many of these unique situations are not addressed in Council's standard road cross sections hence there is a need to apply unique or modified design elements.

Whilst the cross sections do incorporate elements of Council's subdivision Manual, the unique nature of the town centre is such that a number of the street cross sections do not represent the Council standard. Nonetheless, the proposed cross sections are considered to represent an appropriate design form to suit the intended function.

The following typical street widths are proposed:

- Casuarina Way north of the Town Centre (Road No. 3) – 20.5m road reserve within which is a two lane roadway (total pavement width of 11m) plus indented kerbside parking (2.5m each). This is a slightly wider form than Council's Normal Neighbourhood Connector and satisfies the same outcomes in design. At the intersection with the Boulevard some pavement widening is necessary and can be achieved in the road reserve of 20m;
- Casuarina way south of the Town Centre (Road No. 2) – 20.5m road reserve within which is a two lane roadway (total pavement width of 11.0m). This is consistent with Council's Low Volume Neighbourhood Connector. At the intersection with The Boulevard some pavement widening is necessary and can be achieved in the road reserve of 20.0m;
- The Boulevard, also known as Entry Road (Tweed Coast Road – Casuarina Way) – 40.0m road reserve within which is a four lane roadway (plus turning lanes), median divided with 45 degree indented parking on each side. Given the unique form and function of this street, there is no comparable cross section within Council's standards. Appropriate design standards are met, generally in accordance with Council's Shopping Strip Access Street;
- Main Street or Road No. 1 (east of Casuarina Way) – 33.7m road reserve within which is a two lane roadway (plus turning lane) median divided with 90 degree parking intended on the north side and parallel parking indented on the southern side. Given the unique form and function of this street, there is no comparable cross section within Council's standards. Appropriate design standards are met, generally in accordance with Council's Shopping Strip Access Street;
- Road No. 4 (running north-south at the eastern end of Main Street) – 18.0m road reserve within which is a two lane roadway (7.0m pavement). This is generally consistent with Council's Wider Access Street and satisfies the same outcomes in design;
- Road No. 5 (running east-west to the east of Casuarina Way) – 19.0m road reserve within which is a two lane roadway (7.0m pavement) plus indented 90 degree parking on both sides. This is slightly wider than Council's Narrower Access Streets to satisfy the same outcomes in design and also provide for indented on-street parking;

- Road No. 5 (running north-south to the east of Main Street) – minimum 12.5m road reserve within which is a two lane roadway (6.0m pavement) plus indented parallel parking on one side. This is slightly wider than Council's Narrower Access Streets to satisfy the same outcomes in design and also provide for indented on-street parking;
- Road No. 6 (running east-west to the east of Casuarina Way) – 15.0m road reserve within which is a two lane roadway (6.0m pavement) plus indented 90 degree parking on the northern side. This is slightly wider than Council's Narrower Access Streets to satisfy the same outcomes in design and also provide for indented on-street parking;
- Road No. 7 (running east-west and north-south to the west of Casuarina Way) – 13.0m road reserve within which is a two lane roadway (6.0m pavement). This achieves the same outcomes as Council's Narrower Access Streets.

These proposed street cross sections provide a suitable form for the traffic, parking, cycle, pedestrian, landscaping and public transport demands within the town centre. As stated above, there are a number of minor variations between these cross-sections and the equivalent (where available) Tweed Shire Council cross sections. Table 3.1 outlines the equivalent standard cross section and, where applicable, any variations between the proposed cross section and that standard. All cross sections have been designed to recognise the traffic/road function, the Council standards and the urban design aspects, including landscaping, street scape, pedestrian facilities, cyclist needs and car parking.

Table 3.1 ***Cross Section Details***

Road Section	Equivalent Tweed Shire Council Cross Section	Variation(s)
Casuarina Way north of the town centre (Road No. 3)	Low Volume Neighbourhood Connector	Wider (20.5m versus 18m) road reserve to accommodate indented parking and wider verges but pavement (11m) is as per Council standard.
Casuarina Way south of the town centre (Road No. 2)	Low Volume Neighbourhood Connector	Wider (20.5m versus 18m) road reserve to accommodate wider verge but pavement (11m) is as per Council standard.
The Boulevard/Entry Road (Tweed Coast Road – Casuarina Way)	Shopping Strip Neighbourhood Connector	Wider (40m versus 30m) road reserve to accommodate median and wider verges. Pavement is wider to accommodate four lanes.
Main Street/Road No. 1 (east of Casuarina Way)	Shopping Strip Access Street	Wider (33.7m versus 30m) road reserve to accommodate median and wider verges. Pavement is similar to Council standard.
Road No. 4 (running north-south at the eastern end of Main Street)	Wider Access Streets	Slightly narrower (7.0m versus 7.5m) pavement but a wider (18m versus 14.5m) road reserve.
Road No. 5 (running east-west to the east of Casuarina Way)	Wider Access Streets	Slightly narrower (7.0m versus 7.5m) pavement but a wider (19m versus 14.5m) road reserve to accommodate 90 degree parking on one or both sides.
Road No. 5 (running north-south to the east of Main Street)	Narrower Access Streets	Slightly narrower (12.5m versus 13m) road reserve to create slow speed environment. Pavement (6m) is as per Council standard.
Road No. 6 (running east-west to the east of Casuarina Way)	Narrower Access Streets	Wider (15m versus 13m) road reserve to accommodate indented on-street parking. Pavement (6m) is as per Council standard.
Road No. 7 (running east-west and north-south to the west of Casuarina way)	Narrower Access Streets	Road reserve (13m) and pavement (6m) are as per Council standard.

3.6 Provision for Bus Movements

The RTA provides a framework for assessing the suitability of routes for the operation of 14.5m buses. While bus lengths are normally limited to 12.5m, many bus operators currently use 14.5m buses on routes that have been determined in their suitability for accommodating such vehicles.

The RTA provides turning path templates for 12.5m and 15m radius paths. These represent the absolute minimum and desirable minimum radius paths respectively.

A 14.5m bus must be able to negotiate any traffic calming devices without making bodily contact with the device, road surface or a roadside object. Any bus stops designated for use by 14.5m buses must also be able to sufficiently accommodate their access and storage.

Buses will use Casuarina Way for public transport services. The location and form of bus stops and bus bays will be addressed subsequent to formal planning of the bus route. The road reserve of Casuarina Way provides sufficient width to achieve kerbside bus stops outside of the through traffic lane.

To facilitate disabled access to the foreshore, a public vehicle turnaround area is proposed at the eastern end of the southern public car park adjacent to the foreshore. This turnaround area will accommodate a small bus such that disabled access via a “maxi taxi” can easily occur at this point. In addition, such vehicular access will be possible at the northern car parking precinct.

3.7 Parking

Within the development it is necessary to provide a sufficient amount of parking to meet the needs of the proposed retail and commercial facilities and also provide a sufficient amount of public car parking for use by the general public when accessing the beach. These parking spaces are discussed below.

All parking areas and spaces will be designed in accordance with Australian Standards AS2890.5:1993 and AS2890.1:2004 for on-street and off-street car parking respectively. Whilst in general there are no issues of non-compliance, any required modifications can be addressed by conditions and/or in the operational works application stage.

3.7.1 Shopping Centre Car Parking

The 'Tweed Shire Council Development Control Plan (2007) Section A2 – Site Access and Parking Code' specifies the car parking rates for various land uses. The car parking requirements for land uses applicable to the proposed shopping centre are:

- shops: 4.4 spaces per 100sq.m GFA, plus 1 per 100sq.m GFA for staff;
- restaurant: 1 space per 7sq.m GFA dining area, plus 1 per staff;
- office: 1 space per 40sq.m GFA.

Based on the above rates the proposed shopping centre will require 226 spaces. Restaurant dining area has been assumed to be 65% of the proposed restaurant GFA. Section 4.11 of the DCP allows for a reduction of 20% of the car parking requirements shown within the plan to support the Council's Strategic Plan and reduce car dependence. The latter would result in a requirement for 181 car spaces.

The following number of spaces is proposed:

- Off-Street: 226;
- On-Street: 16.

As the Casuarina development embodies the principles of the strategic plan with a focus on pedestrian and cyclist infrastructure, it is considered that the number of spaces proposed (242 spaces) by the shopping centre is well above the requirements of DCP No. 2.

3.7.2 Public Car Parking

It is understood that the state government (DIPNR) has accepted that a rate of 300 spaces per kilometre of beach frontage is an appropriate provision of public parking for beach goers. The Salt development to the north (approved by DIPNR) has proceeded with public parking provided at 200 public spaces per kilometre of beach frontage. The full length of the Casuarina Town Centre site has a beach frontage of approximately 538m. This produces a public parking requirement of 162 car spaces (at 300 spaces/km). It is proposed to supply a total of 170 public car parking spaces as shown on Figure A.1 at Appendix A. All these spaces will be within a 200m distance of the foreshore for ease of access by walking.

The location of the proposed 170 public spaces is summarised as follows:

- Road No. 6 – 15 spaces along street plus 6 spaces at eastern end. Note this only represents those spaces within 200m of the foreshore;
- east-west section of Road No. 5 – 20 spaces along street;

- The Boulevard (Road No. 1) to the west of the intersection with Road No. 4 – 20 spaces along street. Note this only represents those spaces within 200m of the foreshore;
- Road No. 5 at the foreshore – 16 spaces along street;
- eastern most end of The Boulevard – 21 spaces along street;
- public car park at northern end (adjacent to foreshore) – 72 spaces.

There will be other public on street spaces provided throughout the site as part of the overall development and streets (eg. on Casuarina Way and The Boulevard (west)). These are not included in the numbers reported above since they are further than 200m from the foreshore.

It is noted that the subject site is one of the last remaining beach front sites within Casuarina. It is understood that Council had initially agreed upon a requirement for 668 public car parking spaces to be provided throughout the entire length of Casuarina to satisfy the beach goer demand. As at January 2005 there were a total of 410 spaces available for such public use. In general, this number has not changed since then. Recent applications by Multiplex at the southern end of Casuarina will provide an additional 120 public spaces. As such, the total provision of 410 (existing) + 120 (Multiplex development) + 170 (proposed) spaces (700 spaces in total) will exceed Council's desired provision.

The Tweed Shire Development Control Plan Section A2 (Site Access and Parking Code) requires that disabled parking is provided at a rate of not less than one space per 30 spaces. For the 170 parking spaces proposed, this equates to a requirement of six disabled parking spaces.

The attached plans (8491-901-A to 8491-907-A) present, for all the on-street public car parking spaces incorporated in the town centre, the:

- car park dimensions;
- aisle widths;
- location of disabled car parking spaces.

There will be easy access for disabled users to the foreshore (parkland and boardwalk) via vehicle turnaround areas at the end of each beach access road.

3.7.3 Private Development Car Parking Provision

The individual parking requirements of each private/individual development site will be addressed in subsequent applications for each site. Such provisions are anticipated to occur on site with relaxations only where public on-street parking is to be provided by the applicant. Such relaxation due to public parking will not utilise those parking spaces proposed for public beach access (see Section 3.7.2).

3.7.4 Parking for Service Vehicles and Bicycles

The Tweed Shire Council guidelines for service vehicle and bicycle parking, as outlined in Tweed Shire Council Development Control Plan Section A2, are summarised in Table 3.2.

Table 3.2 ***Service Vehicle and Bicycle Parking***

Use	Bicycle	Service Vehicles
Shops	2 per 100sq.m GFA up to 100 GFA, 1 per 200sq.m thereafter	1 per 1500sq.m GFA, minimum of 1, minimum of 2 for supermarkets (HRV)
Restaurant	1 per 5 car parks	1 (HRV)
Office	1 per 100sq.m GFA	1 space per 200sq.m GFA (SRV)

The location and quantum of these parking facilities will be addressed in the detailed design associated with each subsequent application for each development component. At that time the layout of each parking area will also be assessed against AS2890 and Council Standards.

For the proposed Stage 1 shopping centre application (4,135sq.m GFA) the following bicycle and service vehicle spaces are required:

- 22 bicycle spaces;
- 3 heavy rigid vehicle (HRV) spaces.

These space requirements can be accommodated in the proposed building design.

4.0 IMPACT OF PROPOSED DEVELOPMENT

4.1 Development Traffic Generation

The proposed development provides a mixture of residential dwellings for permanent, semi permanent, weekend living and investment/holiday rental use as well as retail, community and commercial uses (supermarket, offices, cafes, shops and community facilities).

To assess the traffic impacts of the proposed development, the existing traffic, traffic attributable to beachgoers and through traffic from adjacent developments has also been included in the future traffic generation network. Traffic generation rates used are generally representative of urban environments which is considered to be conservative as the development will consist of a high level of temporary and holiday accommodation which is typically associated with lower traffic generation levels. This will ensure that any capacity deficiencies in the road network are identified.

The through traffic represents the impact of closure of Dianella Drive and the reallocation of this traffic onto The Boulevard (west) as well as the north south connection of Casuarina Way.

Calculation of the appropriate infrastructure contribution under the Tweed Road Contribution Plan (TRCP) CP No. 4, Version 4.9 is discussed in Section 5.0. For this latter component the traffic generation is adjusted to rates specified in the TRCP to provide a more appropriate estimate of anticipated traffic demand. Only traffic generated directly by the development has been included in the TRCP calculation.

In order to assign traffic generation from the proposed road network, a spreadsheet has been created to determine the AM and PM peak hour and daily traffic volumes on the road network. The following section describes the methodology used to determine future traffic flows. Resulting AM peak, PM peak and daily traffic volumes for design years of 2018 and 2028 are shown at Appendix B. These dates have been adopted on the assumption that full development is likely to be complete by 2018.

4.1.1 Development Assumed Land Usages

Traffic generation rates vary according to land usage. The assumed land uses for traffic generating zones within the network are indicated in Table 4.1. Figures B.1 – B.6 at Appendix B show the location of all zones.

Table 4.1 ***Assumed Land Usages***

Zone	Land Usage	Size
T1	Residential	13 detached dwellings, 47 medium density dwellings
T1C	Commercial/Community Facilities	4,792sq.m GFA
T2	Residential	18 detached dwellings
T2R	Retail	Shopping Centre 8,163sq.m GFA
T3	Residential	11 detached dwellings, 88 medium density dwellings
T4North	Residential/Resort	164 medium density dwellings
T4South	Residential/Resort	174 medium density dwellings
T5	Residential	90 medium density dwellings
T6	Residential	94 high density dwellings
T6R	Retail	Shops 1,800sq.m
T7R	Retail	Shops 1,900sq.m
T7Beach	Beach Parking	Public Parking 133 spaces
T7R(Beach)	Retail	Cafés 2,00sq.m
T7	Residential/Hotel	347 high density units

4.1.2 Traffic Generation Rates

The base traffic generation rates used in this assessment have been sourced from publications such as the Tweed Road Contribution Plan, the NSW Road and Traffic Authority's Guide to Traffic Generating Developments and the draft Transport Assessment Guide prepared by Queensland Transport, as included in the Department of Main Roads (DMR) Traffic Assessment Guidelines. The latter document uses rates sourced from the RTA guide.

The adopted base rates of weekday peak hour vehicle trips are shown in Table 4.2.

Table 4.2 ***Traffic Generation Rates***

Use	Peak Hour Rate	Source
Detached Dwellings	0.64vph per dwelling	TRCP
3 Bedroom Units	0.39vph per unit	TRCP
1-2 Bedroom Units	0.39vph per unit	TRCP
Shopping Centre (8,163sq.m GFA)	12vph per 100sq.m GFA	DMR Traffic Assessment Guidelines
Retail (shops)	10vph per 100sq.m GFA	DMR Traffic Assessment Guidelines
Retail (cafés)	5vph per 100sq.m GFA	RTA Guide
Commercial (offices)	3.4vph per 100.sqm GFA	DMR Traffic Assessment Guidelines
Beach Parking	1vph per space	Cardno Eppell Olsen

For AM peak hour volumes, the retail traffic generation rates have been reduced to 20% of the peak hour rates above.
These rates are generally consistent with those suggested in the New South Wales Road and Traffic Authority publication "Guide to Traffic Generating Developments". The adopted rates are generally more conservative (i.e. greater) than the latter. A list of the relevant RTA rates can be found at Appendix E.

It is noted that the assumed overall traffic generation is based on typical residential traffic generation. Such assumptions are considered to be high on the basis that many of the residential dwellings within Casuarina will be semi permanent or for holiday use. These uses typically have a higher portion of alternate model trips (walking, cycling) and a reduced need for commuter trips to work or school. As such, it is likely that actual traffic volumes will be less than that adopted herein.

4.1.3 Traffic Generation of Other Proposed Developments

In addition to the development site, the traffic generation due to existing and future development sites (not part of this application) to the north and south of the site (shown on Figure A.4 at Appendix A) have been assumed as outlined in Table 4.3 (these rates are based on previous work for these other developments).

Table 4.3 ***Traffic Generation of Other Proposed Developments***

Proposed Development	AM IN (vph)	AM OUT (vph)	PM IN (vph)	PM OUT (vph)	Daily In (vpd)	Daily Out (vpd)
A-D	104	313	250	167	2,085	2,085
A-D retail	13	13	65	65	650	650
E - F	37	112	90	60	746	746
SALT	344	690	770	507	3,032	3,035
Seaside	146	350	287	209	2,480	2,480

The traffic generation volumes shown in Table 4.3 are determined based on completion of the proposed developments. The timing of completion of these development areas has been assumed as shown in Table 4.4 below.

Table 4.4 ***Assumed Completion of Other Proposed Developments***

Proposed Development	2018	2028
A-D	100%	100%
A-D retail	100%	100%
E - F	100%	100%
SALT	100%	100%
Seaside	50%	100%

4.1.4 External Traffic Network Volumes and Growth

The proposed development will access the external traffic network via Casuarina Way and via the proposed intersection of The Boulevard with Tweed Coast Road. This intersection will replace the function of the existing Tweed Coast Road/Dianella Drive intersection (which will be closed).

Existing traffic volumes turning into and out of the Tweed Coast Road/Dianella Drive intersection have been added as background traffic to the proposed road network. Through traffic on the Tweed Coast Road has been increased at a linear annual growth rate of 4% per annum (determined from assessment of historic AADT's on Tweed Coast Road in the vicinity of Casuarina). In addition to the existing background traffic on Casuarina Way, traffic generation from development sites immediately north and south of the proposed development has been added (background traffic growth outside of the Casuarina catchment has been assumed to be zero due to limitations of the bridge connecting Casuarina to Kingscliff).

4.1.5 Hourly Distribution of Trips

The assumed distribution of trip ends at each of the assumed land uses is shown in Table 4.5.

Table 4.5 ***Temporal Trip Distribution***

Time	Use	In	Out
AM Peak	Residential	25%	75%
	Retail	50%	50%
	Commercial	80%	20%
PM Peak	Residential	60%	40%
	Retail	50%	50%
	Commercial	20%	80%
Daily	All Trips	50%	50%

4.1.6 Trip Assignments

The vehicle trips generated by the development have been separated into two components, internal trips and external trips. This has been done to establish the impacts on the road network external to the development. Due to the emphasis placed on provision of pedestrian and cycle-ways, the outdoor lifestyle theme of the developments and the high level of semi permanent and holiday homes, trips within the development are generally assumed to be made by walking and cycling, indicated in Table 4.6 as "Alternate Mode" trips. The assumed trip destination proportions for trip ends within the Casuarina Beach traffic network are reported in Table 4.6.

Table 4.6 ***Traffic Distribution Classification***

Zone	South via The Boulevard	North Via The Boulevard	North Via Casuarina Way	Town Centre South	Town Centre North	Alternate Mode (e.g. walk/ cycle)	External To Network
A-D			10%	15%		10%	65%
A-D retail			15%	30%		20%	35%
T1	20%	45%	10%			25%	
T1C	20%	15%	15%	10%	10%	30%	
T2	20%	45%	10%			25%	
T2R	20%	20%	20%	10%	10%	20%	
T3	20%	45%	10%			25%	
T4North	20%	45%	10%			25%	
T4South	20%	45%	10%			25%	
T5	20%	45%	10%			25%	
T6	20%	45%	10%			25%	
T6R	20%	15%	15%	10%	10%	30%	
T7R	20%	15%	15%	10%	10%	30%	
T7Beach	20%	60%	20%				
T7R (Beach)	20%	15%	15%	10%	10%	30%	
T7	20%	45%	10%			25%	
E	20%	40%	15%		10%	15%	
F	20%	40%	15%		10%	15%	
SALT	20%	0%	55%		10%	15%	
Seaside	20%	30%	25%		15%	10%	

It is important to note that the traffic distribution assumptions to/from and within Casuarina are consistent with our previous assessments for components of the Casuarina development undertaken on behalf of Kings Beach No. 2 Pty Ltd. These previous assessments have been accepted and approved by Council. The distribution is based on consideration of the likely attractors in each direction (e.g. north to Tweed Heads, Gold Coast and Brisbane, south to Cabarita and Ballina). The following explains the distributions further:

- south or north via The Boulevard uses The Boulevard to access Tweed Coast Road to head south or north;
- north via Casuarina Way uses Casuarina Way to head north (eg. to Kingscliff);
- Town Centre south or north uses Casuarina Way to access the Town Centre from the south or north;
- alternate mode represents the proportion of trips that use the pathway networks provided with Casuarina as part of the lifestyle choice in the overall community. This proportion represents non-car trips hence it has been excluded from the analysis.

For the traffic assumed for the Town Centre retail and commercial areas, it is anticipated that a significant proportion will use alternative modes of transport e.g. walk, cycle or public transport. This is in line with the Tweed Shire Council Strategic Plan to reduce car dependence.

4.1.7 Generated Traffic Volumes

AM peak, PM peak and daily traffic volumes for design years of 2018 and 2028 have been determined using the information presented herein and the assumptions documented in the previous sections. The resulting volumes are shown on Figures B.1 through B.6 at Appendix B.

4.1.8 Daily Traffic Volumes

The predicted daily traffic volumes for the Casuarina Beach road network are shown on Figures B.3 and B.6 at Appendix B. Note that the calculation of these volumes incorporates full development within the Casuarina site using traffic generation rates based on typical residential accommodation (as discussed previously) hence the projected volumes are considered conservative. Therefore the actual volumes are likely to be less than those shown below. The key traffic volumes (daily two-way) for consideration of the subject development are as follows:

2018 Ultimate Design Case

- 14,042vpd on Casuarina Way (immediately north of The Boulevard);
- 11,467vpd on Casuarina Way (at northern end of Casuarina);
- 13,916vpd on Casuarina Way (immediately south of The Boulevard);
- 1,684vpd on Casuarina Way (north of Barclay Drive);
- 15,392vpd on The Boulevard (west of Casuarina Way);
- 5,252vpd on Main Street (east of Casuarina Way).

2028 Ultimate Design Case

- 15,654vpd on Casuarina Way (immediately north of The Boulevard);
- 13,079vpd on Casuarina Way (at northern end of Casuarina);
- 14,288vpd on Casuarina Way (immediately south of The Boulevard);
- 1,684vpd on Casuarina Way (north of Barclay Drive);
- 16,632vpd on The Boulevard (west of Casuarina Way);
- 5,252vpd on Main Street (east of Casuarina Way).

Note that these traffic volumes are indicative only and do not take into account the local circulation routes within the Town Centre. As such, volumes on The Boulevard (west) may be less than reported above and volumes on The Boulevard (east) may be greater than reported above.

The traffic volumes reported for each roadway are generally consistent with their role in the road hierarchy as follows:

- The Boulevard (west) – as a Main Street within a local town centre (retail, commercial and other uses), plus its role in providing a connection to other development areas to the north and south (eg. Salt, Seaside City, Casuarina), the projected volume is considered appropriate;
- Casuarina Way (through Town Centre) - as part of the Main Street within a local town centre (retail, commercial and other uses) plus its role in providing a connection between other development areas to the north (eg. Salt, Seaside City, Casuarina) and south (Casuarina) the projected volume is considered appropriate;
- Casuarina Way (north of Town Centre) - as a Major Collector Street within the overall Casuarina Area plus its role in providing a connection to other development areas to the north (eg. Salt, Seaside City) the projected volume is considered appropriate;

- Casuarina Way (south of Town Centre) - as a Collector Street within the overall Casuarina Area the projected volume is considered appropriate;
- The Main Street (east) – as a Main Street within a local town centre (retail, commercial and other uses) the projected volume is considered appropriate, although it is recognised that volumes may be higher (due to local traffic circulation) and volumes in the order of 6,000vpd would not be inappropriate).

The proposed future road hierarchy is illustrated on Figure A.9 at Appendix A.

4.2 Traffic Impact Analysis

Assessment of the road network adjacent to the development comprises the peak hour intersection capacity impacts and the daily link volumes for both capacity and residential amenity. These traffic volumes are illustrated on Figures B.1 through B.6 at Appendix B.

For the assessment of future traffic volumes on The Boulevard, it has been assumed that all background traffic at the intersection of Tweed Coast Road/Dianella Drive will use The Boulevard after the proposed closure of Dianella Drive.

The two key intersections that require assessment are Tweed Coast Road/The Boulevard and Casuarina Way/The Boulevard.

Tweed Coast Road/The Boulevard

The Tweed Coast Road/The Boulevard intersection will replace the function of the existing Tweed Coast Road/Dianella Drive intersection which is currently an unsignalised intersection. For the design year of 2018 an unsignalised intersection is considered inappropriate due to both the increase in through traffic on the Tweed Coast Road and the increase in turning movements from traffic due to developments in Casuarina (including the proposed development). There are also safety concerns at this location raised by residents and apparent from crash records.

A signalised intersection form has been assessed for 2018 and 2028 volumes on the basis that the current planning for Tweed Coast Road anticipates traffic signals at the Dianella Drive intersection.

The signalised intersection as proposed herein will be safer than the existing Dianella Drive/Tweed Coast Road intersection (to be closed);

- traffic movements will be controlled by signals;
- the intersection is moved further from the curve in Tweed Coast Road;
- the intersection will be more visually prominent.

Casuarina Way/The Boulevard

The Casuarina Way/The Boulevard intersection will be a new four way intersection. Due to the high number of pedestrian and cyclist movements in the area it is considered that this intersection should be a signalised four way intersection of urban form (no slip lanes) providing the safest pedestrian movements possible. Whilst a roundabout could provide another alternative, the signalised form has been adopted to ensure the safest environment for the interaction of pedestrians, cyclists and vehicles. In addition, a signalised intersection will operate more efficiently during the estimated peak hour traffic volumes.

Due to the above reasons, an unsignalised or roundabout intersection has not been considered for the initial stages of the development and the intersection has been analysed for 2018 and 2028 design volumes only.

4.2.1 Peak Period Volumes and Intersection Analysis

The proposed intersections have been analysed using the computer software SIDRA Intersection 3.1 to determine the most appropriate intersection forms. The SIDRA Intersection 3.1 outputs are included at Appendix D. The intersection forms analysed for the Tweed Coast Road/The Boulevard and Casuarina Way/The Boulevard intersections are shown on Figures D.1 and D.2 at Appendix D.

Tweed Coast Road/The Boulevard

The existing Tweed Coast Road/Dianella Drive intersection is an unsignalised intersection with protected left and right turns from the Tweed Coast Road into Dianella Drive. It is proposed that this intersection will be closed and its function (provision of collector connection from Casuarina Way to Tweed Coast Road) is replaced by the connection of The Boulevard to Tweed Coast Road.

For the ultimate design volumes, an unsignalised form is considered inappropriate, with signalisation required to provide safe and efficient turning movements. For a signalised intersection, the maximum desirable degree of saturation (DOS) is 0.95. The maximum degree of saturation determined using SIDRA Intersection 3.1 for 2018 and 2028 peak hour volumes is reported in Table 4.7.

Table 4.7 Intersection Analysis of Tweed Coast Road/The Boulevard

Scenario	Intersection Analysis DOS Results	
	AM peak	PM peak
2018	0.45	0.64
2028	0.50	0.68

Casuarina Way/The Boulevard/Main Street

The operation of the proposed signalised intersection of Casuarina Way/The Boulevard was assessed for the design years of 2018 and 2028 in the intersection form shown on Figure D.2 at Appendix D. The maximum degree of saturation predicted by SIDRA Intersection 3.1 for the peak hours of 2018 and 2028 is reported in Table 4.8.

Table 4.8 Intersection Analysis of Casuarina Way/The Boulevard

Scenario	Casuarina Way/The Boulevard	
	AM peak	PM peak
2018	0.69	0.85
2028	0.70	0.91

4.3 Impact on Traffic Safety

The existing intersection of Tweed Coast Road/Dianella Drive is an unsignalised intersection. As discussed in Section 2.5, RTA records indicate that two accidents have occurred in the last five years involving right turn movements out of Dianella Drive. Signalisation of the proposed Tweed Coast Road/The Boulevard intersection (which will replace the Dianella Drive connection) will improve the safety of turning movements at this intersection. Therefore, it is recommended that signalisation occur immediately upon the creation of the new intersection and completion of the first development stage.

The intersection of Casuarina Way/The Boulevard will be signalised and in an urban form (i.e. no slip lanes). This will provide a higher level of safety for pedestrian movements than alternative intersection forms (such as a roundabout or unsignalised intersection). It is recommended that the signalised intersection be installed immediately upon completion of the first stage of development and creation of the four way intersection.

5.0 FUNDING OF DEVELOPMENT IMPACTS

5.1 Tweed Shire Council Road Contribution Plan

The Tweed Shire Council has developed the Tweed Road Contribution Plan (TRCP) to determine a financial contribution towards transport infrastructure funding in the Tweed Shire according to the amount of traffic generated by a development. The contribution is required to enable the local authority to fund the construction of the road infrastructure to which all developments contribute.

The subject site falls within Sector 7 of the TRCP (version 4.9) and has a special subcategory (locality) defined as "Kings Beach Development". Within this subcategory the development is responsible for both a standard contribution and local area contribution, in addition to Council administration contributions.

The developers of Casuarina (including the developer of the subject site) will construct the entire road infrastructure internal to their proposed site. Similarly, the developers have constructed the existing local road network within Casuarina. As such, any traffic that is generated by the development but only occurs internal to Casuarina should not be considered towards the road contribution levy.

The signalisation of the Tweed Coast Road/The Boulevard intersection is included (by way of finding allocation) within the TRCP. As such, the works should be funded by Council or alternatively, if funded by the applicant, the cost should be credited to the applicant.

It is recognised that the applicant (Kings Beach No. 2 Pty Ltd) has previously funded the construction of the Tweed Coast Road. It is understood that no such credits have been provided to the applicant in respect of this. Therefore, whilst estimates of TRCP contribution are provided herein, it must be acknowledged that the applicant will seek to claim credits for the cost of constructing the Tweed Coast Road on the basis that the latter provides a material public benefit. Such a claim for credits is not added in this report.

5.2 TRCP Calculation

To identify an estimate of the contribution of funds towards infrastructure, it is necessary to determine trip generation out of the development to the external road system. Since the proposed development will include construction of the internal road network within the development, it is not appropriate to charge external contributions for vehicle trips that only occur on the internal road network. In this context, the "internal road network" represents all the roads within Casuarina, not just the subject site. The "internal road network" includes Casuarina Way, The Boulevard and other streets but excludes Tweed Coast Road.

As discussed earlier in this report the subject site traffic generation has been estimated using conservatively high generation rates for road and intersection capacity analysis. For the purpose of calculating the appropriate TRCP contribution the daily traffic generation rates (as specified by the TRCP) are:

- dwelling houses 6.5vpd per unit;
- units 3.9vpd per unit;
- courtyard apartments 3.9vpd per unit;
- townhouses 3.9vpd per unit;
- commercial 16vpd per 100sq.m;
- retail (shops) 200 + 80vpd per 100sq.m;
- retail (supermarket) 500 + 75vpd per 100sq.m.

For all land uses except retail, a Council contribution rate of $453.60 per daily vehicle trip (consisting of a standard $292.00 plus local $81.00 plus interest $59.00 plus 5% administration factor) is applicable.

It is recognised that the project application is only for subdivision into a number of master jobs plus Stage 1 of the shopping centre site. Accordingly, the first series of estimates below represent an approximation of the TRCP contributions for this first stage. The TRCP calculations for the project application will only represent a proportion of the total future contributions, which are also given below.

Project Application

The TRCP contribution calculations for the project application are based on the size of Stage 1 of the supermarket site, in addition to 56 master lots (each treated as a detached dwelling house). The total external vehicle trips generated by the master lots is estimated to be 273vpd (56 x 6.5 x 75%), resulting in a non-retail contribution of $123,833.

The number of trips and the applicable modification factor for the proposed Stage 1 retail facilities is shown below in Table 5.1.

Table 5.1 TRCP Contribution Calculations – Project Application

Description	GFA (sq.m)	TRCP Trip Rate	% External	External Trips	TRCP Modification	Contribution Cost
Supermarket	4,135	500 + 75vpd per 100sq.m	50%	1,801	0.55	$449,313
Total						**$449,313**

The total development contribution by the subject applicant to the external road infrastructure is estimated as $573,146 for the project application.

Concept Plan Development

At the TRCP traffic generation rates, the total vehicle trips external to the development road network is estimated, for the development yield and make up adopted herein, to be 3,526vpd. Therefore the development contribution due to non-retail land uses is estimated to be $1,599,394.

For the retail land use, a modification factor is used to account for diverted trip making (as specified in the TRCP). The modification factor varies according to the GLA of the proposed retail facility. The number of trips and the applicable modification factor for the proposed retail facilities is shown below in Table 5.2.

Table 5.2 TRCP Contribution Calculations – Concept Plan Development

Description	GFA (sq.m)	TRCP Trip Rate	% External	External Trips	TRCP Modification	Contribution Cost
Supermarket	8,163	500 + 75vpd per 100sq.m	50%	3,311	0.55	$826,028
Boulevard Retail North	1,800	200 + 80vpd per 100sq.m	50%	820	0.177	$65,836
Boulevard Retail South	1,900	200 + 80vpd per 100sq.m	50%	860	0.177	$69,047
Beach Retail	2,000	200 + 80vpd per 100sq.m	50%	900	0.197	$80,423
Total						**$1,041,334**

The total development contribution by the subject applicant to the external road infrastructure is estimated as $2,640,728, based upon the ultimate development make up and yield adopted herein. It must be recognised that the applicant will seek to claim credits against the TRCP contribution as discussed in Section 5.1.

6.0 CONCLUSIONS

This report has been prepared to document the traffic related issues associated with the proposed Town Centre development within Casuarina. The site is located towards the northern end of Casuarina. The subject application is for concept plan approval hence individual details are subject to further consideration and applications. Nonetheless, for assessment herein, the development is to comprise a supermarket, mixed use developments (retail/commercial below with residential above), residential (low – medium density), resort, hotel, open space and car parking.

Public Car Parking

State agencies have considered that the appropriate provision of public car parking to satisfy the demand of beach goers in Casuarina is 300 public spaces per kilometre length of beach. It should be noted that for the Salt development to the immediate north of the site, a parking ratio of 200 public spaces per kilometre of beach frontage has previously been accepted. The development site has a beach frontage of approximately 538m hence 162 public car spaces are required (at 300 spaces/km). The proposal is to provide 170 public parking spaces within a 200m distance of the foreshore walkway/cycleway to ensure easy and convenient access to the beach. Such parking is to be provided via a combination of open public car parks in discrete areas adjacent to the foreshore, underground public car parks adjacent to the foreshore and kerbside parking in streets adjacent to the foreshore.

Parking requirements (both private and public) for each of the development components will be provided additional to this 170 space public parking provision. The former will be provided by a mix of on site and on street parking.

Disabled parking will be provided within the public parking areas and there will be easy access for disabled users to the foreshore (parkland and boardwalk) via vehicle turnaround areas at the end of each beach access road.

Pedestrian and Cycle Access

The proposed development will maintain the existing bikeway and pathway network along the foreshore. The existing pedestrian access points to the beach are to be retained and a new beach access path is also proposed. In addition, a network of pathways will be provided throughout the development site to ensure convenient pedestrian connections between the foreshore and the development components. Continuing with the seaside village and outdoor lifestyle theme of Casuarina, the street network will readily accommodate cycling on roadways.

Street Network

The proposed street network represents an appropriate design outcome achieving the following key objectives:

- connection of Casuarina Way to provide a collector route for local traffic within Casuarina. This route would accommodate public transport services through the Casuarina catchment;
- connection of the foreshore to Casuarina Way via a number of local streets and walkways;
- connection of Casuarina Way to Tweed Coast Road via The Boulevard (replacing the existing connection via Dianella Drive);
- provision of public car parking and public open space areas adjacent to the foreshore;
- provision of an esplanade road (approximately 200m long) adjacent to the foreshore;
- accessibility to, from and within the individual uses within the Town Centre;
- easy and convenient pedestrian and cycle access to/from the foreshore and within the Town Centre.

Based on preliminary lot yields and development land uses, it is estimated that by 2018 Casuarina Way (through the Town Centre) will carry approximately 14,000vpd immediately north of The Boulevard, approximately 14,000vpd immediately south of The Boulevard and the east-west connection to Tweed Coast Road (The Boulevard (west)) will carry approximately 15,400vpd. Traffic signals are required for the new intersections of The Boulevard/Casuarina Way and The Boulevard/Tweed Coast Road to operate efficiently and safely.

These volumes represent appropriate traffic volumes within an active and vibrant Main Street environment, as proposed for the Town Centre. Although these volumes can be accommodated by two lane roadways, it is recognised that some sections will be constructed with four lanes to allow better access to kerbside parking and to provide stand up lane capacity at intersections. The sections where four lanes will be necessary are as follows:

- new roadway (The Boulevard) between Tweed Coast Road and Casuarina Way;
- northern and southern legs at the intersection of Casuarina Way and The Boulevard.

From our analysis, there do not appear to be any inherent safety problems with the proposed street network. It is recommended that the Casuarina Way/The Boulevard intersection be signalised at the completion of Stage 1 of development when the four way intersection is created.

New Connection to Tweed Coast Road

The proposed street network will see the closure of Dianella Drive where it connects to Tweed Coast Road (at the northern end of the Town Centre). Dianella Drive will take on a local access role for the adjacent residential catchment, with a cul-de-sac just east of Tweed Coast Road.

To replace the existing role of Dianella Drive a new connection (The Boulevard) between Casuarina Way and Tweed Coast Road will be provided, intersecting with Tweed Coast Road some 80 - 100m south of the existing Dianella Drive intersection. This revision to the street network is an appropriate outcome as it introduces the opportunity for direct access into the Town Centre from Tweed Coast Road. It also provides increased traffic levels into the Town Centre to activate the streets. This is an important factor in the success of the Town Centre. The proposed arrangements retain the Casuarina masterplan policy of allowing only three traffic connection points to Tweed Coast Road.

There are no traffic safety deficiencies with the proposed location of the new intersection on Tweed Coast Road. Traffic signals will be provided at this intersection, as funded by Council's Tweed Road Contribution Policy (TRCP). It is recommended that signalisation occur as soon as the new intersection is created and the first stage of development is completed. RTA records indicate that two accidents have occurred at the existing intersection involving turning movements. Therefore turning movement safety at this intersection will be improved by signalisation and relocation away from a bend.

Treatment of Foreshore Interface

The area immediately adjacent to the foreshore (or coastal edge) is 7(f) zone running the full north-south length of Casuarina. The development proposal herein intends to retain the bulk of this zone as green open space with public pedestrian access. This provides a better environmental outcome for the 7(f) zone than the placement of a roadway (hard surface, vehicle traffic, parking) in the 7(f) zone. The exception to this is a section (approximately 200m) of esplanade commencing at the eastern end of the Main Street. This esplanade road is important to provide a circulation route and a point of arrival at the foreshore in this immediate location. It also provides an opportunity for pick up/set down of disabled users for direct access to the foreshore.

Previous versions of the master plan for this section of Casuarina proposed an esplanade roadway immediately adjacent to the foreshore, along the full length of the site. That proposed roadway was to be located in the 7(f) zone abutting this development and the dunal system. The latter roadway was not proposed to be continuous along the entire length of Casuarina. The current proposal is to reduce the length and significance of this esplanade, in line with community consultation results and sound planning (traffic, land use and amenity) principles. Road connections (with public car parking) will be provided at three locations along the foreshore. This arrangement is considered to be a far more appropriate outcome for the Town Centre for the following reasons:

- safety and convenience benefit - reduced need for pedestrians (from within the Town Centre) to cross a roadway (The Esplanade) to access the foreshore and parking spaces are located adjacent to the beach access pathways. The proposed public cap park locations present no discernable change to the walking distance (from car to beach and car to the main park) from what would have been possible under the full "esplanade" option ;
- environmental benefit - less chance of multiple informal tracks being created through the dune system to access the beach;
- amenity and environmental benefit - reduced traffic/environmental concerns (noise, adverse amenity, safety risk, odour, oil runoff) adjacent to the pedestrian/cycle foreshore environment and the 7(f) zone;
- safety and amenity benefit - reduced potential for "hooning" traffic in an unsupervised area during off peak times;
- amenity benefit - increased area of passive recreation between the dunes and the adjacent development.

It is noted that since the beach would not be directly visible from an esplanade road there is no "sight seeing" benefit provided by an esplanade road. The required provision of public car parking on site will be adequately achieved without the esplanade road.

Tweed Road Contribution Plan

The development contribution towards infrastructure funding has been assessed using the Tweed Road Contribution Plan in Section 5.0. The total contribution towards infrastructure funding has been indicatively estimated to be $2,640,728 for the total concept plan development. It must be recognised that this is an estimate based upon the ultimate development yields assumed herein and obviously will vary as individual applications are made.

For the project application, the TRCP contribution is estimated to be $573,146 since the project application only represents subdivision into a number of master lots (56) plus Stage 1 of the shopping centre site.

It is noted that whilst the TRCP estimate is provided herein, the applicant (Kings Beach No. 2 Pty Ltd) will make a claim for credits against the TRCP contributions on the basis that:

- the applicant has funded the constructed of the Tweed Coast Road which provides a material public benefit;
- the signalisation of the Tweed Coast Road/The Boulevard intersection is included within the funding contributions received under the TRCP.

Such a claim for credits is not included within this report.

Appendix A

Figures

Casuarina Beach Town Centre - Indicative Master Plan

JOB NO: 1992-02-B 26/02/2008 MP-01-04(D) **SCALE:** 1:2000 @ A3

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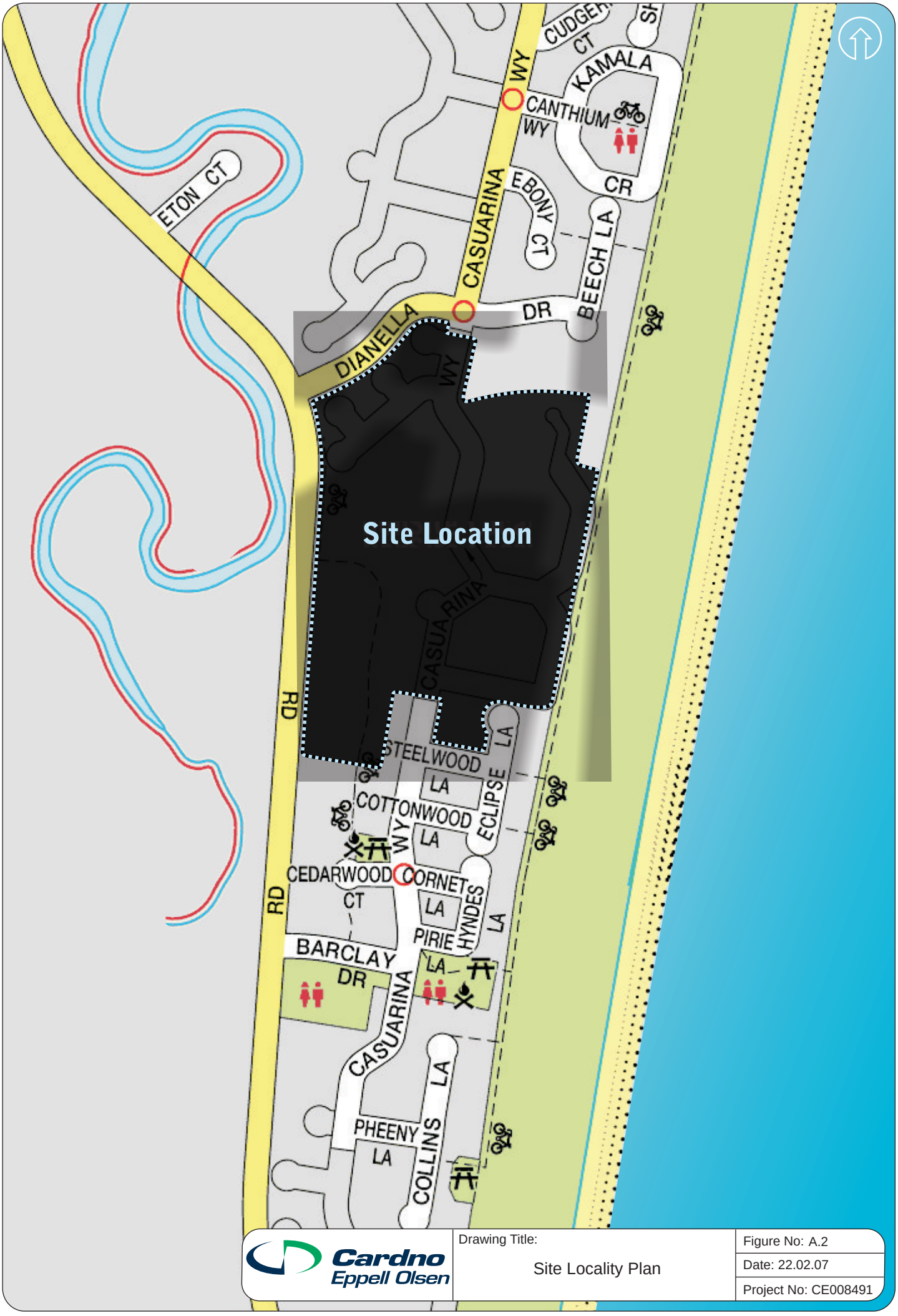
APPROVED FOR ISSUE: .....

Casuarina Beach

Consolidated Properties

ML Design
architects
planners
interior designers



Cardno Eppell Olsen

Drawing Title: Site Locality Plan

Figure No: A.2

Date: 22.02.07

Project No: CE008491

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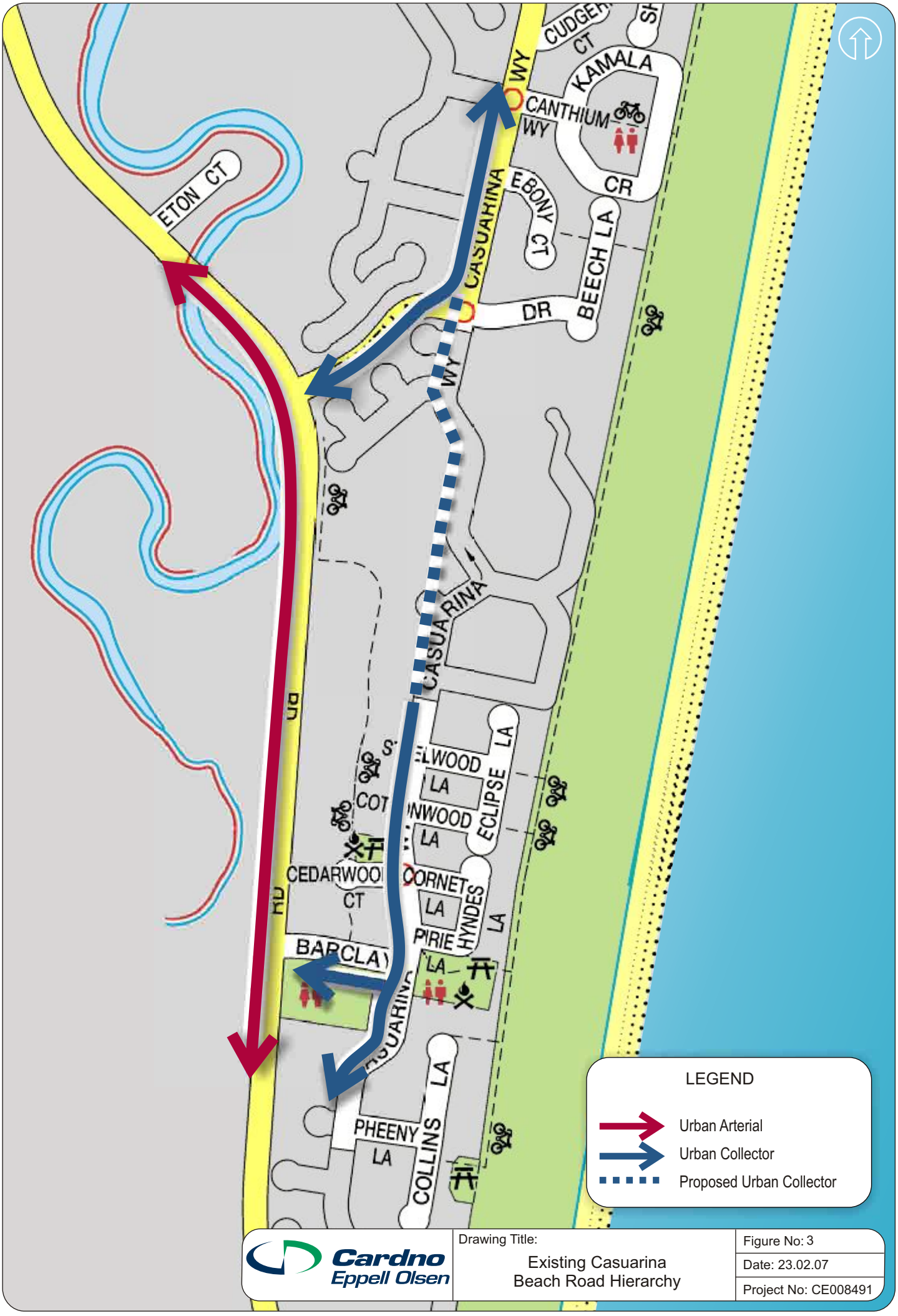

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Cardno Eppell Olsen

Drawing Title:

Zones of Proposed Developments in Casuarina

Figure No: 4

Date: 28.02.07

Project No: CE008491

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CONCEPT ONLY

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Client: CONSOLIDATED PROPERTIES		Sheet 1 of 1	Issue C
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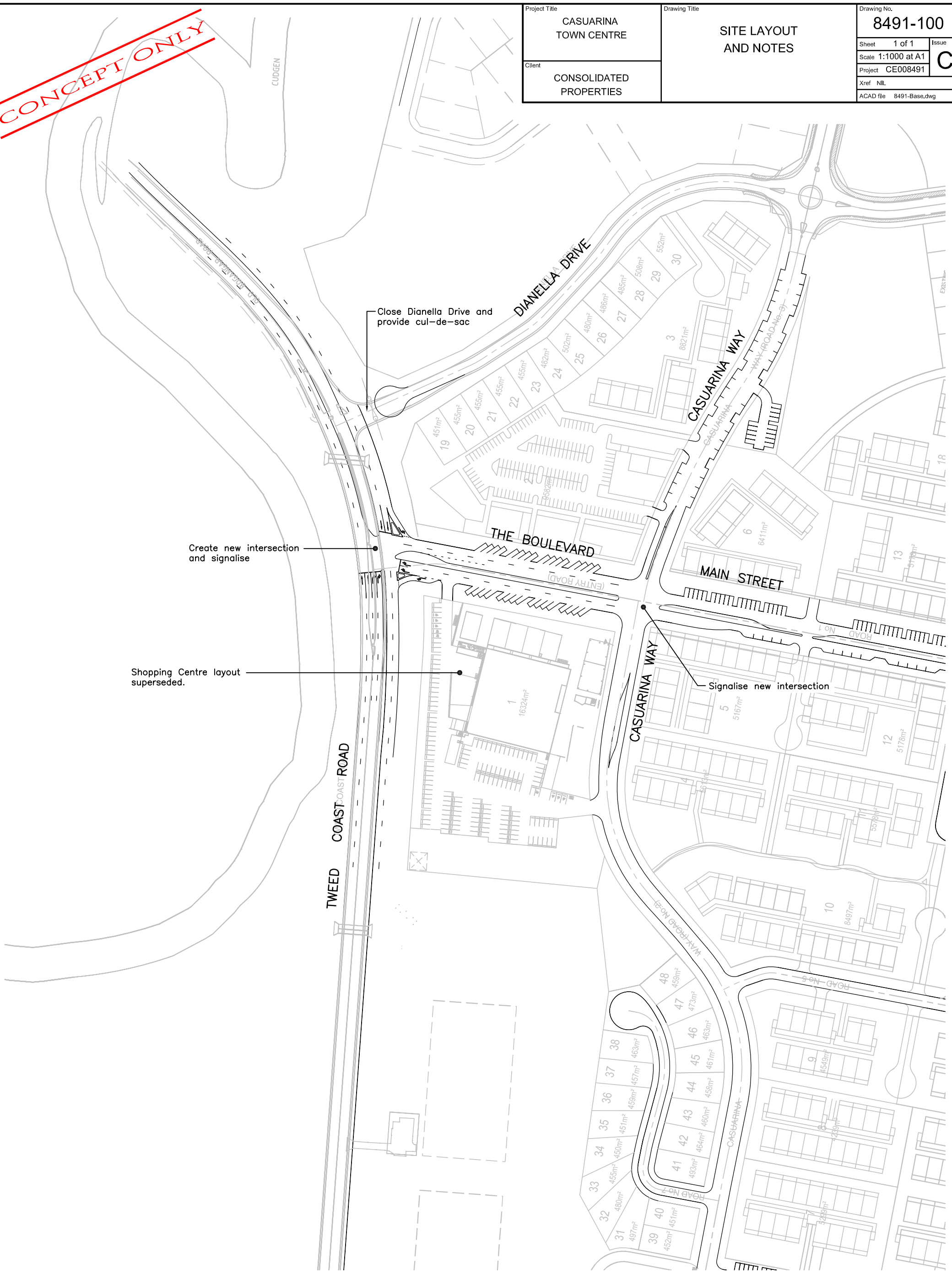

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Issue	Description	Date	By
A	ISSUE FOR COMMENT	31.08.07	AX
B	LAYOUT AMENDED	19.12.07	J.M.
C	BASE LAYOUT UPDATED	26.02.08	J.M.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

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SCALE 1 : 1000 @ A1 SCALE 1 : 2000 @ A3

North

Base Information Supplied By: NIL

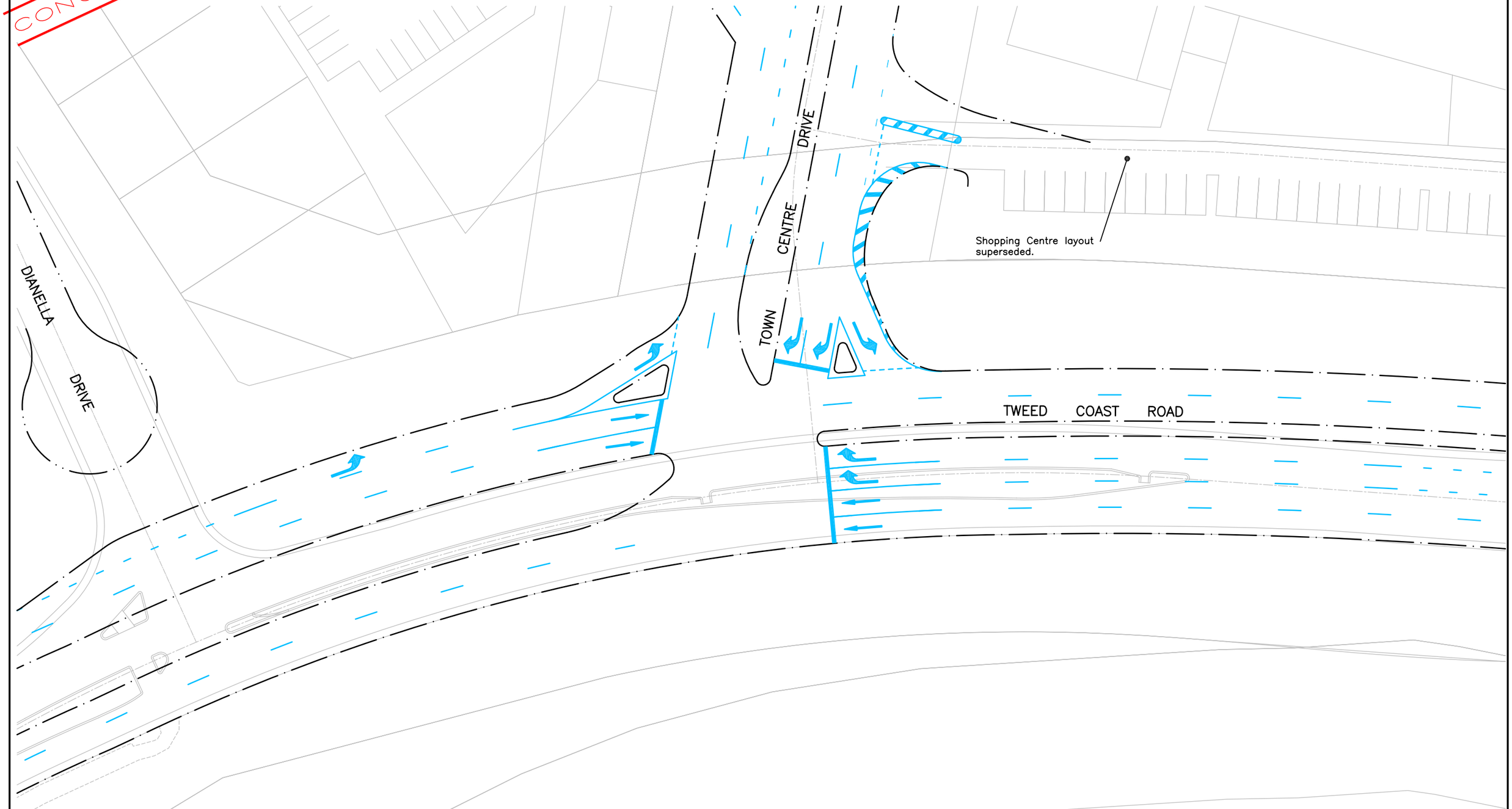
Design	Drawn	Checked
	AX	BM

Certified .....

RPEQ No. .....

CONCEPT ONLY

REFER TO DWG 8491–102 FOR CONTINUATION



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Issue	Description	Date	By
A	ISSUE FOR COMMENT	02.05.07	AX
B	TWEED COAST ROAD INTERSECTION AMENDED	10.07.07	AX
C	LAYOUT AMENDED	31.08.07	AX
D	LAYOUT AMENDED	19.12.07	J.M.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

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North

Base Information Supplied By: NIL

Design	Drawn	Checked
	AX	BM

Certified .....
RPEQ No. .....

Project Title: CASUARINA TOWN CENTRE

Client: CONSOLIDATED PROPERTIES

Drawing Title: TWEED COAST ROAD / TOWN CENTRE DRIVE INTERSECTION CONCEPT

Drawing No. 8491-101

Sheet 1 of 1 | Issue D
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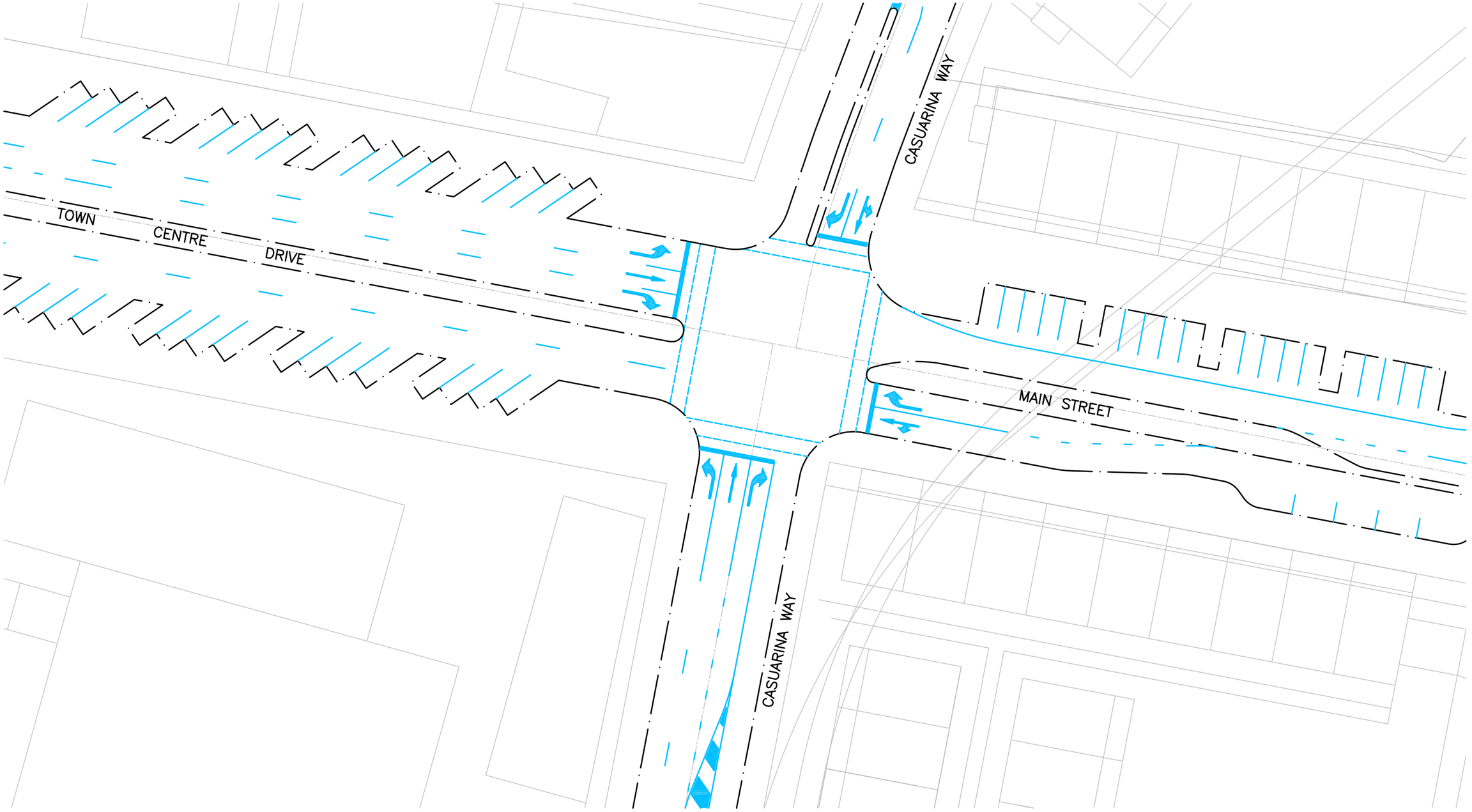
CONCEPT ONLY



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Issue	Description	Date	By
A	ISSUE FOR COMMENT	02.05.07	AX
B	LAYOUT AMENDED	31.08.07	AX

PRELIMINARY PRINT
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Base Information Supplied By: NIL

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Certified .....

RPEQ No. .....

Project Title: CASUARINA TOWN CENTRE

Client: CONSOLIDATED PROPERTIES

Drawing Title: CASUARINA WAY / TOWN CENTRE DRIVE INTERSECTION CONCEPT OPTION 1

Drawing No. 8491-102

Sheet 1 of 1 | Issue B

Scale 1:250 at A1

Project CE008491

Xref NIL

ACAD file 8491-Base.dwg

SITE PLAN/ROOF PLAN

N

DONOVAN HILL
FOR CONSOLIDATED PROPERTIES

ISSUE	DATE	
1.	20.07.07	DA SUBMISSION

CASUARINA BEACH

SCALE BAR 0 5 10 25

DRAWING NO	*DA02*
SCALE	*1:500@A3*
DATE	*20.07.07*

Cardno Eppell Olsen

Drawing Title:
Casuarina Beach
Proposed Road Hierarchy

Figure No: 9
Date: 26.02.2008
Project No: CE008491

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